NEW JERSEY TRAFFIC AND REVENUE STUDY

Garden State Parkway Asset Appraisal

Final Report

January 2008

Prepared for:

State of New Jersey
Department of Treasury
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GLOSSARY OF DEFINED TERMS:

- Annual Average Weekday Traffic (AADTw)
- Atlantic City Expressway (ACE)
- Annual Average Daily Traffic (AADT)
- CRA International (CRAI)
- EDR Group (EDRG)
- Electronic Toll Collection (ETC)
- Federal Highway Administration (FHWA)
- Garden State Parkway (GSP)
- Gross Domestic Product (GDP)
- Gross Regional Product (GRP)
- Level of Service (LOS)
- New Jersey Department of Transportation (NJDOT)
- New Jersey Highway Authority (NJHA)
- North Jersey Regional Model (NJTPA)
- New Jersey Turnpike (NJTP)
- New Jersey Turnpike Authority (NJTA)
- Origin-Destination (O-D)
- Rutgers State University of New Jersey's Economic Advisory Service (RECON)
- South Jersey Regional Model (SJTPO)
- South Jersey Transportation Authority (SJTA)
- U.S. Highway Capacity Manual (HCM)
- Vehicle Miles Traveled (VMT)
- Wilbur Smith and Associates (WSA)

DISCLAIMER

This report has been prepared for the State of New Jersey as an initial overview of issues relevant to traffic and revenue projections to assist in the preparation of the possibility of monetizing a number of the transport assets at present owned and operated by the State (or its agents). This report is intended to provide an overview of relevant issues and does not provide investment grade analysis.

The analysis and projections of traffic and revenue contained within this document represent the best estimates of Steer Davies Gleave at this stage. While the forecasts are not precise forecasts, they do represent, in our view, a reasonable expectation for the future, based on the information available as of the date of this report.

However, the estimates contained within this document rely on numerous assumptions and judgments and are influenced by external circumstances that are subject to changes that may materially affect the conclusions drawn.

In addition, the view and projections contained within this report rely on data collected by third parties. Steer Davies Gleave has conducted independent checks of this data where possible, but does not guarantee the accuracy of this data.

No parties other than the State of New Jersey can place reliance on it.

1. INTRODUCTION

Statement of Objectives

1.1 The State of New Jersey is considering the possibility of monetizing a number of the transport assets at present owned and operated by the State or certain authorities in, but not of, the State. These include the New Jersey Turnpike (NJTP), the Atlantic City Expressway (ACE), the Garden State Parkway (GSP) and Route 440 (between the NJTP and the Outer Bridge Crossing).

1.2 The State has appointed a financial advisor to help it understand how such a process might be carried out – and it has appointed Steer Davies Gleave, together with CRA International (CRAI) and the EDR Group (EDRG), as traffic and revenue advisors. Our brief is to provide assistance in the estimation of the traffic that might be carried on the assets, and the toll revenue that might be generated.

1.3 Our overall work for this assignment consisted of two phases:

- Phase 1: Scoping; and
- Phase 2: Asset by Asset Appraisal of Future Traffic and Revenue streams.

1.4 The objective of the Phase 1 work was to prepare an initial review of the likely levels of traffic and revenue on the target roads across the likely duration of the forecast period. This work comprised the collection and collation of existing traffic data for each road, an initial review of the key drivers of future traffic growth and a literature review of elasticity parameters (a key determinant of traffic responsiveness to changes in tolls).

1.5 In Phase 2 work we have built on the analysis carried out for Phase 1 and developed a modeling framework that can explore the base assignment to the target facility under a range of scenarios – and for different traffic types. It has been built to allow sensitivity testing of a range of factors including values of time – and allows for rapid testing of different tolling scenarios. We have adopted a number of existing modeling tools to act as focused network models and have developed separate spreadsheet based revenue models to focus on the important traffic categories and the choices that road users would face.

Approach and Analysis Undertaken

1.6 In conjunction with our partners at CRAI and EDRG, we have undertaken the following key tasks as part of both work phases:

- Developed an overview of traffic and revenue on the road assets to understand the composition of traffic volumes by time of day and location;
- Reviewed the key economic issues and the likely impact on traffic of estimated growth in key economic parameters;
- Developed a modeling framework to explore the base assignment to the target facility under a range of scenarios – and for different traffic types;

- Undertaken a number of travel time surveys to assist in the model validation process, in particular to check that modeled travel times are representative of observed journey times;
- Undertaken an internet based attitudinal surveys with New Jersey residents to support our forecasting assumptions; and
- Reviewed relevant North American 'price elasticity of demand' studies to assess the likely impact of toll changes on traffic volumes.

1.7 In carrying out this work we reviewed and relied on third party reports and data without independent verification. However, in most instances we used recent data collected by recognized experts or firms with nationally recognized credentials.

Report Contents

1.8 The purpose of this document is to present our traffic and revenue forecasts for the GSP and to provide an overview of the key assumptions made as part of the process to develop these forecasts. A separate report describes the background to our work and methodology in more detail.

1.9 This document is structured as follows:

- Chapter 2 provides an overview of the GSP and presents 2006 traffic and revenues;
- Chapter 3 presents an overview of our forecasting methodology, discusses key forecasting issues and summarizes key forecasting assumptions;
- Chapter 4 discusses how future traffic growth rates have been derived and defined; and
- Chapter 5 presents traffic and revenue forecasts for the facilities.

2. THE GARDEN STATE PARKWAY

Project Overview

2.1 As shown in Figure 2.1, the GSP is a 173 mile long toll road stretching along the New Jersey shoreline from Cape May in the South to Chestnut Ridge in the North, where it connects into the New York State Thruway. The GSP opened in 1954 and after having been operated by the New Jersey Highway Authority (NJHA), it was transferred to the New Jersey Turnpike Authority (NJTA) in July 2003.

2.2 The GSP serves as a primary link along the coast, serving seashore recreational areas and the Newark/New York metropolitan area. The northern half of the GSP runs through heavily populated, metropolitan areas and mainly serves as a commuter link into the Newark region. Most of the southern half runs through the New Jersey Pine Barrens. This part predominantly serves beach resorts and leisure facilities in Atlantic City.

2.3 Heavy Trucks (registered 7,000 lbs. or more) are prohibited north of Exit 105.

FIGURE 2.1 GSP LOCATION

2.4 The GSP interacts with most major highway routes throughout New Jersey, including:

- ACE (Exit 38 and 38A)
- I-195, providing access to Belmar and Trenton (Exit 98)
- US 9/NJ 440, providing access to Woodbridge and Staten Island (Exit 127)
- New Jersey Turnpike (Exit 129)
- I-78/NJTP, providing access to Newark Airport and the west, (Exit 142)
- I-280, providing access to Newark and the west (Exit 145)
- I-80, providing access to George Washington Bridge and the west (Exit 159)

2.5 The GSP is both a commuter road and a link to leisure facilities.

2.6 The northern end of the road is a functional commuter highway, serving users into the New York area and running through densely populated urban and suburban areas.

2.7 South of the Raritan River, the GSP serves more rural regions, following the shoreline with its beach resorts and casinos, from Monmouth to Cape May counties.

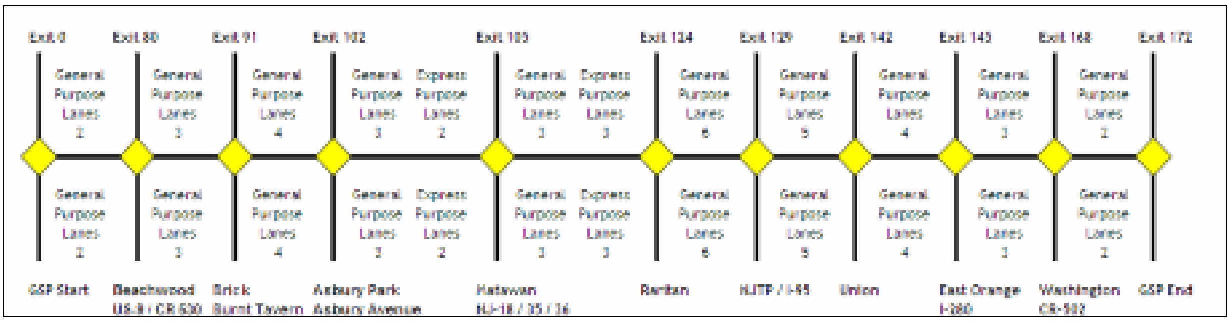
2.8 Because trucks are not permitted along its entire length, commercial through traffic is not significant.

Road Configuration

2.9 The GSP is a grade-separated limited access roadway with a speed limit of 65 mph from milepost 27 north to milepost 123, and from milepost 163 north to the New Jersey-New York border. Elsewhere, the maximum posted speed limit is 55 mph (with the exception of the Driscoll Bridge, where the posted speed limit is 45 mph).

2.10 A schematic summary of the lane geometry of the GSP is shown in Figure 2.2.

FIGURE 2.2 GSP - LANE GEOMETRY



- South of Exit 80, the GSP operates as a 4-lane (2 lanes per direction) facility.
- Between Exits 80 and 129, the GSP gradually goes from 3 lanes (2 lanes per direction) to 12 lanes (6 lanes per direction).

- Between the Asbury Park and Raritan toll barriers, the GSP splits into express and local lanes (in this section there are 10 to 12 lanes). The express lanes have access to no exits, except for Exit 105 and Exit 117.
- Between Exits 129 and 172, the number of lanes on the GSP gradually decreases from 10 (5 lanes per direction) to 4 (2 lanes per direction) until the northern extremity of the road.

Competing Routes

2.11 A number of competing routes exist along the length of the GSP. In the North (Exit 172 to Exit 127) it competes with the I-287 and NJTP.

2.12 At the southern end, the I-287 connects into the GSP as Route 440 at Exit 10 of the NJTP and extends westwards to Pluckemin, from where it extends northwards, parallel to the GSP, while bypassing the New York/Northern New Jersey Metropolitan areas. At its northern end, it connects with the New York State Thruway. The route offers an un-tolled alternative to the GSP for journeys to and from the New York/Northern New Jersey Metropolitan area and upstate New York or further north along the eastern seaboard.

2.13 The NJTP offers an alternative for through journeys from New York State to central New Jersey. It also offers users an alternative for all or at least the southern portion of trips from central New Jersey to more northerly areas such as Newark. Users may choose the NJTP as it may provide a quicker journey although, albeit at a higher price for some trips in the Central to Northern sections.

2.14 The I-287 and NJTP are shown in Figure 2.3 below.

FIGURE 2.3 GSP - COMPETING ROUTES: NORTHERN SECTION

Southern and Central Sections (Exit 125 to Exit 0)

2.15 As shown in Figure 2.4, in the South, US-9 competes with the GSP for short distance journeys. US-9 is a free road that extends along the seashore from Cape May to Toms River. The route has a 50 mph speed limit but does suffer from considerable peak-hour congestion and is regulated by traffic lights. With reported average traffic speeds of 40 mph on average during the Off-Peak period compared to observed traffic speeds on the GSP of 65 mph in the same period this is only likely to be a realistic alternative for local trips.

FIGURE 2.4 GSP - COMPETING ROUTES: SOUTHERN AND CENTAL SECTIONS

2.16 Table 2.1 summarizes the competing routes showing lane geometry, speed limits and observed speeds for the roads competing with the GSP.

TABLE 2.1 GSP - COMPETING ROUTES AND FACILITIES

Section	Route	Lane Geometry	Speed Limit (mph)
Northern Section	NJTP	3x3/4x4	65
	I-287	3x3	55-65
Central Section	NJTP	3x3	65
	US-9	1x1-3x3	50
Southern Section	US-9	1x1	50

Planned Infrastructure Improvements

2.17 It is planned to widen the GSP from Exits 63 to 80 in Ocean County by 2009. A 12-foot-wide third lane will be added in each direction of travel along with 12-foot-wide shoulders. This project is to be completed by 2009.

2.18 There are existing plans by the NJTA to add a third lane in each direction to the GSP between Exits 30 and 48 before 2015, although this has not been officially scheduled. Longer term plans of the NJTA include the widening of the GSP from Mileposts 140 to 155.

2.19 Figure 2.5 presents future improvements on the main roads in New Jersey.

FIGURE 2.5 FUTURE IMPROVEMENTS IN NEW JERSEY

Tolling Regime

2.20 The GSP operates as an 'open system' whereby users pay tolls at regular intervals along the length of the road and at certain exits. On some short distance sections, vehicles can use the road without paying tolls. Maps showing the location of toll barriers and ramps are included in Appendix A.

2.21 Historically, tolls were collected in both directions at all barriers. In order to reduce the congestion associated with toll collection, an initiative was undertaken to convert eight toll barriers to one-way toll collection. At these toll plazas, a single 70-cent toll is now collected in only one direction with the other direction free, whereas previously a 35-cent toll was collected in each direction.

2.22 For consecutive one-way barriers, tolls are collected in alternating directions to limit the incentive for selecting alternative routes. The following toll plazas were made one-way: Cape May, Great Egg, New Gretna, Asbury Park, Raritan, Union, Essex, and Bergen. In March 2007, Barnegat was converted to one-way. As of March 2007, the remaining two-way barriers (Hillsdale/Pascack Valley and Toms River) are not scheduled to be converted to one-way tolling.

2.23 Tolls are charged differentially according to vehicle size with the toll classifications based on the number of axles, with passenger cars, 2-axle, 3-axle, 4-axle, 5-axle and 6-axle trucks making up Classes 1-6 respectively.

TABLE 2.2 GSP - 2006 TOLLS FOR SELECTED KEY MOVEMENTS (CLASS 1, CASH PAYMENT)

	Exit 0	Exit 38	Exit 129	Exit 142	Exit 172
Exit 0 (South Termini)		$0.70	$2.80	$2.80	$4.55
Exit 38 (Atlantic City)	$0.70		$2.10	$2.10	$3.85
Exit 129 (NJTP)	$2.10	$1.40		$0.00	$1.75
Exit 142 (NJTP)	$2.10	$1.40	$0.00		$1.75
Exit 172 (North Termini)	$3.15	$2.45	$1.05	$1.05	

Source: NJTA

2.24 As mentioned, heavy vehicles are charged more, according to the number of axles per vehicle, with toll rates varying by a factor of 2.6. With a cost-per-mile rate of approximately $0.02 per mile, the GSP is currently the least costly toll road in the United States.

TABLE 2.3 GSP - 2006 AVERAGE TOLL PER VEHICLE MILE, US AVERAGE AND MINIMUM

Vehicle Type	GSP Average Toll ($/Mile)	US Average Toll ($/Mile)	US Maximum Toll ($/Mile)
Cars	0.02	0.09	1.00
Trucks	0.06	0.22	1.75

Source: NJTA / SDG Analysis

2.25 Since 1999, the NJTA has operated an Electronic Toll Collection (ETC) system called E-ZPass. E-ZPass allows vehicles equipped with a compact E-ZPass tag mounted on the windshield the ability to drive through designated toll lanes without the need to stop and manually pay a toll. Currently E-ZPass users have dedicated lanes prohibited to cash payment but work is underway to incorporate the E-ZPass technology into all toll lanes so that E-ZPass users are not just restricted to the designated lanes.

2.26 Currently, users of the E-ZPass system on the GSP only benefit from reduced delays through the toll plazas and do not receive any toll discount.

2006 Transactions and Revenue Levels

2.27 Vollmer Associates LLP has worked for many years for the NJTA, monitoring the development of traffic and revenue. From their work (which has been provided to us as part of this study) we have a significant volume of past and present data on the road. Furthermore the NJTA has provided us directly with up-to-date 2006 Transaction and Revenue Data for the GSP – this has given us a good understanding of the characteristics of traffic using the GSP.

2.28 Based on transaction data supplied by the NJTA and our own analysis of the characteristics of the road, we have established an overview of the following:

- General transaction volumes and characteristics;
- Transactions and revenue by vehicle type;
- Time of day transactions profiles;
- Analysis and observations of traffic patterns on different sections of each road; and
- Capacity constraints.

2.29 Data from the NJTPA and SJTPO and New Jersey State-wide model enabled us to establish traffic composition by vehicle type and also enabled us to build up a picture of trip purposes on the GSP.

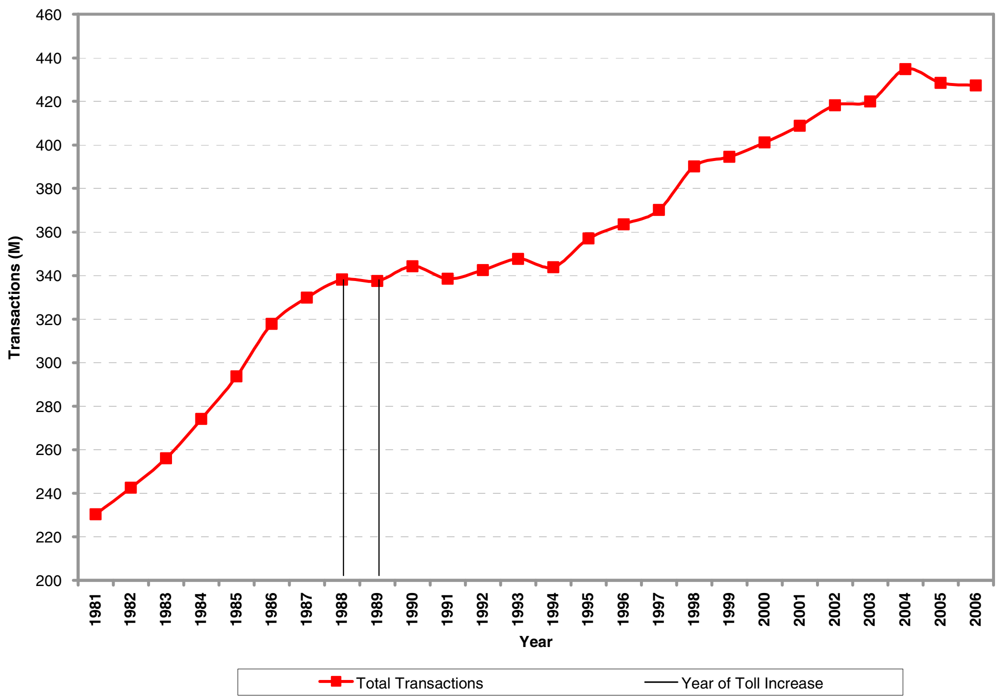
2.30 Because the GSP operates as an 'open system', only the total number of transactions at each barrier and ramp toll plazas is recorded. The number of vehicles using the entire GSP (vehicle-miles) is not collected. The following analysis is therefore based on transaction data provided by the NJTA.

