US 301 MAINLINE TOLL ROAD
TRAFFIC AND REVENUE FORECAST

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FINAL

Prepared for The Delaware Department of Transportation

In association with:

Alliance Transportation Group

Stantec

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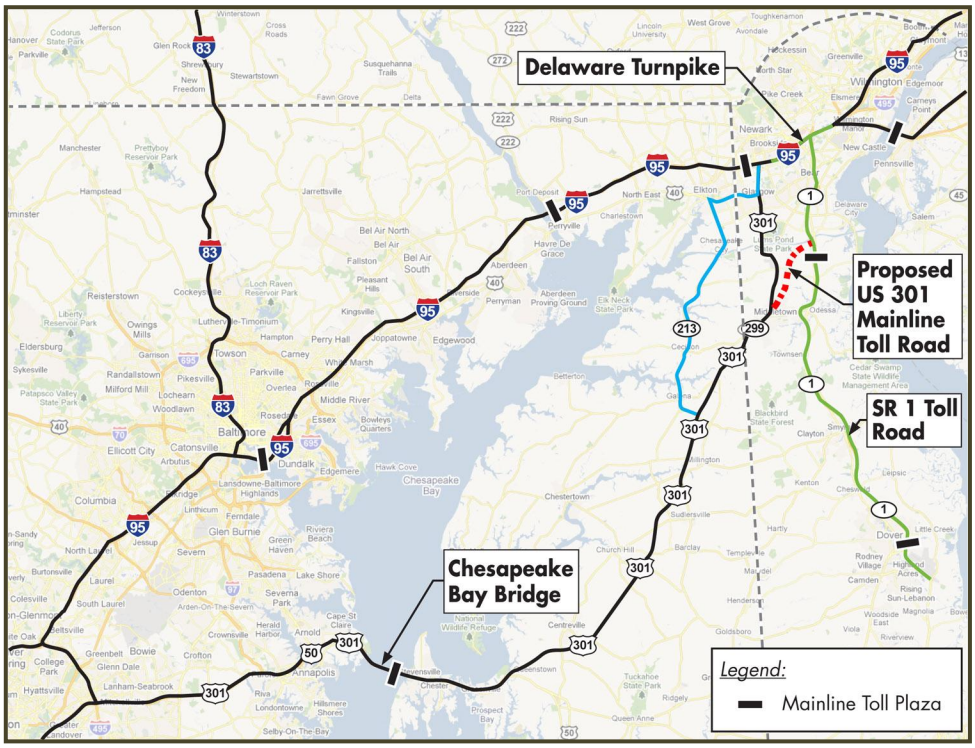
EXECUTIVE SUMMARY

The traffic and toll revenue forecasts for the proposed US 301 Mainline Toll Road have been prepared in connection with Delaware Department of Transportation's (DelDOT's) financing of the project. The purposes of the US 301 Mainline Toll Road, referred to as the "US 301 Project", are to reduce projected roadway congestion, improve safety on the local arterial roadways and manage long-haul auto and truck traffic through the rapidly-growing area surrounding Middletown, Delaware. The proposed route is shown in Figure ES-1.

This report presents the estimates of the traffic and toll revenue for the project configuration based on the final approved alignment. The traffic and revenue estimates were developed using an enhanced version of the DelDOT Statewide Transportation Model as well as the latest version of the Stantec Toll Diversion Model. Forecasts were prepared for a 40-year horizon period consistent with the anticipated financing.

Figure ES-1
Principal Routes in the Delaware / Chesapeake Bay



ES.1 Project Description

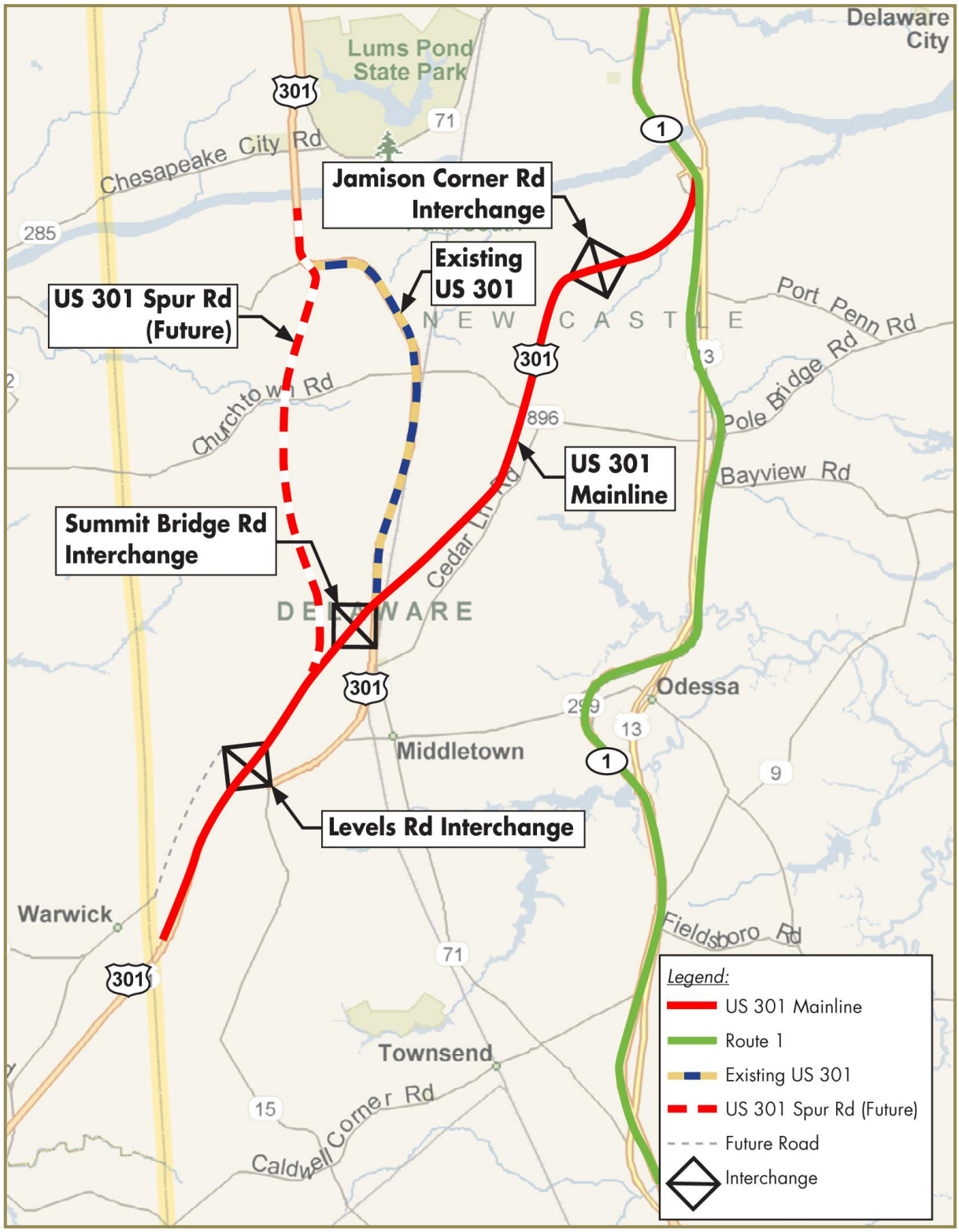
The proposed US 301 Mainline Toll Road will improve travel along existing US 301 in the Northeast Corridor between Washington, D.C. and Wilmington, Delaware and provides an attractive alternative to traveling on the highly congested sections of I-95. US 301 in Maryland is a controlled-access roadway between the Chesapeake Bay Bridge and the Delaware state line, with limited at-grade intersections. The US 301 Mainline Toll Road will extend from a connection with the Maryland section of US 301 at the state line passing west of Middletown, and then northward and eastward, tying into SR 1 south of the Chesapeake & Delaware (C&D) Canal. Accordingly, US 301 Mainline Toll Road will be routed via SR 1 over the Canal Bridge and the current routing designation via SR 896 to US 40 will be removed.

The conceptual alignment for US 301 Toll Road is provided in Figure ES-2. Note that with the completion of the new toll road, the existing US 301 alignment near Middletown would be a different state route designation. This road will be designated as SR 71 from Bethel Church Road to North Broad Street, and as SR 299 south of Main Street. This road will also be known locally as Summit Bridge Road from Bethel Church Road to North Broad Street and as Middletown Warwick Road between North Broad Street and MD State line. Traffic would be able to use the proposed Summit Bridge Road Interchange to access SR 896 to cross the C&D Canal via the Summit Bridge.

The new toll road will be constructed as a four-lane limited access roadway with a total length of approximately 14 miles. The new toll road will have interchanges at Levels Road, Summit Bridge Road (Existing US 301 Alignment) and Jamison Corner Road. For this analysis, it was assumed that the US 301 Mainline would be completed and would initiate tolled operation in July 2016.

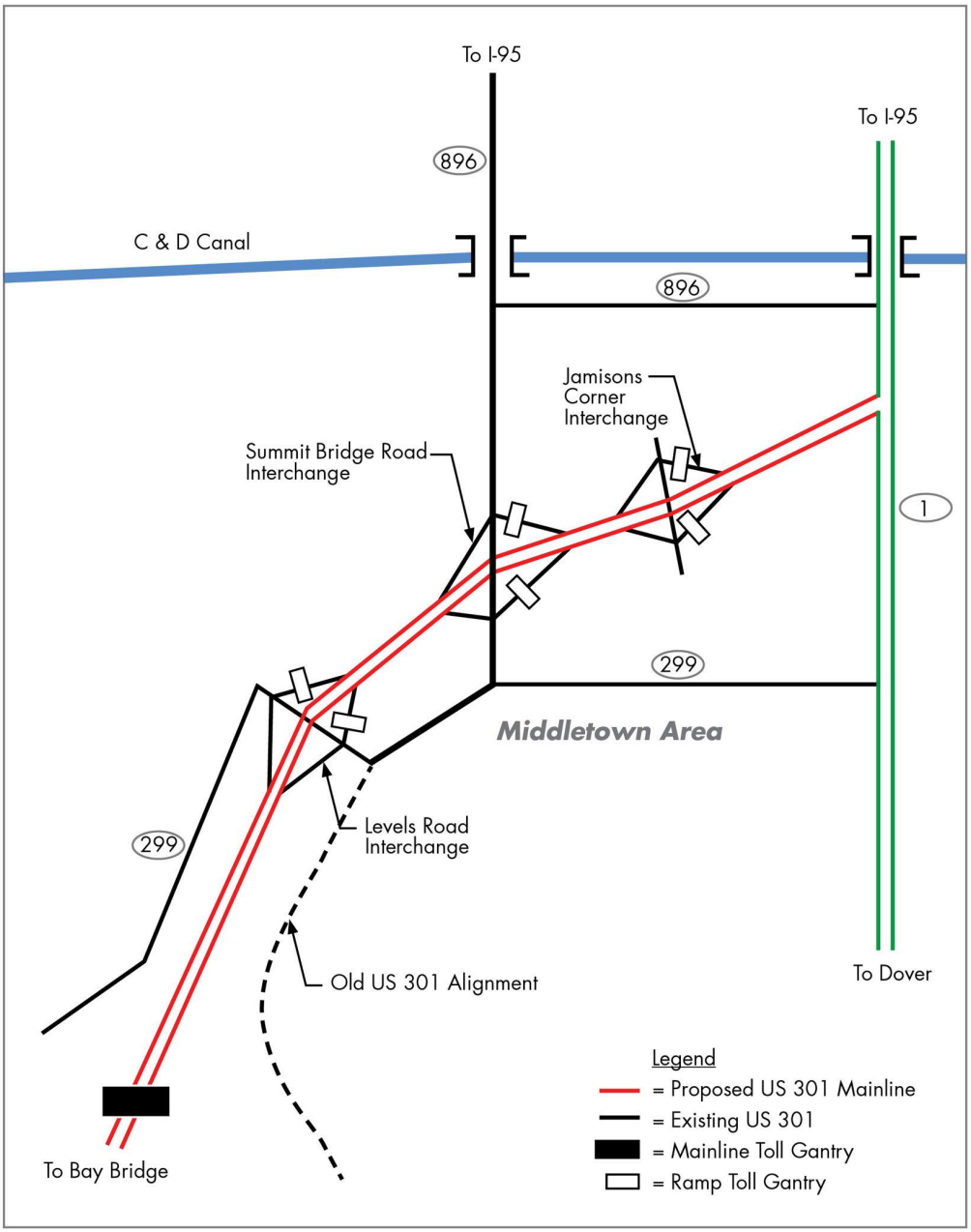
The US 301 Mainline Toll Road Project also includes a Spur Roadway as a future project that would provide a direct connection to SR 896 immediately south of the Summit Bridge. For this Traffic and Revenue Report, it is assumed that the US 301 Spur Road will be financed after the US 301 Mainline Toll Road is financed and that the US 301 Spur Road will not be constructed until after the US 301 Mainline Toll Road is opened to traffic.

Figure ES-2
US 301 Mainline Toll Road Alignment



As shown in the schematic in Figure ES-3, toll charges are assessed at a mainline gantry just east of the Maryland state line and on gantries on the ramps serving traffic to/from the north at the Levels Road, Summit Bridge Road, and Jamison Corner Road Interchanges. The toll collection plan is designed as a “closed system” that requires all trips using the facility to pay a toll.

Figure ES-3
US 301 Mainline Toll Road



The US 301 Mainline Toll Road will be operated as an All Electronic Toll (AET) collection facility. Tolls will be collected by transponder or by video recognition only; there will be no cash toll collection. Tolls for video recognition transactions will have a surcharge of 40 percent for passenger cars and 20 percent for trucks. Video transactions will be billed by mail, no additional statement or mailing fees are anticipated for video transactions. License plates will be recorded and the mailing information will be obtained from the state agency responsible for maintaining this information. As shown in the schematic in Figure ES-3, toll charges are assessed at a mainline gantry just east of the Maryland state line and at the ramps serving traffic to/from the north at each of the interchanges.

The route designation of certain roadways will be altered and a series of truck restrictions will also be implemented to prohibit trucks from using local roads adjacent to the new toll road. Due to the planned truck restrictions, it is anticipated that some northbound trucks seeking a non-tolled alternative route will exit US 301 at the intersection with MD 313 in order to access MD 213 and US 40 via Elkton, Maryland.

ES.2 Existing Travel Patterns

Traffic count, origin/destination survey data and travel time/speed survey data from existing sources and new field surveys for this study were used to develop travel patterns in the project area and to support the development and calibration of the travel demand model for this project.

Table ES-1 lists the traffic growth at permanent count stations on US 301 in Delaware and MD 213 from 2000 to 2011. While MD 213, as an existing 2-lane roadway, is not a significant competing route currently, it has the potential to be a competing non-tolled route, especially for trucks, when the US 301 Mainline Toll Road is completed.

Table ES-1
US 301/MD 213 Traffic Growth, 2000-2011

Year	US 301[A]		MD 213[B]	
	AADT	Change	AADT	Change
2000	12,188		9,894	
2001	12,675	4.0%	9,814	-0.8%
2002	14,399	13.6%	10,410	6.1%
2003	14,439	0.3%	10,409	0.0%
2004	14,613	1.2%	10,829	4.0%
2005	14,725	0.8%	10,784	-0.4%
2006	14,611	-0.8%	10,706	-0.7%
2007	15,552	6.4%	10,402	-2.8%
2008	15,581	0.2%	10,088	-3.0%
2009	14,259	-8.5%	9,022	-10.6%
2010	14,435	1.2%	8,260	-8.4%
2011	15,470	7.2%	10,019	21.3%

Notes:
(A) North of Warwick Rooad (SR 299) Permanent ATR 8016
(B) Near MD 310 (Permanent ATR P0058) - South of C&D Canal

The average daily traffic (AADT) along US 301 had an average annual growth of 2.2 percent between years 2000 to 2011. During this period, there were periodic upward spikes in several years, with a significant increase of 7.2 percent in 2011 as a result of improved economic conditions following the recession of 2007-2009. For example, in 2007, the AADT increased considerably at a rate of 6.4% compared to traffic from previous year as shown in Table ES-1. The increase could be attributed to traffic diverting from I-95 due to the toll increase at the I-95 Newark Toll Plaza that year. The auto and truck toll rates were increased from $3.00 to $4.00 and from $8.00 to $9.00 (5-axle rate), respectively.

In July, 2008, DelDOT installed a new permanent count station on US 301 immediately adjacent to the state line in the vicinity of the proposed location of the mainline gantry for the US 301 Mainline Toll Road. Currently, full year data for 2009 through 2011 are available. As shown in Table ES-2 the annual changes in between 2009 and 2011 indicate a slight increase but note that overall traffic is lower than the permanent count Station 8016 located further north since that location includes traffic merging onto US 301 from SR 299 (Warwick Road). Traffic at the northerly location had a significant increase in 2011 due possibly to the new developments along US 301 just south of Middletown.

Table ES-2
Traffic Growth on US 301 at State Line, 2008-2011

Year	US 301[(A)]		US 301[(B)]	
	AADT	Change	AADT	Change
2008	15,581		NA	
2009	14,259	-8.5%	10,838	NA
2010	14,435	1.2%	11,009	1.6%
2011	15,470	7.2%	11,112	0.9%

Notes:
(A) North of Warwick Rooad (SR 299) Permanent ATR 8016
(B) North of MD state line near proposed mainline toll plaza (ATR 8025)

The new permanent count station at state line also provides classification counts and an estimate of the percentage of vehicles with transponders. Table ES-3 provides a summary of that data for 2008 through 2011. Trucks (all vehicles with 3 or more axles as well as 2-axle–6 tire vehicles) are approximately 23 percent of total traffic.

Table ES-3
US 301 Traffic Growth, 2008-2011

Year	Auto AADT		Truck AADT(A)		Percent Truck		Vehicle with ETC(B)	
	Volume	Change	Volume	Change	Percent	Change	Percent	Change
2008(C)	8,449		2,336		21.7%		40.0%	
2009	8,409	-0.5%	2,429	4.0%	22.4%	3.2%	39.5%	-1.3%
2010	8,547	1.6%	2,462	1.4%	22.4%	0.0%	39.0%	-1.3%
2011	8,523	-0.3%	2,589	5.2%	23.3%	4.0%	39.0%	0.0%

Notes:
(A) Trucks include 2-axle, 6-tire vehicles
(B) Vehicles Equipped with Transponders
(C) 2008 data includes the period of July through December

The percentage of vehicles with transponders is approximately 40 percent and this value is largely unchanged since the new permanent count location was established in July, 2008. The slight reduction in transponder shares in 2010 and 2011 could be related to a slightly lower share of long distance trips as a result of the increase in local trips in the Middletown region. The reduction could also be a result of EZPass fees initiated by Maryland in 2009, as well as a reduction in long distance travel due to higher fuel prices.

Using the new permanent count station statistics at the state line, the number of trucks by axle category was estimated for the 2009 model calibration year, as shown in Table ES-4.

Table ES-4
US 301 Traffic by Vehicle Class for 2009

Vehicle Class	Volume	Percent of	
		Total	Truck
2 axle 4-tire	8,409	77.6%	
2 axle 6-tire	550	5.1%	22.6%
3 axle	62	0.6%	2.6%
4 axle	145	1.3%	6.0%
5 axle	1,642	15.2%	67.6%
6 axle	30	0.3%	1.2%
Total	**10,838**	**100.0%**	**100.0%**

Note that approximately 67 percent of the truck volume is in the 5-axle category. These larger trucks are normally long-haul truck trips as confirmed by the origin-destination survey data.

Travel time and speed data were collected for various roadway segments both for local routes near the proposed mainline toll plaza as well as for long-haul routes serving longer distance travelers. These data were collected by RK&K and Stantec staff in 2005, 2008, and 2010.

Table ES-5 provides a comparison of the travel times on the trips passing through the Middletown area on the US 301 Mainline Toll Road and the nearest non-tolled alternative route. A comparison of travel times and distances for a typical trip using the a non-tolled route following existing US 301 and the proposed US 301 Mainline Toll Road indicates an estimated distance savings of 4 miles and a time savings of 24 minutes for auto trips. For truck trips, the non-tolled alternative routing would use MD 213 which is 27 minutes more and 6 miles longer than the tolled path via the new via the new route.

Table ES-5
Current and Projected Travel Times and Distances in the US 301 Corridor

Mode	Route End Points	Route	Distance (Miles)	Time[(A)] (Min.)	Speed (MPH)
Auto	SR-1/I-95 & US 301/MD 313	Via I-95, SR896, Existing US 301, SR 299 & MD 282	33	52	38
		Via SR 1 and Proposed US 301 Connector Toll Road	29	28	62
		Saving via US 301 Connector Toll Road	4	24	
Trucks	SR-1/I-95 & US 301/MD 313	Via I-95, SR 896, US 40, MD 213, & MD 313	35	55	38
		Via SR 1 and Proposed US 301 Connector Toll Road	29	28	62
		Saving via US 301 Connector Toll Road	6	27	

[(A)] Peak Period Times
For US 301 Connector Toll Road, used 2015 AM Peak Network

For a long distance trip between the northerly decision point at I-95/SR 1 and the southerly decision point at I-95/I-495/US 50 along the Capital Beltway east of Washington, D.C., it is estimated that the US 301 Mainline project would likely reduce approximately 12 minutes off the present 117 minutes, and increase the US 301 average speed to 60 mph (matching that on I-95).

Roadside traffic surveys were conducted by RK&K in 2005 and in 2011 to identify the travel patterns of auto and truck traffic on existing US 301. The results of the 2011 survey were expanded to be representative of traffic patterns in the corridor on a typical weekday in the model calibration year (2009).

Table ES-6 provides a further disaggregation of the survey data by individual origin and destination districts. The state representing most of the trip origins for northbound trips is Maryland, followed by Virginia. For passenger cars, 81 percent of the northbound trips were from Maryland: 67 percent of the trips had origins in the Eastern Shore

counties and remaining 14 percent had origins on the west of the Chesapeake Bay and entered the area via the Bay Bridge. Another 4 percent began in Virginia. For trucks, the major portion of the northbound trips also had origins in Maryland: 28 percent of the trips began in the Eastern Shore and 21 percent came across the Bay Bridge. Another 21 percent began in Virginia. The wide range of trip origins indicates that many of the truck trips on US 301 are not local in nature.

Table ES-6
Trip Origins and Destinations for Northbound Traffic Using US 301 (2011)

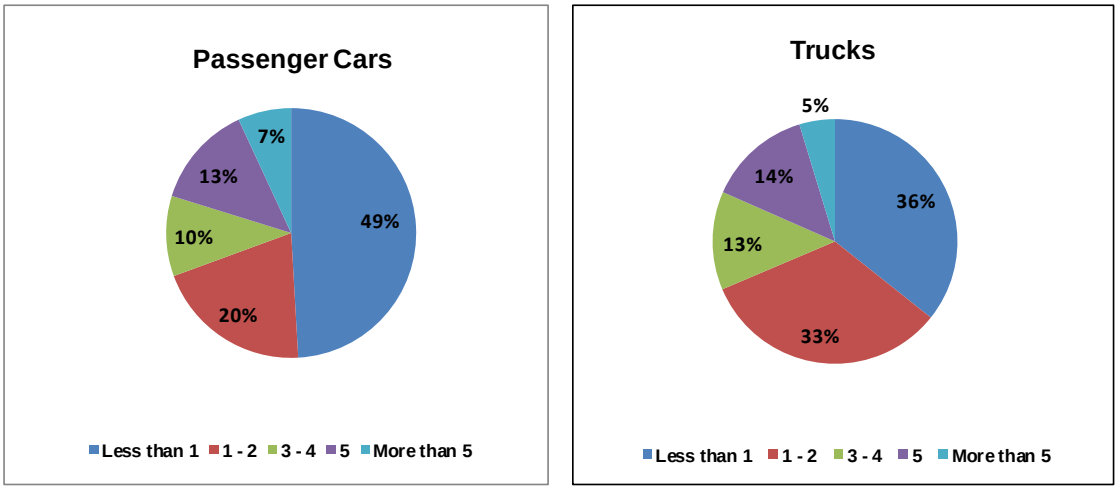
Trip Origins		
Location	**Passenger Cars**	**Trucks**
Delaware - New Castle County, South of C&D Canal	4.5%	0.3%
Delaware - Kent & Sussex Counties	3.7%	2.9%
Maryland - Via Bay Bridge	14.6%	21.1%
Maryland - Eastern Shore	64.5%	25.5%
Maryland - South Eastern Shore	2.2%	3.5%
Virginia	4.4%	21.2%
Others	6.2%	25.5%
Totals	**100.0%**	**100.0%**

Trip Destinations		
Location	**Passenger Cars**	**Trucks**
Delaware - Wilmington Area	7.1%	7.0%
Delaware - North of Canal	16.1%	10.1%
Delaware - South of Canal	40.3%	12.4%
Pennsylvania	14.6%	20.5%
New Jersey	12.1%	28.1%
New York	4.5%	9.0%
Others	5.3%	13.0%
Total	**100.0%**	**100.0%**

Delaware is the state with the highest number of northbound trip destinations, with 64 percent of the passenger car trip destinations and one-third of the truck destinations. Of the northbound passenger cars, 40 percent are going to locations south of the C&D Canal and 16 percent are going to New Castle County, between the Canal and the Wilmington area. Other major destinations for northbound passenger cars are Pennsylvania (14 percent), New Jersey (12 percent) and New York (4 percent). For trucks, northbound trip destinations are more evenly distributed with 26 percent going to New Jersey and 22 percent going to Pennsylvania. The truck trips to Delaware are distributed throughout New Castle County. The trip origins and destinations indicate that many of the trips on US 301 are long distance movements and US 301 provides a logical and cheaper alternative to using I-95 through the congested Baltimore area.

Additional data obtained during the 2011 survey provided information on trip frequency, trip purpose, use of the Chesapeake Bay Bridge, as well as the route used for the reverse trip. With regard to trip frequency, half of the passenger car trips are made less than once a week, indicating infrequent users and 36 percent of the truck trips are made less than once a week, typical of long haul truck movements. Trip frequency for passenger cars and trucks is shown in Figure ES-4.

Figure ES-4
US 301 Trip Frequency



It should be noted that infrequent trip users are less likely to be knowledgeable about other local non-tolled roadways that are in the vicinity of the toll road and would not be likely to divert off of the US 301 Mainline Toll Road.