2006 Toll Transactions

2.31 In 2006 there were over 417 million toll transactions on the GSP, this is equivalent to just over 1.1 million transactions per day on average. Cars accounted for 98% of transactions, whereas trucks and buses accounted for the remaining 2%. Figure 2.6 shows the number of GSP toll transactions for the period 1981-2006.

2.32 Overall, the number of transactions grew at 2.41% per annum for the period 1981-2006 but was only 1.43% for the period 1995-2006. The number of transactions grew relatively strongly during the 1980s (4.9% growth per annum). In May 1988 the Class 1 toll rate was increased to 25 cents at most ramp plazas. Consecutively, in April 1989, Class 1 toll rates at barriers and certain ramps increased to 35 cents. Although there was relatively flat growth in transactions in the years immediately after these toll increases, growth resumed at a rate of 1.8% per annum in the period from 1996 until 2004. The recent decrease in the number of transactions is not due to a decrease in traffic levels, but due to the conversion of the main toll barriers to one-way tolling from September 2004 onwards, effectively halving the number of transactions at these locations.

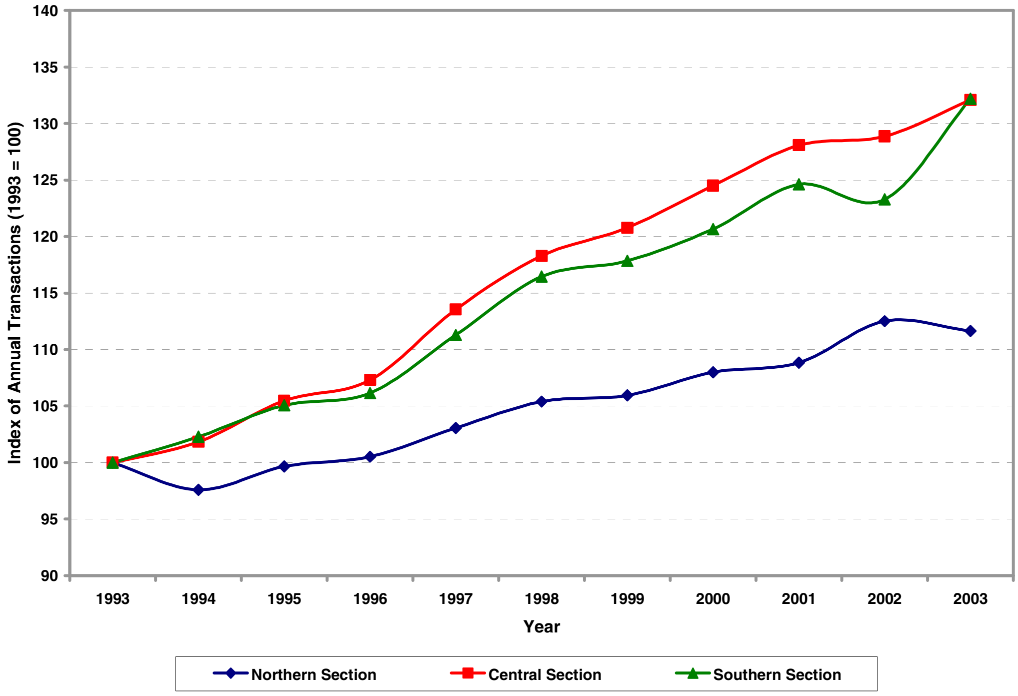
FIGURE 2.6 GSP – ANNUAL TRANSACTIONS AND REVENUE (NOMINAL): 1981-2006



Source: NJTA / SDG Analysis

2.33 Figure 2.7 overleaf presents the development of transactions by section of road between 1993 and 2003.

FIGURE 2.7 GSP – TRANSACTION GROWTH INDEX: 1993-2003 (1993 = 100)



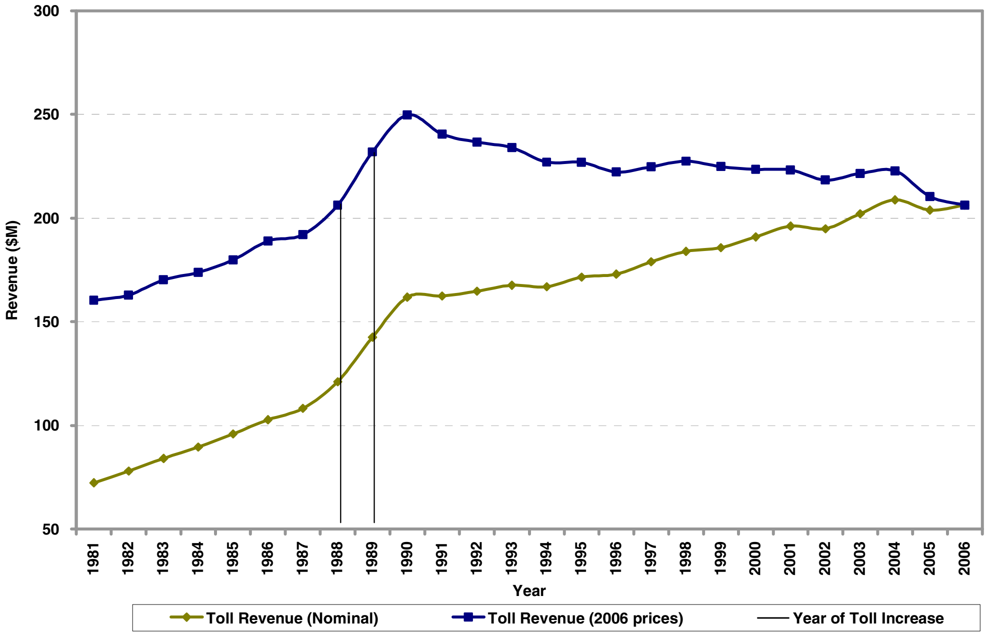
Source: Vollmer / SDG Analysis

2.34 While the northern section of the GSP grew at 1.1% per annum on average between 1993 and 2003, over the same period, the central and southern sections have grown at 2.82% and 2.83% per annum, respectively. The recent urban expansion around the GSP in Monmouth and Ocean Counties as well the development of casinos in Atlantic City explain the higher growth in the central and southern sections.

Toll Revenue

2.35 2006 toll revenue for the GSP totaled $206 million. Cars accounted for over 96% of revenues collected. GSP toll revenue has grown rapidly since opening. Figure 2.8 shows toll revenue in nominal and 2006 prices for the period 1981-2006. As can be seen, toll revenue has grown from just under $72 million in 1981 to $206 million in 2006, an annual average growth of almost 4.3% per annum. In recent years, growth has been slowing down, at 1.69% per annum on average for the period 1995-2006. Figure 2.8 also shows that real annual toll revenue has actually grown at just 1.0% per year since 1981, while between 2001 and 2006 annual growth has been negative.

FIGURE 2.8 GSP – TOLL REVENUE: 1981 – 2006 (NOMINAL AND 2006 PRICES):

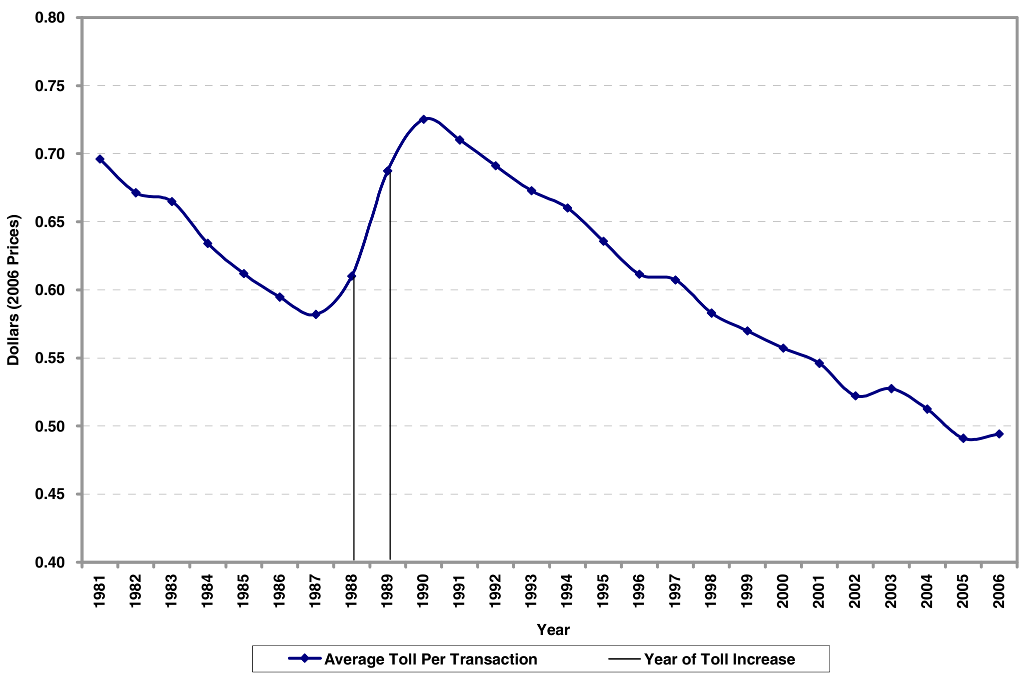


Source: NJTA / SDG Analysis

2.36 Toll increases in the early 1990s contributed to the 'surge' in revenue. When tolls were increased, diversion of traffic away from the GSP was limited, resulting in a net increase in revenue on a per transaction basis. While it is clear that there was a relatively inelastic response, it is equally apparent that GSP tolls have increased at a rate considerably below inflation since 1989/90. As a result, the cost of using the GSP has actually fallen in real terms since 1990.

2.37 Figure 2.9 shows that the average real toll paid by GSP users has fallen from $0.70 in 1981 to just $0.49 in 2006, when tolls are expressed with a 2006 price base. In 2001, a discount was introduced for E-ZPass holders, further lowering the average yield. This discount was abolished in November 2002 and E-ZPass holders now pay the same toll rates as those paying by cash.

FIGURE 2.9 GSP - AVERAGE TOLL PER TRANSACTION: 1981-2006 (2006 PRICES)



Source: NJTA / SDG Analysis

Transactions and Revenue by Vehicle Type

2.38 Table 2.4 shows the 2006 monthly revenue by vehicle type. It can be seen that the proportional split is relatively stable throughout the year.

TABLE 2.4 GSP - 2006 REVENUE BY VEHICLE TYPE ($M)

Month	Cars	Trucks	Buses	Total	%Car
January	14.10	0.33	0.24	14.67	96%
February	12.99	0.31	0.22	13.52	96%
March	15.45	0.40	0.27	16.13	96%
April	15.35	0.39	0.26	16.00	96%
May	17.12	0.48	0.31	17.91	96%
June	17.81	0.49	0.29	18.59	96%
July	19.34	0.46	0.27	20.08	96%
August	19.70	0.49	0.27	20.47	96%
September	16.99	0.43	0.27	17.68	96%
October	16.92	0.44	0.28	17.64	96%
November	16.02	0.41	0.25	16.67	96%
December	16.27	0.38	0.23	16.87	96%
TOTAL	198.06	5.01	3.16	206.23	96%

Source: NJTA / SDG Analysis

Transactions and Revenue by Location

2.39 Table 2.5 shows the 2006 revenue broken down by location and type of toll facility. It can be seen that the northern section of the GSP generates around 47%, closely followed by the central section, generating 40% of revenue. The southern end of the GSP only accounts for 13% of total revenue collected.

2.40 The majority of revenue is collected at one of the mainline toll plazas. Only 22% of revenue is collected at the ramp plazas. Two thirds of total revenue is generated by the following seven toll barriers: Raritan, Union, Asbury Park, Essex, Bergen, Toms River and Hillsdale.

TABLE 2.5 GSP - BREAKDOWN OF 2006 REVENUE BY SECTION AND TOLL FACILITY

Section	Barrier	Ramp	Total
North	35.8%	11.1%	46.9%
Central	29.9%	10.1%	40.0%
South	12.1%	1.0%	13.1%
TOTAL	77.8%	22.2%	100%

Source: NJTA / SDG Analysis

2.41 In 2006, annual transactions on the GSP were highest in the northern and central sections which experienced 198 and 175 million transactions. In contrast, the southern section only generated 45 million transactions, representing 11% of total transactions on the GSP.

2.42 As expected, a high proportion, 88%, of total toll revenue is generated by the northern and central sections as shown in Table 2.6.

TABLE 2.6 GSP - 2006 ANNUAL TRANSACTIONS AND REVENUE BY SECTION

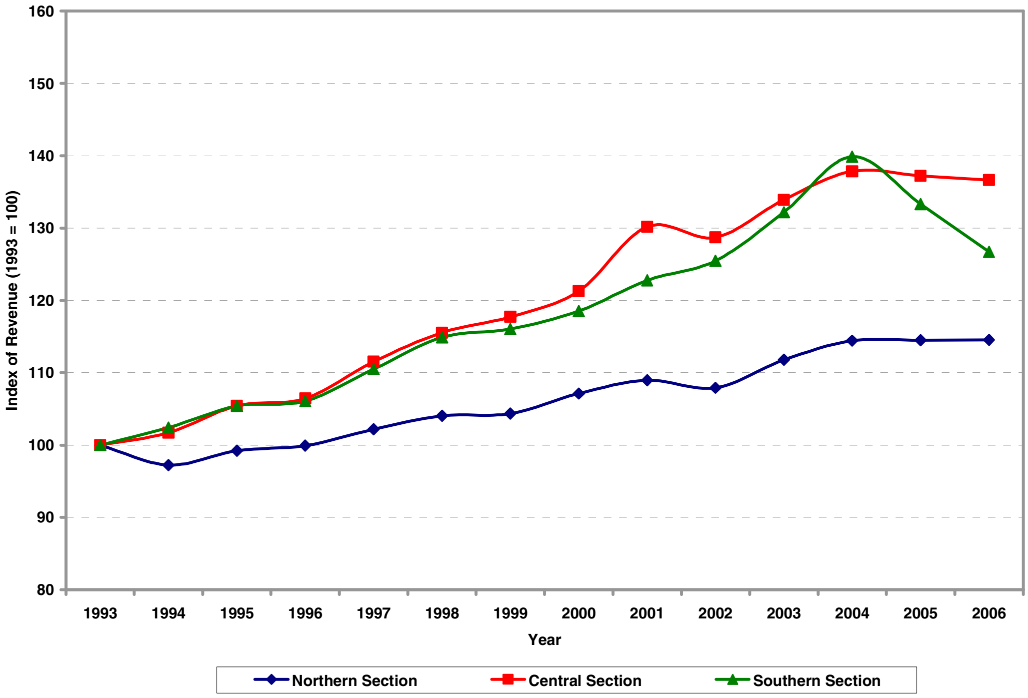
Section	Transactions (M)	% of Total	Revenue ($M)	% of Total	Yield ($ per transaction)
North	197.6	47.3%	98.0	47.6%	0.50
Central	174.8	41.9%	83.5	40.5%	0.48
South	44.9	10.8%	25.7	12.5%	0.55
TOTAL	417.4	100%	206	100%	0.49

Source: NJTA / SDG Analysis

2.43 Revenue has not grown uniformly across the length of the GSP. Figure 2.10 shows indexed revenue growth between 1993 and 2006 by section of road. At the northern end, revenue grew least and slowest by 1.1% per annum, while on the central and southern sections it grew 2.4% and 1.8% per annum, respectively. The southern end displays a drop in revenue since 2005 (-4.9% per annum).

2.44 However, revenue from the southern section is four times lower than that of the other section. This drop may in part be explained by the rise in oil prices and by the fact that all toll barriers in the southern section were made one-way in 2006, implying that the rise in the one-directional toll diverted some non-captive traffic away from the GSP.

FIGURE 2.10 GSP - REVENUE GROWTH INDEX BY SECTION: 1993-2004 (1993 = 100)



Source: Vollmer / NJTA / SDG Analysis

Revenue by Payment Method

2.45 Table 2.7 shows the breakdown of revenue by month and payment method. It can be seen that E-ZPass payments dominate, accounting for around 65% of payments on average. The proportion of E-ZPass payments drops in the summer when a higher proportion of infrequent seasonal traffic uses the road. Violations, which occur when the correct toll is not paid at the plaza, are constant throughout the year. Approximately 74% of violations revenue is recovered on average.

TABLE 2.7 GSP - 2006 REVENUE ($M) BY MONTH AND PAYMENT METHOD

Month	E-ZPass	Cash	Violations	Total	% E-ZPass
January	9.9	3.6	1.2	14.7	68%
February	9.2	3.2	1.1	13.5	68%
March	10.9	4.0	1.3	16.1	67%
April	10.6	4.1	1.3	16.0	66%
May	11.6	4.8	1.5	17.9	65%
June	11.7	5.3	1.6	18.60	63%
July	12.4	6.0	1.8	20.1	62%
August	12.9	5.9	1.7	20.5	63%
September	11.2	5.0	1.4	17.7	64%
October	11.4	4.9	1.4	17.6	64%
November	10.8	4.6	1.3	16.7	65%
December	10.9	4.7	1.3	16.9	64%
TOTAL	133.4	56.0	16.9	206.2	65%

Source: NJTA / SDG Analysis

Seasonal Traffic Profiles

2.46 Figure 2.11 below shows the monthly profile of transactions volumes for three toll barriers on the GSP.

Northern Section

2.47 At Union toll barrier, located in the Northern section of the GSP, the transactions profile is relatively flat with equal volumes of transactions throughout the year (around 8%).

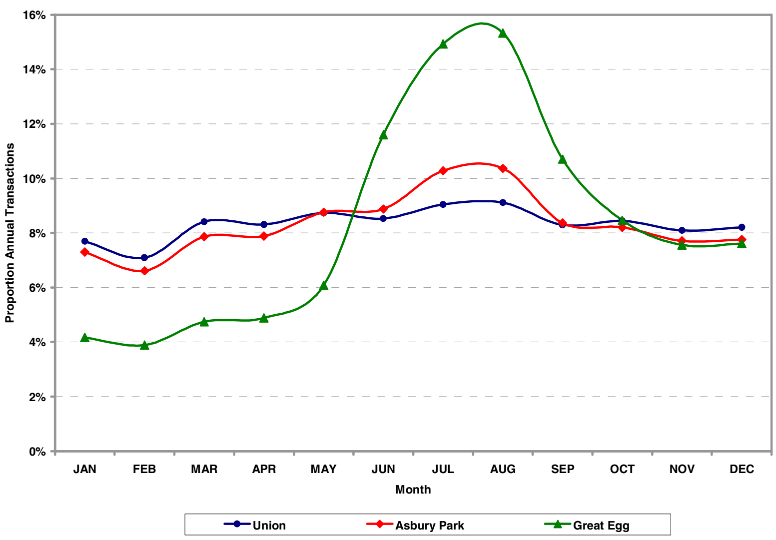
Central Section

2.48 The Central section, represented by Asbury Park toll barrier, sees a small peak of summer transactions with the months of July and August seeing higher than average transactions volumes (around 10% of total transactions for the year are generated in these months). The seasonality profiles imply that there are high proportions of regular users in both the Northern and Central sections.