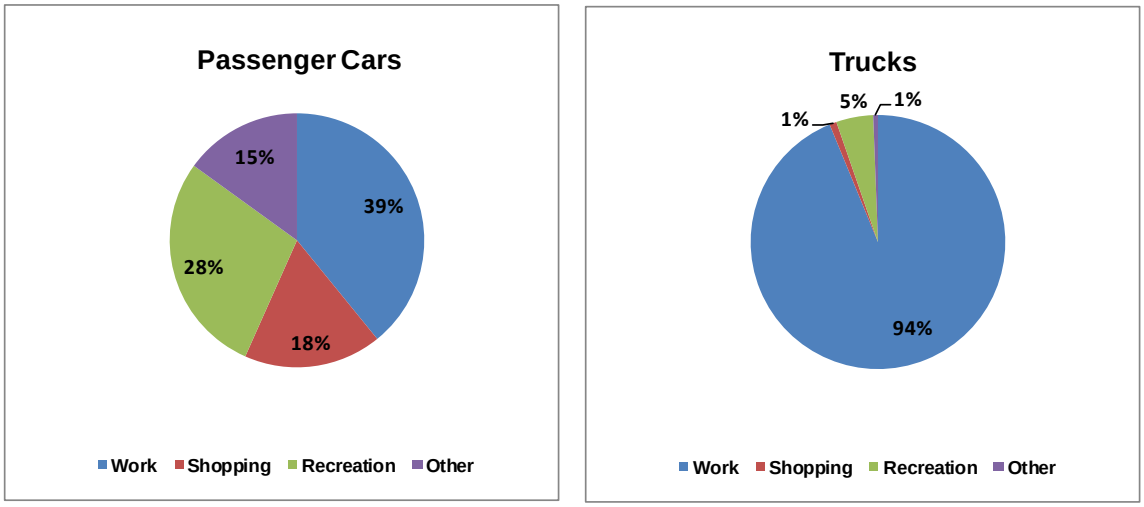
Regarding trip purpose, 39 percent of the trips by passenger cars are for business, which includes both commuter and other types of business trips, such as attending meetings. Approximately 94 percent of the truck trips are for business purposes. The trip purpose is shown graphically for passenger cars and trucks in Figure ES-5.

During the survey, motorists were asked whether or not they used the same route; i.e., US 301, for their return trip. Of the total round trips, 13 percent of the passenger cars and 23 percent of the trucks are using an alternative route for their return trip. This is to be expected since the competing parallel I-95 route is less costly in the southbound direction due to one-way northbound toll collection on the Maryland Turnpike. A higher percent of trucks is using an alternative route for their reverse route most likely because trucks have a higher sensitivity to tolls than passenger cars.

An additional question asked during the survey was whether or not the motorist used the Chesapeake Bay Bridge as part of the trip. Of the passenger cars, 24 percent used the bridge as did 68 percent of the trucks.

In October 2008 and November 2010, Stantec and RK&K conducted a series of travel speed runs along US 301 and the local parallel routes within the corridor. The surveys were performed via multiple trials in both peak and off-peak conditions.

Figure ES-5
US 301 Trip Purpose



The surveys found that the US 301 Corridor via Summit Bridge has only minor variations in travel time by direction and time of day. The lack of variation in travel time is a result of recent widening and other improvements to the alignment of US 301 south of Middletown. Other local corridors exhibit minor variations in travel times and speeds. Route 299 between US 301 and SR 1 shows congestion in the peak periods. MD 213 has an average speed of approximately 44 MPH, which reflects a combination of low speeds near the small towns of Galena, Georgetown and Cecilton, with the remaining sections having a higher speed limit at 55 MPH. Note that these data are used in calibrating the model to ensure reasonable travel speeds for the local competing facilities.

ES.3 Modeling Methodology

The modeling methodology adopted for this project used two separate modeling procedures. The first modeling tool was the DelDOT Regional Model (also known as the Peninsula Model) which was used to develop estimates of overall travel flows in the form of vehicle trip tables for the region. The second modeling tool was a customized assignment process developed by Stantec to estimate toll diversion and traffic assignment. Stantec also obtained the Baltimore Metropolitan Council's (BMC) regional model network and trip tables to assist in abstracting travel west of the DelDOT regional model.

Stantec obtained the latest available 2008 base year and 2040 future year data sets for the DelDOT regional model and executed the regional model with a revised 2009 calibration year socioeconomic data set prepared for this project. The resulting trip

tables were then used as inputs to the customized toll diversion model that performs the highway assignment and the toll diversion model was calibrated to replicate traffic for all roadways in the corridor.

Future year networks were also prepared for each of the horizon years for the modeled period up to the year 2040. Stantec coded the committed and planned improvements to the highway network based on projects identified in the DelDOT's Statewide Regional Long-Range Transportation Plan, published in October 2010, as well as the DelDOT Capital Transportation Program Fiscal Years 2011-2016, published in September 2010; Dover/Kent County Metropolitan Planning Organization Regional Transportation Plan: A Long Range Transportation Plan for 2030; and Delaware Statewide Transportation Plan Update, List of Regionally Significant Projects included in the travel demand model for SIP/TIP Conformity, February 16, 2010. For Maryland, Stantec utilized the projects identified in publically available reports from Maryland DOT and WILMAPCO.

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ES.3.1 Model Calibration

Utilizing existing count data and travel pattern data collected from the field surveys, Stantec performed a final model calibration for the toll diversion process to replicate traffic flows specifically within the US 301 Corridor. This model calibration also included specific analysis related to trips by vehicle type (auto, truck) as well as specific travel patterns that would utilize the US 301 Mainline Toll Road.

Stantec reviewed the model estimated speeds to ensure that values along the roadways in the vicinity of the US 301 Corridor and toll traffic predicted by the model are based on acceptable estimates of speeds and travel times in the corridor. This was an essential part of the model calibration since the level of congestion and potential travel time savings in the corridor are the primary factors influencing diversion of traffic to the tolled facilities.

Daily traffic volumes developed by the model were compared to actual volumes at four key intercept lines encompassing the major facilities traversing the C&D Canal (MD 213, SR 896-Summit Bridge, SR 1, and US 13); at the major toll plazas for the Delaware Turnpike and SR 1; and at the entry points to the regional model. The model closely replicates the observed total volumes crossing the screenlines as well as the auto and truck traffic on the key competing routes, MD 213 and existing US 301 at the state line. The model also adequately replicates the auto and truck traffic at the I-95 Newark plaza and the Chesapeake Bay Bridge that effectively intercept the majority of vehicles traveling along the competing I-95 and US 301 corridors. Stantec also adjusted the toll diversion model to replicate the observed traffic on the SR 1 and I-95 toll facilities, with particular emphasis on tolled traffic at the I-95 Newark Plaza.

ES.3.2 Toll Diversion Methodology

The proportion of traffic predicted to use the tolled lanes is estimated by a customized toll diversion model developed by Stantec and implemented within the highway assignment process. The toll diversion model was structured as binary logit model that estimated the probability of selecting a toll road based on the tradeoff between travel time savings and associated toll costs. The toll diversion model was also structured to enable market segmentation by payment type (i.e., ETC or video-tolling) thereby producing separate traffic forecasts for each market segment. As part of the model development effort, Stantec calibrated and validated the toll diversion model using the 2009 transaction statistics from the Delaware Turnpike and SR 1. It included an extensive validation effort to ensure that the model provides an appropriate level of sensitivity to key policies, such as variation in toll rates.

The values of time for auto trips used in the Toll Diversion Model vary by trip purpose within a range from $10.50 to $19.23 per hour. The weighted average value of time is approximately $15.45, which is approximately 50 percent of the wage rates for the study area counties. Trips with higher values, such as those associated with home-based-work trips and journey-to-work trips, indicate a greater willingness to pay a toll in order to save travel time. For trucks, a relatively high value of time of $45.53 per hour reflects the greater sensitivity related to the delivery of the commodities being transported and costs associated with truckers' salaries.

ES.4 Socioeconomic Forecasts

For this study, historical population and employment and population forecasts prepared by the U.S. Bureau of Census and state agencies were reviewed; conversations were held with representatives of regional and local government agencies; windshield surveys were conducted; inventories were made of platted projects, maps and plans of the study area; and digital aerial photography and other relevant literature were reviewed. Based on this information, and using professional judgment, adjustments were made to the socioeconomic forecasts in the DelDOT 2010 Regional Model.

The study area for this project is defined at two levels: the 12-county region included in the regional transportation model and the local area around the project. The twelve counties included in the regional transportation model are: Kent, New Castle and Sussex counties in Delaware and Caroline, Dorchester, Kent, Queen Anne's, Somerset, Sussex, Talbot, Wicomico and Worchester counties in Maryland. The US 301 study area in the vicinity of the project consists of New Castle County south of the Chesapeake and Delaware Canal and portions of southwestern Cecil County and northwestern Kent County in Maryland.

ES.4.1 Historical and Projected Population Trends

The 2010 population within the 12-county regional model area was 1.3 million according to the U.S. Bureau of Census. During the period 2000 to 2010, the overall growth rate of the 12-county region was 14.2 percent, or a compounded annual growth rate (CAGR) of 1.3 percent, as shown in Table ES-7.

Table ES-7
Historical Population
Delaware Regional Model Area

Area	Estimated Total Population		Average Annual Growth Rate
	2000 Census	2010 Census	
Cecil County, MD	85,951	101,108	1.6%
Kent County, MD	19,200	20,197	0.5%
New Castle County, DE	500,272	538,479	0.7%
Study Area Counties	605,423	659,784	0.9%
Remaining 9 Counties	574,038	687,376	1.8%
Total	1,179,461	1,347,160	1.3%

Source: US Census Bureau

The baseline population control totals in the model were adjusted to develop control totals for each county in the 12-county study area. The socioeconomic data assessed for this study included Wilmington Area Planning Council's (WILMAPCO) 2011 forecasts for New Castle and Cecil counties and data from DelDOT's 2010 Peninsula model for the remaining counties. The revised control totals for the counties reflect the trends noted above and anticipate reasonably modest growth through the forecast year of 2040, while also accounting for a stabilization of the local economy in the near term. The population forecasts are shown in Table ES-8.

Table ES-8
Projected Population
Delaware Regional Model Area

Area	Used in Model		Average Annual Growth Rate
	2010	2040	
Cecil County, MD	101,519	155,883	1.4%
Kent County, MD	20,226	23,580	0.5%
New Castle County, DE	536,583	598,896	0.4%
Study Area Counties	658,328	778,359	0.6%
Remaining 9 Counties	690,518	939,809	1.0%
Total	1,348,846	1,718,168	0.8%

ES.4.2 Historical and Projected Employment Trends

Total employment estimates from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) for 2001, 2007 and 2010 for counties in the DelDOT Regional Transportation Model show that gains between 2001 and 2007 were lost between 2007 and 2010, typical of the response to the recession throughout the country, as presented in Table ES-9.

Table ES-9
Historical Employment
Delaware Regional Model Area

	Estimated Total Employment		
	2001	2007	2010
Cecil County, MD	25,573	30,763	27,822
Kent County, MD	7,914	8,600	7,659
New Castle County, DE	282,318	283,231	261,981
Study Area Counties	315,805	322,594	297,462
Remaining 9 Counties	235,414	266,911	253,186
Total	551,219	589,505	550,648

Source: US Bureau of Census

Baseline employment estimates for the counties were adjusted to the Delaware Department of Labor's and the Maryland Department of Labor, Licensing, and Regulation's QCEW data, as shown in Table ES-10. Using these data led to a lower employment estimate than the 2010 DelDOT model's assumptions. While there are some shortcomings to the QCEW employment estimates, such as not counting agricultural workers and the self-employed, they also are more likely than other data sources to accurately reflect the number of individuals who commute to work.

Table ES-10
Projected Employment
Delaware Regional Model Area

Area	Used in Model		Change	CAGR
	2010	2040	2010 - 2040	2010 - 2040
Cecil County, MD	27,988	46,071	18,083	1.7%
Kent County, MD	7,645	9,325	1,680	0.7%
New Castle County, DE	262,250	279,228	16,978	0.2%
Study Area Counties	297,883	334,624	36,741	0.4%
Remaining 9 Counties	253,342	320,496	67,154	0.8%
Total	551,225	655,120	103,895	0.6%

ES.4.3 US 301 Study Area Growth Patterns

The US 301 study area experienced significant residential and commercial development between 2000 and 2008 and, as residential growth has occurred, so has economic activity. The 12 counties within the DelDOT 2010 Regional Model area are currently experiencing modest population growth and stabilizing employment levels after the effects of the national recession. The area's growth patterns have also been influenced by changes in the Philadelphia-Washington-Baltimore corridor.

Population is anticipated to grow in the US 301 study area, although at more modest rates than prior to the current economic downturn. The overall level of employment within the US 301 study area has likely increased during the past few years with the opening of various retail stores and is expected to grow further with the construction of new medical facilities that will provide a significant increase to the study area's future employment. Both trends should support growing traffic volumes on the proposed US 301 Mainline Toll Road.

ES.5 Toll Collection Plan

The toll collection plan for the US 301 Mainline Toll Road utilizes a system of gantries placed across the mainline just north of the state line in the vicinity of Middletown and on the northerly ramps. These points are located to ensure that all traffic using the facility will pay a toll. Table ES-11 lists the assumed toll rates by number of axles for vehicles using transponders for the FY 2017 opening year. Rates for motorists opting to pay by video recognition will be 40 percent higher than the transponder rate for autos and 20 percent higher for trucks. The proposed toll collection plan also assumed a series of toll increases at five year intervals starting in the year 2021.

Table ES-11
Proposed US 301 Mainline Toll Rates Effective July 2016

Toll Location	Tolls *					
	Auto	Truck				
	2-axle	2-axle 6-tire	3-axle	4-axle	5-axle	6-axle
Middletown Mainline Gantry	$4.00	$4.00	$9.00	$10.00	$11.00	$12.00
Levels Road ramps	$1.00	$1.00	$8.00	$9.00	$10.00	$11.00
Summi Bridge Road ramps	$0.75	$0.75	$8.00	$9.00	$10.00	$11.00
Jamison Corner Road ramps	$0.50	$0.50	$8.00	$9.00	$10.00	$11.00

(*) Tolls are rates for transponder transactions. Video recognition tolls will be 40 percent higher for autos and 20 percent higher for trucks. For example, the 2-axle auto toll for video recognition transactions at the Middletown Mainline Gantry will be $5.60, while the 5-axle truck toll will be $13.20.

The tolls were calculated assuming a rate of 28.6 cents per mile for passenger cars and were rounded to the nearest 25-cent values. Assumed increases of the proposed toll plan are structured to double the initial toll rates by 2036, which implies a compounded annual growth rate of approximately 3.5 percent. The increases are applied at five-year intervals beginning in 2021 and continue for the entire 40-year horizon period. Within Maryland, the tolls were increased in FY 2012 and the approved increase for FY 2014 and periodic adjustments thereafter for the entire forecast period were also included in the analysis.

In comparing the future rates for the long-distance trips via US 301 and I-95, it is important to note that the US 301 routing will maintain a lower overall toll cost when considering the total cost of all the paypoints on the I-95 routing. Table ES-12 lists the total toll costs for transponder patrons using either route for several horizon years. As shown in the table, cost savings for the US 301 Mainline Toll Road are increasing as the over time, providing a competitive advance over the I-95 routing through Maryland.

Table ES-12
Future Toll Rates by Vehicle Type and Route

Year	Auto Tolls			5-Axle Truck Tolls		
	I-95	Bay Bridge / US 301	Cost Savings	I-95	Bay Bridge / US 301	Cost Savings
2016	$ 17.75	$ 10.50	$ 7.25	$ 88.25	$ 49.50	$ 38.75
2021	$ 21.75	$ 13.00	$ 8.75	$ 108.75	$ 61.50	$ 47.25
2031	$ 30.25	$ 18.25	$ 12.00	$ 152.75	$ 85.75	$ 67.00
2041	$ 41.50	$ 24.75	$ 16.75	$ 213.75	$ 119.25	$ 94.50

ES.6 Traffic and Toll Revenue Forecasts

Using the validated toll diversion model along with the anticipated growth in the socioeconomic data and the planned transportation improvements in the DelDOT Regional Model, Stantec developed traffic and revenue forecasts for the US 301 Mainline Toll Road, taking into account the initial (2016) toll schedule and periodic toll increases in 2021, 2026, 2031, 2036 and 2041. The forecast period (2016-2041) reflects the model's five horizon years ending with 2041. The traffic and revenue estimates for the non-modeled years from 2016 through 2041 were developed using standard interpolation techniques.

Beyond 2041, the projected 25th year of operation, revenues were projected out to 2055, the 40th year of operation, with tolls continuing to increase every five years to $12.00 for autos and $33.00 for 5-axle trucks by 2056. For the non-modeled period after 2041, the forecast was based on a linear extrapolation using the growth from the

last 10 years of the modeled period which results in a tapering traffic growth rate (in percentage terms) over time.

As part of toll revenue estimation, assumptions regarding evasion, general 'ramp-up', assumed ETC shares, a truck axle factor, and an annualization factor were adopted. The source and derivations of these assumptions are as follows:

- *Truck Axle Factors*: The truck toll revenue estimates were developed by multiplying the truck toll transactions with the base 2-axle toll rate times an average truck axle factor. The truck axle multipliers were based on the vehicle classification data at each toll facility of US 301, I-95, and SR 1.

- *Annualization Factor:* The annual toll revenue estimates were developed by using an annualization process that calculates "annual toll revenue days" and converts typical weekday revenue estimates to an annual revenue. An annualization factor of 355 was developed based on permanent traffic count data from DelDOT for the count station on US 301 established at the Maryland Stateline.

- *Ramp-Up Factors:* Ramp-up is a term used to describe the period from when a toll road first opens to traffic until it achieves the steady-state traffic flows predicted by the travel demand model. Ramp-up factors of 90 percent and 95 percent were applied in 2016 and 2017. The moderate ramp-up factors reflect the fact that US 301 is an established traffic corridor.

- *Toll Evasion Factors:* Toll evasion rates were developed from available data and evasion experience from the Delaware Turnpike and SR-1. Evasion for ETC transactions is estimated to be 1.5 percent and for video recognition transaction transactions, 44 percent. Toll evasion rates for autos and trucks are assumed to be the same.

- *Transponder Tolling Assumptions*: Assumptions regarding the percentage of traffic with ETC transponders in future years were developed based on the historical ETC usage data from other toll facilities across the country and on the percent of vehicles already equipped with transponders recorded at the state line. In the period from 2008 through 2010, approximately 40 percent of the vehicles crossing the state line were equipped with transponders. With the new facility being operated as an AET roadway, it is assumed that 72 percent of the passenger cars and 64 percent of the trucks will be equipped with ETC transponders in 2016, gradually increasing to 83 percent for autos and 74 percent for trucks in 2041.

Table ES-13 lists the transactions by vehicle type and Table ES-14 lists the revenue by vehicle type by fiscal year at five–year intervals. Annual data are shown in the body of this report. Note that these estimates include both ramp-up and evasion and with the high level of evasion for video tolling assumed in the analysis, the percentage of 'paying' transactions collected by transponders is higher than the initial shares by payment type discussed in the prior paragraph.

Table ES-13
US 301 Mainline Toll Road
Estimated Transactions

FISCAL YEAR	AUTO			TRUCK			TOTAL			
	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	% TRUCK
2017	11,863	2,666	14,529	1,796	594	2,390	13,659	3,260	16,919	14.1%
2022	16,207	2,631	18,838	2,451	650	3,101	18,658	3,281	21,939	14.1%
2027	18,800	2,555	21,355	2,875	680	3,555	21,675	3,235	24,910	14.3%
2032	19,630	2,480	22,110	3,264	730	3,994	22,894	3,210	26,104	15.3%
2037	21,154	2,590	23,744	3,692	795	4,487	24,846	3,385	28,231	15.9%
2042	22,828	2,822	25,650	4,112	887	4,999	26,940	3,709	30,649	16.3%
2047	24,312	2,965	27,277	4,483	958	5,441	28,795	3,923	32,718	16.6%
2052	25,810	3,113	28,923	4,905	1,037	5,942	30,715	4,150	34,865	17.0%
2057	27,320	3,265	30,585	5,279	1,108	6,387	32,599	4,373	36,972	17.3%

Table ES-14
US 301 Mainline Toll Road
Estimated Toll Revenue

FISCAL YEAR	AUTO REVENUE ($1,000)			TRUCK REVENUE ($1,000)			TOTAL REVENUE ($1,000)			
	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	% TRUCK REVENUE
2017	$ 9,048	$ 4,121	$ 13,169	$ 6,307	$ 2,536	$ 8,843	$ 15,355	$ 6,657	$ 22,012	40.2%
2022	$ 15,584	$ 5,282	$ 20,866	$ 10,940	$ 3,521	$ 14,461	$ 26,523	$ 8,803	$ 35,327	40.9%
2027	$ 22,622	$ 6,181	$ 28,803	$ 15,464	$ 4,463	$ 19,927	$ 38,086	$ 10,644	$ 48,730	40.9%
2032	$ 27,520	$ 7,003	$ 34,523	$ 19,940	$ 5,399	$ 25,339	$ 47,460	$ 12,402	$ 59,862	42.3%
2037	$ 34,484	$ 8,469	$ 42,953	$ 25,970	$ 6,796	$ 32,766	$ 60,454	$ 15,265	$ 75,719	43.3%
2042	$ 41,278	$ 10,291	$ 51,569	$ 32,911	$ 8,613	$ 41,524	$ 74,189	$ 18,905	$ 93,093	44.6%
2047	$ 48,551	$ 11,944	$ 60,495	$ 39,946	$ 10,355	$ 50,301	$ 88,497	$ 22,299	$ 110,796	45.4%
2052	$ 56,413	$ 13,724	$ 70,137	$ 46,596	$ 11,949	$ 58,545	$ 103,009	$ 25,674	$ 128,682	45.5%
2057	$ 64,882	$ 15,637	$ 80,519	$ 54,946	$ 13,997	$ 68,943	$ 119,828	$ 29,634	$ 149,462	46.1%

Given the toll plan and the higher level of truck transactions at the mainline tollgantry, the dominant share of revenue is related to tolls collected at the mainline gantry. Over the forecast period approximately 87 percent of the total revenue is obtained from patrons at the malinline gantry, many of which are long-distance trips.

ES.6.1 Impact on Other Routes

The impact on I-95/Delaware Turnpike revenue due to the implementation of the US 301 Mainline Toll Road was estimated in response to the anticipated diversion of some long distance trips from I-95 (via Baltimore). While the exact time savings for the individual trip origins west of the Chesapeake Bay will vary depending on their proximity to the I-95-based routing and the US 50/US 301 routing, the improved travel times from the US 301 Mainline Toll Road should result in some diversion to the new toll road. Using information from the 2011 origin-destination survey and the distribution patterns from the Baltimore Metropolitan Council's regional model, Stantec has made assumptions of the number of trips that would divert to US 301 Toll Road. These trips are assumed to enter the toll road at the mainline plaza and travel the entire length of the toll road to access SR 1 and continue to destinations beyond Middletown.

It is estimated that in the first year of operation, approximately 2.1 percent of the transactions on the new toll road and approximately 2.8 percent of the revenue on the US 301 Mainline Toll Road will be the result of diversions from I-95. By the end of the model-based forecast period (2041), traffic being diverted from I-95 represents 1.9 percent of transactions and 2.4 percent of total revenue on the US 301 Mainline Toll Road.

The higher percentage of revenue in comparison to the percentage of transactions is due to the fact that truck trips represent a larger share of the traffic being diverted to the new toll road. Since toll rates for the Delaware Turnpike's I-95 plaza are nearly identical to the toll rates for the US 301 Mainline Toll Road, any revenues diverted from the Turnpike system will be offset by revenues gained on the new toll road. It should be noted that this loss of revenue on the Delaware Turnpike is relatively minor given that currently there are more than 71,000 daily transactions at the Newark Toll Plaza.

Traffic at two screenlines was summarized to identify any changes in traffic patterns resulting from the new toll road. A screenline north of the project paralleling the C & D Canal indicates that there will be a noticeable diversion to the SR 1 Bridge across the C&D Canal just above the merge point with the new toll road after the opening of the US 301 Mainline Toll Road. This diversion is related to the improved travel times for accessing locations north of the canal provided by US 301 Mainline Toll Road and the fact that the US 301 route designation will be altered so the US 301 will now merge with SR 1 rather than use the existing alignment that is shared with SR 896. As a result, traffic on the existing US 301 alignment that uses the Summit Bridge shows a lower rate of growth. The percentage shares of the other north-south roadways show only minimal changes in response to the new toll road.

A second screenline was established south of the project corridor to identify diversions for traffic south and west of Middletown. Traffic volumes on US 301 south of Middletown near the proposed mainline gantry continues to show an increasing share of the overall corridor traffic in response to the reduced travel times provided by the new toll road. Note that several local roads indicate an increase in the share of corridor traffic. This increase is due to development growth and for some local traffic these roadways provide a non-tolled route into Middletown.

ES.7 Sensitivity Analysis

Stantec analyzed four alternative scenarios to quantify the impact of changes in the assumptions used in the baseline forecasts on estimated transactions and revenue for the US 301 Mainline Toll Road. It is anticipated that these sensitivity analyses will be useful as a starting point for the analyses performed by the rating agencies.

The four sensitivity scenarios are:

1. Reduced growth rates for external trips;
2. Existing DelDOT Toll Collection System (Open Road Tolling/Cash);
3. Discounted tolls for local trips to and from the south; and
4. Assumption that there will be no diversion from I-95 to US 301 Mainline Toll Road.

These sensitivity analyses were performed using the same methodology and regional transportation model as the Base Case. Adjustments were made to the model input only where it was necessary to reflect the specific characteristic being evaluated.

A comparison of toll transactions for the Base Case with the four sensitivity trials is presented in Table ES-15.

Table ES-15
Transaction and Revenue Impacts for Sensitivity Scenarios

Scenario	Percent Different from Base Case	
	Toll Transactions	Revenue
#1 Reduced growth rates for external trips	-5.2%	-9.0%
#2 ORT/Cash toll collection	+12.3%	+11.4%
#3 Discounted tolls to/from south	+3.6%	-6.5%
#4 No diversion from I-95	-2.1%	-2.8%

Two of the sensitivity scenarios (reduced rates for external trips and no diversion from I-95) are estimated to result in fewer transactions and less revenue over the 40-year period included in this analysis. The sensitivity case with ORT, since it provides for cash toll collection, is estimated to result in additional transactions and revenue. The scenario with reduced toll rates for local trips to/from the south is estimated to result in additional trips due to the availability of a discounted toll; however, this is estimated to result in lower toll revenues.

1 INTRODUCTION

The traffic and toll revenue forecasts for the proposed US 301 Mainline Toll Road have been prepared in connection with Delaware Department of Transportation's (DelDOT's) financing of the project. The purpose of the US 301 Corridor Improvements, of which the US 301 Mainline Toll Road is a component, is to reduce projected roadway congestion, improve safety, and manage long-haul auto and truck traffic through the rapidly growing area surrounding Middletown, Delaware. DelDOT has conducted the analysis of the US 301 Corridor Improvements since 2004 to identify and evaluate alternatives that improve traffic flow in the US 301 / SR 896 Corridor. Multiple alternatives were evaluated and a preferred alternative was selected as part of an extensive NEPA study. The Final Environmental Impact Statement (FEIS) was approved on November 30, 2007 and the Federal Highway Administration (FHWA) granted final approval of the proposed US 301 Mainline Toll Road on April 30, 2008.

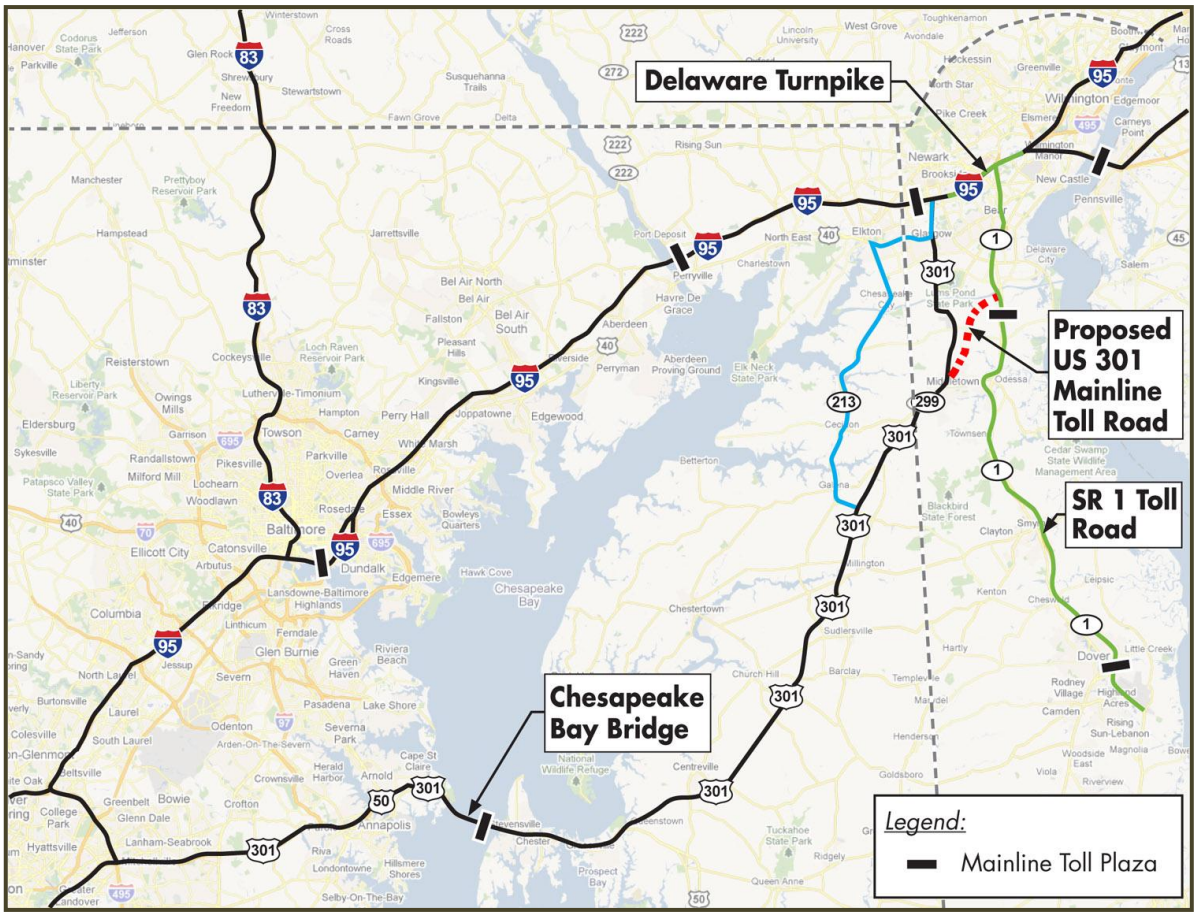
In association with DelDOT's general engineering consultant for the project, Rummel, Klepper, & Kahl, LLP (RK&K), Stantec Consulting Services Inc. (Stantec) has conducted this investment-grade study to estimate traffic and revenue for the proposed US 301 Mainline Toll Road. This study was a continuation of ongoing toll feasibility analyses conducted since 2005 in conjunction with alternative analysis and environmental studies that were performed to obtain federal approval to implement the new facility. During the course of these prior studies, the latest available estimates of current population and employment along with anticipated future development and changes in land use were utilized. This report presents the estimates of the traffic and toll revenue for the project configuration based on the final approved alignment. The traffic and revenue estimates were developed using an enhanced version of the DelDOT Statewide Transportation Model as well as the latest version of the Stantec Toll Diversion Model. Forecasts were prepared for a 40-year horizon period consistent with the anticipated financing.

1.1 US 301 Corridor and Mainline Toll Road

The proposed US 301 Mainline Toll Road will be part of existing US 301 Highway that connects US 50 in the northeastern Washington D.C. suburbs with I-95 just south of Newark Delaware. The Maryland section of US 301 is a 4-lane high speed, at-grade divided highway with some grade-separated interchanges at major cross-roads. Given the relatively rural area that US 301 traverses and the grade separated interchanges at major crossroads, the roadway functions primarily as a rural expressway for nearly 60 miles from the Chesapeake Bay Bridge to the State Line just west of Middletown, Delaware. Within Delaware, US 301 is configured as an arterial with signalized intersections in Middletown and its alignment extends northward over the C&D Canal to US 40 and the Delaware Turnpike (I-95) via SR 896. From Middletown, traffic on US

301 can also access SR 1 and US 13 via either SR 299 or SR 896. Figure 1-1 shows the extent of the proposed US 301 Mainline Toll Road along with I-95/Delaware Turnpike and SR 1, Delaware's other toll roads in the Chesapeake Bay region and Delaware Peninsula. Note that other toll facilities in Maryland such as the I-95 JFK Expressway and the Baltimore Harbor crossings also influence the longer-distance traffic that could potentially use US 301.

Figure 1-1
Principal Routes in the Delaware / Chesapeake Bay Region



The proposed US 301 Mainline Toll Road provides a limited access roadway, extending from the Maryland's US 301 at the state line, west of Middletown, to SR 1, north of the Biddles Toll Plaza and south of the C&D Canal. This alignment effectively allows long-haul traffic to traverse the rapidly growing Middletown area without using the existing arterial roadways. Furthermore, this new roadway will enable long-haul traffic destined to locations in the northeast region to utilize the higher-speed limited access SR 1 to reach I-95 (Delaware Turnpike) rather than to access I-95 via existing arterials that comprise US 301 and SR 896 south of Newark.

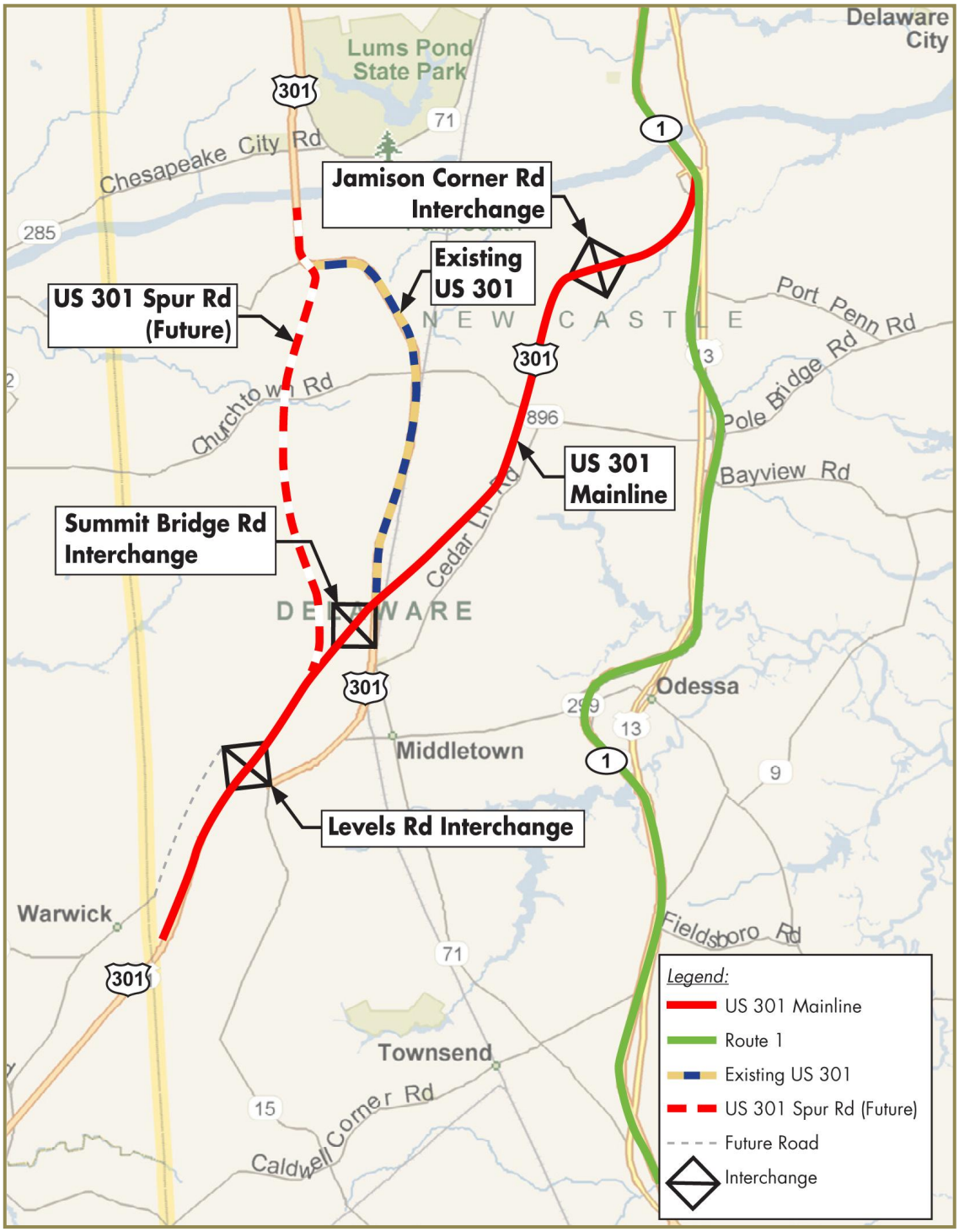
The alignment of the US 301 Mainline Toll Road is shown in Figure 1-2. The new toll road will have interchanges at Levels Road, Summit Bridge Road (Existing US 301 Alignment) and Jamison Corner Road. Note that with the completion of the new toll road, the existing US 301 Alignment near Middletown would have a different state route designation which has not yet been determined. Traffic would be able to use the proposed Summit Bridge Road Interchange to access SR 896 to cross the C&D Canal via the Summit Bridge. The US 301 Mainline Toll Road Project also includes a Spur Roadway as a future project that would provide a direct connection to SR 896 immediately south of the Summit Bridge. For this Traffic and Revenue Report, it is assumed that the US 301 Spur Road will be financed after the US 301 Mainline Toll Road is financed and that the US 301 Spur Road will not be constructed until after the US 301 Mainline Toll Road is opened to traffic.

1.2 Study Purpose and Scope

The purpose of this study was to prepare investment-grade traffic and toll revenue forecasts for the proposed US 301 Mainline Toll Road. This study identified the current demographic and economic trends in the Middletown, Delaware region and incorporated these trends into a review and adjustment of socioeconomic forecasts from the DelDOT Regional Travel Demand Model. The study also utilized an extensive set of traffic data collected over the last several years as well as the latest available version of the DelDOT regional transportation model as the basis for this analysis. Additional traffic data were collected to replicate the current travel characteristics by surveying travel speeds in major corridors, traffic counts by vehicle classifications at significant locations, and origin-destination travel patterns in the project area. Future year highway network improvements for the background highway network were identified from capital programs and long range plans in the project study area of Delaware and Maryland. The configuration and anticipated completion dates for the project improvements were confirmed by discussions with the relevant state agencies.

The DelDOT regional model was used as the basis for predicting overall travel demand in the corridor including the long-distance trips that comprise the key market for the project. As part of this effort, the regional model was reviewed for consistency and logic. The regional model generated estimates of overall demand in the form of trip matrices for each horizon year using the adjusted socioeconomic data for the future horizon years along with the anticipated growth in long-distance trips from beyond the region.

Figure 1-2
US 301 Mainline Toll Road Alignment



The trips estimated from the DelDOT model were converted into time-of-day trips for use in the customized toll diversion model developed by Stantec. The toll diversion model was calibrated to replicate the 2009 observed tolled traffic on Delaware's toll facilities as well as other non-tolled roadways including US 301 at the state line. The customized toll diversion model was then used to forecast tolled traffic and generate a gross revenue stream for the 40-year forecast period. The model estimates were adjusted for both ramp-up and toll evasion. As part of this effort, sensitivity analyses were also performed for several scenarios as discussed in Chapter 10 and revenue from customer service processing is estimated in Chapter 11.

1.3 Organization of the Report

The traffic and revenue report has been organized into a series of chapters. The contents of each chapter are described as follows:

- Chapter 2 – Project Description – provides a summary of the project alignment and its connections to the existing roadway network. This chapter also summarizes the proposed toll collection plan and the configuration of adjacent roadways that are altered as part of the project alignment.

- Chapter 3 – Existing Travel Patterns – summarizes the traffic conditions in the project area such as the traffic trends for the existing US 301, the daily traffic counts for the major roadways in the study area, the travel speeds for the major corridors, and the origin-destination travel patterns for autos and trucks. This data was also used to calibrate the toll diversion model for conditions in the year 2009.

- Chapter 4 – Modeling Methodology – describes the overall modeling methodology developed for the study. This includes the application of the DelDOT Regional Model as well as the development and calibration of the toll diversion model.

- Chapter 5 – Socioeconomic Forecasts – provides independent estimates of current conditions as well as revised forecasts that reflect the current economic conditions for the region. This analysis was prepared by Stantec's subconsultant, Alliance Transportation Group.

- Chapter 6 – Toll Collection Plan – describes the tolling plan and rates by vehicle class and payment types for the proposed US 301 Mainline Toll Road. The chapter also includes the future toll rates for the assumed periodic rate increases for the US 301 Mainline Toll Road. Future year toll rates for other facilities are described in Chapter 7.

- Chapter 7 – Background Highway Improvements – summarizes the major project improvements identified in the capital program as well as the long range plans for Delaware and Maryland. These project improvements are included in the future background highway networks as well as the assumed rate increases for the competing toll facilities in Maryland and the Delaware Turnpike. Lastly, the chapter includes a description of the proposed truck restrictions on local roadways adjacent to the proposed mainline toll plaza near the state line.

- Chapter 8 – Traffic Forecasts – provides a summary of the daily toll transactions for the 40-year horizon period from the opening in July, 2016 to 2056. The traffic diversion from major corridor screenlines is also analyzed.

- Chapter 9 – Toll Revenue Estimates - presents the annual toll revenue forecast with the assumptions of annualization and ramp-up for the base case conditions. This chapter also includes a discussion of limitations and disclaimers related to the forecasts.

- Chapter 10 – Sensitivity Analysis – analyzes the impacts of varying input assumptions, such as lower growth in external traffic volumes, alternative toll plans, and a condition where there is not diversion from existing I-95 traffic.

- Chapter 11 – Estimated Customer Service Revenues – estimates of customer service revenues derived from the enforcement of tolls from video patrons were prepared in for DelDOT planning purposes. These estimates were not included in the projected revenue stream for bond support.

2 PROJECT DESCRIPTION

This chapter provides a comprehensive description of the US 301 Mainline Toll Road and its connections with the existing roadway network. As part of this chapter, a description of the proposed toll collection plan is provided as well as the configuration of adjacent roadways that are altered as part of the project alignment.

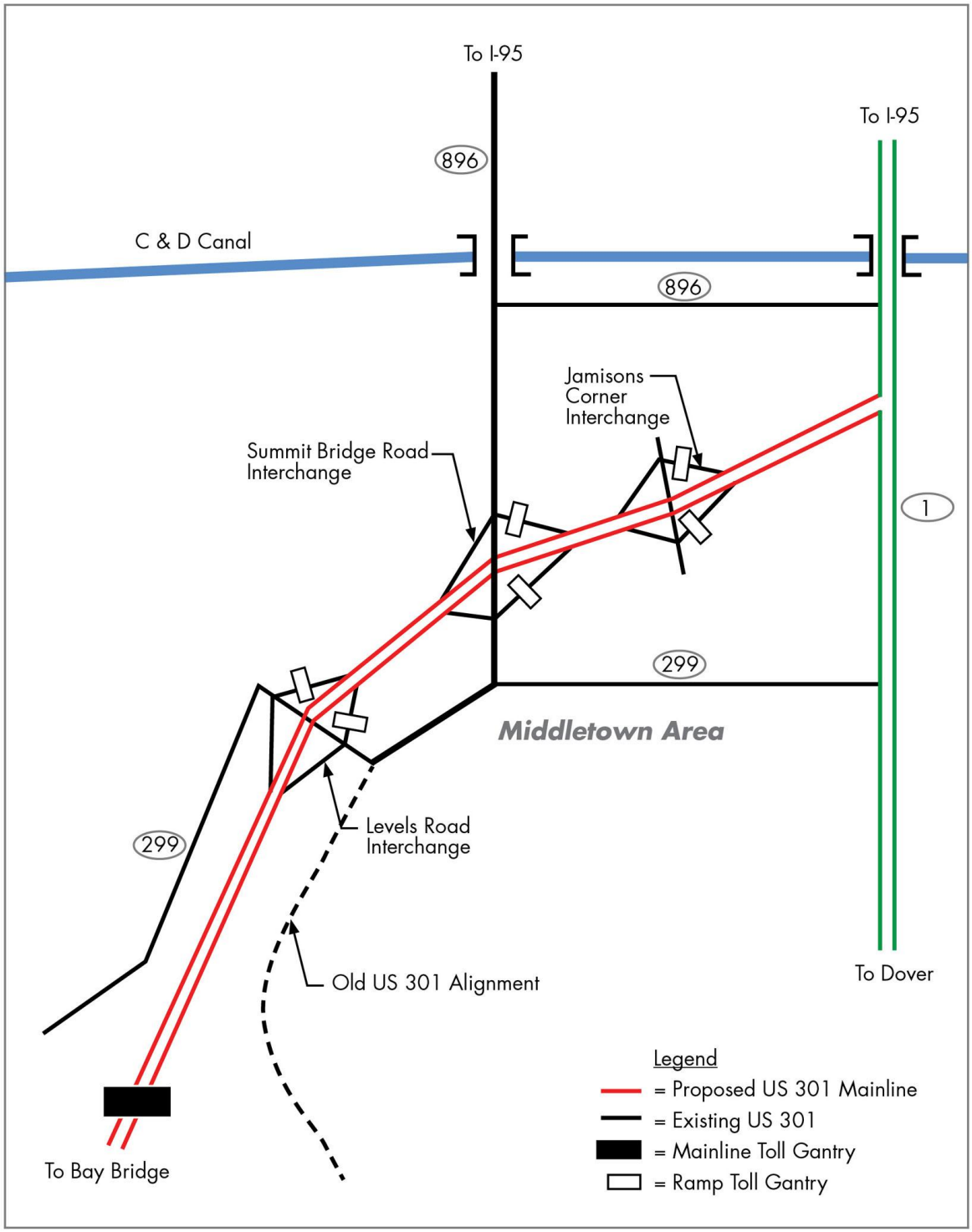
2.1 US 301 Mainline Toll Road Alignment

The US 301 Mainline Toll Road will improve travel along existing US 301 in the Northeast Corridor between Washington, D.C. and Wilmington. US 301 provides an attractive alternative to traveling on the highly congested sections of I-95 through the Baltimore region even with the arterial section of US 301 that traverses Middletown, Delaware. US 301 in Maryland is a controlled-access roadway between the Delaware line and the Chesapeake Bay Bridge, with limited at-grade intersections. The US 301 Corridor Improvements will extend from a connection with the Maryland section of US 301 at the state line passing west of Middletown, and then northward and eastward, tying into SR 1 south of the C&D Canal. US 301 Mainline Toll Road will be routed via SR 1 over the Canal Bridge and the present routing designation via SR 896 to US 40 will be removed. The conceptual alignment with paypoints is provided in Figure 2-1.

As discussed previously in Chapter 1, the US 301 Mainline Toll Road will provide a limited access roadway with a direct connection to SR 1 just north of the existing Biddles Toll Plaza on SR 1. The 14-mile project will replace the section of US 301 that is predominately a two-lane arterial with uncontrolled access and numerous traffic signals. This existing section of US 301 is currently utilized by a significant volume of trucks relative to autos which traverses the west side of Middletown. For long distance trips currently using the existing arterial system to cross the C&D Canal via either the Summit Bridge or the Roth Bridge to access the Delaware Turnpike, the US 301 Mainline Toll Road will provide a high-speed option to access the SR 1 bridge and continue northward on SR1 to reach the Turnpike. Trips destined to local areas surrounding Middletown and areas north of the Canal along existing US 301 will use the proposed interchanges at Levels Road, Summit Bridge Road, or Jamison Corner Road.

The new toll road will be constructed as a four-lane limited access roadway with a total length of approximately 14 miles. The first segment from SR 1 south to the interchange with Jamison Corner Road is approximately 2.3 miles. The next two segments to the Summit Bridge Road interchange and the Levels Road interchange are 3.7 and 3.4 miles respectively. The final segment of approximately 4.6 miles south of Levels Road provides to the connection with existing US 301 at the Maryland state line. For this analysis, it was assumed that the US 301 Mainline would be completed by July 2016, with FY 2017 the first full year of operations.

Figure 2-1
US 301 Mainline Toll Road



2.2 Toll Collection Plan

The US 301 Mainline Toll Road will be operated as an All Electronic Toll (AET) collection facility. Tolls will be collected by transponder or by video recognition only and there will be no cash toll collection.

Tolls for video recognition transactions will have a surcharge of 40 percent for passenger cars and 20 percent for trucks. Video transactions will be billed by mail, no additional statement or mailing fees are anticipated for video transactions. License plates will be recorded and the mailing information will be obtained from the state agency responsible for maintaining this information.

As shown in the schematic in Figure 2-1 toll charges are assessed at a mainline gantry just east of the Maryland state line and at the ramps serving traffic to/from the north at each of the interchanges. Under this plan, ramp tolls at the Levels Road, Summit Bridge Road, and Jamison Corner Road interchanges would be charged for trips to/from the north at appropriately lower rates for autos, while trucks would pay one dollar less than the mainline rate in order to discourage trucks from diverting from US 301 mainline toll road to avoid the mainline gantry. The toll collection plan is designed as a “closed system” that requires all trips using the facility to pay a toll. Note that each trip will traverse only one gantry and that trips continuing onto SR 1 and crossing the C&D Canal will not pay toll charges on SR 1 since the proposed interchange is north of the final paypoint (existing Biddles Toll Plaza) on SR 1.

Similar to the Delaware Turnpike and SR 1, toll rates for different vehicle types will be based on the number of axles. The description of the toll rates by gantry location and horizon year are provided in Chapter 6.

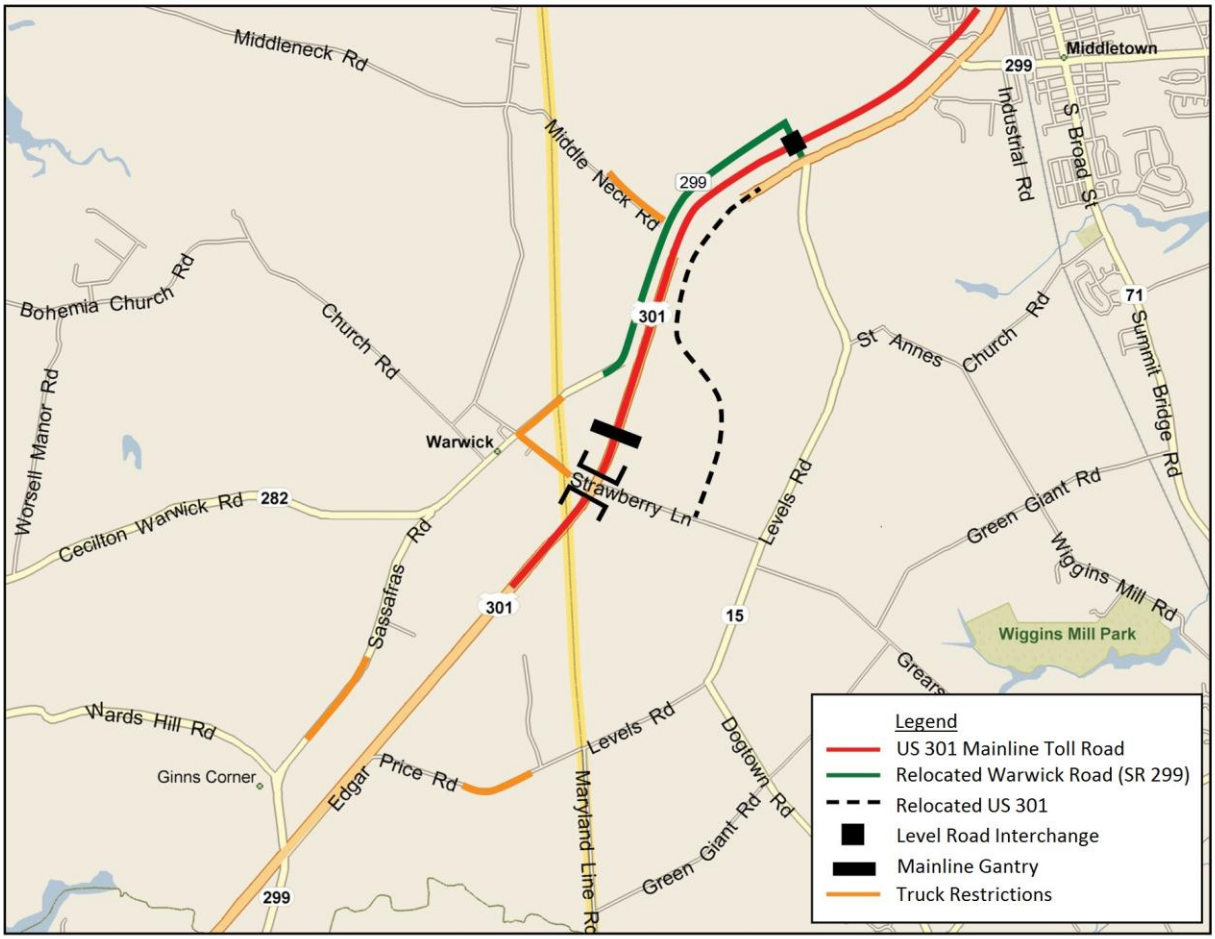
2.3 Adjacent Roadway Modifications

The implementation of the US 301 Mainline Toll Road will include a series of modifications to the existing roadway network. These modifications will include the removal of existing intersections and a series of grade separated crossings and interchanges. The route designation of certain roadways will be altered and a series of truck restrictions will also be implemented to prohibit trucks from using local roads adjacent to the new toll road. Figure 2-2 provides a schematic of the proposed changes near the mainline plaza.