Southern Section

2.49 At Great Egg toll barrier, located in the Southern section of the GSP, the seasonal nature of the GSP is apparent. The peak in the number of transactions occurs between June and September, during which more than half of total annual transactions are generated. The winter months, see a drop in the number of transactions – with only 4% of transactions generated in January. The Southern section of the GSP is thus mostly used for recreational as opposed to work related purposes.

FIGURE 2.11 GSP - MONTHLY PROFILE OF 2006 TRANSACTIONS VOLUMES



Source: NJTA / SDG Analysis

Daily Transactions Profile

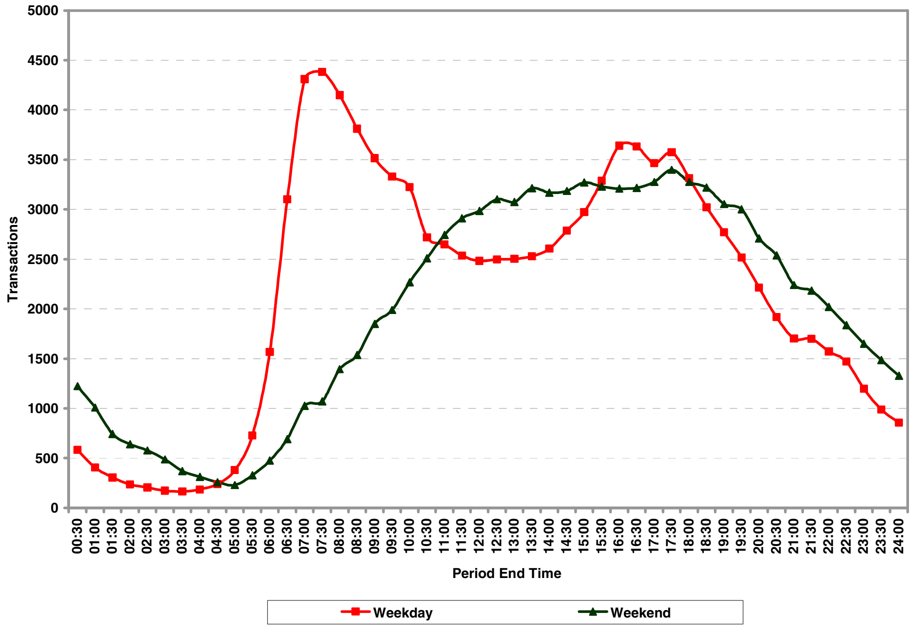
2.50 We have analyzed daily traffic profiles for typical weekday and weekend days in October 2006 at main barriers along the GSP.

Northern Section

2.51 Figure 2.12 presents the daily profiles for the northbound-paying toll plaza, Union barrier. The weekday AM peak period indicates commuters traveling from southern New Jersey to the Newark area. The PM peak period, less pronounced, shows that commuters also travel in the opposite direction, albeit to a lesser extent.

2.52 The weekend transactions profile displays a smooth trend, with the peak period extending from 12:00 to 20:00.

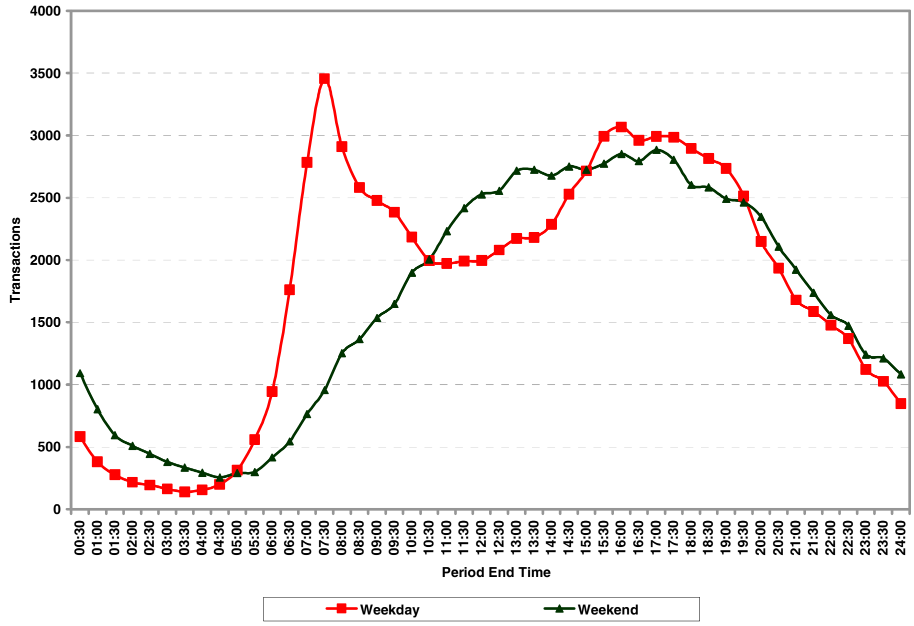
FIGURE 2.12 GSP - UNION TOLL BARRIER WEEKDAY AND WEEKEND DAILY PROFILE (NORTHBOUND)



Source: NJTA / SDG Analysis

2.53 At the southbound-paying Essex toll barrier, the AM peak period is highly concentrated from 7:00 to 7:30 AM, as illustrated in Figure 2.13. Commuters travel from northern New Jersey to Newark/New York metropolitan area through this toll barrier. The PM peak period shows evidence of commuting in the opposite direction as well.

FIGURE 2.13 GSP - ESSEX TOLL BARRIER WEEKDAY AND WEEKEND DAILY PROFILE (SOUTHBOUND)

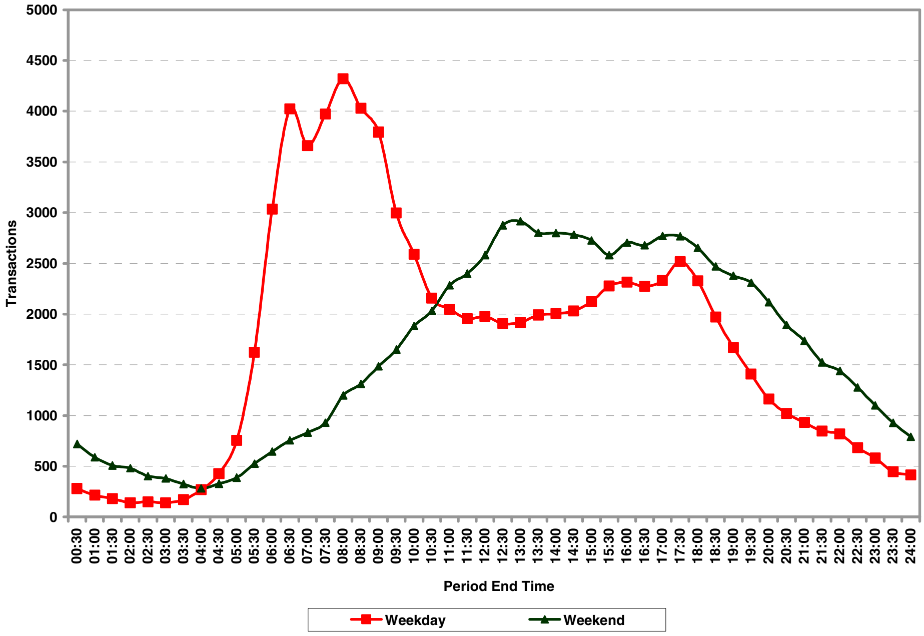


Source: NJTA / SDG Analysis

Central Section

2.54 Figure 2.14 presents the daily profiles for the northbound-paying Asbury Park toll barrier, located in the predominantly residential county of Monmouth. The week transaction profile provides a clear peak in the AM period. Starting at 5:30AM and extending until 9:30AM, the peak represents commuters traveling northbound from the southern part of New Jersey. The relatively small peak in the PM period implies that there is little commuting in the opposite direction.

FIGURE 2.14 GSP - ASBURY PARK TOLL BARRIER WEEKDAY AND WEEKEND DAILY PROFILE (NORTHBOUND)

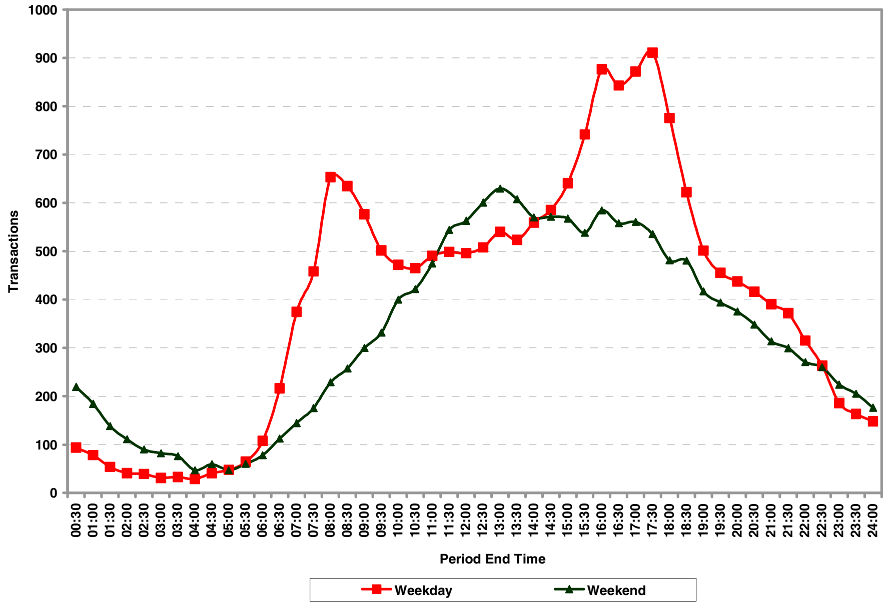


Source: NJTA / SDG Analysis

Southern Section

2.55 Transactions volumes experienced at Great Egg toll barrier, in southern New Jersey, are significantly lower than those in the central and northern sections, as illustrated in Figure 2.15. Tolls are only paid by traffic traveling southbound at this barrier toll plaza. During the average weekday, the main peak occurs in the afternoon, indicating that most commuting traffic travels north to reach their work destination in the Atlantic City area. Fewer commuters travel in the opposite direction, as is shown by the relatively less significant peak in the AM peak period.

FIGURE 2.15 GSP - GREAT EGG TOLL BARRIER WEEKDAY AND WEEKEND DAILY PROFILE (SOUTHBOUND)



Source: NJTA / SDG Analysis

GSP Traffic Patterns

2.56 The New Jersey Department of Transportation (NJDOT) State-wide traffic forecasting model was used to examine patterns of traffic movements for traffic using the GSP. A Select Link Analysis was undertaken to examine movements to and from the northern, central and southern sections of the GSP. The results of this analysis are presented below.

Northern Section

2.57 The northern section of the road, located between Pascack Valley and Union toll barriers, displays high volumes of traffic traveling within northern New Jersey counties. Figure 2.16 shows that at these toll barriers, local traffic accounts for approximately 90% of total traffic. This implies that most commuting stays within northern New Jersey and no significant flows travel into New York (only 2% of total traffic travels to and from New York and the barriers of the Northern section).

2.58 The low proportion of commuting to and from New York (and thus the high proportion of traffic commuting within northern New Jersey) is explained by the fact that there is a large proportion of commuting into New York by transit, trying to avoid congestion, which is at its peak during AM peak periods at the tunnels and bridges. Further, the evident scarcity and high cost of parking in Manhattan explains the high proportion of transit commuters into New York.

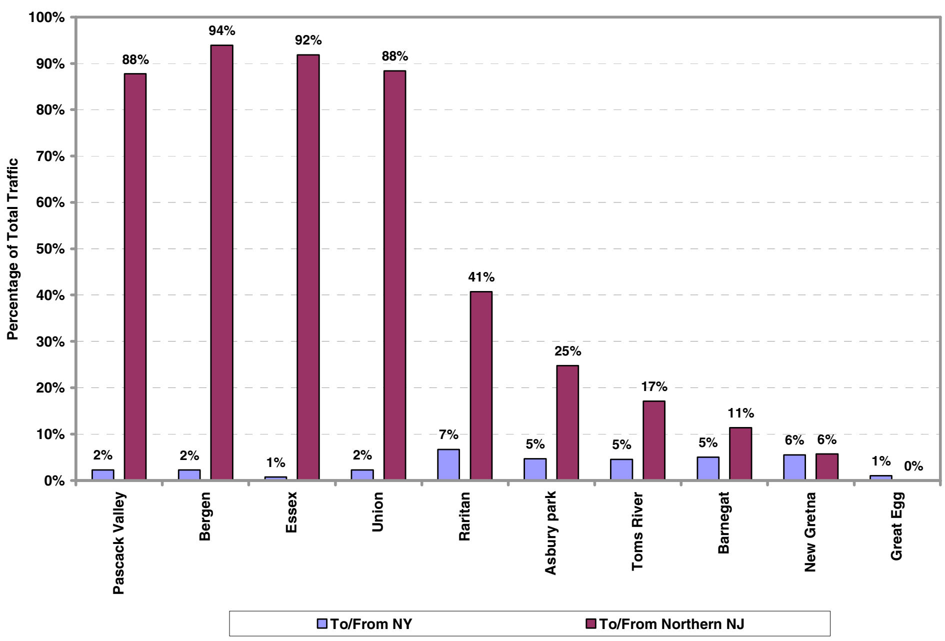
Central Section

2.59 The central section, located between Raritan and Toms River toll barriers, displays decreasing volumes of traffic traveling to and from northern New Jersey as the toll barriers are further south. Between 7 and 5% of total traffic passing through barriers of the central section, travel to and from New York – a higher proportion than that of the northern section. In this area, commuters must rely on their cars in order to reach New York.

Southern Section

2.60 The southern section, located between Barnegat and Great Egg toll barriers, displays steadily decreasing volumes of traffic traveling to and from northern New Jersey as the toll barriers are located further south. The proportion traveling to and from New York remains that of the central section except at Great Egg toll barrier where virtually no traffic travels to and from New York.

FIGURE 2.16 GSP - TRAFFIC PATTERNS BY TOLL PLAZA (MODELLED)



Source: NJDOT Model / SDG Analysis

2.61 The general pattern appears to be that the further south, the less traffic travels to and from Northern New Jersey. This can be explained both by the distance factor but also by the influences from both Atlantic City and Philadelphia on the proportion of origins/destinations, as one would expect traffic in the southern part of New Jersey to be attracted to these employment and recreational areas. This also provides an indication of the low proportion of end-to-end traffic.

Traffic Speeds and Congestion

2.62 To develop an understanding of the levels of congestion on the GSP we have compared observed traffic flows with benchmark service volumes from the U.S. Highway Capacity Manual (HCM). The HCM uses the concept of Level of Service (LOS) as a qualitative measure of describing the extent of capacity problems on a section of highway. The HCM adopts a sliding scale of LOS ranging from LOS A which represents almost entirely free-flow conditions to LOS F which in contrast describes breakdowns in vehicular flow which result in significant recurring congestion.

2.63 On a multi-lane grade-separated highway like GSP, occurrences of LOS F are extremely rare and instead a clearer understanding of the extent of capacity problems on NJTP can be obtained by measuring if LOS D volumes are being observed. LOS D is believed to be the point at which free-flow speeds begin to significantly decline and even minor traffic incidents can create queuing. Table 2.8 compares observed AM peak hour directional volumes across a number of sections of the GSP with the equivalent service volumes at which LOS D typically occurs. We adopted a link capacity of 2,250 vehicles/hour/lane to correspond to flow levels at which HCM recommends a LOS D.

TABLE 2.8 GSP – 2006 AM PEAK HOUR SERVICE LEVELS

Section	Observed Peak Hour Volumes	LOS D Service Volumes	Volume/LOS D Service Volume (%)
Cape May - Great Egg	1,113	4,500	25%
Great Egg - New Gretna	1,266	4,500	28%
New Gretna - Barnegat	2,772	5,625	46%
Barnegat - Tom's River	4,336	6,750	64%
Tom's River - Asbury Park	5,912	9,000	66%
Asbury Park - Raritan	8,807	12,375	71%
Raritan - Union	9,586	13,500	71%
Union - Essex	7,817	10,688	76%
Essex - Bergen	6,320	7,313	87%
Bergen - Hillsdale	4,800	6,750	71%

Source: NJTA / HCM / SDG Analysis

2.64 As can be seen, in average AM peak hour conditions, there appears to be imminent capacity constraints on the Northern section of the GSP with observed Volume/LOS D Service ratios of up to 87%.

2.65 Table 2.9 shows average AM peak hour speeds on a number of sections.

TABLE 2.9 GSP - AM PEAK PERIOD SPEEDS

Section	Northbound Speed (mph)	Southbound Speed (mph)
Tom's River - Asbury Park	68.6	63.3
Asbury Park - Raritan	65.8	72.1
Raritan - Union	51.7	65.1
Union - Essex	45.0	63.0
Essex - Bergen	47.1	51.2
Bergen - Hillsdale	56.6	61.9

Source: SDG Analysis

2.66 As can be seen, traffic speeds are typically above 50 mph during the AM peak hour period. Speeds are lower in the northern section of the road between Union and Hillsdale where the route passes through the Newark metropolitan area but this is likely to be a reflection of the lower 55 mph speed limit in this area rather than the effect significant capacity constraints.

2.67 Table 2.10 provides equivalent analysis for the off-peak period. Here speeds are almost at completely free-flow conditions indicating very few or no capacity constraints in the off peak.

TABLE 2.10 GSP - OFF PEAK SPEEDS

Section	Northbound Speed (mph)	Southbound Speed (mph)
Tom's River - Asbury Park	68.6	64.5
Asbury Park - Raritan	71.2	69.1
Raritan - Union	68.5	66.0
Union - Essex	65.9	67.1
Essex - Bergen	64.7	62.3
Bergen - Hillsdale	59.5	64.5

Source: SDG Analysis

Behavioral Research

2.68 As part of our literature review we concluded that it would be worthwhile undertaking fieldwork to compare the markets served by the three roads of interest, and possibly also to gather evidence on other key issues that the modeling process should address.

2.69 A survey was undertaken to provide fresh evidence on certain key issues of relevance to the study. As part of the survey, 395 GSP users were interviewed between Friday 16th March and Tuesday 20th March 2007. Further details of the survey methodology and analysis can be found in Appendix C of the Background Report, Behavioral Research.

2.70 GSP users, like the users of the NJTP, are not very sensitive to the price of the tolls - at least not at their present level, which is low compared to other toll roads in the United States. While GSP users are undoubtedly sensitive to the idea of the tolls going up, the survey presents an accumulation of findings which show that at present many of them do not worry about the price of the tolls.

2.71 The GSP users set themselves apart from users of the other roads in that they seem to be even more car-dependent (87% agreed with the statement that for most of their trips they had no choice but to drive), they were more likely to say that the road is essential to them traveling around NJ (67% agreed), and they were also more likely to agree with the sentiment that it is unfair to charge for using the road (45% agreed). There seems to be more of a feeling that the GSP should be a public service amongst the frequent users of the road, compared to the users of the NJTP and the users of the ACE.

2.72 The GSP users had an income profile broadly similar to that of the NJTP users, but with a lower proportion of people in the highest income bracket - only a quarter of GSP users classified themselves in this category, compared to a third of the NJTP users. Of the GSP users, 70% lived in NJ, 24% in New York, and the remainder in the adjoining states of Pennsylvania, Delaware and Connecticut.

2.73 In terms of the perceived value for money, level of congestion, and the stress of using the road, the GSP users had slightly less negative experiences than the NJTP users, but significantly more negative experiences than the ACE users. The more significant findings were that 51% of the GSP users described the value for money of the tolls as being "average", 60% of them said that they did not normally think about how much they spend on tolls, and congestion did not feature as a significant reason for using the road less.

2.74 The GSP users' evaluation of the importance of their most recent trip on the GSP was very similar to that of the NJTP users' regarding the NJTP: both these groups of users regarded their most recent trip using the respective road as being more important, compared to the ACE users' evaluation of the importance of their recent trips on the ACE. GSP users were more likely to consider alternative routes compared to the NJTP users, but less likely to consider alternative routes in comparison to the ACE users. GSP users were less likely to consider other modes of transport, compared to users of the NJTP.

2.75 About 60% of GSP users with EZ-Pass do not normally think about the cost of using the road - even more than in the case of NJTP users (50%), but less than in the case of ACE users (70%). The evidence on value of time showed that the proportion of people with medium or high values of time was lower for the GSP users compared to the NJTP users - the distribution of values of time for GSP users was very similar to that of the ACE users. The direct questions about toll price changes suggested that in terms of the likelihood of them changing their behavior in response to a toll rise, the GSP users fall between the NJTP users (expected to be least responsive) and the ACE users (expected to be most responsive).

2.76 Individuals did not report significant changes in their usage of the toll roads, and the reasons given for changes in usage were dominated by changes in personal circumstances. The evidence suggests that there has been no significant change to the level of congestion on the GSP over the last 2 years – about half the respondents reported that the congestion they experienced on the GSP had not changed, and the remainder was split more or less evenly between reporting improvement and reporting deterioration.

2.77 When asked about changes to the tolls over the past two years (there have not been any significant changes), only about 63% of the GSP users correctly answered that the tolls had not changed (or said they were not sure) - most of the rest responded that the tolls had gone up, with 4% saying that “tolls are now much higher” compared to two years ago. This adds to the impression that many GSP users do not have a clear idea of how much they are paying and whether or not it has been changing.

2.78 The survey suggests that the gasoline price rises over the past two years have not had a significant impact on people’s use of the GSP, and that many people would adapt to future gas price increases by switching to vehicles with greater fuel-efficiency.

Summary

- The GSP is a 173 mile long toll road stretching along the New Jersey shoreline. It serves as a primary link along the coast, serving seashore recreational areas, Atlantic City and the Newark/New York metropolitan area;

- Heavy Trucks (registered 7,000 lbs. or more) are prohibited north of Exit 105;

- The facility intersects with the major highway routes within New Jersey including the ACE and NJTP providing access to New York City;

- The GSP is a grade-separated limited access interstate-standard facility with a speed limit ranging from 55-65 mph. The number of lanes range from two per direction in the south of the facility to six lanes per direction in the northern sections;

- A number of competing routes exist along the length of the GSP. In the North (Exit 172 to Exit 127) it competes with the I-287 and NJTP. In the South, US-9 competes with the GSP for short distance journeys;

- The GSP operates as an ‘open system’ whereby users pay tolls at regular intervals along the length of the road and at certain exits. On some short distance sections, vehicles can use the road without paying tolls;

- The GSP is an existing road and has been open for decades. As a result we have precise knowledge about the amount of traffic that is currently carried by the road and how much toll revenue is collected;

- Historic transaction data allows us to consider how traffic levels have changed over time, how traffic has responded in the past to changes in toll rates and what the relation between traffic on the GSP and past economic growth has been;

- With a cost-per-mile rate of approximately $0.02 per mile, the GSP is currently the least costly toll road in the United States. Payment can be made in cash or by E-ZPass - the ETC system in place on the facility;

- In 2006 there were over 417 million toll transactions on the GSP, this is equivalent to just over 1.1 million transactions per day on average. Cars accounted for 96% of transactions, whereas trucks and buses accounted for the remaining 4%;

- Between 1981 and 2006 toll revenue has grown at 4.3% on average from $72 million to $206 million. However toll revenue in real terms has only grown at 1.0% per year over the same period;

- The northern section of the GSP generates around 47% of revenue, closely followed by the central section, generating 40% of revenue. The southern end of the GSP only accounts for 13% of total revenue collected;

- Traffic growth has been most rapid in the central and southern section of the route, while growth in the north of the facility has recently stagnated – a possible cause of which is the growing congestion and capacity problems in this section;

- GSP tolls have increased at a rate considerably below inflation since 1989/90. As a result, the cost of using the GSP has actually fallen in real terms from $0.70 in 1981 to just $0.49 in 2006 (2006 prices);

- E-ZPass payments dominate, accounting for around 65% of payments. The proportion of E-ZPass payments drops in the summer when a higher proportion of infrequent seasonal traffic uses the road;

- Capacity constraints are evident as the route reaches the Newark metropolitan areas where traffic flows will typically reach in excess of 200,000 vehicles per day and average daily speeds can reach as low as 30 mph in peak periods; and

- The obvious congestion in the northern section of the facility appears to have produced 'peak spreading' with peak conditions observed for several hours in the morning and evening peaks.

- A key issue for the GSP concession is to understand how traffic levels will be changing over time and what the impact of capacity constraints are. Important inputs into this process are assumptions with regards to economic growth, population, and major developments (mainly port and infrastructure) that are planned to take place in the study area or surroundings and that may impact on traffic levels.

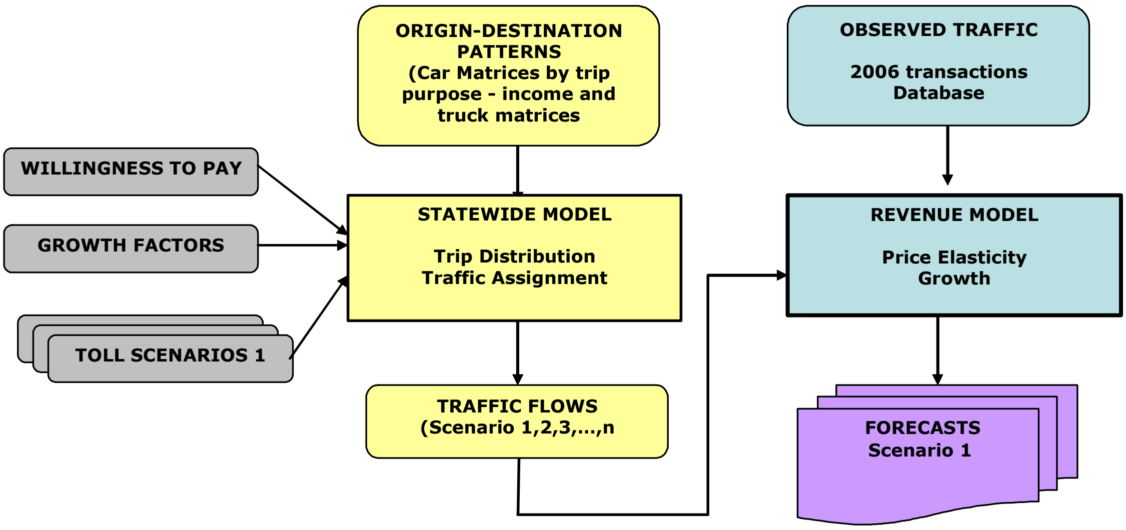
3. THE FORECASTING METHODOLOGY

Introduction

3.1 We have developed a modeling framework that can explore the base assignment to the target facility under a range of scenarios – and for different traffic types. The key issue for the GSP concession is to understand how traffic levels will be changing over time and what the impact of capacity constraints are. Important inputs into this process are assumptions with regards to economic growth, population, and major developments (mainly port and infrastructure) that are planned to take place in the study area or surroundings and that may impact on traffic levels.

3.2 The central component of the modeling framework is a spreadsheet based revenue model – this has been built to allow testing of different tolling scenarios and to carry out a wide range of sensitivity tests to explore the impact on demand and revenue of factors such as growth rates, values of time and changes in trip distribution. Our forecasting methodology is illustrated in Figure 3.1 below.

FIGURE 3.1 FORECASTING METHODOLOGY



3.3 The model uses observed 2006 toll demand and revenue data as a basis from which future year forecasts are derived. Within the model demand and revenue are segmented by:

- Geography (toll plazas and toll barriers);
- Time of day (AM Peak, PM Peak, Off-Peak);
- Day of Week (Weekday and Weekend);
- Vehicle Type (Cars and Trucks);
- Payment Method (Cash, E-ZPass); and
- Journey Purpose (Work and Other).

3.4 We have adopted a number of existing modeling tools to inform the revenue model in terms of:

- Impact of congestion;
- Changes in trip distribution;
- Diversion; and
- Traffic Growth.

3.5 The *network models* used are an updated version of the State-wide model, which was initially developed over 10 years ago as an all day (24 hour) traffic assignment model. For the purpose of our assignment, we have updated the *trip tables*, *road network* (base and future) and *assignment procedures*.

3.6 The *trip tables* were updated with the information on trip patterns (Origin- Destination and Journey Purpose split by time of the day) from the NJTPA and SJTPO. Car trips were segmented into two journey purposes (home based work and other), with both journey purposes split into four income groups. The four income groups are based on county-level Census 2000 household income levels that fit into the income ranges of the four income groups identified in the NJTPA (values grown to 2000). Commercial vehicles were treated as one segment.

3.7 The *road network* for the area comprises the freeway, arterial and collector facilities. Each road link contains information on the number of lanes, free flow speeds, capacity, volume-delay relationships and toll charges at toll plazas. The link characteristics were updated to reflect coding of the NJTPA and SJTPO networks for significant roads. Also a future 2025 year network was built which incorporates those planned infrastructure improvements in the New Jersey area that could have a significant impact on the road network.

3.8 The link volume-delay relationships and factors to convert hourly capacity into each time period were reviewed and updated using recent traffic count travel time data collected specifically for the purpose of this assignment. The re-calibrated volume delay functions provided a significantly improved fit to the observed travel time data.

3.9 The third component is the *assignment process* used to estimate how origin-destination demand will route itself over the available network facilities. The vehicle (auto and truck) assignments are based on a process that iterates until network or passenger travel times are in equilibrium. The resulting outputs include vehicle (auto and truck) network volumes, travel times and costs.

Impact of Toll Changes and Congestion

3.10 There are several ways in which people can adapt to a change in toll levels and increased levels of congestion, as follows:

- Time period - in the case of relative changes in the tolls applying to specific time periods or congestion occurring at specific times;
- Route - in many cases, however, alternative routes offer considerably longer and more uncertain journey times;
- Vehicle occupancy - ride sharing can reduce the trip costs per passenger / reduce congestion;
- Mode - flying for long-distance through passenger traffic, rail for certain other Origin-Destination (O-D) combinations (the NJ Transit rail network focuses on trips to and from New York);
- Destination - in some cases people might consider going to a different city if there is a big difference in the cost of the trip or congestion levels; and
- Activity - some people might offset the higher costs of travel by doing the activity less often, or not at all.

3.11 Recent research by Ozbay[1] et al. on the behavioral response to the time of day pricing initiative on the NJTP showed that the most common responses to increased peak-hour tolls and reduced off-peak tolls were to travel by alternative routes, to reduce use of the Turnpike, to increase ride sharing, and to increase travel in off-peak periods. However it is important to note that approximately 93% of individuals did not change their travel behavior at all in response to the changes to the toll schedule in the year 2000. The research concluded that faced by a small differential between peak and off-peak tolls being introduced, the demand was very inelastic.

3.12 Our modeling framework currently handles route choice and changes in travel times. Trip suppression is due to changes in vehicle occupancy, mode-shifting, destination and activity changes are not currently modeled explicitly, but we do allow for trip suppression due to capacity constraints. However we have checked the implied elasticities from the model are reasonable compared to evidence from other roads.

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[1] Ozbay, K., J. Holguín-Veras, O. Yanmaz-Tuzel, S. Mudigonda, A. Lichtenstein, M. Robins, B. Bartin, M. Cetin, N. Xu, J.C. Zorrilla, S. Xia, S. Wang, and M. Silas (2005). 'Evaluation Study of New Jersey Turnpike Authority's Time-ofday Pricing Initiative'. Publication FHWA-NJ-2005-012.FHWA, U.S. Department of Transportation. Available online at time of writing:

http://knowledge.fhwa.dot.gov/cops/hcx.nsf/All+Documents/BA2414CE1EAC182685256DC500674090/$FILE/njtpa_final_report_may_31_2005.pdf

Existing and Future Capacity Constraints

3.13 Initially a set of constrained traffic forecasts was developed. These were then used to determine when lane expansions may be required over the life of the concessions of the four road assets. The basis for this was the requirement specified by the State that Service Levels should not fall below "LOS D". Our method for estimating capacity constraints is outlined below.

3.14 Firstly the 2006 transactions database was used to establish annual average weekday traffic flows (AADTw's) by section of road, time of day and direction of travel.

3.15 From this the number of vehicles per hour per lane for each road section for the AM Peak period (defined as 6:00AM-9:00AM on weekdays) was derived. Traffic growth estimates from the forecasting model were applied to derive this information for each of the forecasting years.

3.16 Secondly on the basis of the HCM and speed/flow relationships calibrated on other inter-urban highways, we adopted a link capacity of 2,250 vehicles/hour/lane to correspond to flow levels at which HCM recommends a LOS D[2].

3.17 When forecast traffic levels exceeded the Service Level D definition capacity constrains are believed to be binding and an expansion of one lane per direction has been assumed. The triggered expansions are summarized in Appendix C. It can be seen that for certain road sections a secondary expansion has been necessary due to further traffic growth. Finally the traffic models were rerun to include the additional network capacities.

[2] Our analysis is fully reliant on data supplied by NJDOT and its agencies, and is based on 'average' traffic conditions. It is however apparent that at certain times of the year and on certain days, volumes will be considerably higher than these averages. In addition unforeseen incidents may generate a severe breakdown in flow and these effects will be 'smoothed' by taking an average approach. However we feel this is the only method by which we can obtain an accurate picture of the performance of a facility over an extended period of time and thus a fair assessment of whether an expansion is genuinely required. The method applied is a 'link-based' assessment, i.e. it does not explicitly consider the capacity of interchanges or the interaction of the facilities with the 'secondary' highway network (from where downstream queuing often occurs because capacity is typically much less). By assessing constraints purely on the basis of link volumes and capacities we are effectively isolating highway sections where the provision of additional lane capacity will help solve prevailing congestion levels.

4. TRAFFIC GROWTH

Introduction

4.1 To derive the extent to which traffic will grow in the future, we have undertaken the following:

- Reviewed the extent of economic development in the region and derived appropriate 'economic' forecasts (e.g. we have used various recognized economic forecasting sources to derive population and employment forecasts at a county level – based on discussions with development agencies, we have also provided an 'overlay' to these forecasts, depending on the extent new sites and developments will generate additional population);
- Analyzed the extent to which travel-related parameters such as trip making by drivers have changed over time (e.g. there is considerable evidence from official New Jersey statistics that drivers are undertaking more mileage every year. For the appropriate traffic categories, we have therefore adjusted the county-based economic forecasts accordingly to reflect this); and
- So that the growth vectors can be incorporated into the traffic modeling framework, matrices containing vectors at the county level have been developed for each of the three traffic categories. These reflect assumptions about growth to/from origins and destinations. The growth vector matrices then form an input to the traffic models.

4.2 As discussed in this chapter, observed economic and traffic growth in New Jersey have been robust and based on our review of all available data and forecasts, we believe that these robust level of growth will continue into the future.

Economic Development

4.3 New Jersey is a key region of economic activity within the United States and is situated at the centre of a metropolitan axis stretching from Washington, DC to Boston, MA. The State is the most densely populated in the United States, at 1,174 residents per square mile. According to the United States Census Bureau, it is also the second wealthiest state per capita in the United States.

4.4 According to the US Bureau of Economic Analysis, the State's median household income is the highest in the nation, at $55,146 and it is ranked second in the nation by the number of locations with per capita incomes above the national average of 76.4%. Nine of New Jersey's counties are in the wealthiest 100 of the country.

4.5 New Jersey has an extensive industrial base that comprises the following:

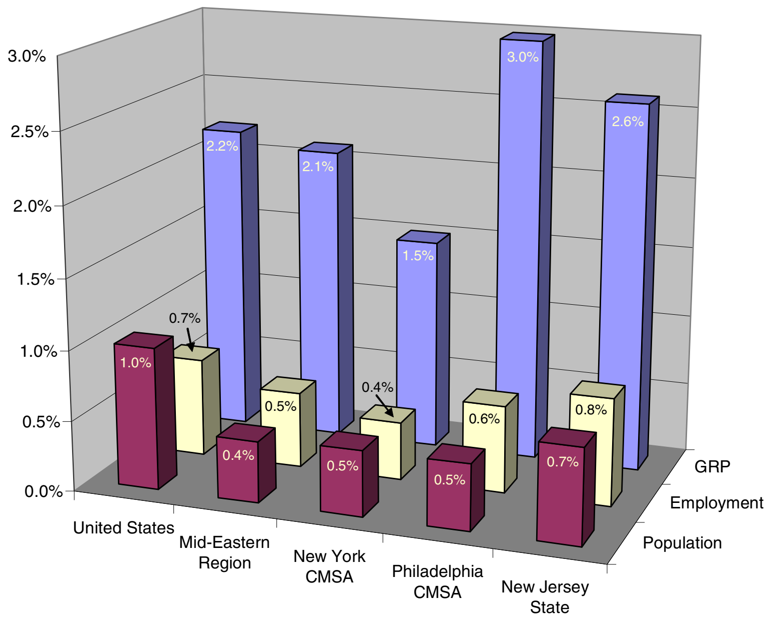
- The Port Newark-Elizabeth Marine Terminal is one of the world's largest container ports while Newark Liberty International Airport is ranked seventh among the nation's busiest airports and among the top 20 busiest airports in the world;

- New Jersey's industrial outputs include pharmaceutical and chemical products, food processing, electric equipment, printing and publishing, and tourism. Additionally, New Jersey is home to the largest petroleum containment/storage system outside of the Middle East;
- New Jersey hosts several business headquarters (fifty Fortune 500 companies have headquarters in or conduct business from Morris County alone);
- New Jersey has several oil refineries and chemical plants;
- Its agricultural outputs are numerous and include nursery stock, horses, vegetables, fruits and nuts, seafood and dairy products.