As noted above, three new interchanges will be created to provide grade-separated crossings of major roadways near Middletown. In the vicinity of the mainline gantry along the existing US 301 alignment there will be a series of modifications that alter the current movements between US 301 and the local roads. The existing intersection with

Strawberry Lane will be removed and a bridge on Strawberry Lane will be constructed to pass over US 301 Mainline. The existing arterial section of US 301 south of the proposed new Levels Road Interchange will be converted to a frontage road that terminates at Strawberry Lane. Warwick Road will also be realigned and connected to the proposed Levels Road Interchange. The existing section of US 301 north of Levels Road will be a different state route designation. This road will be designated as SR 71 from Bethel Church Road to North Broad Street, and as SR 299 south of Main Street. This road will also be known locally as Summit Bridge Road from Bethel Church Road to North Broad Street and as Middletown Warwick Road between North Broad Street and MD State line.

Figure 2-2
Roadway Modifications near Mainline Toll Gantry



The conversion of US 301 to a tolled facility requires that notification be given to travelers prior to entry to the toll road. For northbound traffic, the last at-grade intersection on US 301 in Maryland at Sassafras Road will be signed to advise northbound traffic that US 301 is tolled beyond this intersection, but there will not be signage directing travelers to a designated non-tolled roadway.

Figure 2-2 also displays a set of truck restrictions in the vicinity of the mainline plaza. These restrictions will effectively prohibit truck traffic from using local roadways to bypass the mainline toll plaza. As shown in the figure, the prohibitions on Warwick Road, Sassafras Road, Edgar Price Road, and Middle Neck Road will effectively block through truck traffic. Note that a complete listing of restricted roadways with description of the restricted segments is provided in Chapter 7 as part of the background network modifications. Due to planned truck restrictions, it is assumed that some northbound trucks seeking a non-tolled alternative route will exit US 301 at MD 313 in Maryland in order to access MD 213 and travel north to US 40 to bypass Middletown. However, MD 213 is a two-lane roadway, one-lane per direction, traversing mostly farm lands with a few traffic lights along the corridor. The possibility of sharing the corridor with farm equipment, as well as the presence of traffic lights, may render this corridor as an unattractive alternative route for truck traffic.

3 EXISTING TRAVEL PATTERNS

This chapter describes the existing traffic count data as well as travel patterns in the project area that supported the development and calibration of the travel demand model for this project. Note that these data have been collected over several years from 2005 through 2010 as various planning and feasibility assessments were performed. The traffic data collection was focused primarily on obtaining current traffic counts at specific locations within the US 301 corridor. General origin-destination surveys were collected by a roadside survey conducted in August, 2011 for this study to update surveys performed in 2005 and a video license plate survey was performed in 2008 to confirm specific routing patterns for northbound US 301 traffic as it approached the state line. Travel time/speed surveys were conducted for selected routes in the corridor in 2005 and 2010 by RK&K, and Stantec staff also performed travel time and speed surveys for selected roadway sections of the corridor. RK&K provided the additional traffic count data collected in 2008, 2009 and 2011 and count data were obtained from DelDOT and the Maryland State Highway Administration (SHA) for 2009, 2010 and 2011. The study also utilized an extensive set of traffic data collected over the last several years at a permanent count station installed on US 301 at the state line in July, 2008.

3.1 Historical Traffic, 2000-2011, on US 301 and MD 213

Table 3-1 lists the traffic growth at permanent count stations on US 301 in Delaware and MD 213 from 2000 to 2011. Although MD 213, as an existing 2-lane roadway is not a significant competing route currently (its volume is approximately 57 percent of the volume on US 301 at the state line), as shown previously in Figure 1-1, it has the potential to be competing non-tolled route, especially for trucks, when the US 301 Mainline Toll Road is completed. However, it should be noted that the speed along this route through several small towns and the signalized intersections will limit the attractiveness of the route.

The average daily traffic (AADT) along US 301 has an average annual growth of 2.2 percent between years 2000 to 2011. During this period, there were periodic upward spikes in several years, with a significant increase of 7.2 percent in 2011 as a result of improved economic conditions following the height of the recent recession. For example, in 2007, the AADT increased considerably at a rate of 6.4% compared to traffic from previous year as shown in Table 3-1. The increase could be attributed to traffic diverting from I-95 due to the toll increase at the I-95 Newark Toll Plaza that year. The auto and truck toll rates were increased from $3.00 to $4.00 and from $8.00 to $9.00 (5-axle rate), respectively.

Table 3-1
US 301/MD 213 Traffic Growth, 2000-2011

Year	US 301[(A)]		MD 213[(B)]	
	AADT	Change	AADT	Change
2000	12,188		9,894	
2001	12,675	4.0%	9,814	-0.8%
2002	14,399	13.6%	10,410	6.1%
2003	14,439	0.3%	10,409	0.0%
2004	14,613	1.2%	10,829	4.0%
2005	14,725	0.8%	10,784	-0.4%
2006	14,611	-0.8%	10,706	-0.7%
2007	15,552	6.4%	10,402	-2.8%
2008	15,581	0.2%	10,088	-3.0%
2009	14,259	-8.5%	9,022	-10.6%
2010	14,435	1.2%	8,260	-8.4%
2011	15,470	7.2%	10,019	21.3%

Notes:
(A) North of Warwick Rooad (SR 299) Permanent ATR 8016
(B) Near MD 310 (Permanent ATR P0058) - South of C&D Canal

A similar upward spike can also be seen in the 2002 AADT. This growth could be attributed to the significant toll increase at the I-95 Kennedy Toll Plaza in 2001, in which both auto and truck (5-axle) rates were doubled, causing traffic diversion from I-95 to US 301. Traffic was reduced in 2009 by 8.5% compared to the 2008 AADT. The decreased traffic could be attributed both to the economic recession and possibly also construction along US 301 in Middletown.

In addition to the permanent count station locations summarized in Table 3-1, DelDOT recently installed a new permanent count station on US 301 immediately adjacent to the state line in the vicinity where the proposed mainline toll plaza for the US 301 Mainline Toll Road will be located. This new station has been operational since July, 2008 and full year data for 2009 through 2011 are available. As shown in Table 3-2 the annual changes in between 2009 and 2011 indicates a slight increase but note that overall traffic is lower than the permanent count Station 8016 located further north since that location includes traffic merging onto US 301 from SR 299 (Warwick Road). Traffic at the northerly location had a significant increase due partially to local improved economic conditions in recent years.

The new permanent count station at state line also provides classification counts and an estimate of the percentage of vehicles with transponders. Table 3-3 provides a summary of that data for 2008 through 2011. As shown in the table the percentage of truck traffic, which includes all vehicles with 3 or more axles as well as 2-axle – 6 tire vehicles, is approximately 23 percent. This value is consistent with the truck percentages recorded at permanent count station 8016, just to the north of Warwick Road, which indicates a value of 18.5 percent in 2011.

Table 3-2
Traffic Growth on US 301 at State Line, 2008-2011

Year	US 301[A]		US 301[B]	
	AADT	Change	AADT	Change
2008	15,581		NA	
2009	14,259	-8.5%	10,838	NA
2010	14,435	1.2%	11,009	1.6%
2011	15,470	7.2%	11,112	0.9%

Notes:
(A) North of Warwick Rooad (SR 299) Permanent ATR 8016
(B) North of MD state line near proposed mainline toll plaza (ATR 8025)

Table 3-3
Traffic Characteristics on US 301 at Stateline, 2008-2011

Year	Auto AADT		Truck AADT[A]		Percent Truck		Vehicle with ETC[B]	
	Volume	Change	Volume	Change	Percent	Change	Percent	Change
2008[C]	8,449		2,336		21.7%		40.0%	
2009	8,409	-0.5%	2,429	4.0%	22.4%	3.2%	39.5%	-1.3%
2010	8,547	1.6%	2,462	1.4%	22.4%	0.0%	39.0%	-1.3%
2011	8,523	-0.3%	2,589	5.2%	23.3%	4.0%	39.0%	0.0%

Notes:
(A) Trucks include 2-axle, 6-tire vehicles
(B) Vehicles Equipped with Transponders
(C) 2008 data includes the period of July through December

The percentage of vehicles with transponders is approximately 40 percent and this value is largely unchanged since the new permanent count location was established in July, 2008. The slight reduction in transponder shares over the last two years could be related to a slightly lower share of long distance trips, as local traffic continues to increase in the Middletown region. The reduction could also be a result of EZPass fees initiated by Maryland in 2009, as well as a reduction in long distance travel due to higher fuel prices.

3.2 Truck Classification Data

Truck classification counts were performed by RK&K in 2005, 2006 and 2008 at locations throughout the corridor. Stantec Staff also obtained existing classification data from DelDOT and Maryland SHA for other locations. Using the new permanent count station on US 301 at the state line, the number of trucks by axle category was estimated for 2009, as shown in Table 3-4.

Table 3-4
US 301 Traffic by Vehicle Class for 2009

Vehicle Class	Volume	Percent of	
		Total	Truck
2 axle 4-tire	8,409	77.6%	
2 axle 6-tire	550	5.1%	22.6%
3 axle	62	0.6%	2.6%
4 axle	145	1.3%	6.0%
5 axle	1,642	15.2%	67.6%
6 axle	30	0.3%	1.2%
Total	**10,838**	**100.0%**	**100.0%**

Note that approximately 67 percent of the truck volume is in the 5-axle category. These larger trucks are normally long-haul truck trips as confirmed by the origin-destination survey data collected in 2005 and 2011, as discussed below in Section 3.4.

In addition to the traffic counts at the state line, Stantec also compiled count and classification data for 2011 at several locations along US 301 and its shared alignment with SR 896 between Middletown and US 40 at Glasgow as listed below in Table 3-5. The sections of US 301 listed in this table, along with other roadways link US 301 to SR 1 and US 13, encompass the primary routes between the Delaware Turnpike and US 301 in Maryland.

Table 3-5
US 301/SR 896 Traffic Profile

Route	Location	2011 AADT			Percent Truck
		Auto	Truck [A]	Total	
US 301/SR 896	South of US 40	36,800	2,100	38,900	5.4%
US 301/SR 896	Summit Bridge (C&D canal)	19,500	2,100	21,600	9.6%
US 301/SR 896	North of Boyd's Corner Rd	18,400	2,800	21,200	13.4%
US 301 [B]	West of Middletown	12,600	2,900	15,500	18.5%
US 301	Maryland State Line	8,500	2,600	11,100	23.4%

NOTES:

[A] Truck includes 2-axle, 6-tire

[B] Truck Percent was adopted from the 2010 Truck Percentage at STA 8016

Note that while the corridor volume is highest north of the Summit Bridge, the truck volumes are higher west of Middletown, and particularly south of the Mount Pleasant intersection, where SR 896 (Boyds Corner Road) connects US 301 with SR 1 and US 13. This reflects the merge point of the two principal alternative routings available to long distance US 301 traffic at the Mount Pleasant intersection.

3.3 Travel Time / Delay Data

Travel time and speed data were collected for various roadway segments both for local routes near the proposed mainline toll plaza as well as for long-haul routes serving longer distance travelers. These data were collected periodically by RKK and Stantec Staff in 2005, 2008, and 2010. In 2005, travel times and speeds were estimated for existing segments of local adjacent roadways that would be likely routes to bypass the proposed mainline plaza. These data and the assumed travel time for the tolled route are shown in Table 3-6. Since trucks would be prohibited from using a section of MD 282 shown for the auto path in the table, the truck path represents a potential non-tolled truck option.

Table 3-6
US 301 Corridor Current and Projected Travel Times and Distances

Mode	Route End Points	Route	Distance (Miles)	Time[(A)] (Min.)	Speed (MPH)
Auto	SR-1/I-95 & US 301/MD 313	Via I-95, SR896, Existing US 301, SR 299 & MD 282	33	52	38
		Via SR 1 and Proposed US 301 Connector Toll Road	29	28	62
		Saving via US 301 Connector Toll Road	4	24	
Trucks	SR-1/I-95 & US 301/MD 313	Via I-95, SR 896, US 40, MD 213, & MD 313	35	55	38
		Via SR 1 and Proposed US 301 Connector Toll Road	29	28	62
		Saving via US 301 Connector Toll Road	6	27	

[(A)] Peak Period Times
For US 301 Connector Toll Road, used 2015 AM Peak Network

In 2005 and 2010, RK&K conducted comparative travel time runs for through trips in the extended Northeast Corridor region in the two corridors — I-95 via Baltimore and US 301 via the Chesapeake Bay Bridge. The results listed in Table 3-7 compare a trip movement between the northerly decision point at I-95/SR 1 and the southerly decision point at I-95/I-495/US 50 along the Capital Beltway east of Washington, D.C. Also shown are the relative tolls at the time the travel time runs were performed. Note that tolls are significantly higher via I-95, which is an inducement for some motorists and particularly truckers to use the US 301/Chesapeake Bay Bridge routing.

The travel times for 2005 in Table 3-7 represent an average of six runs in each direction on two weekdays in June 2005 during morning, mid-day, and evening periods, with half of the runs at the posted speed limit and the other half at the prevailing traffic speeds. On US 301, the travel ranged from 109 to 128 minutes with an average of 117 minutes, while on I-95 the range was much broader. The range for the I-95 corridor was 93 to 125 minutes depending on Baltimore/Washington traffic conditions with an average of 104 minutes. Note that the US 301 routing is six miles longer than the I-95 route. Generally, the I-95 routing is both shorter and faster by approximately 13 minutes, but this route does include significant additional toll costs.

Table 3-7
Northeast Corridor Comparative Travel Times, Distances, and Tolls

Route End Points	Year and Conditions [A]	Route	Distance (Miles)	Time[A] (Min.)	Speed (MPH)	Tolls[B]	
						2-axle	5-axle
SR-1/I-95 & I-95/I-495/US 50	2005 Average Conditions	Via US 301 & US 50	104	117	53	$2.50	$10.00
		Via I-95 Through Baltimore	98	104	57	$10.00	$36.00
		Saving via I-95	6	13		-$7.50	-$26.00
SR-1/I-95 & I-95/I-495/US 50	2010 A.M. Peak Southbound	Via US 301 & US 50	104	114	55	$2.50	$15.00
		Via I-95 Through Baltimore	98	119	49	$11.00	$51.00
		Saving via I-95	6	-5		-$8.50	-$36.00
SR-1/I-95 & I-95/I-495/US 50	2010 P.M. Peak Northbound	Via US 301 & US 50	104	115	54	$2.50	$15.00
		Via I-95 Through Baltimore	98	107	55	$11.00	$51.00
		Saving via I-95	6	8		-$8.50	-$36.00

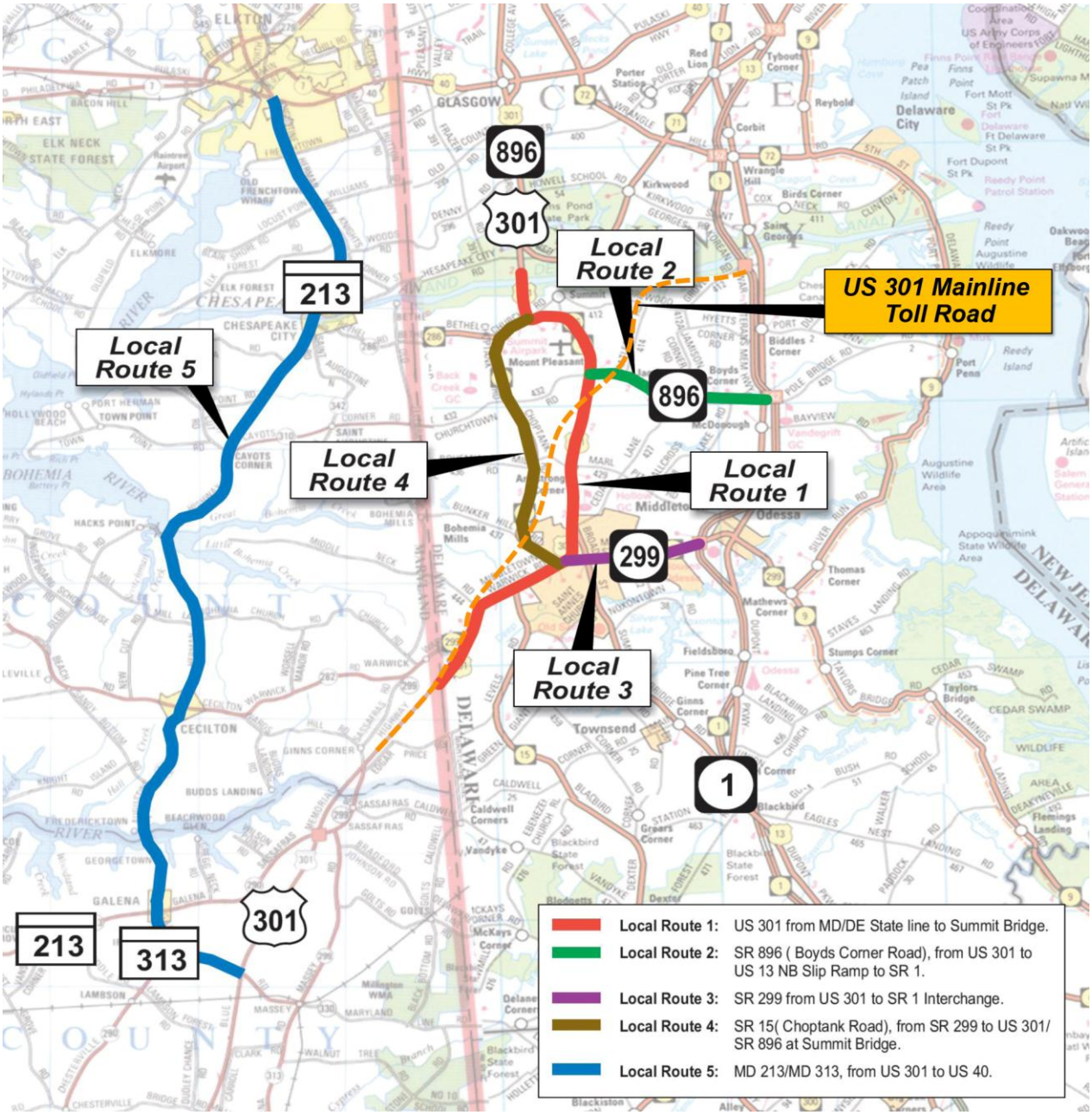
(A) 2005 Data includes data from all periods of day, 2010 data includes peak period in peak direction.

(B) Tolls reflect toll rates in the year the data was collected.

In 2010, the travel time runs were repeated with largely similar results where the I-95 routing was generally 15 minutes faster than the times using the existing US 301 alignment during the off peak hours and non-peak directions of travel. During the peak periods in the peak direction, congestion in the southbound direction during the morning peak on I-95 results in this route being approximately five minutes longer than the US 301 route. During the evening peak, I-95 is only eight minutes faster than US 301. It is significant to note that the US 301 travel times in Table 3-6 were recorded on existing US 301 in Delaware. If the new toll road was in existence now, the US 301 Mainline project would likely reduce approximately 12 minutes off the present 117 minutes, reducing the US 301 travel time to 105 minutes, and increasing this route's average speed to 60 mph (similar to the observed speed on the I-95 routing).

On October 2008, Stantec staff also conducted a series of travel speed runs along US 301 and the local parallel routes within the corridor. RK&K also performed additional travel time runs for these local routes in November 2010. Figure 3-1 displays the locations of the latest speed run data for five local roadways. The data were used to establish current travel speeds and were compared to previous data gathered during prior studies. This survey was performed in both peak and off-peak conditions and these data were collected via multiple trials. The travel conditions were averaged to provide estimates of typical travel speeds through the corridor.

Figure 3-1
Local Corridors for Speed / Travel Time Data



As listed in Table 3-8, Corridor 1 (US 301 Corridor via Summit Bridge) has only a minor variation in travel time by direction and time of day. The lack of variation in travel time is a result of recent widening and other improvements to the alignment south of Middletown. The other local corridors exhibit minor variations in travel times and speeds. Route 299 between US 301 and SR 1 does show congestion in the peak periods. Corridor 5 (MD 213) has an average speed of approximately 44 mph, which reflects a combination of low speeds near the small towns of Galena, Georgetown and Cecilton, with the remaining sections having a higher speed limit at 55 mph. Note that these data are used as part of the model calibration data set to ensure reasonable travel speeds for the local competing facilities.

Table 3-8
Speed Summary for US 301 and Parallel Routes

Corridor Description and Direction		Distance	Travel Time and Speed By Period					
			AM Peak		PM Peak		Off Peak	
			Travel Time (min)	Speed (mph)	Travel Time (min)	Speed (mph)	Travel Time (min)	Speed (mph)
1. US 301 Local from MD/DE Stateline to Summit Bridge	NB	11.0	15.0	44.0	15.0	44.0	15.0	44.0
	SB	11.0	14.0	47.1	14.0	47.1	14.0	47.1
2. Route 896 from US 301 to SR 1 via US 13 NB Slip Ramp	EB	6.0	9.0	40.0	10.0	36.0	9.0	40.0
	WB	6.0	8.0	45.0	8.0	45.0	8.0	45.0
3. Route 299 from US 301 to SR 1	EB	3.0	6.0	30.0	7.0	25.7	6.0	30.0
	WB	3.0	8.0	22.5	7.0	25.7	8.0	22.5
4. Choptank Road from US 301/RT 299 to US 301	NB	9.0	15.0	36.0	17.0	31.8	15.0	36.0
	SB	9.0	13.0	41.5	13.0	41.5	13.0	41.5
5. MD 213/MD313 from US 301 to US 40	NB	22.0	30.0	44.0	30.0	44.0	30.0	44.0
	SB	22.0	30.0	44.0	31.0	42.6	30.0	44.0

3.4 Origin-Destination Survey

Roadside traffic surveys were conducted by RK&K in 2005 and 2011 to identify the travel patterns of auto and truck traffic on existing US 301. In 2005, RK&K interviewed truck traffic using the truck stop on US 301 just east of the Maryland state line as well as auto traffic at the signalized intersections at SR 299. In 2011, RK&K interviewed traffic on US 301 in the vicinity of the proposed mainline toll plaza to update the earlier findings of the 2005 survey. Northbound passenger car and truck traffic was diverted to a weigh station along US 301 just north of the Maryland/Delaware state line to be interviewed on Tuesday, August 2, 2011, between 7 AM and 8 PM.

The results of the 2011 survey were expanded to be representative of traffic patterns in the corridor on a typical weekday in 2009, the base year for the DelDOT Regional Transportation Model, and used to calibrate the model. Information obtained for each vehicle in the survey included:

- Time of interview (to indicate if trip was made during peak or off-peak period);
- Vehicle class (passenger cars, motorcycles, trucks by number of axles);
- Trip origin;
- Trip destination;
- Trip frequency;
- One-way or round trip;
- Return route, if round trip;
- Trip purpose; and
- Whether or not motorist used the Bay Bridge for this trip.

A total of 1,994 interviews were obtained, representing 54.8 percent of the total 3,642 northbound vehicles passing the survey location during the survey hours and 38.7 percent of the total northbound traffic on the full 24-hour day. Of the total 2,824 passenger cars passing the station, 1,672, or 59.2 percent, were interviewed and 304 or 38.8 percent of the total 784 trucks were interviewed. Of the 24-hour volume at the site, 45.7 percent of the passenger cars and 21.7 percent of the trucks were interviewed. The number of vehicles passing the survey station on the survey day, during the survey hours, the number of interviews, and the percent interviewed, by vehicle class, are shown in Table 3-9:

Table 3-9
Northbound Traffic and Survey Sample Statistics

Vehicle Class	Number of Vehicles			Percent Interviewed	
	Full Day	During Survey Hours	Interviewed	Of Full Day	During Survey Hours
Passenger Cars	3695	2,824	1,687	45.7%	59.7%
Trucks					
2-axle, 6-tire	301	242	63	20.8%	25.9%
3-axle	52	39	20	39.2%	52.4%
4-axle	23	17	9	41.1%	56.0%
5-axle	1,009	466	206	20.4%	44.2%
6-axle	30	21	9	30.3%	43.2%
Subtotal	1,414	784	307	21.7%	39.1%
Buses	49	34			
Total	5,158	3,642	1,994	38.7%	54.8%

To geocode the origin and destination data, all origins and destinations were originally coded to the zip code level and then compressed into 11 larger geographic districts to facilitate discussion of the travel patterns. The districts, shown in Figure 3-2 and Table 3-10 and Figure 3-2, were developed based on an aggregation of the Transportation Analysis Zones (TAZs) in the regional model used for forecasting US 301 Mainline Toll Road Traffic.