4.6 It is these types of activities that generate significant volumes of traffic on the toll roads in New Jersey. In addition, considerable volumes of car journeys are generated from the large number of residential developments throughout the States as well as the car trips generated by the employment in major centers such as New York City.

4.7 Figure 4.1 is based on historic data collated by Woods & Poole, a firm that specializes in long-term economic and demographic analyses. In the figure, the 'Mid-Eastern' region is defined as that comprising Delaware, Washington DC, Maryland, New Jersey, New York and Pennsylvania.

FIGURE 4.1 ANNUAL GRP, POPULATION & EMPLOYMENT GROWTH, 2000 - 2005



Source: Woods & Poole

4.8 The figure shows that economic growth between 2000 and 2005 (as measured by Gross Regional Product, (GRP)), was higher than that observed nationally. Although there is evidence that in the past year, New Jersey's economic expansion has lagged behind that in the country, long term forecasts by institutions such as Woods & Poole predict a return to robust growth of approximately 2.5% per year over the period to 2030.

4.9 The figure above also shows that over the period between 2000 and 2005, employment growth in New Jersey has exceeded that observed nationally while population growth has also been significant and has compared well with the national average.

4.10 Recent research by the Rutgers State University of New Jersey's Economic Advisory Service (RECON) supports the predictions of other forecasters, such as Woods & Poole, by indicating that over the longer term (between 2005 and 2016), economic growth in the State will continue to be robust.

4.11 The RECON forecasts of January 2007, for example, suggest that output in the State of New Jersey will increase by 2.5% per year (similar to the growth indicated in the Woods & Poole forecasts). This is an issue that has relevance to traffic growth forecasts and these are discussed later.

Trip Rates

4.12 In addition to evaluating forecast economic and demographic growth at the county level, we have also undertaken research into the following:

- The extent of any 'decoupling' between economic and traffic growth; and
- Investigating whether there is evidence of an increase in VMT per capita.

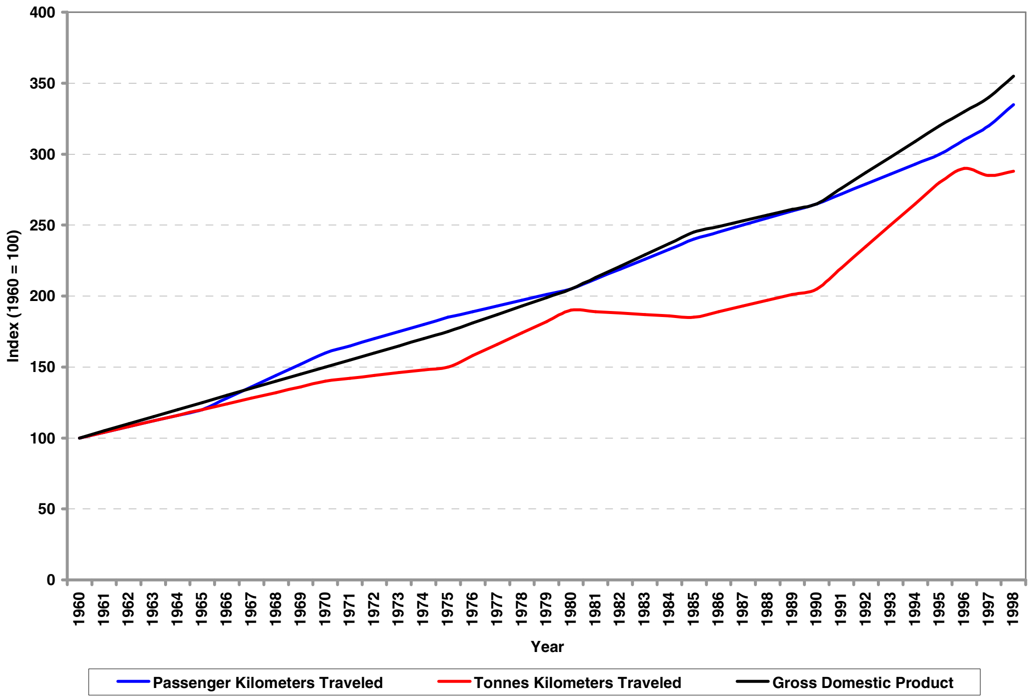
4.13 These are important parameters since they provide guidance as to whether the demographic growth-based vectors should be adjusted to reflect observed changes in trip making and vehicle mileage.

4.14 One of the key issues here is the evidence of any increase in annual vehicle mileage per member of the population in New Jersey. If, for example, the number of miles each person travels is increasing each year, this indicates that an allowance should be made for this within any demographics-based growth vectors.

Decoupling of Economic & Traffic Growth

4.15 Research undertaken in the United States ('Decoupling Economic Growth & Transport Demand: A Requirement For Sustainability', R Gilbert & K Nadeau, May 2002) has shown that there is some evidence of 'decoupling' of economic growth and traffic growth. This is indicated in Figure 4.2 below (albeit with data only available up to 1998).

FIGURE 4.2 DECOUPLING OF ECONOMIC & TRAFFIC GROWTH 1960 – 1998 (USA)

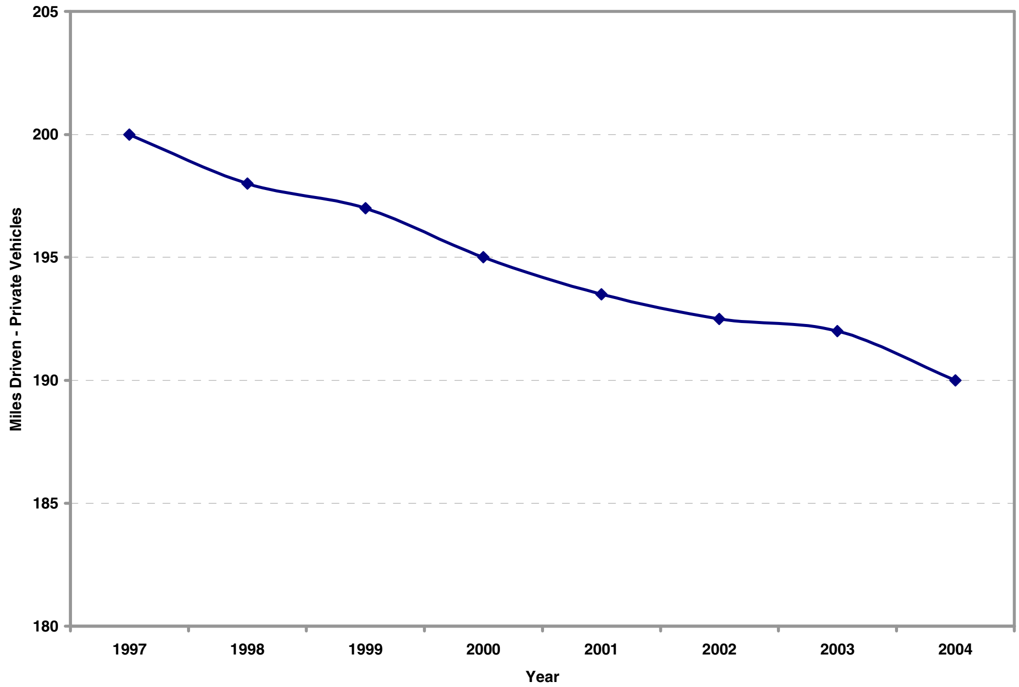


Source: US Bureau of Transport Statistics ('National Transport Statistics') / US Bureau of Economic Analysis ('Current Account Data')

4.16 As Figure 4.2 indicates, although the motorized movement of people in the US has closely matched the growth in the economy, there has been some decoupling of economic activity and freight transport activity since the early/mid 1970s and of economic activity and passenger transport since the early 1990s.

4.17 Private motoring data from the New Jersey Department of Labor and Workforce Development and the Federal Transit Administration's National Transit Database (for 1997 to 2004) shows that for every $1,000 of Gross State Product, total mileage driven decreased by approximately 5% over the period. This is indicated in Figure 4.3.

FIGURE 4.3 PRIVATE VEHICLE MILES DRIVEN PER $1,000 GROSS STATE PRODUCT, NEW JERSEY, 1997-2004



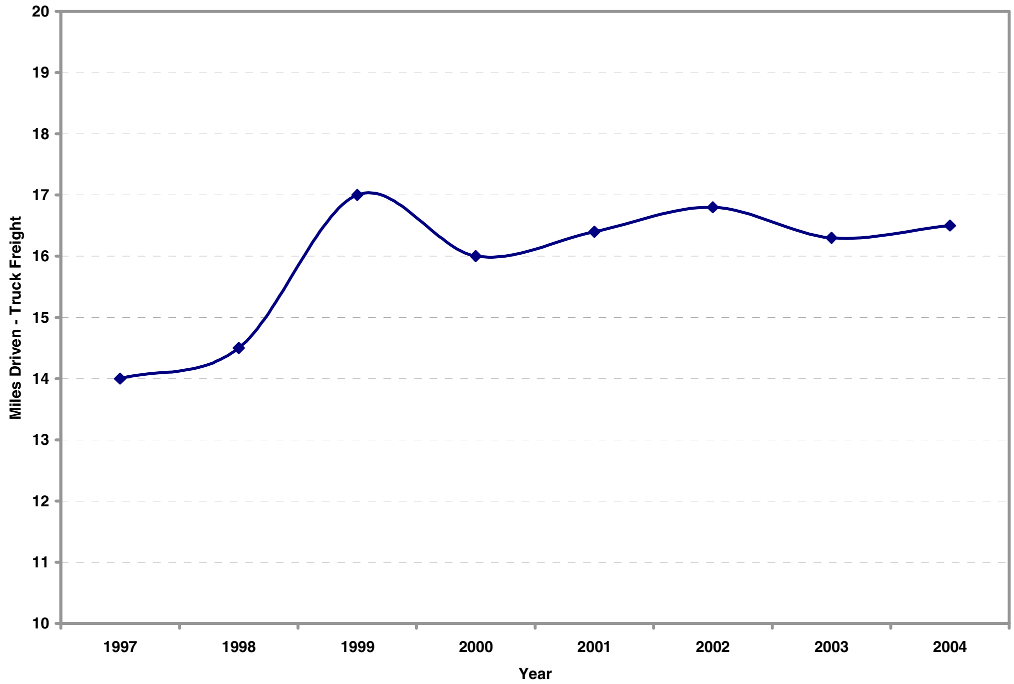
Source: NJ Dept of Labor & Workforce Development, 1997-2004

4.18 For passenger mileage, although this indicates some decoupling of economic activity from transport activity, the annual extent of this (-0.7% per annum) is relatively small and may reflect factors such as growth in transit use State-wide as well as a 13.6% increase in 'output per worker' over the same period. This indicates that fewer workers (and fewer drivers) are required to produce a larger Gross State Product.

4.19 Given this relatively small level of 'decoupling' each year, we have not adjusted the car traffic growth vectors as there is considerably more evidence (see below) that on a per capita basis, drivers in New Jersey have been traveling increasing vehicle mileages each year.

4.20 For truck freight traffic in New Jersey, the outcome appears to be different as on average, the number of miles driven per $1,000 of Gross State Product has increased over the period by almost 18%. Figure 4.4 overleaf indicates this trend, including the two years where the volume of mileage per Gross State Product decreased.

FIGURE 4.4 TRUCK VEHICLE MILES DRIVEN PER $1,000 GROSS STATE PRODUCT, NEW JERSEY, 1997-2004



Source: NJ Dept of Labor & Workforce Development, FTA National Transit Database, 1997-2004

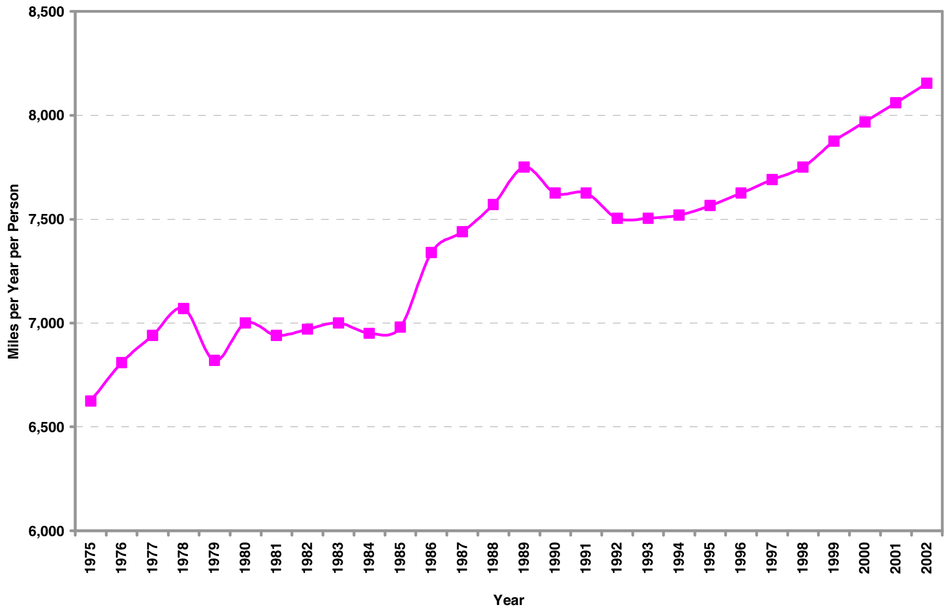
4.21 For truck traffic, although we have not made a direct upward adjustment to reflect this increased level of mileage per unit of economic activity, the growth vectors derived for this traffic category are higher than those for other traffic types are due, in part, to this phenomenon.

4.22 To demonstrate the high level of truck traffic observed in New Jersey between 1997 and 2004, data from NJDOT's 'Travel Activity by Vehicle Type' shows that truck travel grew by 44%, compared to 15% for all vehicles. Trucks traveled more than 6.3 billion miles in 2004, up nearly 2 billion miles from 1997. Trucks also made up a growing share of the vehicles on New Jersey's roadways. In 2004, trucks comprised almost 9 percent of the total miles traveled, up from 7 percent in 1997, an increase of 25%.

Evidence of Increases in VMT Per Capita Over Time

4.23 Data collected for New Jersey indicates that there has been a steady increase in VMT per capita over time. Using both FHWA and Census data from 1975 through to 2002, there have been several trends over different periods in the VMT per capita relationship as indicated in Figure 4.5.

FIGURE 4.5 SUMMARY OF VEHICLE MILES TRAVELED PER CAPITA, 1975 - 2002



Source: NJDOT (figure produced in New Jersey Department of Environment Protection's 'Environmental Trends 2005')

4.24 As the figure shows, there are several distinct 'periods' in which the relationship between vehicle mileage per person changes and these are summarized below:

- 1975 – 1980: a period of comparatively strong growth (despite downturn in 1979);
- 1980 – 1985: VMT per capita remained broadly constant;
- 1985 – 1989: VMT per capita increased by just over 2% per annum;
- 1989 – 1995: VMT per capita fell; and
- 1995 – 2005: VMT per capita increased by just over 1% per annum.

4.25 The most important conclusion to be drawn from the data in the figure is that there has been a steady increase in miles per capita since the mid-1990s. Following the end of the economic downturn of the early 1990s, drivers throughout New Jersey have been undertaking more mileage each year as their need to travel increases.

4.26 Over the last five years, for example, the average increase has been approximately 1.2% per annum. In other words, New Jersey residents are driving approximately 1.2% more miles compared to the previous year.

4.27 Figure 4.6 shows the absolute vehicle miles traveled per capita between 2000 and 2005. The figure clearly indicates that although VMT per capita decreased between 2002 and 2003, this was more than made up in the following year. The decrease between these years is most likely, however, to be attributed to the 'one off' economic shock associated with the events of 9/11. We would thus conclude from the longer term average that vehicles miles traveled per capita is likely to grow by at least 1% per annum.

FIGURE 4.6 VEHICLE MILES TRAVELED PER CAPITA, 2000 - 2005

Source: NJDOT / US Census Bureau

4.28 The observed increase in VMT per capita is a key finding since it suggests that for certain traffic categories, forecast growth based on forecast changes in population and employment will be supplemented by growth attributable to the increases in mileage per capita.

4.29 To demonstrate this, the majority of official county-based demographic forecasts in New Jersey (e.g. including those produced by Woods & Poole) indicate annual increases in population of approximately 1%. To derive an overall growth vector that reflects these and the increases in VMT per capita of 1% per year, the two growth rates are multiplied together to produce a combined vector of over 2% per annum.

4.30 The derivation of vectors incorporating an allowance for increases in VMT per capita is discussed in more detail under 'Car – Other' below.

Vollmer Forecasts

4.31 Vollmer Associates LLP produced transactions and revenue projections in 2005 for the GSP as shown in Table 4.1. These estimates were based on historic data and covered the period 2005 – 2011. The results of this report are summarized below.

4.32 The projections were based on a number of assumptions. The most significant are the following:

- Raritan and Asbury Park go to one-way tolling in September 2004; Union in March 2005; Essex on July 15, 2005; New Gretna, Great Egg, Cape May and Bergen in May 2006, and Barnegat in January 2009; Eatontown in September 2004; Union Ramp in July 2005; and Somers Point and Saddle Brook in May 2006;
- Pascack Valley goes to Express E-ZPass lanes in February 2004; and Raritan, Asbury Park, and Toms River go in July 2005;
- Continuation of 2005 toll schedule with Electronic Toll Collection;
- The GSP capital improvement program completed as scheduled;
- The competitive highways scheduled by the NJDOT completed as scheduled;
- High standards of maintenance and operations are maintained by the NJTA;
- No major national emergency or drastic economic recession, although it is assumed that the normal cyclical economic pattern will continue;
- No drastic reduction on fuel supplies but the traffic and revenue estimates do factor in the possible impacts of a short term fuel shortage or high than normal fuel pricing;
- No toll increase during the forecast period;
- No major competing highway construction during the forecast period.

4.33 The report projected increases in population in the ten counties though which the GSP passes. It expected population to grow at a reduced rate than that experienced before 2005 in the southern part of New Jersey. Vollmer projected violations to increase by 0.5% for toll plazas being improved to accommodate the E-ZPass system. They further assumed that the number of transaction would decrease at toll plazas being converted to one-way tolling (e.g. loss of 5% at Raritan and 2% at Bergen).

4.34 Vollmer projects total transactions to decrease from 508 million 2005 to over 450 million by 2011, accounting for the implementation of one-way tolling at major toll plazas. Toll revenue is expected to rise from approximately $207 million in 2005 to about $225 by 2011. With no toll increases assumed, this infers an average annual growth rate of 1.3% in toll revenue.

TABLE 4.1 GSP - VOLLMER TRAFFIC & REVENUE PROJECTIONS (2005 - 2011)

Year	Transactions (M)	Observed Transactions (M)	Toll Revenue (Nominal $M)	Observed Toll Revenue (Nominal $M)
2005	508.4	428.5	207.3	203.8
2006	454.3	417.4	209.9	206.2
2007	442.4		212.5	
2008	449		215.5	
2009	440.1		218.3	
2010	446.5		221.4	
2011	453.1		224.6	
Average Annual Growth	-1.90%		1.34%	

Source: Vollmer / NJTA / SDG Analysis

Steer Davies Gleave Forecasts

4.35 The following paragraphs contain descriptions of the how the growth vectors for each traffic category have been derived. In addition to using forecasts of demographic parameters, the growth vectors also reflect 'Trend Analyses' of historic traffic growth on the toll road. This has informed our view of the most appropriate growth factors to use for the traffic forecasts.

Development of Growth Vector Matrices

4.36 Before discussing how the growth vectors by have been derived, we provide a summary of how the growth matrices are developed. These growth matrices form a key input to the traffic forecasting process.

4.37 For traffic forecasting purposes, there are three different 'growth' matrices developed for each traffic type. These represent:

- Car – work journeys;
- Car – 'other' journeys (including business & leisure journeys); and
- Truck.

4.38 In each of these matrices, the 'zoning' system is based on the 21 counties within the State of New Jersey as well as 28 'external' counties that are located in neighboring States. The 28 external counties are shown below in Table 4.2.

TABLE 4.2 SUMMARY OF 'EXTERNAL ZONE' COUNTIES

New York	Pennsylvania	Delaware	Maryland	Connecticut
Bronx	Berks	Kent	Cecil	Fairfield
Dutchess	Bucks	New Castle		
Kings	Chester	Sussex		
Nassau	Delaware			
New York	Lancaster			
Orange	Lehigh			
Queens	Monroe			
Richmond	Montgomery			
Rockland	Northampton			
Sullivan	Philadelphia			
Ulster	Pike			
Westchester				

4.39 Within each matrix, the objective is to derive a series of annual growth rates to apply to trips between each origin and destination. The derivation of these growth rates is discussed below with each county-to-county vector reflecting forecasts in variables such as employment and population growth as well as any adjustments made to reflect changes in trip rates / trip making over time.

4.40 There is thus a three-step process used to derive the annual growth vectors for each traffic type:

1) Derive 'economic' growth factors for each county-based zone (a full description of how these population and employment-based growth vectors are derived is included in the 'Economic Analysis' section of the Background Report of the Traffic and Revenue study);

2) For each traffic type, evaluate how these growth vectors should be adjusted to reflect changes in trip rates / trip making (e.g. for 'Car – Other' journeys, evidence of increases in vehicle mileage per capita will warrant an appropriate adjustment to the basic growth vectors); and

3) Given the potential 99 year duration of the forecast period, appropriate changes to the traffic growth vectors are made at key points in the concession timescale.

4.41 If appropriate, matrix 'Furnessing'[3] is undertaken for those traffic types where origin vectors (e.g. based on 'population' growth) are different to destination vectors (e.g. based on 'employment' growth). This technique has been specifically applied to the 'Car – work' category where origins are related to population growth and destinations based on employment forecasts.

4.42 The format of the output from the traffic growth matrices are then converted to the traffic model's zone structure for input to the traffic model.

Car - Work

4.43 For car-based journeys to work, we have used county employment growth vectors as a basis for 'destination' trips. This is because growth in this traffic category will be very closely linked to growth in at 'employment destinations'. For the 'origin' trips, these are based on forecast increases in population in each county as the relative growth in the number of residents will also influence the rate of increase in work trips.

4.44 Given that there will be differing rates of growth at both origins and destinations within the 'Car – Work' matrices, these are 'balanced' by use of an appropriate 'Furnessing' process. Through a series of iterations, this ensures that the resulting row totals of trips matches the column totals of trips.

4.45 The growth rates in the table are annual vectors applicable to the earlier years of the concession period. Over time, it is necessary to adjust these vectors as it becomes increasingly difficult to forecast changes in economic variables over the long term. The profile indicated below applies to all growth vectors:

- 2007 – 2025: annual growth vectors are based on those indicated in the table above;
- 2026 – 2050: all growth vectors are reduced by 25%;
- 2051 – 2075: all growth vectors are reduced by 50%; and
- 2076 – 2107: all growth vectors are reduced to zero as there is considerable uncertainty surrounding growth levels so far into the future.

[3] Furnessing: Process by which traffic volumes are adjusted using an iterative process in order to satisfy defined control totals

TABLE 4.3 CAR - WORK: SUMMARY OF ANNUAL GROWTH VECTORS

County	Pop	Emp
Atlantic, NJ	1.03%	1.00%
Bergen , NJ	0.54%	1.05%
Burlington , NJ	1.00%	1.24%
Camden , NJ	0.63%	0.93%
Cape May , NJ	0.23%	1.27%
Cumberland , NJ	0.67%	0.85%
Essex , NJ	0.51%	0.77%
Gloucester , NJ	1.25%	1.38%
Hudson , NJ	0.33%	0.92%
Hunterdon , NJ	1.19%	1.12%
Mercer , NJ	0.73%	1.19%
Middlesex , NJ	0.72%	0.87%
Monmouth , NJ	0.77%	0.96%
Morris , NJ	0.91%	1.25%
Ocean , NJ	1.20%	1.52%
Passaic , NJ	0.54%	0.76%
Salem , NJ	0.83%	0.75%
Somerset , NJ	1.00%	1.16%
Sussex , NJ	1.21%	1.61%
Union , NJ	0.54%	0.91%
Warren , NJ	1.21%	1.03%
Fairfield, CT	0.52%	1.35%
Kent, DE	1.09%	1.33%
New Castle, DE	0.97%	1.46%
Sussex, DE	1.53%	1.67%
Cecil, MD	1.82%	2.04%
Bronx, NY	0.78%	1.06%
Dutchess, NY	0.81%	0.98%
Kings, NY	0.35%	1.17%
Nassau, NY	0.14%	0.76%
New York, NY	-0.17%	0.22%
Orange, NY	1.26%	1.32%
Queens, NY	0.58%	0.99%
Richmond, NY	1.53%	2.14%
Rockland, NY	0.81%	1.14%
Sullivan, NY	0.49%	0.91%
Ulster, NY	1.11%	1.16%
Westchester, NY	0.56%	0.93%
Berks, PA	0.57%	0.96%
Bucks, PA	1.21%	1.55%
Chester, PA	1.21%	1.76%
Delaware, PA	0.19%	0.90%
Lancaster, PA	0.86%	0.86%
Lehigh, PA	0.63%	1.36%
Monroe, PA	2.13%	1.94%
Montgomery, PA	0.55%	1.01%
Northampton, PA	1.00%	1.16%
Philadelphia, PA	-0.30%	0.50%
Pike, PA	2.15%	1.93%

Car - Other

4.46 For this traffic category, we have used an amalgam of county-based population and employment growth vectors as a basis for both ‘origin’ and ‘destination’ trips. For the employment vectors, these are based on forecast employment growth in different sectors of the labor market. Forecast growth in total employment across all sectors is also taken into account. A fuller explanation as to the selection of these variables is contained in the ‘Economic Analysis’ section in Report Set 2, ‘Background To Our Work’.

4.47 The employment forecasts for the 21 New Jersey counties represent growth in six different sectors of the labor market. The reason for using growth in different employment sectors is that ‘Car – Other’ category covers an extremely wide range of trip purposes and is likely to be influenced by changes in economic activity across several sectors. For the 28 ‘external’ county zones, the employment forecasts represent both the ‘Retail’ and ‘Service’ sectors, as well as forecast growth across all employment sectors.

4.48 To reflect the phenomena of increases in VMT per capita, an adjustment is made to each county-based growth vector. This is necessary as ‘Car – Other’ trips are those most likely to be affected by increases in vehicle mileage as drivers make more leisure and business trips. An uplift of 1% per annum was applied.

4.49 There is no requirement to ‘Furness’ these growth vectors as they are based on a synthesis of population-based ‘origin’ movements and employment-based ‘destination’ movements.

4.50 The profile of adjustments in these growth vectors is identical to that indicated under the ‘Car – Work’ category above. The growth vectors used as inputs to the ‘Car - Other’ traffic matrices are given in Table 4.4.

TABLE 4.4 CAR - OTHER: SUMMARY OF ANNUAL GROWTH VECTORS

County	
Atlantic, NJ	2.39%
Bergen , NJ	2.27%
Burlington , NJ	2.56%
Camden , NJ	2.20%
Cape May , NJ	2.36%
Cumberland , NJ	2.16%
Essex , NJ	2.03%
Gloucester , NJ	2.75%
Hudson , NJ	2.11%
Hunterdon , NJ	2.53%
Mercer , NJ	2.44%
Middlesex , NJ	2.19%
Monmouth , NJ	2.28%
Morris , NJ	2.54%
Ocean , NJ	2.84%
Passaic , NJ	2.02%
Salem , NJ	2.11%
Somerset , NJ	2.50%
Sussex , NJ	2.92%
Union , NJ	2.17%
Warren , NJ	2.46%
Fairfield, CT	2.26%
Kent, DE	2.55%
New Castle, DE	2.32%
Sussex, DE	2.93%
Cecil, MD	3.38%
Bronx, NY	2.05%
Dutchess, NY	2.16%
Kings, NY	2.01%
Nassau, NY	1.66%
New York, NY	1.16%
Orange, NY	2.68%
Queens, NY	2.00%
Richmond, NY	3.04%
Rockland, NY	2.28%
Sullivan, NY	1.82%
Ulster, NY	2.32%
Westchester, NY	1.98%
Berks, PA	2.10%
Bucks, PA	2.72%
Chester, PA	2.77%
Delaware, PA	1.71%
Lancaster, PA	2.14%
Lehigh, PA	2.41%
Monroe, PA	3.23%
Montgomery, PA	2.03%
Northampton, PA	2.31%
Philadelphia, PA	1.47%
Pike, PA	3.15%

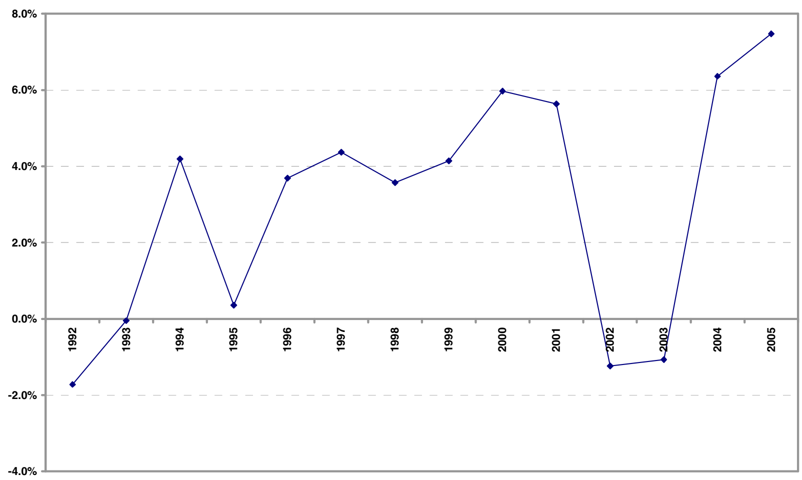
Trucks

4.51 For truck traffic, extensive use was made of 'Trend Analysis' of past growth as well as forecasts of truck movements made by organizations such as the Federal Highway Administration's (FHWA's) Freight Analysis Framework (FAF). The latter comprises, for example, forecasts of truck movements by county in New Jersey.

4.52 The findings from this analysis show that truck traffic growth in New Jersey, both observed and forecast, is extremely robust with the key findings being:

- Based on data from the NJTA, observed truck traffic on the NJTP over the 15 year period from 1991 to 2006 grew at an average of 2.5% per annum (with slightly negative growth in the years following the events of 9/11), as shown in Figure 4.7;
- According to data from the Bureau of Transportation Statistics, total truck ton mileage across New Jersey increased by just over 2.6% per annum between 1993 and 2002 (over the shorter period between 1997 and 2002, annual growth was just over 2.5%); and
- According to the FHWA's Freight Analysis Framework, forecast annual growth in truck traffic across all 21 New Jersey counties is predicted to be 2.7% per annum between 1998 and 2020.

FIGURE 4.7 NJTP - YEAR ON YEAR TRUCK TRAFFIC GROWTH 1992-2005



Source: NJTA / SDG Analysis

4.53 Although there have been fluctuations in truck traffic across different years, the 15-year average growth of 2.5% per annum is consistent with that observed across the State since 1993. In addition, historic growth in the New Jersey's Gross State Product is very similar, at 2.5% on average between 1998 and 2005.

4.54 There thus appears to be a very close link between historic truck traffic and economic activity in the State. This is reflected in our selection of truck growth vectors.

4.55 We have based the selection of truck growth vectors on the basis of these findings and have derived a growth vector of 2.5% per annum across all county-based zones;

4.56 The selection of a vector of 2.5% appears prudent given both observed truck traffic and Gross State Product growth in the State as well as the forecasts for growth in these two parameters. Woods & Poole, for example, forecast that Gross State Product growth in New Jersey will be close to 2.5% per annum.

4.57 Similar to the ‘Car – Work’ and ‘Car – Other’ traffic categories, annual truck growth is adjusted by the same profile of adjustments given in Paragraph 4.48.

5. FORECASTS

Introduction

5.1 Traffic and Revenue forecasts have been developed, for a scenario which has been defined as the most likely outcome, taking into account the balance of probabilities with all the different risks and uncertainties in any forecasting process.

5.2 The revenues presented in the report are in real terms – the price base for the results is 2006. Table 5.1 below summarizes the main assumptions underlying the forecasts.

TABLE 5.1 SUMMARY OF FORECASTING ASSUMPTIONS

Item	
Base Year Demand and Revenue	2006 Transaction Databases for NJTP / GSP and ACE providing transactions and revenues by location, day of year, payment type and toll rate – provided by toll authorities General assumption on exempted traffic and others: reflected in average toll per vehicle taken from Transaction database
O/D Pattern and Journey purpose split	Taken from State-wide model. Matrices updated with NJTPA and SJTPO (including DVRPC) data. 2 time periods: Peak (represented by AM flow direction) and Off Peak. The factors applied to each period come from most recent NJTPA script parameters adjusted using count data available for 24 hours period. Segmentation by 2 journey purposes (home based work and other), both journey purposes split into four income groups. The four income groups are based on county-level Census 2000 household income levels fit into the income ranges of the four income groups identified in the NJTPA (values grown to 2000). Number of households in each income group converted to trips using the income group trip levels in NJTPA documentation. Commercial vehicles treated as one segment.
Traffic Growth – Cars (work journeys)	Based on economic growth variables for 21 New Jersey counties and 28 'external' counties Key parameters are annual 2005 – 2025 employment & population and forecasts (sources: Woods & Poole, DLWFD & Metropolitan Planning Organizations) For 'origin' trips, population growth vectors are used and for 'destination' trips, employment growth vectors are used Origin-based & destination-based growth is then 'balanced' within the matrix by using an appropriate 'Furnessing' process

Traffic Growth – Cars ('other' journeys)	Based on economic growth variables for 21 New Jersey counties and 28 'external' counties Key parameters are annual 2005 – 2025 population & employment forecasts – the latter are based on forecasts across a variety of labor market sectors (sources: Woods & Pool, DLWFD & Metropolitan Planning Organizations) The vectors from the different labor markets are then weighted according to assumptions about what proportions form 'total' growth – the population vectors are also 'weighted' as part of this process Further adjustments to growth factors: for this traffic category, the annual growth vectors are multiplied by 1% to reflect observed increased in Vehicle Miles Traveled, VMT, per capita.
Traffic Growth - Trucks	Based on analysis of historic & forecast truck traffic trends throughout New Jersey, truck growth is based on forecast State-wide GDP growth.
Highway Model Network	Taken from State-wide model and updated to reflect coding of North and SJTPA networks for significant roads. Also updated to reflect other key coding elements (e.g. Auto only section of New Jersey Turnpike). Link speeds and capacities based on NJTPA values. New Jersey Turnpike free flow speeds are set at 70 mph regardless of the area type. Link volume-delay relationships follow the conventional BPR function (a=0.15, b=4.0) for high-type roadways (tollways, freeways, expressways and divided principal arterials), and follow a modified BPR function (a=0.135, b=5.35) for lower-type roadways. The modified BPR function was estimated from graphical presentations of the relationships used in the NJTPA. All significant toll plazas were coded for two-way collection to avoid creating unrealistic differences in assigned traffic volumes in the O->D and D->O directions.
Highway Model Network Toll Rates	Taken from State-wide model and updated with current NJT, GSP, and ACE toll rates, as well as current toll rates of bridge crossings to/from NJ to Delaware, New York, and Pennsylvania.
Year of dollar in Model runs	All model runs include tolls, and values of time in 2006 dollars. VOT are assumed to remain constant in real terms in the future.
Traffic Assignment Principle	Equilibrated generalized cost, where generalized cost is travel time adjusted for motorway bonus * VOT + travel distance * VOC + toll. In each iteration, the equilibration procedure determined a minimum generalized cost OD path for each distinct user class, reflecting the class's individual VOT and VOC.
Equilibrium Calculation Tolerance	An assignment tolerance of 0.05 was used.