Figure 3-2
Geographic Origin/Destination Districts

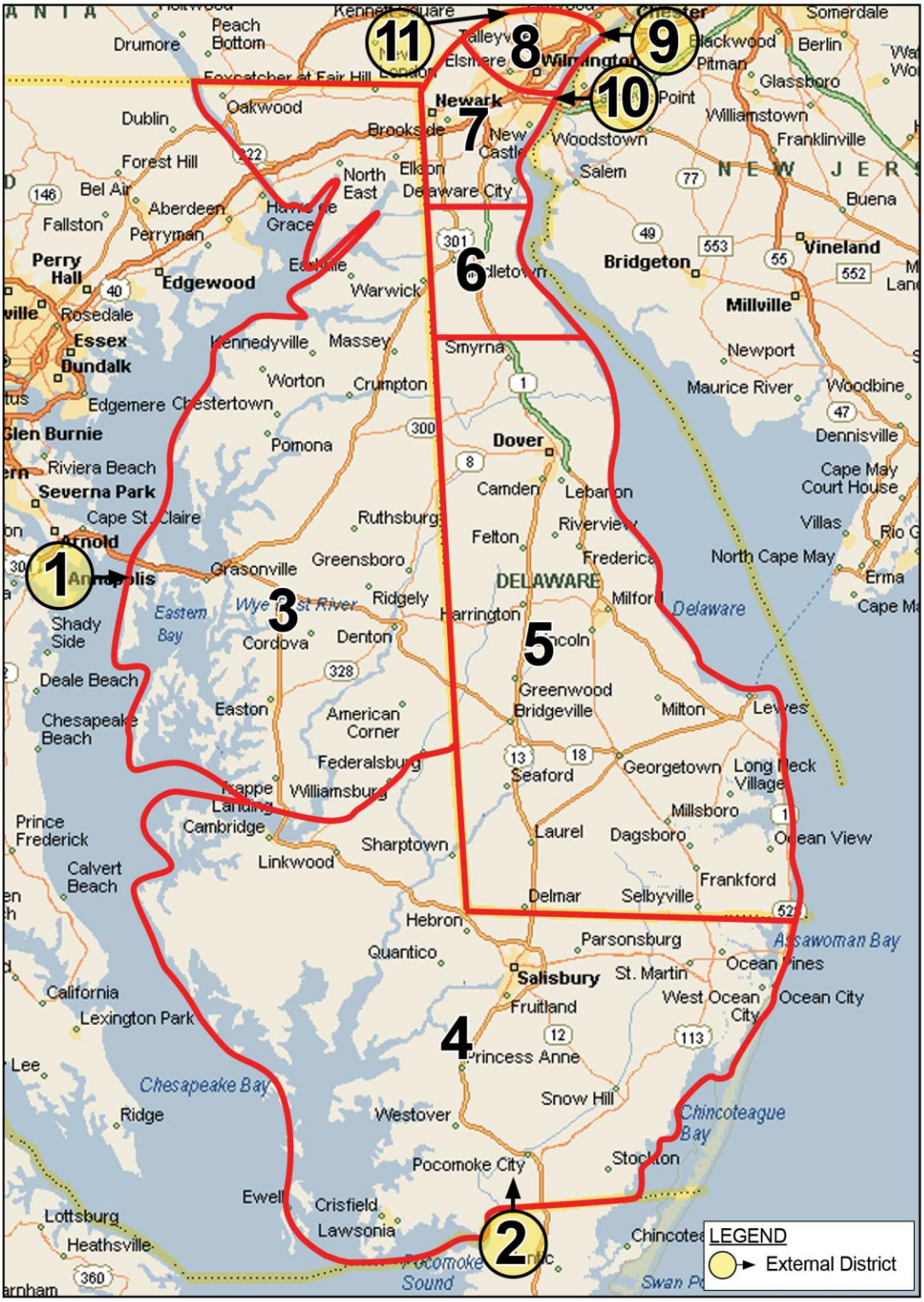


Table 3-10
Geographic Origin/Destination Districts

District	Name	Type
1	Bay Bridge	External
2	US-13, VA (Southern external)	External
3	Eastern Shore Maryland (Cecil, Kent, Queen Anne, Talbot, Caroline Counties)	Internal
4	Maryland Others - Southern Internal Zones	Internal
5	Kent & Sussex Counties, DE	Internal
6	New Castle County - South of Canal	Internal
7	New Castle County - North of Canal	Internal
8	New Castle County - Wilmington Area	Internal
9	I-95 at PA/Delaware State Line	External
10	I-295 Delaware Memorial Bridge	External
11	Other Northern External Roadways	External

Six of these districts are “internal”, which are located within the immediate area of the project and the source of local or intermediate distance trips. The remaining five districts are “external” districts which encompass regions outside of the modeled area and are the source of longer distance trips. Note that these external districts at the northern end of the study area represent the ‘gateways’ to the larger metropolitan areas of Philadelphia (via I-95) and northern New Jersey, New York City, and points beyond. At the southern end of the study area, the principal external zone is the Chesapeake Bay Bridge where trips enter the modeled region from the western shore counties of Maryland, Washington D.C and locations further south.

Based on the location of the origin and destination, a trip can be short or intermediate distance trips with both ends within the modeled area that encompasses the US 301 Toll Road (internal-internal trips), intermediate distance trips with one end in the immediate study area and the other end outside the area (internal-external or external-internal trips), or long-distance trips with both trip ends outside the area covered by the regional transportation model (external-external trips).

The external districts represent entry points or “gateways” where trips from various remote origins and destinations enter and exit the area encompassed in the regional model. On the southern end, the Bay Bridge external zone represents northbound trips originating from western shore of Maryland, Washington D.C., Virginia, Florida and other southern states and entering into the study area via the Chesapeake Bay Bridge. Similarly on the northern end of the study area, the I-95 and I-295 external districts represent exiting roadways are gateways for trips to locations in Pennsylvania, New Jersey, New York and New England. District 11 includes other northern external

roadways, such as US 202 at the Pennsylvania state line, that serve as gateways for areas to the suburban Philadelphia west of the city.

Table 3-11 provides an initial summary of the surveyed trips by vehicle type aggregated into categories with respect to the modeled region. As expected, the majority of the auto trips (56 percent) are internal movements inside the modeled area. In contrast approximately 80 percent of the truck trips have at least one or both ends of their trips outside of the modeled area.

Table 3-11
Trips by Movement Type

Type of Trip	Passenger Cars		Trucks	
	Number	Percent	Number	Percent
Internal-Internal	2,382	56.7%	238	19.8%
Internal-External, External-Internal	1,139	27.1%	306	25.5%
External-External	678	16.1%	656	54.7%
Total	4,199	100.0%	1,200	100.0%

Table 3-12 provides a further disaggregation of the survey data by individual origin and destination districts. The states accounting for most of the trip origins are Maryland, and Virginia. For passenger cars, 81 percent of the trips were from Maryland: 67 percent of the trips had origins in the Eastern Shore counties and remaining 14 percent had origins on the west of the Chesapeake Bay and entered the area via the Bay Bridge. Another 4 percent began in Virginia. For trucks, the major portion of the trips also had origins in Maryland: 28 percent of the trips began in the Eastern Shore and 21 percent came across the Bay Bridge. Another 21 percent began in Virginia. The wide range of trip origins indicates that many of the trips are not local in nature.

Table 3-12
Trip Origins and Destinations

Trip Origins		
Location	**Passenger Cars**	**Trucks**
Delaware - New Castle County, South of C&D Canal	4.5%	0.3%
Delaware - Kent & Sussex Counties	3.7%	2.9%
Maryland - Via Bay Bridge	14.6%	21.1%
Maryland - Eastern Shore	64.5%	25.5%
Maryland - South Eastern Shore	2.2%	3.5%
Virginia	4.4%	21.2%
Others	6.2%	25.5%
Totals	**100.0%**	**100.0%**

Trip Destinations		
Location	**Passenger Cars**	**Trucks**
Delaware - Wilmington Area	7.1%	7.0%
Delaware - North of Canal	16.1%	10.1%
Delaware - South of Canal	40.3%	12.4%
Pennsylvania	14.6%	20.5%
New Jersey	12.1%	28.1%
New York	4.5%	9.0%
Others	5.3%	13.0%
Total	**100.0%**	**100.0%**

Delaware has the highest number of trip destinations, with 64 percent of the passenger car trip destinations and one-third of the truck destinations. Of the passenger cars, 40 percent are going south of the C&D Canal and 16 percent are going to New Castle County, between the Canal and the Wilmington area. Other major destinations for passenger cars are Pennsylvania (14 percent), New Jersey (12 percent) and New York (4 percent). For trucks, trip destinations are more evenly distributed with 26 percent going to New Jersey and 22 percent going to Pennsylvania. The truck trips to Delaware are distributed largely throughout the New Castle County. As can be seen from the distributions of trip origins and destinations, many of the trips are long distance and US 301 provides a logical alternative to the traveling on I-95 through the congested Baltimore Area.

Table 3-13 is a matrix showing the number of trips by district-to-district movement for passenger cars and trucks. As anticipated, the majority of the auto traffic is internal trips between the Maryland Eastern Shore counties and New Castle County. Of the 4,199 passenger car trips on an average weekday, 2,382, or 57 percent, have both ends located in internal districts. The largest movement measured during the survey, with 1,288 daily trips, is between the Eastern Shore of Maryland bordering Chesapeake Bay and New Castle County south of the C&D Canal (which includes the Middletown area). Other large internally-oriented movements are trips between these same Maryland counties and locations north of the Canal and the Wilmington area which together account for 700 auto trips (479 and 221). Note that these trips are effectively 'pass through' trips and would likely use the US 301 Mainline Toll Road to bypass local traffic in Middletown.

There are 1,139, or 27 percent of the total trips, with one end in an internal district and the other end outside the modeled study area. Most of these trips are between the Eastern Shore of Maryland and I-295, I-95 and other northern external zones. Since US 301 provides the best approach to northeastern U.S. for trips from the Eastern Shore, these trips are likely to continue to use the US 301 route.

Of all auto trips intercepted at the survey point on the state line, 16 percent are external-external movements passing completely through the study area, and represent longer distance trips traveling through to the northeastern U.S. via I-95 or I-295. The long-distance trip between the Chesapeake Bay Bridge and I-295 at the Delaware Memorial Bridge and points beyond is the third highest volume trip representing 10.3 percent of the total passenger car trips on an average weekday. These trips, and other trips between the Chesapeake Bay Bridge and northern external zones such as I-95 and US 202 into Pennsylvania, are likely to continue to take the US 301 route to avoid the congestion in the Baltimore area and on I-95 in Maryland.

Table 3-13
Survey District-to-District Trip Movements

Autos

	Zone - to - Zone	Eastern Shore Maryland	Kent and Sussex Counties, DE	New Castle County - South of Canal	New Castle County - North of Canal	New Castle County - Wilmington Area	I-95 at Delaware/PA Stateline	I-295 at Delaware Memorial Bridge	Northern External	All Trips
		3	5	6	7	8	9	10	11	
1	Chesapeake Bay Bridge	7	3	164	123	69	203	434	23	1,026
2	US 13, VA	4		4	2		2	16		28
3	Eastern Shore Maryland	29		1,288	479	221	296	322	76	2,711
4	Maryland - Southern	6		5	16	5	28	26	8	94
5	Kent and Sussex Counties, DE	18		106	24			3	2	153
6	New Castle County - South of Canal	15		130	35	5		2		187
	All Trips	79	3	1,697	679	300	529	803	109	4,199

Trucks

	Zone - to - Zone	Eastern Shore Maryland	Kent and Sussex Counties, DE	New Castle County - South of Canal	New Castle County - North of Canal	New Castle County - Wilmington Area	I-95 at Delaware/PA Stateline	I-295 at Delaware Memorial Bridge	Northern External	All Trips
		3	5	6	7	8	9	10	11	
1	Chesapeake Bay Bridge	4	4	45	43	52	145	471	25	789
2	US 13, VA							15		15
3	Eastern Shore Maryland	3	3	86	75	26	55	53	20	321
4	Maryland - Southern	7		4	3	8		7	7	36
5	Kent and Sussex Counties, DE			15	4		11	5		35
6	New Castle County - South of Canal			4						4
	All Trips	14	7	154	125	86	211	551	52	1,200

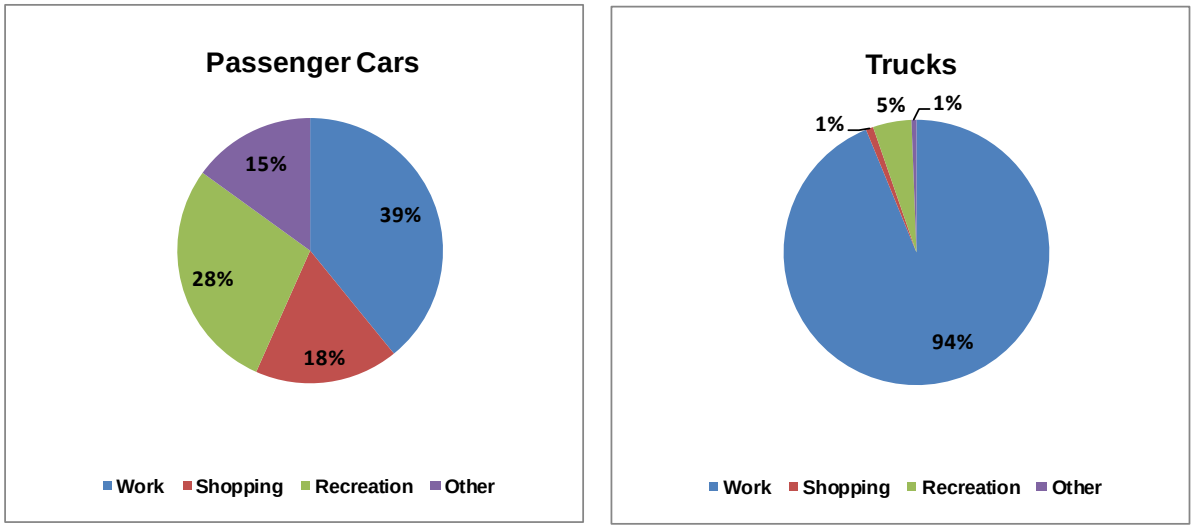
Type of Trip:
- Internal-External, External-Internal
- Internal - Internal
- External -External

The largest concentration of truck trips are longer distance movements not destined to the Middletown area, but instead traveling through to other destinations and likely to continue to use US 301 to avoid local traffic. Of all trips, 55 percent are movements between various external zones. The highest volume truck trip is between the Chesapeake Bay Bridge and I-295 at the Delaware Memorial Bridge, with 471 trips per day. This accounts for 39 percent of all truck trips. The second largest truck trip movement, between the Chesapeake Bay Bridge and I-95 at the Delaware/

Pennsylvania State Line, is also a long-distance trip. On an average weekday, there are 145 truck trips or 12 percent of total truck traffic making this trip. As noted above, these trips are now avoiding I-95 and are therefore likely to remain on US 301 and therefore utilize the proposed toll road.

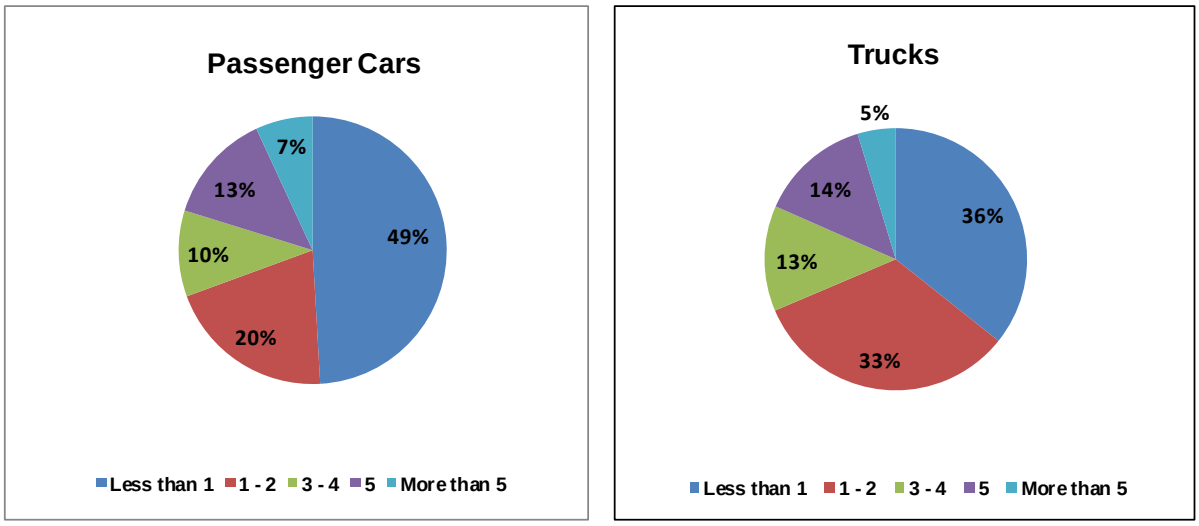
Additional data obtained during the 2011 survey provided information on trip purpose, trip frequency, use of the Chesapeake Bay Bridge, as well as the route used for the reverse trip. Regarding trip purpose, 39 percent of the trips by passenger cars are for business, which includes both commuter and other types of business trips, such as attending meetings. Recreational trips accounted for 28 percent of passenger car trips and shopping was given as a response by 18 percent of the motorists. "Other" accounted for the remaining 15 percent of the trips. Approximately 94 percent of the truck trips are for business purposes. The trip purpose is shown graphically for passenger cars and trucks in Figure 3-3.

Figure 3-3
Trip Purpose



With regard to trip frequency, approximately 70 percent of the passenger car trips are made less than three times per week, indicating infrequent users. This is consistent with the relatively large percent of long distance trips using US 301. Another 10 percent make the trip three to four times per week and 20 percent of the trips are made five days a week or more frequently. Of the truck trips, 36 percent are made less than once a week, typical of long-haul truck movements. A total of 19 percent of the truck trips are made five days a week or more. These are delivery vehicles with regular routes, primarily short distance local trips. Trip frequency for passenger cars and trucks is shown in Figure 3-4.

Figure 3-4
Trip Frequency



It should be noted that infrequent trip users are less likely to be knowledgeable about other local non-tolled roadways that are in the vicinity of the toll road and would not be likely to divert off of the US 301 Mainline Toll Road.

The distribution of trip frequency by trip purpose presented in Table 3-14 shows that more than half of the passenger car work trips are frequent; i.e., three or more times per week. Shopping, recreational and 'other' trips are primarily non-frequent. Approximately 70 percent of the shopping trips, 90 percent of the recreational trips and 80 percent of the "other" trips are made less than three times per week.

Table 3-14
Trip Frequency by Purpose

Times per Week	Passenger Cars				
	Work	Shopping	Recreation	Other	Total
Less than once	31%	38%	74%	62%	49%
1 - 2	17%	32%	18%	20%	20%
3 - 4	11%	20%	5%	10%	10%
5	28%	6%	2%	6%	13%
More than 5	14%	5%	1%	3%	7%
Total	100%	100%	100%	100%	100%

During the survey, motorists were asked whether or not they used the same route; i.e., US 301, for the return trip. The results are presented in Table 3-15

Table 3-15
Return Route

Type of Trip	Passenger Cars	Trucks
Round Trips		
Using US 301	78%	65%
Not using US 301	13%	23%
One-Way Trips	10%	12%
Total	100%	100%

The motorists interviewed were making the northbound trip. As shown in the table, approximately 90 percent of both the passenger car and truck trips are round trips. Of the total trips, 13 percent of the passenger cars and 23 percent of the trucks are using an alternative route for their return trip. This is to be expected since the competing parallel I-95 route is less costly in the southbound direction due to one-way northbound toll collection on the Maryland Turnpike. A higher percent of trucks is using the alternative for their reverse route since trucks have a higher sensitivity to tolls than passenger cars.

An additional question asked during the survey was whether or not the motorist used the Chesapeake Bay Bridge as part of the trip. As shown In Table 3-16, 24 percent of the passenger cars and 68 percent of the trucks used the bridge. These results are similar to the information presented in the district-to-district trip movements presented in Table 3-13.

Table 3-16
Trips Crossing the Chesapeake Bay Bridge

	Passenger Cars	Trucks
Trips Crossing Chesapeake Bay Bridge	24%	68%
Trips Not Crossing Chesapeake Bay Bridge	76%	32%
Total Trips	100%	100%

As an extension of the district-based travel patterns discussed previously, Stantec estimated the travel distances that the various surveyed trips traversed *within the modeled region*. The analysis of trip length provides further insight into the characteristics of these trips and, coupled with the trip frequency data, provides an indication of the likelihood of these trips diverting away from US 301 after tolls are implemented.

Trip distance within the modeled region was estimated using the distances between traffic analysis zones that were representative of general origins and destinations in each of the zip code districts. Note that the distances discussed in the following tables are the values for the portion of trip movements that are within the modeled areas and as such do not reflect that actual 'total' distances for long distance trips that extend beyond the modeled region. As an example a trip from Washington D.C to Philadelphia via the Bay Bridge would be listed as in the tables as 91 miles which includes only the modeled distance from the Bay Bridge to the I-95 external zone at the Pennsylvania state line. Depending on the actual origins and destinations, long-haul trips such as this example can be several hundred miles in actual length and as such extend well beyond the modeled study area.

The modeled-area distances for district-to-district trips are shown in Table 3-17. The longest trips are those from the south via US 13 due to the distance from the survey station to the external decision point. With the exception of some trips within Delaware, all trips are more than 25 miles in distance. As noted above these distances include only the trip length within the modeled area. Therefore, the distances for all trips that are externally-related are significantly longer when including the additional segments of the trip to the actual external origins and external destinations beyond the study area boundary.

3.5 Traffic Routing Survey

In September 2008, Stantec staff, in conjunction with our subconsultant Alliance Transportation Group (ATG), collected video license plate data at selected locations in corridor in order to verify the routing of long-distance trips This survey had two purposes: to gather additional information related to the exact routing of trips through the Middletown area and to quantify through movements on MD 213. The survey also provides some indication of the percentage of vehicles utilizing toll roads in the Middletown region, based on their access to SR 1 south of the Biddles Toll Plaza.

Within Delaware, the license plate data were obtained in the northbound/eastbound direction for a 12-hour (daylight) period for the locations displayed in Figure 3-5. Note that the locations where northbound traffic entered the two video survey areas are shown as green points. Two obtain information on the routing of long-distance trips through the Middletown area, six video locations focused on trips that entered Delaware on US 301. The precise descriptions of these six locations are as follows:

Table 3-17
District-to-District Trip Length
(miles)

	Zone - to - Zone	Eastern Shore Maryland	Kent and Sussex Counties, DE	New Castle County - South of Canal	New Castle County - North of Canal	New Castle County - Wilmington Area	I-95 at Delaware/PA Stateline	I-295 at Delaware Memorial Bridge	Northern External
		3	5	6	7	8	9	10	11
1	Chesapeake Bay Bridge	68	54	58	75	83	91	80	87
2	US 13, VA	153		115	132		144	134	
3	Eastern Shore Maryland	46		26	48	60	76	71	72
4	Maryland - Southern	113		79	93	100	109	97	105
5	Kent and Sussex Counties, DE	54		22	38			63	39
6	New Castle County - South of Canal			8	22	25		27	

Type of Trip:
- Internal-External, External-Internal
- Internal - Internal
- External -External

1) US 301 NB at the Delaware State Line
2) SR 299 on-ramp to NB SR 1
3) SR 896 on-ramp to NB SR 1
4) US 13 south of C&D Canal on-ramp to NB SR 1
5) SR 896 NB exclusive turn lane to EB US 40
6) SR 896 NB ramp to NB I-95

Location 1 (US 301 NB at the state line) captures all trips entering the area and traveling through (or destined within) Middletown, Delaware. The remaining five locations intercepted the routes used by these vehicles as they continue their trip north of Middletown onto major facilities. Note that trips through locations 2 and 3 encountered a toll charge since these trips access SR 1 northbound south of the Biddles Toll Plaza. Trips through Locations 4, 5, and 6 did not incur toll charges as they passed through the Middletown area. To quantify through movements on SR 213, data were collected at two additional locations in Maryland: on MD 313 north of US 301 and MD 213 south of US 40. Trips that passed through both these locations provided the data used to quantify the percentage of trips using this roadway for through movements between US 301 and US 40 within Maryland.

Table 3-18 summarizes the travel patterns by vehicle type from the license plate survey. The percentages are given only for the vehicles passing two origin-destination survey stations. Accordingly, only 34.3 percent of total trips on US 301 at state line passed through one of the destination stations, and the remaining 65.7 percent of the trips used different routes or travelled locally without crossing the C&D Canal.

Figure 3-5
Video Survey Locations

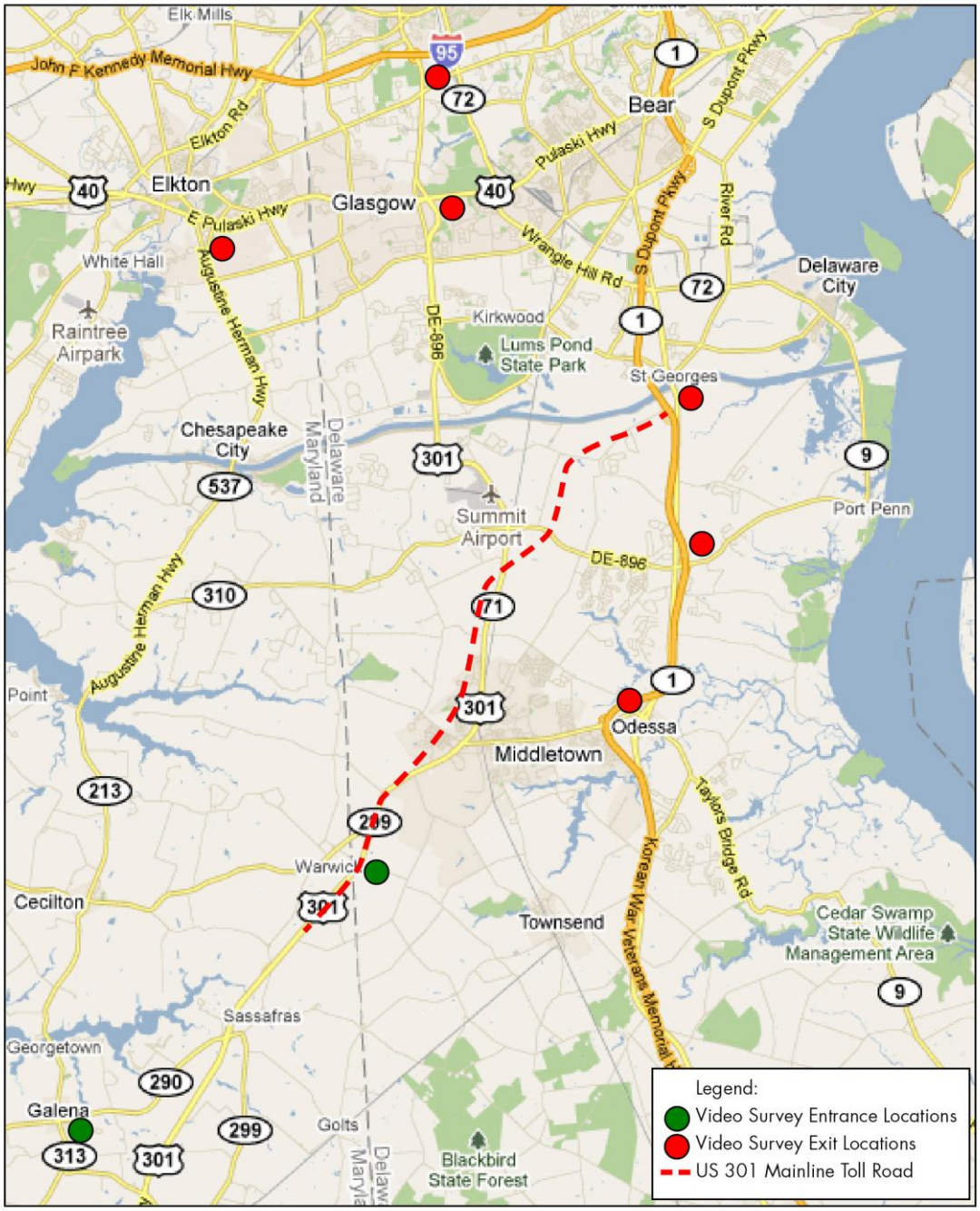


Table 3-18
Summary of License Plate Survey

Origin Station	Destination Station	Day Time		
		Auto	Truck	Total
US 301 NB at State Line	SR 1 NB on Ramp from SR 299	9.7%	1.3%	7.7%
	SR 1 NB on Ramp from SR 896	2.3%	6.6%	3.3%
	SR 1 NB on Ramp from US 13 NB	6.7%	21.5%	10.2%
	US 40 EB from SR 896 NB	3.1%	1.6%	2.7%
	I-95 NB on Ramp from SR 896 NB	9.3%	13.7%	10.4%
	Total	**31.1%**	**44.8%**	**34.3%**
MD 313 NB at W of US 301	MD 213 NB at S. of Whitehall Rd.	1.5%	12.4%	3.6%

The longer-distance trips traveling northbound on US 301 at the Delaware State Line have to utilize one of several bridges serving US 301/SR 896, SR 1, or US 13 in order to cross the C&D Canal. From the survey data approximately 60 percent (21.2 percent of 34.3 percent) of these long distance trips used SR 1, and remaining 40 percent (13.1 percent of 34.3 percent) used US 301/ SR 896.

The long-distance truck trips travelling northbound from US 301 can access SR 1 at three interchanges, SR 299 (Interchange 136), SR 896 (Interchange 142), and US 13 (Interchange 148). Trucks entering SR1 from SR 299 and SR 896 pay tolls at the Biddles Toll Plaza. Note that SR 299, which is Main Street in Middletown, has a prohibition of trucks with 3 or more axles which explain the lower percentage of truck trips versus auto trips using this interchange. Approximately 73 percent of the trucks accessing SR 1 part of their trip use the non-tolled interchange from northbound US 13. Approximately 30 percent of the northbound US 301 truck trips access I-95 from SR 896/US 301 via the Summit Bridge which is also a non-tolled movement. Since long-distance trips tend to be less sensitive to tolls, the choices exhibited by these trips indicate that the current time savings for the limited tolled section of SR 1 south of the Canal do not provide a significant enough benefit to select the tolled route.

The two additional locations in Maryland were used to quantify the usage of long-distance travel on MD 213. Northbound traffic was intercepted on MD 313 just north of US 301 prior to the intersection of MD 313 and MD 213. Traffic captured from this location was compared to northbound vehicles on MD 213 just south of US 40 near Elkton, Maryland. As anticipated the percentage of auto trips traveling this entire distance (1.5 percent) is minimal compared to the percentage of truck trips that travel this section of MD 213. While MD 213 is not currently competing with US 301, the implementation of tolls on US 301 and the truck prohibitions on adjacent roadways that

parallel the US 301 Mainline Toll Road may increase the attractiveness of MD 213 for long-distance truck traffic. As noted previously, the speed restrictions and signalization through several small towns along MD 213 will tend to limit the attractiveness of this route as a non-tolled alternative.

4 MODELING METHODOLOGY

This chapter describes the overall modeling methodology as well as various enhancements implemented to develop the final modeling process. These enhancements included the introduction of a customized toll diversion process, which was used to forecast demand for the existing toll facilities as well as the US 301 Mainline Toll Road.

4.1 Modeling Methodology and Enhancements

The modeling methodology adopted for this project used two separate modeling procedures. The first procedure was the DelDOT Regional Model (also known as the Peninsula model) which was used to develop estimates of overall travel flows in the form of vehicle trip tables for the region. This model forecasts travel for Delaware and includes portions of Maryland as shown in Figure 4-1. The second procedure was a customized assignment process developed by Stantec to estimate toll diversion and traffic assignment. This procedure provided estimates of both peak period and daily toll traffic for this project. In addition to these models, Stantec also obtained the Baltimore Metropolitan Council's (BMC) regional model network and trip tables to assist in abstracting travel west of the DelDOT regional model.

Stantec obtained the latest available 2008 base year and 2040 future year data sets for the regional model from the DelDOT. In preparation for the model calibration Stantec executed the regional model with a revised 2009 socioeconomic data set prepared for this project, as described in Chapter 5. The resulting trip tables were then used as inputs to the customized toll diversion model that performs the highway assignment and the toll diversion model was then calibrated to replicate traffic for all roadways in the corridor. The toll diversion model developed traffic forecasts for four distinct time periods (AM peak, mid-day, PM peak, and night). This was essential for estimating toll diversion that is influenced by traffic congestion which varies significantly by time period. The toll diversion model includes a specialized assignment process that performs toll diversion using a binary logit model as described later in Section 4.3.

Once the model was calibrated, Stantec prepared model data sets for horizon years at 5-year intervals from 2015 to 2040. This effort included updated socioeconomic forecasts at 5-year intervals from 2010 through 2040, as prepared by our subconsultant ATG. The development of these revised forecasts is discussed in detail in Chapter 5. Stantec then executed the regional model and the toll diversion model to prepare traffic and revenue forecasts for the entire horizon year period.

4.1.1 Regional Model Zonal System

The current version of the DelDOT Regional Model has 2,136 traffic analysis zones of which approximately 1,000 are reserved for future use. The zones for each county are listed in Table 4-1. This zone structure was retained for this project as the scale of the zones was acceptable for the toll diversion analysis. Figure 4-1 shows the county map of the study region as listed in Table 4-1. Figure 4-2 shows the zonal boundary in the US 301 project area.

Table 4-1
Zonal System in DelDOT Regional Model

State	County	Zones
Delaware	New Castle	1-345
	Kent	623-780
	Sussex	1081-1307
Maryland	Cecil	1608-1695
	Kent	1696-1715
	Queen Anne's	1716-1737
	Caroline	1738-1744
	Talbot	1745-1753
	Others	1754-1849
External Zones		2109-2136
Zones Reserved for Future Use		346-622, 781-1080, 1308-1607, 1850-2108

4.1.2 Network Enhancements

As part of the model development effort, several enhancements were made to the highway networks used in the regional model and the toll diversion model. The DelDOT regional model utilizes a master highway network including the future improvement projects as well as the US 301 Mainline Toll Road. Stantec utilized this network for the toll diversion model and implemented several improvements for the diversion analysis. These enhancements included the bifurcation of SR 1 and the detailed abstraction of toll rates and discount policies at each toll plaza. Stantec then reviewed the enhanced network to ensure the proper coding of various roadways. The number of lanes and speed limits were also verified to replicate the travel patterns in each major corridor. As a final step the network was processed with several procedures to assess the reasonableness of paths and verify basic network symmetry.

Figure 4-1
County Map of the Study Region

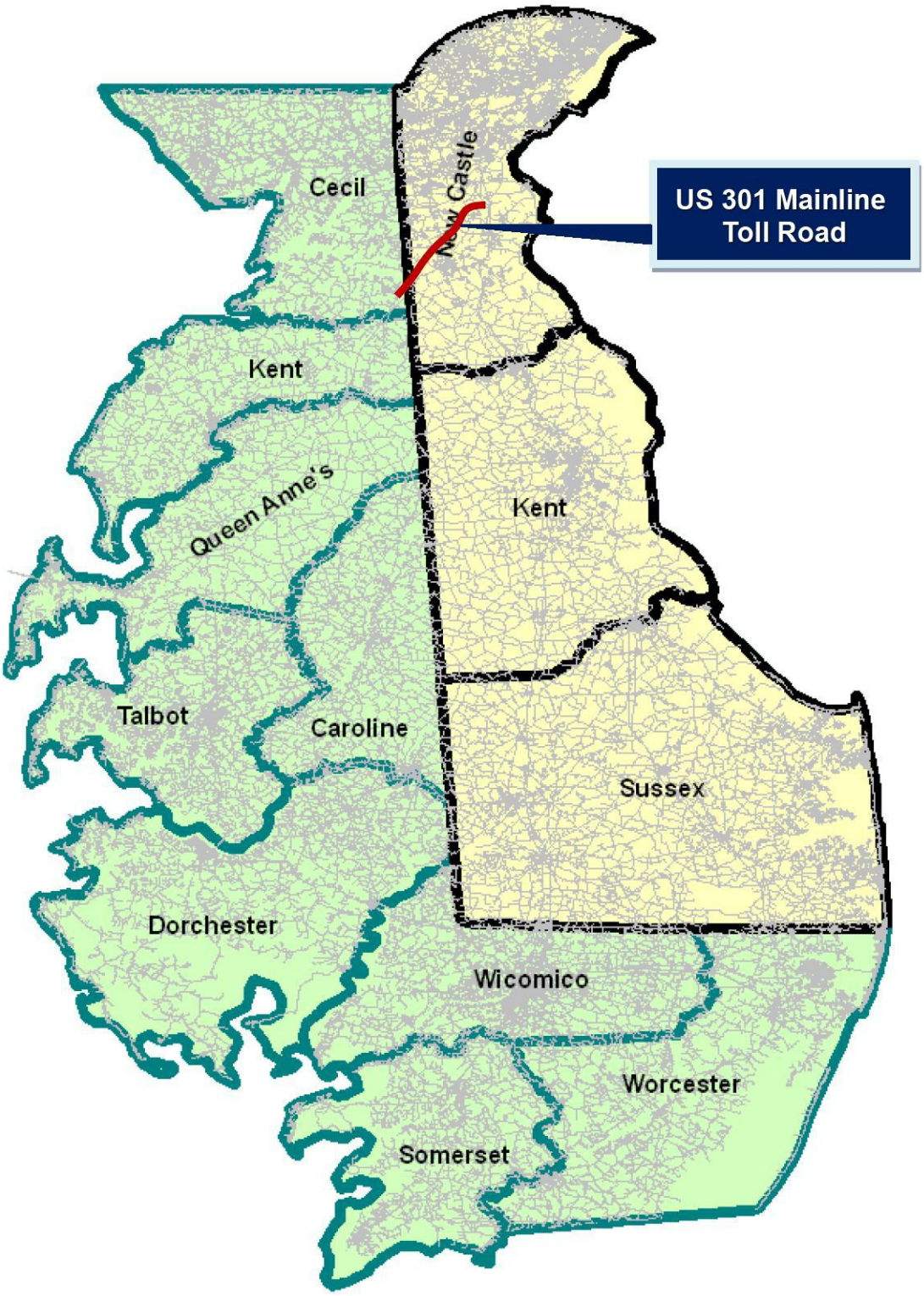
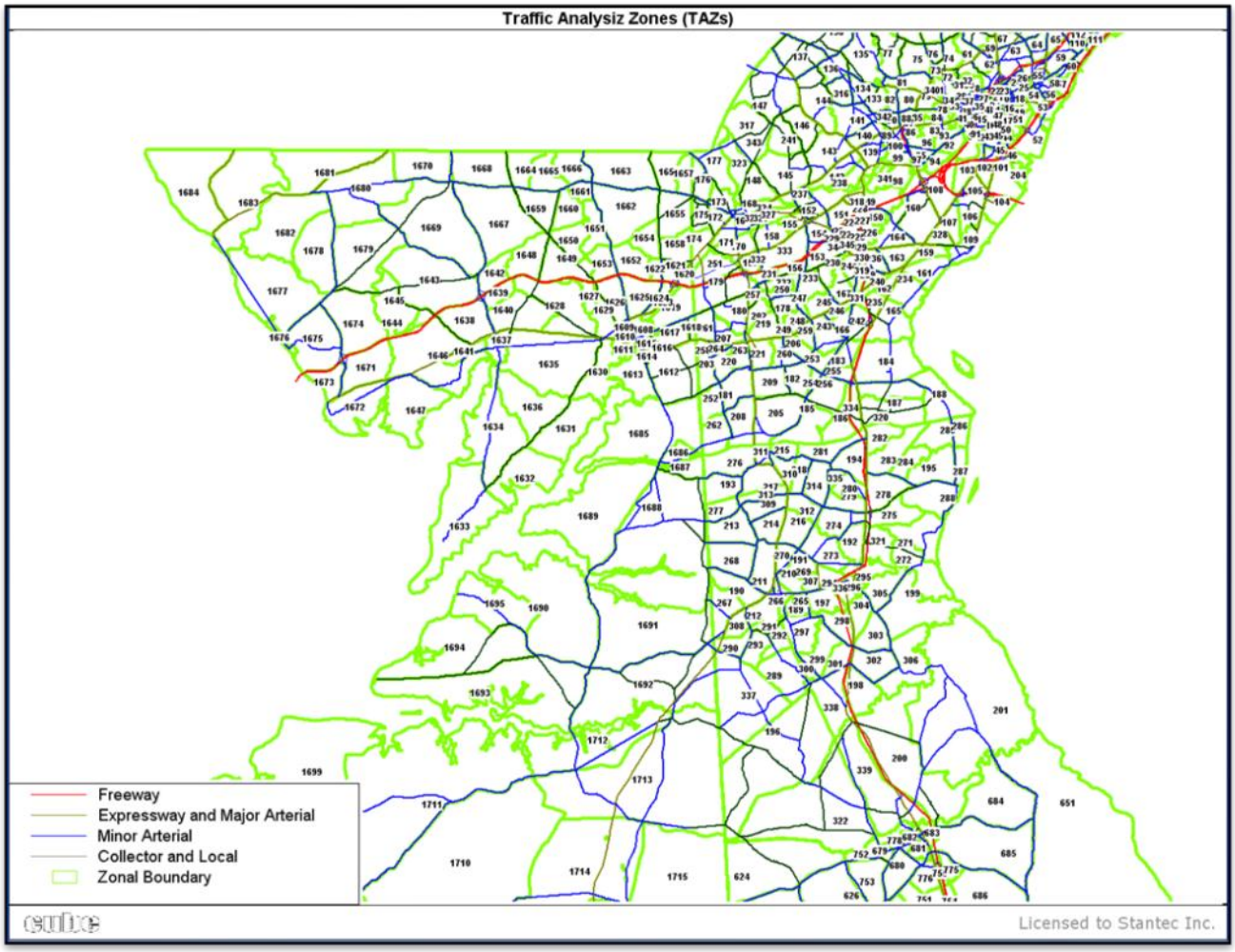


Figure 4-2
Regional Model Traffic Analysis Zones in US 301 Corridor



Utilizing the BMC regional networks Stantec expanded the highway network to include the network segments that influence routing decisions and potential diversion for choice trips west of the Chesapeake Bay. The primary network roadways were abstracted providing links from the decision point of the of I-95/1-495 and US 50 interchange east of Washington D.C. both northward to I-95 at the Susquehanna River and eastward to the Chesapeake Bay Bridge. These additional links included both the travel times and toll costs encountered traveling on either of these routes.

Future year roadway networks were also prepared for each of the horizon years for the modeled period up to the year 2040. The status of major improvement projects was reviewed and the projects were coded into the network using the latest available information for implementation. The specific projects and implementation assumptions are discussed in detail in Chapter 7.

4.1.3 Trip Table Development

As described earlier in Section 4.1, existing and future year daily trip tables were developed using the DelDOT Regional Model. Stantec utilized the trip generation, trip distribution, and mode choice model components of the regional model for this process. Trips were generated by incorporating the updated socioeconomic forecasts developed by ATG. Trip distribution and mode choice routines were then executed to develop daily vehicle trip tables. These routines utilized the highway skims that were generated using the enhanced highway networks described in Section 4.1.2. The regional model was executed using the standard procedures which includes a feedback process to ensure consistency of travel conditions in terms of times and costs across all model components.

In addition to the internal trips generated directly by the regional model, trips traversing between the modeled area and the adjacent regions beyond the model boundary, referred to as “external trips”, are also used as inputs to the regional model. These trips include estimates of external-external (E-E) or through trips as well as external-internal (E-I) trips. The DelDOT regional model was calibrated in 2008, before the magnitude and impacts of the recession were fully recognized. The regional model provided only forecasts for 2010 and 2030 with automated procedures to estimate years beyond 2030**.**

At the Bay Bridge, which is the source of most external traffic using US 301 at the state line, the existing growth rate assumed in the DelDOT Regional Model was approximately 2.5 percent annually. This rate appears to be an aggressive assumption of growth in the corridor and was deemed unreasonably high for the purposes of this study. Therefore, to develop long-term growth rates for external traffic, Stantec reviewed the population and employment trends for the external trip market and compared the compounded average annual growth rates with the growth rates for traffic on the toll roads in the area. A detailed description of this process is presented in Appendix B to this Report.

In order to quantify the observed growth of externally-oriented traffic, Stantec obtained observed traffic statistics from the primary roadways that support longer-distance, interstate movements within the US 301 Corridor. Two toll plaza locations on I-95 that parallel the US 301 alignment, the Newark Plaza on the Delaware Turnpike and the Mainline toll plaza on the JFK Expressway in Maryland, along with two other locations at either end of the project corridor (Delaware Memorial Bridge (I-295) and US 301 at the Chesapeake Bay Bridge) were summarized for this analysis. Note that all of these locations are at toll collection points operated by different toll authorities and have extensive and consistent historical traffic statistics from which long-term trends can be derived. The historical traffic data for these locations is provided in Table 4.2 from the year 2000 forward.

Table 4-2
Regional Highways - Observed Traffic Trends

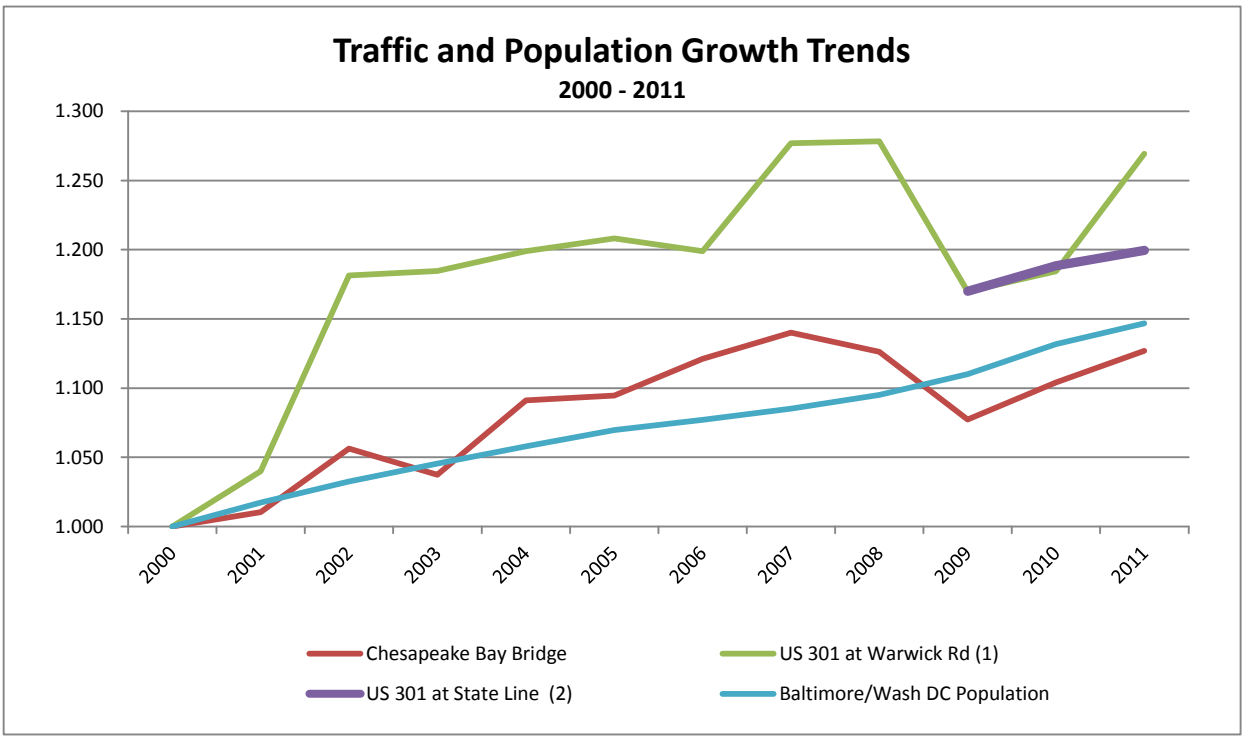
Fiscal Year	I-95 at Newark Plaza		I-95 at JFK Plaza		US 301 at Bay Bridge		I-295 at Delaware Memorial Br.	
	Annual Transactions	AADT	Annual Transactions	AADT	Annual Transactions	AADT	Annual Transactions	AADT
2000	26,138,474	71,612	14,312,070	39,211	11,837,528	32,432	16,192,584	44,363
2001	26,724,378	73,217	14,532,715	39,816	11,961,543	32,771	16,416,847	44,978
2002	27,633,113	75,707	NA	NA	NA	NA	17,144,627	46,972
2003	27,727,195	75,965	14,533,718	39,818	12,280,793	33,646	17,215,450	47,166
2004	28,552,993	78,227	15,161,460	41,538	12,916,961	35,389	17,721,038	48,551
2005	28,410,738	77,838	14,945,482	40,947	12,957,861	35,501	17,593,410	48,201
2006	27,526,665	75,416	14,735,847	40,372	13,270,595	36,358	17,707,494	48,514
2007	27,110,032	74,274	14,840,303	40,658	13,494,252	36,971	17,643,881	48,339
2008	26,409,640	72,355	14,494,198	39,710	13,330,997	36,523	16,920,613	46,358
2009	25,811,851	70,717	14,641,784	40,114	12,751,820	34,936	17,126,876	46,923
2010	25,542,005	69,978	14,850,698	40,687	13,068,484	35,804	16,983,699	46,531
2011	24,459,985	67,014	15,088,005	41,337	13,340,750	36,550	16,786,756	45,991
2012	25,079,423	68,711	14,938,720	40,928	13,204,970	36,178	17,039,440	46,683
Compounded Annual Growth Rate								
2000-2010	-0.2%		0.4%		1.0%		0.5%	
2000-2011	-0.6%		0.5%		1.1%		0.3%	
2000-2007	0.5%		0.5%		1.9%		1.2%	
2007-2011	-2.5%		0.4%		-0.3%		-1.2%	
2008-2011	-2.5%		1.3%		0.0%		-0.3%	
2011-2012	2.5%		-1.0%		-1.0%		1.5%	

Notes:
I-295 FY 2012 Annual Transactions Estimated based on statistics for 6 months (January - June 2012)

As shown in the table there has been significant variation for specific periods reflecting the changing economic conditions. For the I-95 Newark Plaza, I-295 at the Delaware Memorial Bridge and US 301 at the Bay Bridge, traffic has declined for the recent period from 2007 to 2011 as a result of the economic contraction following the 2008-2009 recession. During this period growth at the I-95 JFK Plaza has been minimal. For the 2000 to 2007 period which includes both a recession in 2001 and the resumption of strong growth up to the end of 2007, annualized growth rates at both of the I-95 plazas has been approximately 0.5 percent per year. During this same period growth at the Bay Bridge and the Delaware Memorial Bridge was 1.9 percent and 1.2 percent respectively. Over the longer period of 2000 to 2010 the growth rate at both of the I-95 plazas is less than 0.5 percent while the Bay Bridge has a growth rate of approximately 1.0 percent per year and growth on I-295 has been approximately 0.5 percent per year. Note that toll rates on I-95 were increased twice both in Maryland and Delaware during this decade, therefore it is possible that a portion of the growth on the Bay Bridge likely reflects some diversion to the largely non-tolled US 301 corridor. Construction of the Delaware Turnpike's I-95 Newark Plaza express toll lanes may have also diverted some traffic in 2010 and 2011.

Focusing on the recent traffic growth trends on US 301, Figure 4-3 provides a display of the growth trends for the Bay Bridge, the population of the Baltimore/ Washington region and the two permanent count stations on US 301 near the state line. Note that all of these trends have been normalized to against the values from 2000.

Figure 4-3
Recent Growth Trends



As shown in the blue line, there has been a steady growth in population in the Baltimore / Washington D.C. region and prior to the recession traffic from both the Bay Bridge and the US 301 permanent count station just north of Warwick road had much higher growth rates. As expected the traffic volumes exhibit more variation due to changes in the level of economic activity, while the population trend is much more stable. For the new count station at the state line that was activated in July of 2008 (purple line), the growth trend is similar both to the population growth and Bay Bridge traffic.

Demographic data reviewed for the external markets included the historical and projected growth rates for population and employment provided by Metropolitan Planning Organizations (MPO) for the external market area and an independent forecasting concern, IHS Global Insight (Global Insight). The areas represented by these organizations extend from Dutchess County (Poughkeepsie), NY in the north to Prince William County, VA in the south.

For the 10-year period 2000 to 2010, population growth rates are generally below one percent, as would be expected in the Middle Atlantic and Northeast US states. The average rate of growth for the full region for the ten-year period is 0.7 percent. Population data for the same time periods from Global Insight are at approximately the same level and indicate an overall average annual growth rate for population of 0.6 percent for 2000 through 2010.