Value of Time (VOT) (2006 prices)	Based on Census 2000 Household income levels. Household income levels were converted into average wage rate by dividing by 2080 hours; commuter VOTs were calculated as 50% of the wage rate, and other VOTs as 35% of the wage rate ($ / hr): • Car Commute: 4.2 / 10.8 / 18.1 / 36.9 • Car Other: 2.9 / 7.6 / 12.7 / 25.9 Trucks: 54.25
Value of Time Growth	Assumed constant in the future
Perceived Vehicle Operating Cost (VOC) (2006 prices)	Auto VOC ($/mile):0.01 Truck VOC was calculated as a 2 X multiple of auto VOC.
Motorway Bonus	A 30%-35% bonus for time spent traveling on motorways was applied in the generalized cost calculation. This bonus was computed on a link basis, by reducing the travel time by 30-35% for motorway links.
Toll Road Time Savings compared to other routes	Based on an equilibrium assignment model. Journey time surveys undertaken for validation purposes.
Tolling Policy	Scenarios as defined by New Jersey
E-ZPass Penetration	Assumed constant in the future.
Lane Expansions	Additional lanes set out in Appendix C.

Toll Scenarios

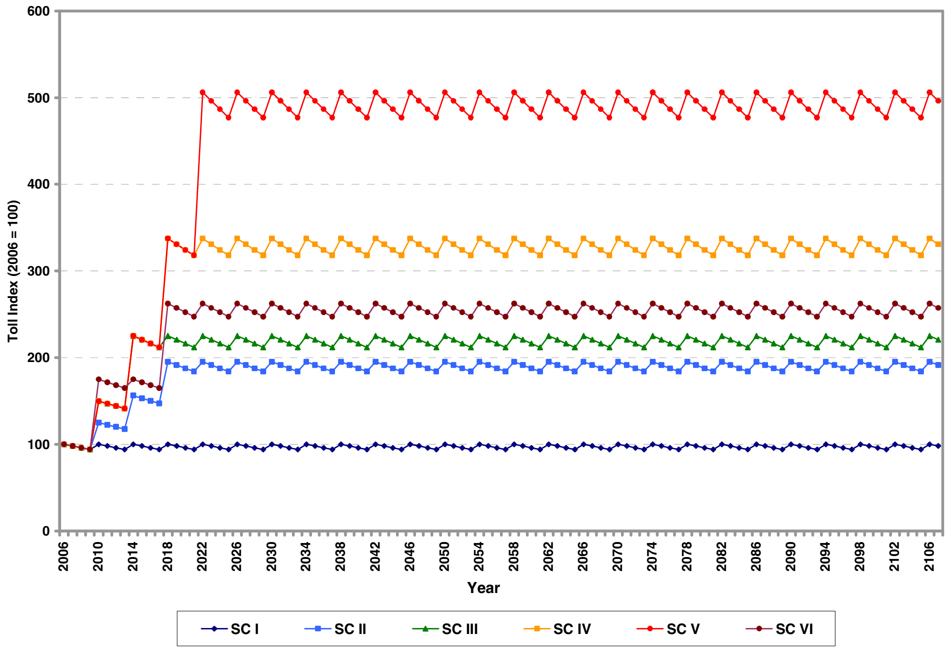
5.3 For the Phase 2 traffic and revenue forecasts, a number of toll scenarios have been defined by the State, as follows.

- Control Case - 2% annual inflationary increases levied in arrears 1/1/2010, 1/1/2014 and every 4th year thereafter. An annual inflationary increase of 2% has been assumed, as defined by the State. (Scenario I);
- Control Case PLUS 25% real toll increases 1/1/2010, 1/1/2014 and 1/1/2018 (Scenario II);
- Control Case PLUS 50% real toll increases 1/1/2010 and 1/1/2014 (Scenario III)
- Control Case PLUS 50% real toll increases 1/1/2010, 1/1/2014 and 1/1/2018 (Scenario IV);
- Control Case PLUS 50% real toll increases 1/1/2010, 1/1/2014, 1/1/2018 and 1/1/2022 (Scenario V); and
- Control Case PLUS 75% real toll increases 1/1/2010, 1/1/2018 and 50% 1/1/2022 on the NJTP, ACE and Rte 440 and a 75% real toll increase 1/1/2010 and 50% in 2018 on the GSP (Scenario VI).

5.4 The scenarios represent a range of toll policies. Scenario I (SCI) sees tolls kept constant in real terms. Scenario V (SCV) implies toll rates by 2026 that are almost five times higher in real terms than they are today.

5.5 Figure 5.1 below shows the index of real GSP tolls for the scenarios analyzed. The saw-tooth pattern is the result of the inflationary adjustments to toll levels that are levied in arrears every 4th year.

FIGURE 5.1 GSP TOLL SCENARIOS



GSP Traffic and Revenue Forecasts

5.6 Tables 5.2 and 5.3 present a summary of the traffic and revenue forecasts for a selection of forecasting years, for each of the six toll scenarios.

TABLE 5.2 GSP REVENUE FORECAST SUMMARY ($M, 2006 PRICES)

Year	SC I	SC II	SC III	SC IV	SC V	SC VI
2008	208.5	208.4	208.4	207.1	207.1	208.2
2010	227.5	271.7	310.9	306.9	306.9	332.8
2014	248.8	352.1	449.0	438.0	438.0	348.1
2018	270.1	448.0	493.4	606.2	606.2	550.7
2022	291.4	487.5	537.8	659.7	810.3	692.5
2026	312.5	527.0	582.2	712.7	884.4	740.6
2036	334.5	573.8	635.6	802.9	989.2	798.2
2046	376.2	641.7	712.2	916.4	1117.4	894.1
2066	415.7	727.5	811.1	1048.2	1297.1	991.6
2086	449.2	807.4	903.3	1156.9	1468.4	1077.2
2106	477.6	882.0	990.1	1255.5	1620.2	1147.8

TABLE 5.3 GSP TRAFFIC FORECAST SUMMARY (2008 = 100)

Year	SC I	SC II	SC III	SC IV	SC V	SC VI
2008	100.0	100.0	100.0	100.0	100.0	100.0
2010	104.9	100.1	95.3	94.7	94.7	88.4
2014	114.6	103.4	91.2	89.7	89.7	100.1
2018	124.3	104.8	100.0	82.3	82.3	98.1
2022	134.1	113.8	108.8	89.5	73.0	120.0
2026	143.7	122.9	117.7	96.6	79.6	128.1
2036	160.1	139.3	133.6	112.6	92.2	143.9
2046	173.2	149.5	143.7	122.9	99.7	154.9
2066	192.2	170.1	164.1	140.9	115.6	172.8
2086	209.1	189.9	183.9	156.7	130.8	189.0
2106	224.1	208.5	202.6	171.4	144.5	202.4

5.7 Traffic growth over the 99-year forecast period for Scenario I equals 0.8% per year on average, although average growth in the early years (until 2022) is much higher at 2.1% per year.

5.8 After 2022 assumed traffic growth rates are lower and the effects of capacity constraints are starting to slow down how much traffic can be accommodated by the road, resulting in significantly lower average growth rates.

5.9 The average growth over the life of the concession for the other toll scenarios equals 0.8% per year for Scenario II, 0.7% for Scenario III, 0.6% for Scenario IV, 0.4% for Scenario V and 0.7% for Scenario VI. These lower rates are due to the increases in toll rates which diverts traffic away from the GSP. As a result however capacity issues are not an issue until much later in the forecasting period.

5.10 In 2022 traffic levels are predicted to be 15%, 19%, 33%, 46% and 11% lower than in Scenario I.

5.11 Revenue growth for Scenario I equals 0.8% per year on average over the life of the concession. This increases to 1.5%, 1.6%, 1.9%, 2.1% and 1.8% for the various toll scenarios.

5.12 Figures 5.2 and 5.3 present the traffic and revenue forecasts graphically. Again the saw-tooth pattern results from the inflationary adjustments that have been assumed to be levied every 4th year.

FIGURE 5.2 GSP REVENUE FORECASTS ($M, 2006 PRICES)

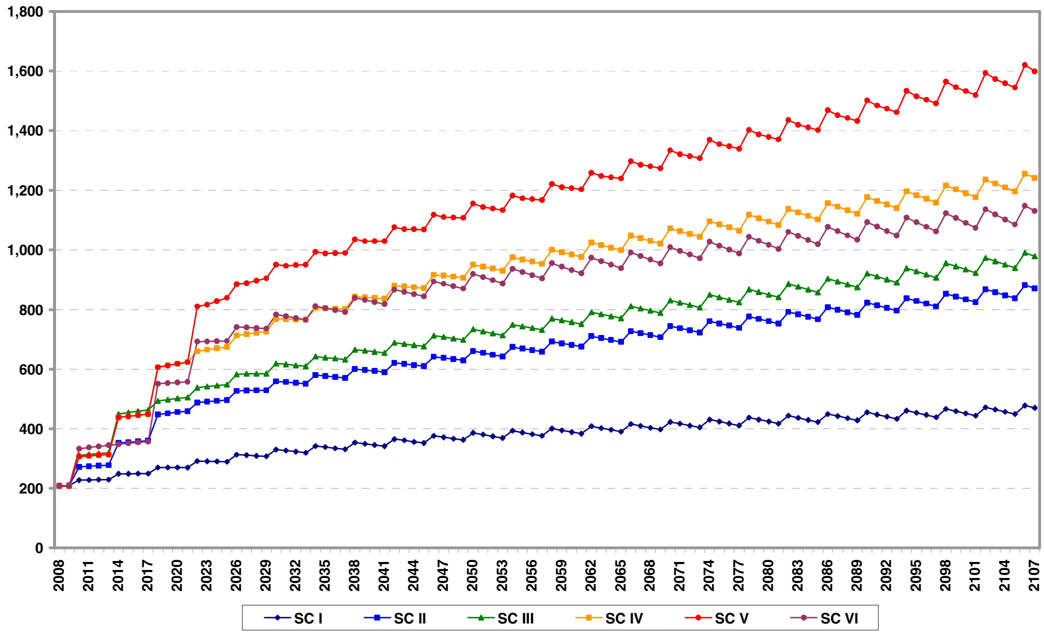
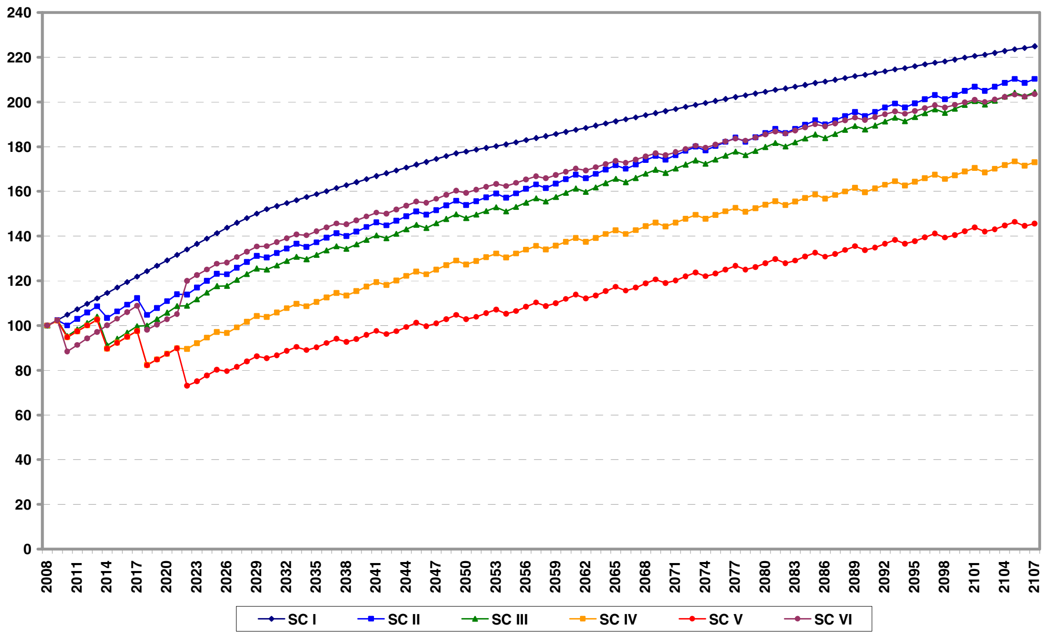


FIGURE 5.3 GSP TRAFFIC FORECASTS (2008 = 100)



5.13 Tables 5.4 – 5.8 provide a summary of demand and revenue forecasts for each toll scenario, disaggregated by vehicle type.

TABLE 5.4 GSP TRAFFIC AND REVENUE FORECASTS – TOLL SCENARIO I

	Cars			Trucks		
Year	Trans-actions (2008 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)	Trans-actions 2006 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)
2008	100	200.2	-	100	8.2	-
2010	105	218.6	4.5%	104	8.9	4.2%
2014	115	239.1	2.3%	113	9.7	2.1%
2018	124	259.6	2.1%	122	10.4	1.9%
2022	134	280.1	1.9%	131	11.2	1.8%
2026	144	300.5	1.8%	140	12.0	1.6%
2036	160	320.4	0.6%	172	14.1	1.7%
2046	173	359.5	1.2%	196	16.7	1.7%
2066	192	396.4	0.5%	227	19.3	0.7%
2086	208	428.0	0.4%	250	21.2	0.5%
2106	223	454.8	0.3%	270	22.8	0.4%

TABLE 5.5 GSP TRAFFIC AND REVENUE FORECASTS – TOLL SCENARIO II

	Cars			Trucks		
Year	Trans-actions (2008 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)	Trans-actions 2006 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)
2008	100	200.2	-	100	8.3	-
2010	100	260.8	14.1%	102	10.9	14.9%
2014	103	337.8	6.7%	107	14.3	7.0%
2018	105	429.5	6.2%	110	18.5	6.7%
2022	114	467.6	2.1%	119	19.9	1.9%
2026	123	505.6	2.0%	127	21.3	1.7%
2036	139	548.6	0.8%	157	25.2	1.7%
2046	149	611.7	1.1%	180	30.0	1.8%
2066	169	692.1	0.6%	213	35.4	0.8%
2086	189	767.6	0.5%	241	39.8	0.6%
2106	208	838.2	0.4%	267	43.8	0.5%

TABLE 5.6 GSP TRAFFIC AND REVENUE FORECASTS – TOLL SCENARIO III

	Cars			Trucks		
Year	Trans-actions (2008 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)	Trans-actions 2006 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)
2008	100	200.2	-	100	8.3	-
2010	95	298.2	22.1%	99	12.7	24.1%
2014	91	430.2	9.6%	98	18.8	10.3%
2018	100	473.1	2.4%	105	20.3	1.9%
2022	109	516.1	2.2%	113	21.7	1.7%
2026	118	559.1	2.0%	120	23.2	1.6%
2036	133	607.8	0.8%	150	27.8	1.8%
2046	143	679.3	1.1%	171	32.9	1.7%
2066	163	772.0	0.6%	204	39.1	0.9%
2086	183	858.8	0.5%	234	44.4	0.6%
2106	202	940.8	0.5%	260	49.3	0.5%

TABLE 5.7 GSP TRAFFIC AND REVENUE FORECASTS – TOLL SCENARIO IV

	Cars			Trucks		
Year	Trans-actions (2008 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)	Trans-actions 2006 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)
2008	100	198.8	-	100	8.3	-
2010	95	294.1	21.6%	99	12.8	24.1%
2014	90	419.1	9.3%	98	18.9	10.3%
2018	82	580.7	8.5%	89	25.5	7.7%
2022	89	632.9	2.2%	93	26.8	1.3%
2026	97	684.6	2.0%	97	28.1	1.2%
2036	112	769.4	1.2%	120	33.5	1.8%
2046	123	876.5	1.3%	137	39.9	1.8%
2066	141	1001.7	0.7%	161	46.5	0.8%
2086	156	1105.6	0.5%	178	51.3	0.5%
2106	171	1199.7	0.4%	195	55.9	0.4%

TABLE 5.8 GSP TRAFFIC AND REVENUE FORECASTS – TOLL SCENARIO V

	Cars			Trucks		
Year	Trans-actions (2008 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)	Trans-actions 2006 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)
2008	100	198.8	-	100	8.3	-
2010	95	294.1	21.6%	99	12.8	24.0%
2014	90	419.0	9.3%	98	19.0	10.3%
2018	82	580.6	8.5%	88	25.6	7.7%
2022	73	775.0	7.5%	83	35.4	8.4%
2026	79	847.3	2.3%	86	37.1	1.2%
2036	92	944.7	1.1%	108	44.5	1.8%
2046	99	1064.5	1.2%	123	53.0	1.8%
2066	115	1234.5	0.7%	145	62.5	0.8%
2086	130	1398.8	0.6%	161	69.7	0.5%
2106	144	1543.9	0.5%	175	76.3	0.5%

TABLE 5.9 GSP TRAFFIC AND REVENUE FORECASTS – TOLL SCENARIO VI

	Cars			Trucks		
Year	Trans-actions (2008 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)	Trans-actions 2006 = 100)	Revenue ($M, 2006 prices)	Average annual growth (%)
2008	100	200.0	-	100	8.2	-
2010	88	319.5	26.4%	92	13.3	27.6%
2014	100	334.6	1.2%	99	13.5	0.5%
2018	98	528.8	12.1%	98	21.9	12.9%
2022	119	658.3	5.6%	120	26.3	4.7%
2026	127	701.7	1.6%	127	27.9	1.5%
2036	141	748.1	0.6%	152	32.1	1.4%
2046	152	835.7	1.1%	173	37.8	1.7%
2066	169	924.4	0.5%	196	42.9	0.6%
2086	184	1004.0	0.4%	212	46.6	0.4%
2106	197	1068.1	0.3%	225	49.6	0.3%

Review of Responses in Demand to Toll Changes

5.14 As part of our work we undertook a review of existing studies of how the level of demand for a toll road might change in the face of changes in toll levels. We note that, in the literature as elsewhere, this is commonly referred to as a toll elasticity – with a concomitant perception that such an elasticity revealed on a particular project is in some way *general* and thus can be transferred/ compared across different projects. This is, of course, not the case: the response of toll road users to changes in toll levels is project specific, reflecting the comparative attractions of the toll road and its competitors. However, given that many projects have been constructed in congested areas, with broadly similar comparative advantage for the tolled facility, it does remain interesting to examine what has happened on other facilities across the United States.

5.15 It was found that there is a considerable body of existing evidence on so-called demand elasticities, with several studies specific to New Jersey and others relating to other States.

5.16 The tolls on the New Jersey toll roads (NJTP, GSP and ACE) are currently low – in comparison with most other facilities within the United States, and certainly with tolled facilities in other advanced economies – while the advantage in using the toll road is high. For most users, the level of toll is well below the indifference price: the toll can, for these users, be raised very significantly before they will seriously consider using a free alternative. At this point, we would expect the revealed demand elasticity to be very low. However, if the tolls increase *significantly* the changes in behavior might themselves become measurable, until a new equilibrium is achieved.

5.17 There are recent studies available for the NJTP and for the crossings between New Jersey and New York, but not for the ACE or the GSP. The evidence from the recent research on the NJTP Time of Day Pricing Initiative suggests that the demand for the road is relatively inelastic to price. This is consistent with the available evidence from time-series data of traffic and revenue for the NJTP, GSP and ACE, which again points to the demand being relatively inelastic.

5.18 In the first phase of this study (the Scoping Study), our analysis was based on an elasticity approach – relying on imported values derived from our experience elsewhere. Elasticity estimates of -0.1 for the NJTP, -0.07 for the GSP and -0.12 for the ACE were adopted, taking on board additional local evidence from time series of transaction and revenue for the NJTP, the GSP and the ACE. In the Phase 2 analysis, however, we employed the State-wide network assignment model to estimate directly the impact of toll increases on GSP usage; this analysis indicated elasticity estimates in a range from -0.1 to -0.2. We have further reviewed the elasticity estimates by time of day, journey purpose and vehicle type. We have found that the out-turn weekday peak elasticities are indeed in line with our Phase I assumptions, but that off-peak elasticities are significantly higher than those adopted earlier. The results obtained from the models are, on review, unsurprising. The assignment models show traffic diverting onto the competing routes, when (as in the off-peak) capacity is genuinely available.

5.19 To provide further validation of our results, we reviewed modeled elasticities developed in work carried out in the development of forecasts for the Indiana Toll Road. On the first 24 miles - close to Chicago with high volumes on the road and in the corridor in general - there is a single toll barrier with a toll of c2.08/ mi and c7.29/ mi,. Here the elasticities derived from the models were -0.23 (cars) and -0.07 (trucks). In the rest of the 125 miles of the road, which runs across the rural areas in the north of Indiana and is lightly used, the elasticities derived from the models were substantially higher, in the range -0.69 to -0.34 for cars and -0.19 to -0.14 for trucks.

5.20 Similarly, work carried out by Maunsell Aecom on the Houston toll road system looking at the response of demand to actual toll increases in 2004, suggested effective elasticities ranging between -0.08 and -0.32. Further, the work showed that, on the predominantly *radial* toll roads, the traffic levels were more responsive to toll changes – while the orbital routes revealed lower elasticities.

5.21 The 2003 paper "Demand Elasticity on Tolled Motorways" by Anna Matas and José-Luis Raymond for the Journal of Transportation and Statistics states that most demand elasticities are within the -0.2 to -0.3 range, though an overall range of -0.03 to -0.5 was found.

5.22 We concluded from this review that the elasticities we derived from the models developed for the analysis in New Jersey were both realistic in terms of the network performance across the State and broadly in line with the behavior of travelers elsewhere.

APPENDIX A

MAPS

FIGURE A.1 GSP NORTHERN SECTION

FIGURE A.2 GSP CENTRAL SECTION

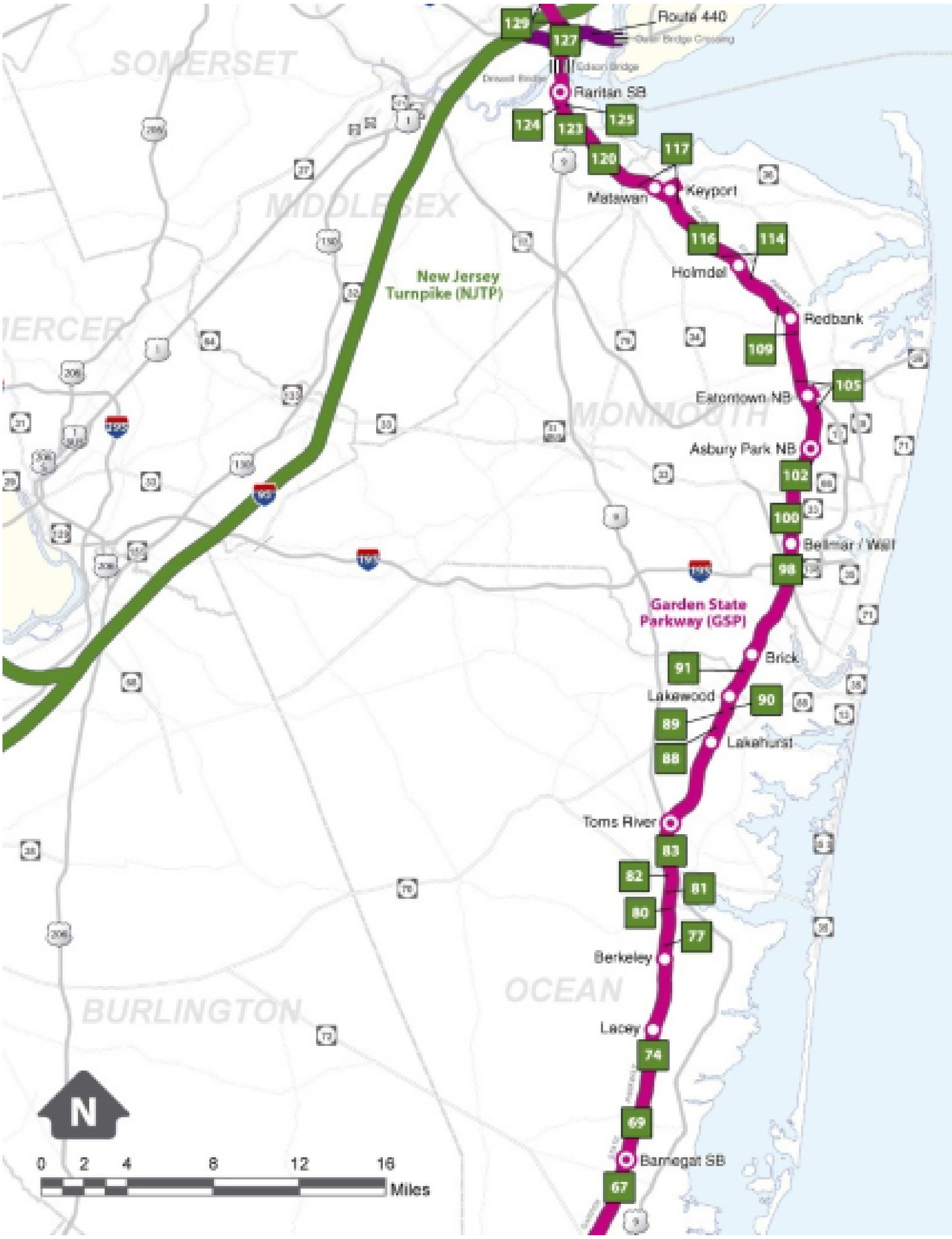
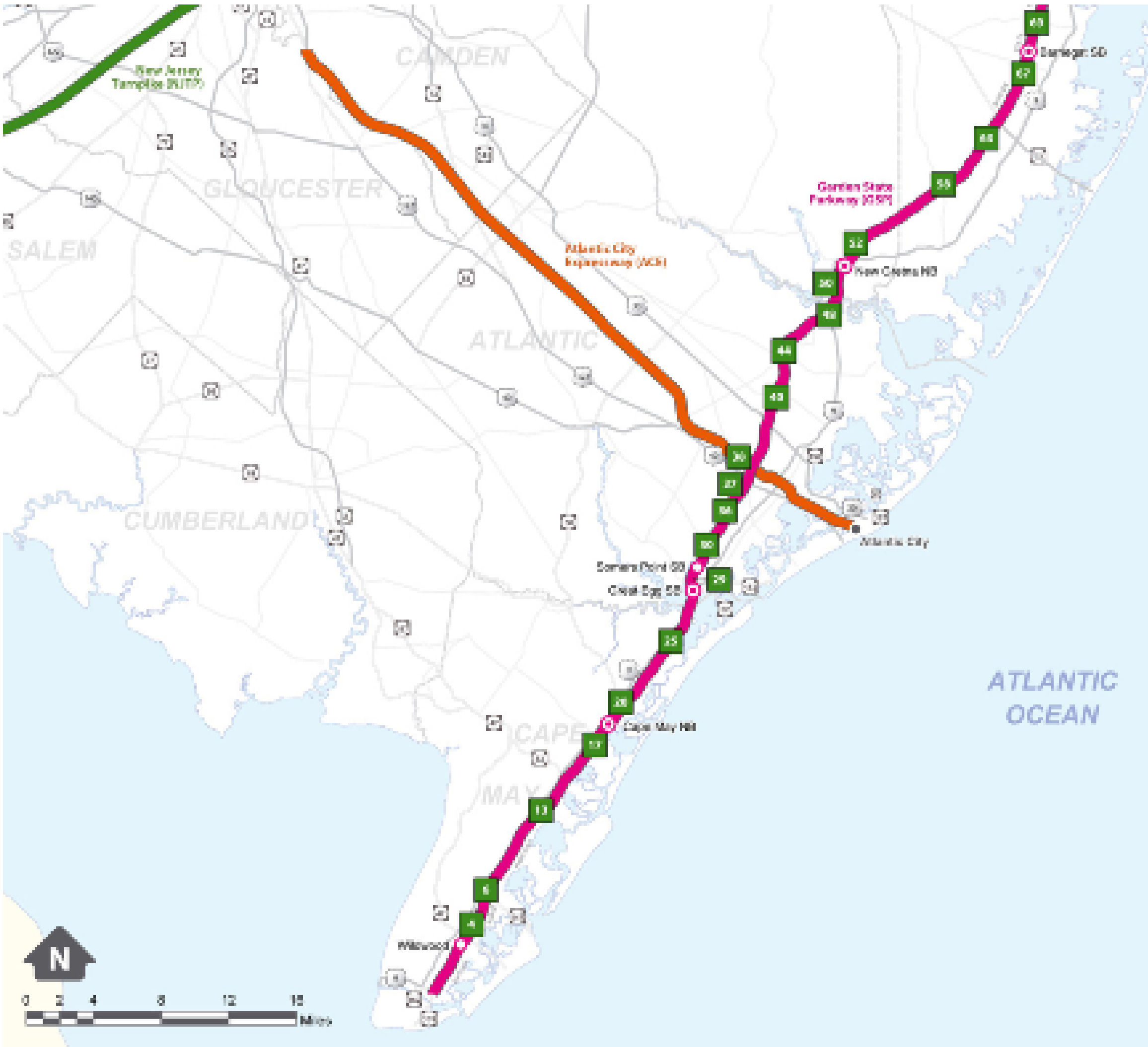


FIGURE A.3 GSP SOUTHERN SECTION



APPENDIX B

FORECASTS

APPENDIX: TABLE B.1 GSP - REVENUE FORECAST SUMMARY ($M, 2006 PRICES)

Year	SC I	SC II	SC III	SC IV	SC V	SC VI
2008	208.5	208.4	208.4	207.1	207.1	208.2
2009	209.4	209.3	209.3	207.3	207.4	209.0
2010	227.5	271.7	310.9	306.9	306.9	332.8
2011	228.3	274.0	314.1	309.2	309.2	337.1
2012	228.9	276.1	317.1	311.3	311.3	341.1
2013	229.4	278.0	319.9	313.2	313.2	344.7
2014	248.8	352.1	449.0	438.0	438.0	348.1
2015	249.1	355.0	454.1	441.9	441.9	351.3
2016	249.4	357.7	458.9	445.5	445.5	354.2
2017	249.5	360.1	463.3	448.8	448.7	356.7
2018	270.1	448.0	493.4	606.2	606.2	550.7
2019	270.0	452.0	497.8	612.5	612.4	553.0
2020	269.8	455.7	501.9	618.2	618.2	555.2
2021	269.6	459.0	505.6	623.5	623.4	557.1
2022	291.4	487.5	537.8	659.7	810.3	692.5
2023	290.8	490.8	541.5	665.1	816.4	693.2
2024	290.2	493.8	544.9	670.0	828.2	693.7
2025	289.5	496.4	547.9	674.1	839.2	693.9
2026	312.5	527.0	582.2	712.7	884.4	740.6
2027	311.1	528.7	584.2	717.1	888.2	739.9
2028	309.3	529.0	584.7	721.7	896.7	738.1
2029	307.4	529.0	584.9	725.8	904.5	735.9
2030	330.5	559.2	618.8	768.1	950.7	783.2
2031	326.9	556.6	616.0	767.6	946.8	777.4
2032	323.3	553.9	613.0	766.8	949.0	771.5
2033	319.7	550.9	609.9	765.8	950.1	765.5
2034	342.1	579.9	642.2	805.4	993.4	811.0
2035	338.3	576.9	639.0	804.3	988.1	804.6
2036	334.5	573.8	635.6	802.9	989.2	798.2
2037	330.7	570.5	632.1	801.3	989.7	791.7
2038	353.7	600.5	665.5	842.6	1035.0	838.7
2039	349.7	597.1	661.9	840.9	1028.9	831.9
2040	345.6	593.6	658.1	838.9	1029.3	825.0
2041	341.6	590.0	654.2	836.5	1029.1	817.9

2042	365.2	621.1	688.9	879.5	1076.3	866.5
2043	360.8	617.4	684.8	877.2	1069.4	859.1
2044	356.4	613.5	680.7	874.6	1069.1	851.6
2045	352.1	609.6	676.4	871.6	1068.3	844.1
2046	376.2	641.7	712.2	916.4	1117.4	894.1
2047	371.6	637.6	707.8	913.4	1109.8	886.3
2048	367.0	633.4	703.2	910.2	1108.9	878.3
2049	362.5	629.1	698.5	906.8	1107.5	870.3
2050	386.3	660.6	733.6	950.1	1155.1	919.5
2051	380.6	654.5	726.9	943.7	1143.4	908.9
2052	374.8	648.3	720.1	937.0	1138.7	898.1
2053	369.1	642.1	713.3	930.2	1133.4	887.0
2054	393.2	674.3	749.1	974.7	1182.4	936.8
2055	387.4	669.0	743.4	968.0	1172.9	925.8
2056	381.7	663.6	737.6	960.8	1170.2	914.9
2057	376.0	658.2	731.7	953.0	1167.0	903.9
2058	400.7	692.4	769.9	1000.0	1220.6	955.3
2059	394.7	686.8	763.8	992.2	1210.4	943.9
2060	388.9	681.1	757.6	984.2	1207.1	932.5
2061	383.2	675.3	751.2	976.0	1203.3	921.1
2062	408.2	710.4	790.7	1024.2	1258.8	973.6
2063	402.1	704.3	784.2	1015.9	1247.9	961.7
2064	396.2	697.8	777.6	1007.4	1243.9	949.9
2065	390.3	691.3	770.5	998.8	1239.5	938.1
2066	415.7	727.5	811.1	1048.2	1297.1	991.6
2067	409.5	720.8	803.8	1039.5	1285.4	979.3
2068	403.4	714.0	796.3	1030.6	1280.5	967.1
2069	397.4	707.2	788.7	1021.5	1274.2	954.9
2070	423.1	744.2	830.4	1072.1	1334.3	1009.4
2071	416.8	737.2	822.7	1062.9	1321.0	996.8
2072	410.6	730.2	814.8	1053.6	1314.5	984.2
2073	404.5	723.1	806.9	1044.1	1307.5	971.7
2074	430.6	761.0	849.7	1095.8	1369.5	1027.2
2075	424.0	753.4	841.2	1085.9	1355.0	1013.9
2076	417.6	745.8	832.7	1075.7	1347.4	1000.8
2077	411.2	738.1	824.1	1064.8	1339.3	987.7
2078	437.5	776.6	867.7	1117.4	1402.5	1043.9
2079	430.6	768.7	858.9	1106.2	1387.3	1030.3

2080	423.8	760.8	849.9	1094.9	1379.2	1016.8
2081	417.0	752.8	841.0	1083.6	1370.6	1003.4
2082	443.4	792.0	885.6	1137.2	1435.5	1060.5
2083	436.4	783.9	876.3	1125.7	1419.7	1046.7
2084	429.4	775.6	867.0	1114.1	1411.0	1032.9
2085	422.6	767.4	857.6	1102.4	1401.9	1019.1
2086	449.2	807.4	903.3	1156.9	1468.4	1077.2
2087	442.1	798.9	893.6	1145.1	1452.1	1063.0
2088	435.0	790.4	883.9	1133.2	1442.8	1048.6
2089	428.1	781.8	874.2	1121.2	1432.7	1034.1
2090	455.0	822.6	920.8	1176.7	1501.4	1093.0
2091	447.8	813.8	910.8	1164.5	1484.4	1077.9
2092	440.6	805.0	900.7	1152.2	1473.6	1063.0
2093	433.6	796.2	890.6	1140.0	1462.3	1048.2
2094	460.8	837.7	938.2	1196.4	1533.6	1108.0
2095	453.5	828.7	927.8	1183.9	1515.2	1092.6
2096	446.2	819.6	917.4	1171.3	1503.7	1077.3
2097	439.0	810.5	906.9	1158.7	1491.8	1062.2
2098	466.5	852.8	955.6	1216.1	1564.7	1122.8
2099	459.0	843.4	944.8	1203.3	1545.7	1107.0
2100	451.6	834.1	934.0	1190.4	1532.8	1090.4
2101	444.3	824.7	923.2	1177.4	1519.1	1074.0
2102	472.0	867.8	972.9	1235.8	1593.5	1135.8
2103	464.4	858.2	961.7	1222.6	1572.8	1118.8
2104	457.0	847.8	950.6	1209.4	1558.7	1101.9
2105	449.6	837.2	939.5	1196.1	1544.5	1085.3
2106	477.6	882.0	990.1	1255.5	1620.2	1147.8
2107	469.9	871.1	978.7	1241.7	1599.0	1130.5

APPENDIX C

LANE EXPANSIONS

APPENDIX: TABLE.1 GSP - LANE EXPANSIONS

		Scenario I		Scenario II		Scenario III		Scenario IV		Scenario V		Scenario VI	
	Milepost	PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY	SECONDARY
Cape May		No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion
Great Egg		No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion
Barnegat	63 - 82	2037	No expansion	2068	No expansion	2098	No expansion	No expansion	No expansion	No expansion	No expansion	2051	No expansion
Toms River	82 - 102	2041	2105	2059	No expansion	2064	No expansion	2084	No expansion	No expansion	No expansion	2055	No expansion
Asbury Park	102 - 125	2049	No expansion	2072	No expansion	2079	No expansion	2095	No expansion	No expansion	No expansion	2067	No expansion
Raritan	125 - 142	2012	2016	2016	2027	2026	2031	2040	2055	2067	2082	2021	2022
Union	142 - 150	2016	2020	2027	2032	2031	2038	2054	2063	2079	2092	2022	2028
Essex	150 - 160	2015	2029	2022	2039	2023	2042	2031	2059	2047	2083	2021	2036
Bergen	160 - 166	2045	No expansion	2071	No expansion	2082	No expansion	No expansion	No expansion	No expansion	No expansion	2083	No expansion
Hillsdale		No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion	No expansion