Comparable data from the MPOs for employment are similar to those for population, with an overall average annual rate of change of 0.8 percent for the 2000 – 2010 period. Estimates of employment prepared by Global Insight indicate a decrease in employment between 2005 and 2010 as a result of the economic downturn. The estimates show declines in employment in all areas except Washington and New York. For the ten-year period, 2000 to 2010, the AAGR is 0.2 percent.

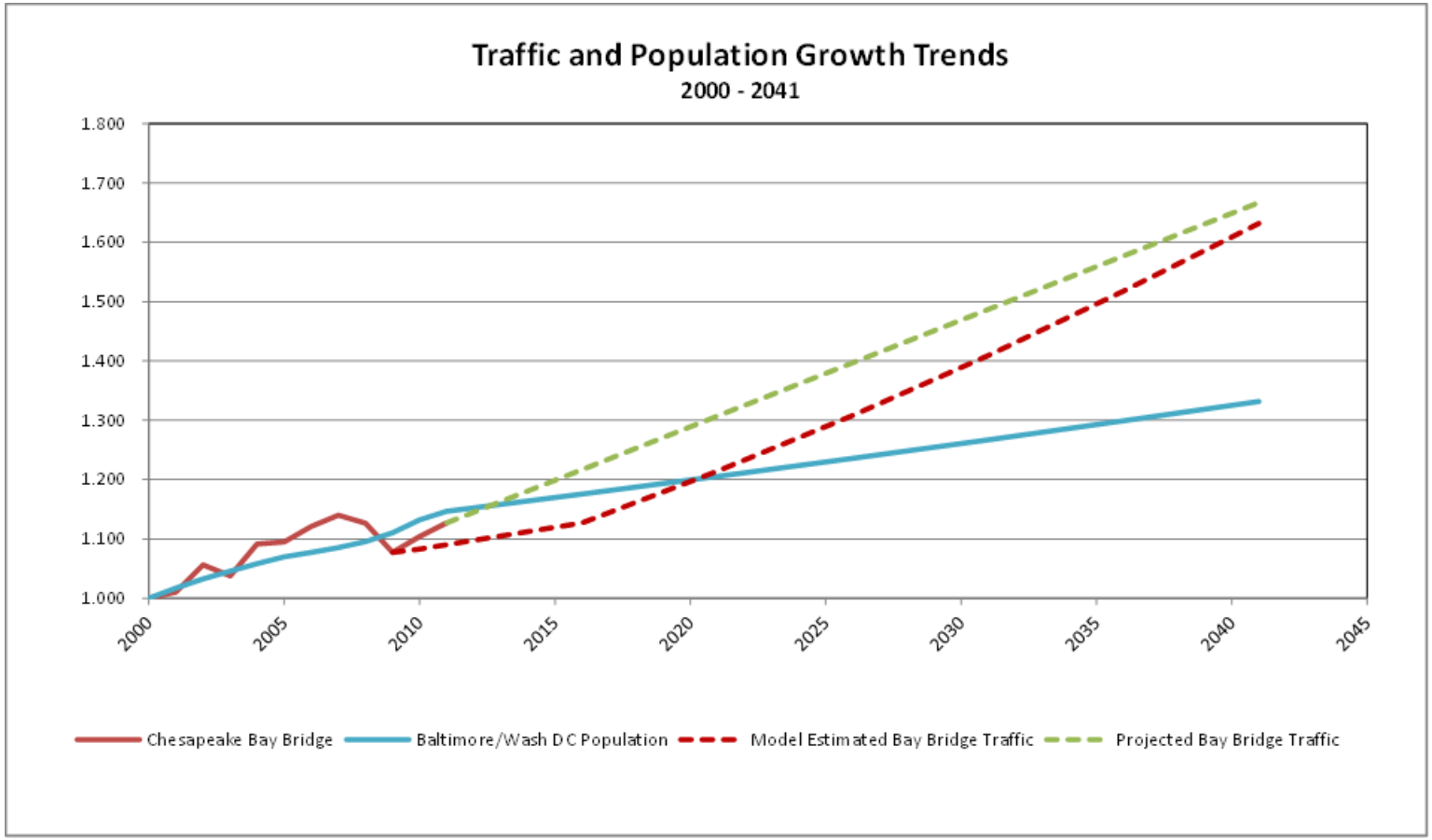
Historically, traffic performance outpaces population and employment growth. Following this pattern, the 2000 - 2010 growth rate for population was 0.7 percent and for employment, 0.2 to 0.8 percent (depending upon the source). During the same period, traffic on the Bay Bridge grew at 2.0 percent, or almost three times the population and employment growth rates.

During the forecast period, the regional population and employment growth rates vary, with forecasts of annual growth rates ranging from 0.3 percent to 0.9 percent for population and from 0.3 percent to 1.1 percent for employment. As noted above, traffic growth on the Bay Bridge currently is almost 3 times population and employment growth. Accordingly, it was assumed rate of growth in the external trips at the Bay Bridge would be 0.5 percent per year for the period between 2009 and 2015 and would then escalate upwards to 1.5 percent per year out to 2041. This provides a compounded rate of approximately 1.3 percent over the entire modeled forecast period. The reduced growth rate for the period between 2009 and 2015 reflects an assumed slow recovery from the 2008-2009 Recession. Using the lowest population growth rate for the external market areas, the implied ratio between traffic and population (1.3/0.5) is consistent with recent historical trends.

Figure 4-4 displays the forecasted external growth trend against the assumed population growth trend, both of which are normalized to 2000 as shown previously in Figure 4-3. As shown in Figure 4.4, the near-term external traffic growth used by the model remains below the trend line of the population growth out to the year 2020. Note also that the actual traffic at the Bay Bridge for the period of 2009-2011 is above the forecasted traffic value.

The green line shows the historical relationship between population and Bay Bridge traffic prior to the recession, extrapolated from the 2011 observed traffic across the forecast period. Assuming the external will eventually resume its historical relationship, the estimated Bay Bridge traffic used by the model will remain below the values anticipated from the historical trend. Note a sensitivity trial with a lower external traffic growth assumption is included in the sensitivity analysis provided in Chapter 10.

Figure 4-4
Projected Growth Trends



As a final step in the trip table development process, the daily trip tables created by the DelDOT regional model were disaggregated into four distinct time periods. This step was necessary to create period-specific trip tables needed to perform traffic assignments using the toll diversion model. Trip tables were developed for the following four time periods:

- AM Peak (6:30 a.m. to 9:30 a.m.)
- Mid-Day (9:30 a.m. to 3:00 p.m.)
- PM Peak (3:00 p.m. to 6:00 p.m.)
- Night (6:00 p.m. to 6:30 a.m.)

Table 4-3 lists Time-of-Day (TOD) factors by trip purpose used by the regional model to allocate trips into the above four time periods. In order to retain the trips by purpose for the toll diversion model, the regional model trip tables in a production-attraction format immediately following mode choice were utilized. Note that the non-home-based purposes (JTW, NHBNW, Others) have only one factor applied to both travel directions.

Table 4-3
Time-of-Day Factors by Trip Purpose

Production-Attraction Trip Factors

Time Period	Time Hours	HBW	HBSH	HBRSH	HBO	HBR	JTW	NHBNW	Others
AM	6:30-9:30 (3)	0.3822	0.0546	0.0434	0.2109	0.0944	0.1754	0.0762	0.1600
MID	9:30-13:00 (5.5)	0.0432	0.2189	0.3336	0.2112	0.2239	0.2658	0.5073	0.3000
PM	15:00-18:00 (3)	0.0215	0.0549	0.0350	0.0509	0.0546	0.3313	0.1485	0.2300
OFF-PEAK	18:00-6:30 (12.5)	0.0813	0.1057	0.0751	0.0661	0.1372	0.2275	0.2680	0.3100
Total 24 Hr		0.5282	0.4341	0.4871	0.5391	0.5101	1.0000	1.0000	1.0000

Attraction-Production Trip Factors

Time Period	Time Hours	HBW	HBSH	HBRSH	HBO	HBR	JTW	NHBNW	Others
AM	6:30-9:30 (3)	0.0128	0.0265	0.0149	0.0361	0.0255			
MID	9:30-13:00 (5.5)	0.0433	0.2369	0.1576	0.2018	0.1034			
PM	15:00-18:00 (3)	0.2401	0.0986	0.1595	0.1113	0.0913			
OFF-PEAK	18:00-6:30 (12.5)	0.1756	0.2039	0.1809	0.1117	0.2697			
Total 24 Hr		0.4718	0.5659	0.5129	0.4609	0.4899	0.0000	0.0000	0.0000

Note		
	HBW	Home-Based Work
	HBSH	Home-Based Shopping
	HBRSH	Home-Based Regional Shopping
	HBO	Home-Based Other
	HBRSH	Home-Based Recreation
	JTW	Journey to work (Non Home-Based Work)
	NHBNW	Non Home-Based Non-Work
	Others	Other Auto, Auto EE, and Trucks

The time of day factors were then applied to these tables to convert the trips into the standard origin-destination (O-D) format required for use in highway assignment. The home-based trip purposes were converted into the O-D format by first transposing these trip tables (matrices) and then applying the appropriate "directional" TOD factors to each direction of travel. The non-home-based trips and external trips were provided in origin-destination format as part of the standard model execution.

The future year trip tables were developed for 2015, 2021 and subsequent five-year intervals to 2041. These trip tables were generated by executing the regional model for each horizon year with the revised socioeconomic data described in Chapter 5 and the future year highway networks discussed in Chapter 7. The 2015 horizon year represents the conditions assumed for the opening of the US 301 Mainline Toll Road.

4.2 Model Calibration

Utilizing existing count data and travel pattern data collected from the field surveys, Stantec performed a final model calibration for the toll diversion process. The objective of the calibration was to replicate traffic flows specifically within the US 301 Corridor. This model calibration also included specific analysis related to trips by vehicle type (auto, truck) as well as specific travel patterns that would utilize the US 301 Mainline Toll Road. As part of the calibration, Stantec compared the estimated travel speeds generated by the travel demand model against the 2010 travel time and speed data. As part of the calibration analysis, Stantec also analyzed initial estimates of toll constraint and elasticity using the latest available data from DelDOT's toll facilities. The model calibration year was 2009 and the trip tables were based on the adjusted 2009 baseline socioeconomic data estimates generated for this project as discussed in Chapter 5. The calibration approach was structured to simultaneously adjust the assignment procedure in order to replicate overall vehicle miles of travel (VMT) by facility type and area type on a regional basis as well as total traffic across primary screenlines. The calibration approach also refined the toll diversion process to replicate tolled traffic at the Delaware Turnpike (I-95) Newark Plaza and the paypoints on the SR 1 Toll Road.

4.2.1 Calibration of Network Speeds

As part of the calibration process, Stantec reviewed the model estimated speeds to ensure that values predicted by the model along the roadways in the vicinity of the US 301 Corridor are reasonable. This analysis was performed to ensure that the toll traffic predicted by the model is based on acceptable estimates of speeds and travel times in the corridor. This was an essential part of the model calibration since the level of congestion and potential travel time savings in the corridor are the primary factors influencing diversion of traffic to the tolled facility. Table 4-4 lists observed and model-

Table 4-4
Travel Time Comparison Summary

Corridor		AM Peak (6:30am - 9:30am)						
		Observed			Estimated			Speed Diff (mph)
		Distance (mile)	Travel Time (min)	Speed (mph)	Distance (mile)	Travel Time (min)	Speed (mph)	
1. US 301 from I-95/US 50 Interchange to I-95/SR 1 Interchange via Bay Bridge [2]	NB	104.00	119.00	52.4	105.42	119.21	53.1	0.6
	SB	104.00	114.00	54.7	105.95	114.10	55.7	1.0
2. I-95 from I-95/US 50 Interchange to I-95/SR 1 Intechange via I-95	NB	98.00	93.00	63.2	98.35	94.67	62.3	-0.9
	SB	98.00	119.00	49.4	98.33	94.44	62.5	13.1
3. US 301 Local from MD/DE Stateline to Chesapeake City Rd.[1]	NB	11.00	15.00	44.0	10.90	15.13	43.2	-0.8
	SB	11.00	14.00	47.1	10.90	14.04	46.6	-0.6
4. Route 896 from US 301 to SR 1	EB	6.00	9.00	40.0	3.71	5.62	39.6	-0.4
	WB	6.00	8.00	45.0	3.71	5.38	41.3	-3.7
5. Route 299 from US 301 to SR 1	EB	3.00	6.00	30.0	2.84	7.21	23.6	-6.4
	WB	3.00	8.00	22.5	2.84	6.44	26.4	3.9
6. Choptank Road from US 301/RT 299 to US 301	NB	9.00	15.00	36.0	6.74	11.09	36.5	0.5
	SB	9.00	13.00	41.5	6.74	10.64	38.0	-3.5
7. MD 213 from US 301 to US-40	NB	22.00	30.00	44.0	26.76	34.58	46.4	2.4
	SB	22.00	30.00	44.0	26.76	31.79	50.5	6.5

Corridor		PM Peak (3:00 pm- 6:00 pm)						
		Observed			Estimated			Speed Diff (mph)
		Distance (mile)	Travel Time (min)	Speed (mph)	Distance (mile)	Travel Time (min)	Speed (mph)	
1. US 301 from I-95/US 50 Interchange to I-95/SR 1 Interchange via Bay Bridge [2]	NB	104.00	115.00	54.3	105.42	113.64	55.7	1.4
	SB	104.00	127.00	49.1	105.95	116.13	54.7	5.6
2. I-95 from I-95/US 50 Interchange to I-95/SR 1 Intechange via I-95	NB	98.00	107.00	55.0	98.35	94.62	62.4	7.4
	SB	98.00	108.00	54.4	98.33	95.08	62.0	7.6
3. US 301 Local from MD/DE Stateline to Chesapeake City Rd.[1]	NB	11.00	15.00	44.0	10.90	13.91	47.0	3.0
	SB	11.00	14.00	47.1	10.90	14.60	44.8	-2.4
4. Route 896 from US 301 to SR 1	EB	6.00	10.00	36.0	3.71	5.32	41.8	5.8
	WB	6.00	8.00	45.0	3.71	5.46	40.8	-4.2
5. Route 299 from US 301 to SR 1	EB	3.00	7.00	25.7	2.84	6.43	26.5	0.8
	WB	3.00	7.00	25.7	2.84	7.42	23.0	-2.7
6. Choptank Road from US 301/RT 299 to US 301	NB	9.00	17.00	31.8	6.74	10.64	38.0	6.2
	SB	9.00	13.00	41.5	6.74	10.79	37.5	-4.1
7. MD 213 from US 301 to US-40	NB	22.00	30.00	44.0	26.76	32.62	49.2	5.2
	SB	22.00	31.00	42.6	26.76	34.70	46.3	3.7

Corridor		MD/off peak (9:30 am - 3:00 pm)						
		Observed			Estimated			Speed Diff (mph)
		Distance (mile)	Travel Time (min)	Speed (mph)	Distance (mile)	Travel Time (min)	Speed (mph)	
1. US 301 from I-95/US 50 Interchange to I-95/SR 1 Interchange via Bay Bridge [2]	NB	104.00	109.00	57.2	105.42	113.53	55.7	-1.5
	SB	104.00	116.00	53.8	105.95	114.25	55.6	1.8
2. I-95 from I-95/US 50 Interchange to I-95/SR 1 Intechange via I-95	NB	98.00	93.00	63.2	98.35	94.37	62.5	-0.7
	SB	98.00	93.00	63.2	98.33	94.46	62.5	-0.8
3. US 301 Local from MD/DE Stateline to Chesapeake City Rd.[1]	NB	11.00	15.00	44.0	10.90	13.99	46.7	2.7
	SB	11.00	14.00	47.1	10.90	14.14	46.2	-0.9
4. Route 896 from US 301 to SR 1	EB	6.00	9.00	40.0	3.71	5.31	41.9	1.9
	WB	6.00	8.00	45.0	3.71	5.32	41.8	-3.2
5. Route 299 from US 301 to SR 1	EB	3.00	6.00	30.0	2.84	6.20	27.5	-2.5
	WB	3.00	8.00	22.5	2.84	6.25	27.2	4.7
6. Choptank Road from US 301/RT 299 to US 301	NB	9.00	15.00	36.0	6.74	10.64	38.0	2.0
	SB	9.00	13.00	41.5	6.74	10.64	38.0	-3.5
7. MD 213 from US 301 to US-40	NB	22.00	30.00	44.0	26.76	31.68	50.7	6.7
	SB	22.00	30.00	44.0	26.76	31.86	50.4	6.4

estimated congested speeds during the AM and PM peak periods as well as during the mid-day off-peak period along the corridors in the US 301 project area. Note that the first two corridors in the table include the long distance routes from Washington D.C. to the I-95/SR 1 interchange while the last 5 corridors include the local routes near Middletown as shown previously in Figure 3-1. Overall the level of calibration of travel speeds was deemed reasonable for the purposes of this study.

The initial calibration of the highway assignment process and toll diversion model was conducted by performing network adjustments as necessary to minimize the difference between the estimated and observed link volumes as well as vehicle-miles-of-travel (VMT) as much as possible, while keeping the trip table constant. Overall model calibration of daily traffic was reasonable at this stage with respect to aggregate VMT. In order to further minimize the variation in overall VMT and to calibrate the share of traffic by vehicle type (auto and truck), Stantec staff employed a special trip adjustment process to minimize the differences in the observed counts and estimated link volumes. This process is an iterative routine which adjusts trip values between specific origin-destination zonal pairs based on the difference between observed counts and estimated link volumes along the path between the two zones.

Table 4-5 lists the comparison of the VMT estimated by the toll diversion model assignment process by facility type and area type combination. The highway assignment process provided a reasonable replication of the aggregate observed VMT by facility type and area type. As shown in Table 4-5, VMT was overall within 1 percent of the observed value and the replication by individual facility type and area type was also within acceptable tolerances, with the variation for freeways, expressways and major arterials all within 8 percent. FHWA standards recommend that the difference between target and estimated daily volumes to be within 7% for freeways, 10% for major arterials, and 15% for minor arterials.

Table 4-5
Estimated / Observed VMT Ratios

Facility Type	Urban			Rural			Total		
	OBS	EST	EST/OBS	OBS	EST	EST/OBS	OBS	EST	EST/OBS
Freeway	1,611,987	1,488,741	0.92	714,927	698,372	0.98	2,326,914	2,187,113	0.94
Expressway	153,136	138,593	0.91	1,433,765	1,534,261	1.07	1,586,901	1,672,854	1.05
Major Arterial High	419,639	444,152	1.06	234,869	235,657	1.00	654,508	679,809	1.04
Minor Arterial	213,435	207,983	0.97	1,076,302	961,476	0.89	1,289,737	1,169,459	0.91
Local Collector	112,536	51,366	0.46	109,433	75,633	0.69	221,969	126,999	0.57
Ramp	19,255	10,494	0.55	1,706	613	0.36	20,961	11,107	0.53
Total	**2,184,762**	**2,071,486**	**0.95**	**2,383,561**	**2,468,290**	**1.04**	**4,568,323**	**4,539,776**	**0.99**

Screenlines were established at four key intercept lines as shown in Figure 4-5. The screenlines encompassed the major facilities traversing the C&D Canal (MD 213, SR 896-Summit Bridge, SR 1, and US 13), several of which support traffic destined to the US 301 corridor. In addition, traffic at the major toll plazas on the Delaware Turnpike and SR 1 and the entry points to the regional model were also summarized as part of the comparison.

Figure 4-5
Screenline Locations

Table 4-6 lists calibration of daily traffic volumes by roadway across the screenlines. The screenline calibration ratios for all screenlines are within the range of (+/-) 5 percent except for Screenline 4 which is well south of the proposed toll road. The overall comparisons at the screenlines are adequate and have only minimal differences at the major tolling points listed in the last section of the table.

Table 4-6
Screenline Calibration

ROUTE	LOCATION	AUTO			TRUCK			TOTAL			TRUCK%		
		OBS	EST	RATIO	OBS	EST	RATIO	OBS	EST	RATIO	OBS	EST	DIFF
I-95 (John F Kennedy Memorial Hwy)	0.5 mi N of MD 272 (N East Rd)	77,480	70,321	0.91	13,860	10,849	0.78	91,340	81,170	0.89	15.2%	13.4%	-1.8%
MD 316 (Appleton Rd)	0.2 mi N of MD 279 (Elkton Rd)	4,400	4,646	1.06	230	888	3.86	4,630	5,534	1.20	5.0%	16.0%	11.1%
MD 279 (Elkton Rd)	0.2 mi N of MD 316 (Appleton Rd)	11,390	11,402	1.00	1,020	1,187	1.16	12,410	12,589	1.01	8.2%	9.4%	1.2%
MD 281 (Red Hill Rd)	between Muddy La & MD 781 (Delancy Rd)	6,600	6,224	0.94	80	67	0.84	6,680	6,291	0.94	1.2%	1.1%	-0.1%
US 40 (Pulaski Hwy)	0.5 mile W of MD 781 (Delancy Rd)	28,410	32,341	1.14	2,320	2,681	1.16	30,730	35,022	1.14	7.5%	7.7%	0.1%
Screenline 1 - Total		**128,280**	**124,934**	**0.97**	**17,510**	**15,672**	**0.90**	**145,790**	**140,606**	**0.96**	**12.0%**	**11.1%**	**-0.9%**
MD 213 (Augustine Herman)	N of C/D Canal Bridge - N of MD 285	12,710	14,264	1.12	1,840	2,180	1.18	14,550	16,444	1.13	12.6%	13.3%	0.6%
US 301/SR 896	At Summit Bridge	18,050	18,043	1.00	2,100	1,905	0.91	20,150	19,948	0.99	10.4%	9.5%	-0.9%
SR 1 (Korean War Vet Hwy)	C&D Canal Bridge	68,100	66,507	0.98	6,220	6,908	1.11	74,320	73,415	0.99	8.4%	9.4%	1.0%
SR 13 (Dupont Pkwy)	St Georges Bridge	10,870	11,413	1.05	860	984	1.14	11,730	12,397	1.06	7.3%	7.9%	0.6%
SR 9 (Port Penn Rd)	Reedy Point Bridge	2,170	2,084	0.96	160	98	0.61	2,330	2,182	0.94	6.9%	4.5%	-2.4%
Screenline 2 - Total		**111,900**	**112,311**	**1.00**	**11,180**	**12,075**	**1.08**	**123,080**	**124,386**	**1.01**	**9.1%**	**9.7%**	**0.6%**
RT 2 (Kirkwood Hwy)	between Harmony Rd & Henderson Rd	28,540	28,798	1.01	570	742	1.30	29,110	29,540	1.01	2.0%	2.5%	0.6%
RT 4 (Ogletown Stanton Rd)	b/w Salemchurch Rd & Churchman's Rd	28,080	28,283	1.01	4,200	4,233	1.01	32,280	32,516	1.01	13.0%	13.0%	0.0%
I-95 (Delaware Tpke)	West of SR 1	138,110	134,303	0.97	26,310	24,573	0.93	164,420	158,876	0.97	16.0%	15.5%	-0.5%
SR 1 (Korean War Vet Hwy)	S of I-95	55,660	55,229	0.99	6,460	6,763	1.05	62,120	61,992	1.00	10.4%	10.9%	0.5%
US 40 (S. Dupont Pkwy)	E of US 13	69,440	69,677	1.00	6,860	7,424	1.08	76,300	77,101	1.01	9.0%	9.6%	0.6%
Screenline 3 - Total		**319,830**	**316,290**	**0.99**	**44,400**	**43,735**	**0.99**	**364,230**	**360,025**	**0.99**	**12.2%**	**12.1%**	**0.0%**
MD 282 (Crystal Beach RD)	West of Cecilton	3,680	3,697	1.00	480	441	0.92	4,160	4,138	0.99	11.5%	10.7%	-0.9%
Sandy Bottom Rd	West of MD 213	1,060	1,085	1.02	140	108	0.77	1,200	1,193	0.99	11.7%	9.1%	-2.6%
MD 213 (Augustine Herman)	West of MD 290	3,290	3,767	1.14	960	942	0.98	4,250	4,709	1.11	22.6%	20.0%	-2.6%
US 301 (Blue Star Memorial)	South of MD 313	6,900	8,812	1.28	3,640	3,797	1.04	10,540	12,609	1.20	34.5%	30.1%	-4.4%
MD 313 (Galena Rd)	South of MD 330	1,590	1,602	1.01	380	364	0.96	1,970	1,966	1.00	19.3%	18.5%	-0.8%
Screenline 4 - Total		**16,520**	**18,963**	**1.15**	**5,600**	**5,652**	**1.01**	**22,120**	**24,615**	**1.11**	**25.3%**	**23.0%**	**-2.4%**
I-95 (John F Kennedy Memorial Hwy)	Tydings Memorial Bridge	69,602	64,209	0.92	12,450	11,399	0.92	82,052	75,608	0.92	15.2%	15.1%	-0.1%
I-95 (Delaware Tpke)	PA State Line	101,730	99,663	0.98	12,580	12,192	0.97	114,310	111,855	0.98	11.0%	10.9%	-0.1%
I-295	Delaware Memorial Bridge	78,760	77,363	0.98	15,010	14,924	0.99	93,770	92,287	0.98	16.0%	16.2%	0.2%
US 301/US 50 (Blue Star Memorial Hwy)	Bay Bridge	64,894	65,911	1.02	6,870	6,887	1.00	71,764	72,798	1.01	9.6%	9.5%	-0.1%
Total Other Control Points		**314,986**	**307,146**	**0.98**	**46,910**	**45,402**	**0.97**	**361,896**	**352,548**	**0.97**	**13.0%**	**12.9%**	**-0.1%**
I-95 (Delaware Tpke)	Newark Toll Plaza	59,983	58,250	0.97	11,430	11,994	1.05	71,413	70,244	0.98	16.0%	17.1%	1.1%
SR 1 (Korean War Vet Hwy)	Biddles Toll Plaza	41,049	43,772	1.07	4,760	4,379	0.92	45,809	48,151	1.05	10.4%	9.1%	-1.3%
SR 1 (Korean War Vet Hwy)	Dover Toll Plaza	30,001	29,633	0.99	3,600	3,467	0.96	33,601	33,100	0.99	10.7%	10.5%	-0.2%
Total Delaware Mainline Barriers		**131,033**	**131,655**	**1.00**	**19,790**	**19,840**	**1.00**	**150,823**	**151,495**	**1.00**	**13.1%**	**13.1%**	**0.0%**
US 301	at MD/DE Stateline	8,400	8,736	1.04	2,400	2,439	1.02	10,800	11,175	1.03	22.2%	21.8%	-0.4%

Screenline 1 intercepts all traffic entering Delaware north of the Chesapeake Bay including I-95. Estimated traffic for this screenline is generally close to the observed counts except that auto traffic on US 40 is over-estimated. Screenline 2 intercepts local and long-distance trips that use US 301 in Maryland and pass through the Middletown area via one of the C&D Canal crossings. Total traffic across each bridge is close to the observed total although the number of trucks is high for the SR 1 Bridge. Screenline 3 intercepts trips north of the Study area and the model replicates traffic on the screenline within acceptable tolerances.

Screenline 4, although well south of the state line, intercepts all of the approach roadways south of Middletown and the estimated traffic by roadway replicates the counts although traffic for US 301 is over-estimated at this location. As shown in the lower portion of the table, the model also adequately replicates the auto and truck traffic at the I-95 Newark plaza and the Chesapeake Bay Bridge. These two locations effectively intercept the majority of vehicles traveling along the competing I-95 and US 301 corridors.

It should also be noted that the latest counts from the toll facilities do include the impacts of the recession and therefore the observed number of trucks is generally a lower percentage of the total vehicles than values observed prior to the recession. It is assumed that the truck percentages will increase as the economic conditions improve going forward.

4.2.2 Corridor Specific Calibration

As part of the model calibration effort, Stantec performed a corridor-specific calibration that was calibrated to the 2009 observed count data obtained for this project. The corridor specific calibration was focused primarily on the replication of traffic in the northern section of the model that encompassed the corridors served by the I-95 and US 301. The model calibration was structured to replicate both auto and truck volumes within these corridors where sufficient count data were available. Stantec also adjusted the toll diversion model in order to replicate the observed traffic on the SR 1 and I-95 toll facilities, with particular emphasis on tolled traffic at the I-95 plaza.

4.3 Toll Diversion Methodology

The proportion of traffic predicted to use the tolled lanes is estimated by a customized toll diversion model implemented within the highway assignment process. Within the framework of the assignment process, the toll diversion routine estimates future year toll traffic and revenue for this project. The toll diversion model is essentially a "route choice" model built into the traffic assignment routine that permits the model to allocate trips between the best toll route and the best non-toll route for a given origin-destination zonal pair. The toll diversion model was structured as binary logit model that estimated the probability of selecting a toll road based on tradeoff between travel time savings and associated toll costs. The toll diversion model has the following structure:

$$\textit{Toll Share} = (1 / (1 + e^{U}))$$

Where:

Toll Share	=	**Probability of selecting a toll road**
e	=	**Natural Logarithm**
U	=	**"Utility" of Toll Route**
		$a * (Time_{TR} - Time_{FR}) + b * Cost + C_{TR} + C_{ETC}$
$Time_{TR}$	=	**Toll road travel time in minutes**
$Time_{FR}$	=	**Nontoll road travel time in minutes**
Cost	=	**Toll in dollars**
C_{TR}	=	**Constant for toll road bias (All payment methods)**
C_{ETC}	=	**Constant for ETC bias (Transponder payment method)**
a,b	=	**Coefficients**

In the above logit equation, the relationship between the coefficients *a* and *b* creates an implied value of time. The toll bias constant C_{TR} is a penalty that discourages the use of toll roads, reflecting a preconceived reluctance on the part of travelers to utilize toll roads. It represents a bias against the use of toll roads, after evaluation of the time and cost trade-offs. The value of this constant is a reflection of travelers' initial opposition to the introduction of toll roads in the region. In regions where toll facilities are present, the toll bias terms tend to be minimal, as travelers recognize the benefits, in terms of timesaving provided by the toll facilities. Since toll facilities are prevalent throughout Delaware and the eastern portion of Maryland, it was assumed that auto travelers would not have an initial bias against the new toll road. In contrast, the bias term was retained for truck trips in order to provide more conservative forecasts with respect to revenue from truck traffic.

The toll diversion model was also structured to enable market segmentation by payment type (i.e., ETC, or video-tolling) thereby producing separate traffic forecasts for each market segment. As part of the model development effort, Stantec calibrated and validated the toll diversion model using the 2009 transaction statistics from the Delaware Turnpike and SR 1. The process included an extensive validation effort to ensure that the model provides an appropriate level of sensitivity to key policies, such as variation in toll rates.

The values of the time and cost coefficients and the bias constants used in the toll diversion model are listed in Table 4-7. The time and cost coefficients, as well as the bias terms for the truck-based trip purposes were adopted from the existing toll diversion model used in earlier studies in the corridor and recalibrated for the 2009 conditions.

Table 4-7
Toll Diversion Model Parameters

TRIP PURPOSE / MODE	COEFFICIENTS		CONSTANTS		VALUE OF TIME ($/HR)	EQUIVALENT MINUTES	
	TIME (MIN)	COST ($)	TOLL BIAS	ETC BIAS		TOLL BIAS	ETC BIAS
AUTO							
Home-Based Work	0.1842	0.5746	0.0000	-0.8140	$19.23	0.0	4.4
Home-Based Shopping	0.0754	0.4310	0.0000	-0.2666	$10.50	0.0	3.5
Home-Based Other	0.0662	0.2670	0.0000	-0.2063	$14.88	0.0	3.1
Non-Home-Based Other	0.1159	0.6143	0.0000	-0.3988	$11.32	0.0	3.4
Journey-to-Work	0.1655	0.6143	0.0000	-0.7178	$16.16	0.0	4.3
TRUCK	0.2334	0.3076	1.8563	-2.2173	$45.53	8.0	9.5

These coefficients and constant terms provided reasonable relationships and predicted logical toll diversion rates. An analysis of the value of time implied by the time and cost coefficients was also performed. The values of time vary by auto trip purpose within a range from $10.50 to $19.23 per hour. For auto trips, the higher values, such as those associated with home-based-work trips and journey-to-work trips, indicate a greater willingness to pay a toll in order to save travel time. This willingness is most likely due to the urgency associated with those trip purposes. In contrast, the lower values of time for purposes such as home-based shopping and non-home-based other trips suggest that these trips are less willing to pay the toll associated with the time savings. For trucks, the relatively high value of time reflects the greater sensitivity related to the delivery of the commodities being transported and costs associated with truckers' salaries.

The value of time was also compared to the average wage rate of the region. Using the Census American Community Survey (ACS) data for the three-year period of 2008-2010, the approximate 2009 median household income of New Castle County was $62,234 and the weighted average median household income of Maryland Counties in the US 301 Corridor was approximately $66,196. From the regional model trips and the values of times for each trip purpose listed in Table 4-7 the weighted average value of time is approximately $15.45, which is approximately 50.0% of the wage rates for the study area counties. This relationship is consistent with the expectation that the value of time should be within 50 to 70 percent of the median wage rate. It should be noted that there are a significant number of trips from outside of the study area passing through US 301. This would include areas such as northern Virginia, Washington D.C., and Maryland west of Chesapeake Bay as well as eastern Pennsylvania, New Jersey and New York. The incomes of travelers from these areas are likely higher than the average incomes of the study area.

Table 4-7 also lists the several bias terms included in the toll diversion model. These bias terms include a 'toll' bias which reflects patrons' unwillingness to use toll roads as well as 'ETC' bias term that reflects the positive influence of being able to pay tolls electronically. Given the number of toll roads and bridges in the corridor both in Maryland and Delaware, it is assumed that auto travelers are very familiar with the travel time savings offered by toll facilities and therefore the toll bias term for auto trips was set to zero. However, the toll bias term for the truck trips was retained to ensure that the unwillingness of segments of the truck market to pay tolls was reflected in the toll diversion model.

The ETC bias term provides a positive influence on the probability of selecting the toll road option. The values of these terms were established during the calibration of traffic on the Delaware Turnpike and SR 1 and are generally consistent with experience in other regions. Note that the bias terms can be expressed in terms of equivalent minutes of penalty applied to the toll choice path. These equivalent penalty minutes are calculated by dividing the bias constant by the time coefficient for the truck purpose. The equivalent toll penalty for the truck purpose calibrated in the model is approximately 8 minutes and this penalty is used to replicate the tolled truck trip patterns on the Delaware Turnpike and SR 1 Biddles and Dover mainline toll plazas.

Figures 4-6 thru 4-11 provide a graphical display of the percent or share of traffic opting to use the toll road given the time savings and payment method for a specified toll amount. These curves are defined by the toll diversion model which estimates the shares by trip purpose and payment method. Figure 4-6 provides the percent of trips selecting the toll road for the home-based work trip purpose, assuming a $4.00 toll value, which is the charge imposed for transponder patrons at the mainline gantry in the opening year. As shown in the figure, the curve with the greater shares represents the portion of trips using a transponder that would select the toll road for a given level of time savings. The second curve with the lower shares represents those trips selecting the toll road if using video tolling to pay. The share selecting the toll road using video tolling is lower than the transponder share since the video tolling option includes a 40 percent toll surcharge for autos and a 20 percent surcharge for trucks.

As the curves show, higher levels of time savings increase the share of trips selecting the toll road. At higher time savings of 20 minutes or more, the vast majority of commuters would select the toll road. At a time savings of 2 minutes, only 20 percent of the vehicles equipped with transponders will choose to pay the $4.00 toll. If using video tolling, only 10 percent of the vehicles would elect to choose the toll road, with a time saving of two minutes since the toll value with the 40 percent surcharge included now equals $5.60. Note that for time savings of less than 2 minutes Stantec further reduces the share of vehicles selecting the toll road to provide a more conservative estimate of vehicles selecting the toll road.

Figure 4-6
Home-Based Work Toll Shares by Time Savings

Figures 4-7 thru 4-10 provide similar toll diversion curves for the other auto-based trip purposes. As shown in these figures, the shares are generally lower for the remaining home-based purposes and the non-home-based purpose as these trips have a lower value of time. Note that for the journey to work trips which include an intermediate stop related to the work trip, the value of time and resulting toll shares are slightly higher than the other non-work trip purposes.

Figure 4-7
Home-Based Shop Toll Shares by Time Savings

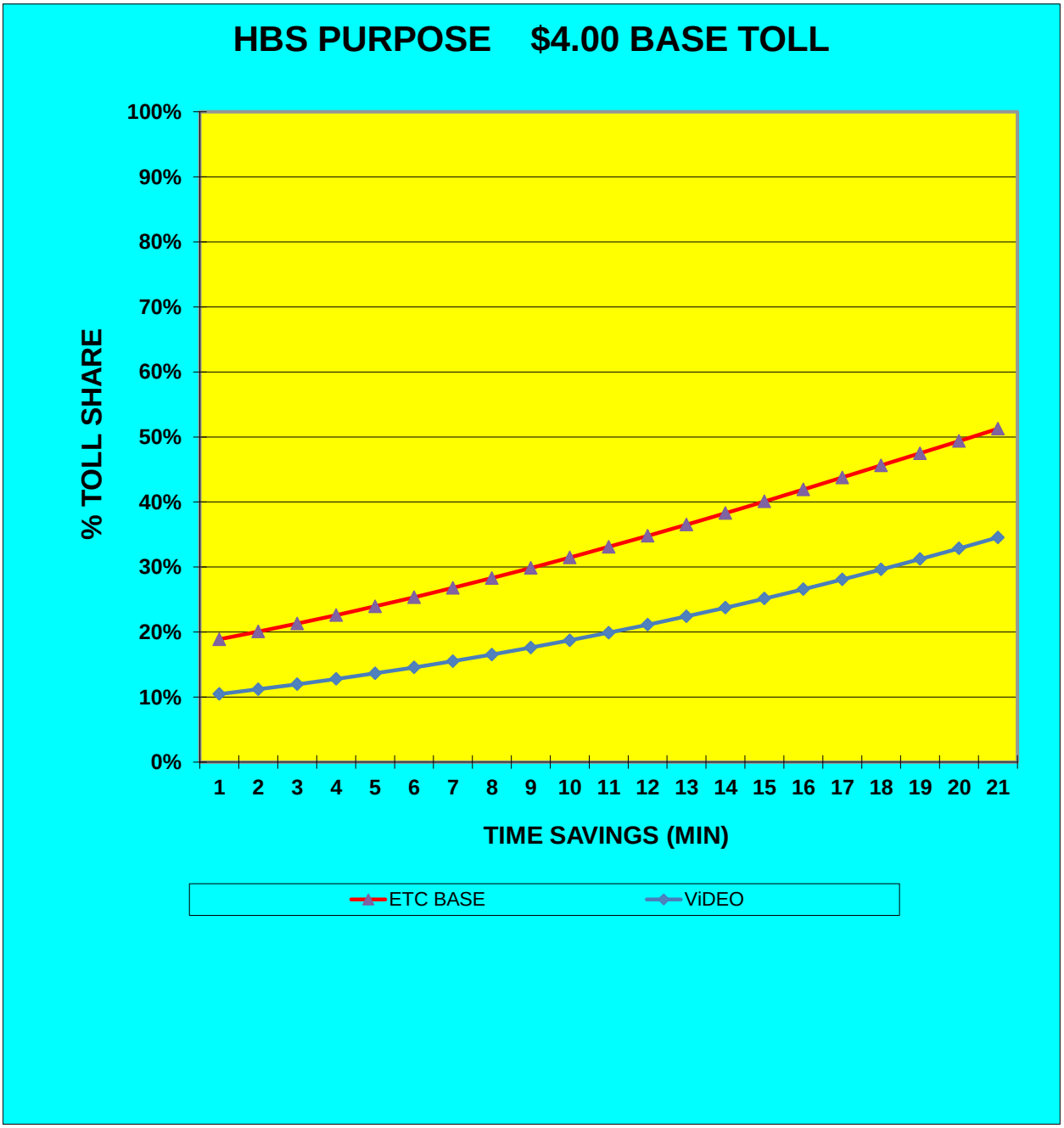


Figure 4-8
Home-Based Other Toll Shares by Time Savings

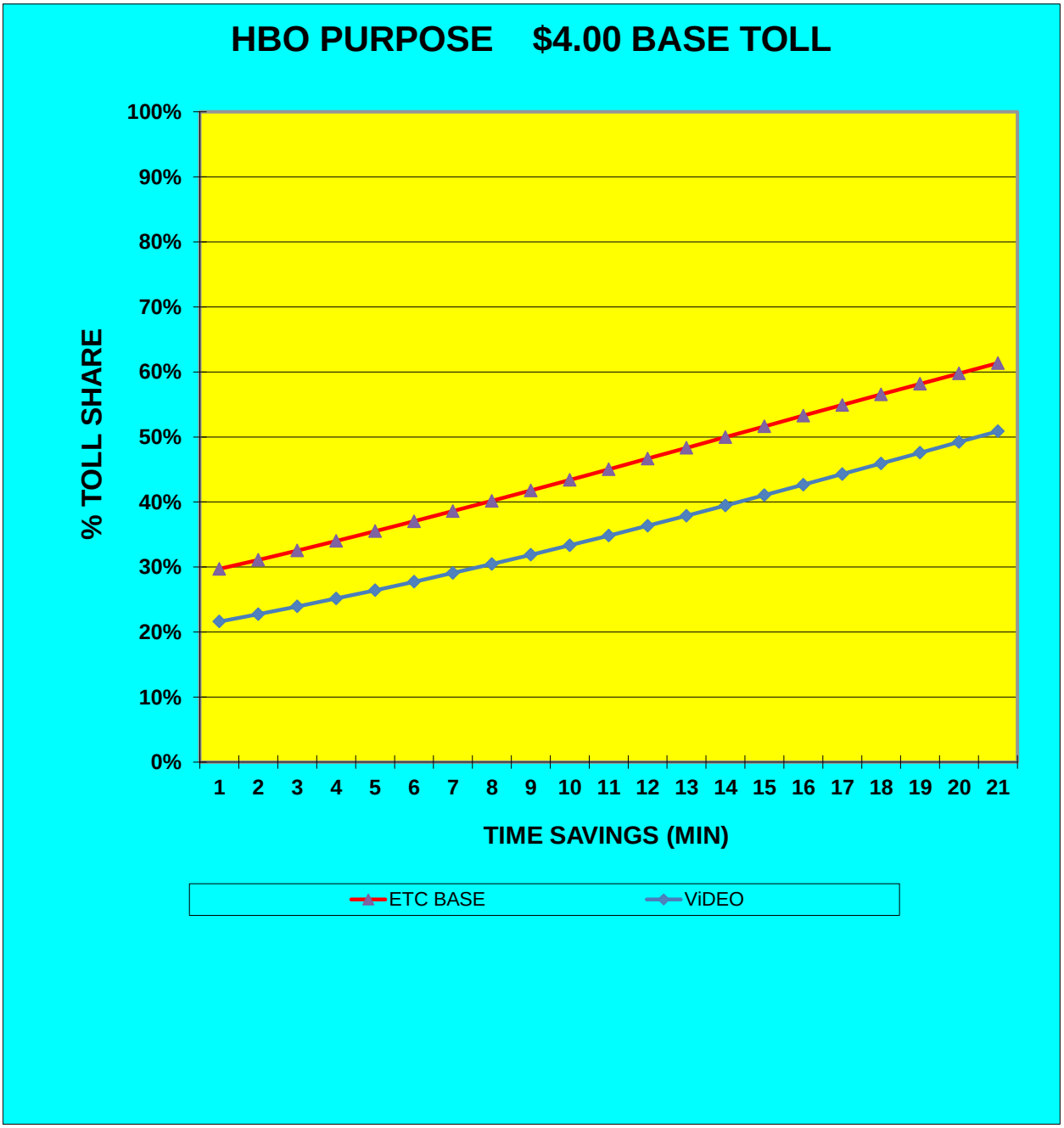


Figure 4-9
Non-Home-Based Toll Shares by Time Savings

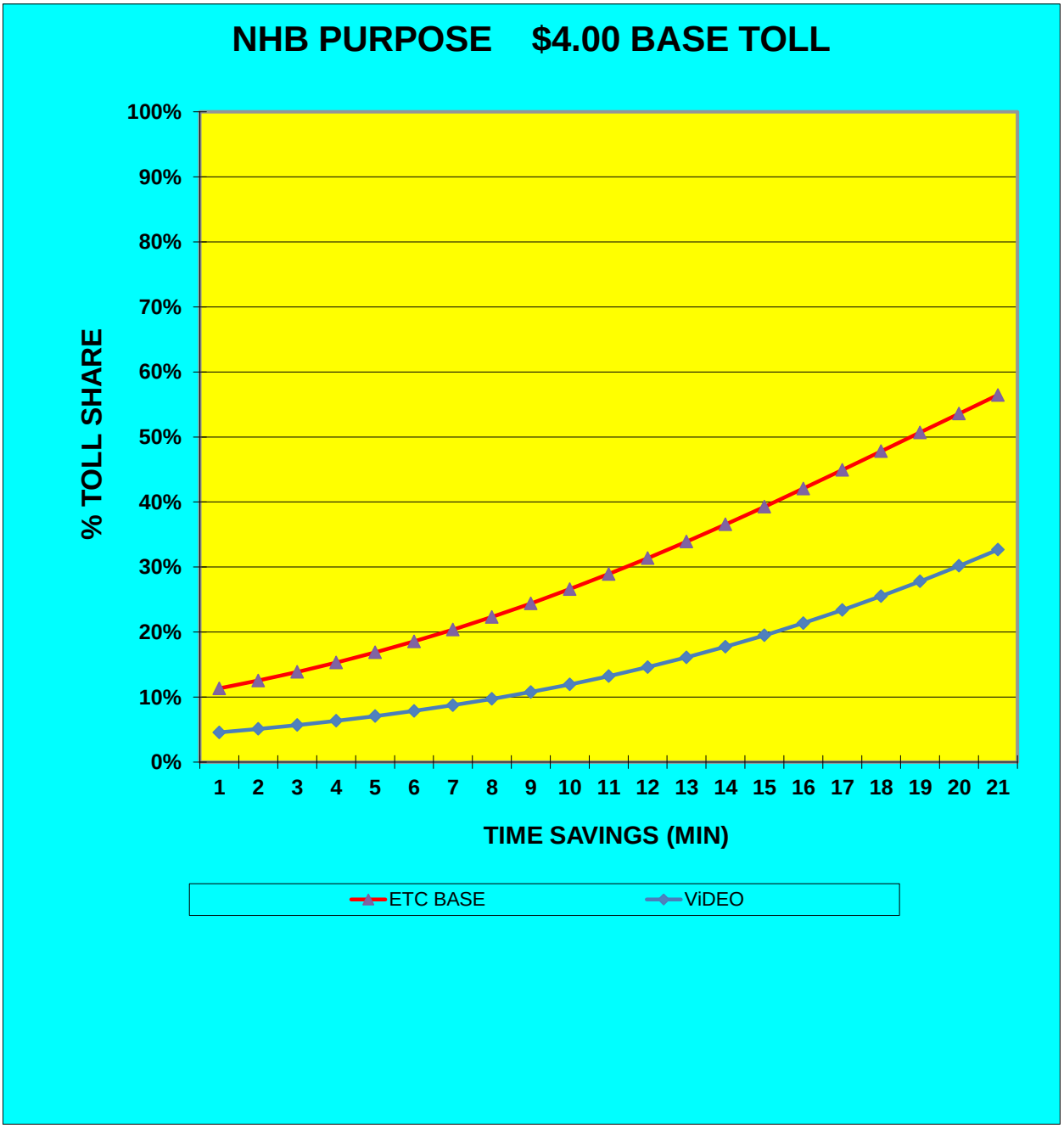
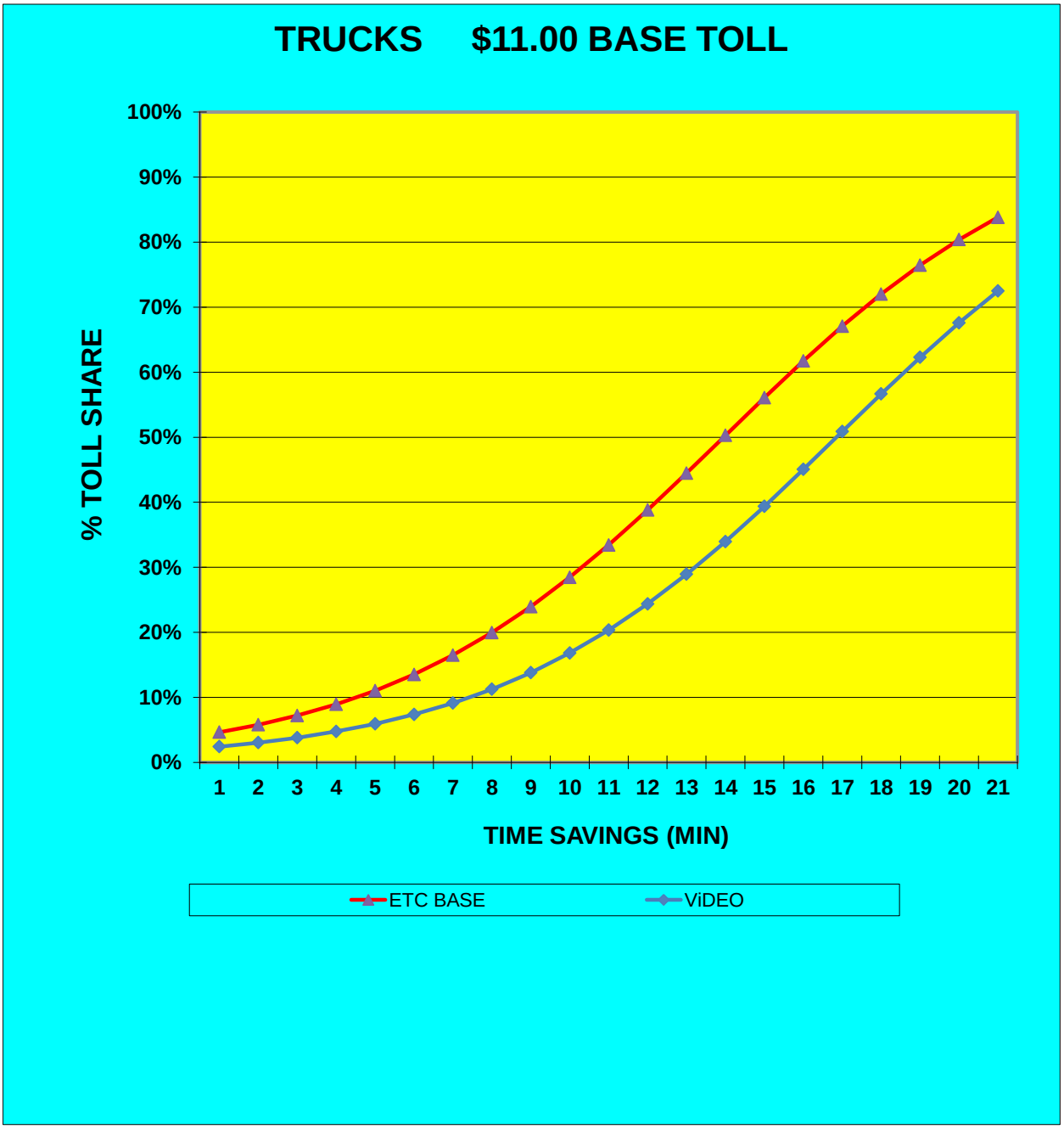


Figure 4-10
Journey to Work Toll Shares by Time Savings

Figure 4-11 provides the shares of traffic using the toll road for the truck trip purpose using an $11.00 base toll that is applicable to for a 5-axle tractor-trailer, which is dominant share of trucks on US 301 in the vicinity of the mainline gantry. The toll rates for trucks by number of axles are provided in Chapter 6 within Table 6-1. Note that the truck toll shares are low for time savings of 6 minutes or less.

Figure 4-11
Truck Toll Shares by Time Savings



5 SOCIOECONOMIC FORECASTS

Traffic forecasts for the US 301 project were developed using future travel demand from the Delaware Department of Transportation's (DelDOT) 2010 Regional Model. The DelDOT Regional Model was discussed in the previous chapter and modeled area was depicted previously in Figure 4.1. This regional model uses both socioeconomic data such as population and employment as generators of internal trips, as well as other estimates of future traffic growth at the model's external zones, as discussed previously in Section 4.1.3, to estimate the total travel demand within the region.

The following sections of this chapter present a discussion of historical and projected growth trends for population and employment, the methodology used to develop projections of these forecasts for use in the regional transportation model, the adjusted forecasts included in the model, and other relevant factors used in the model for projecting future traffic volumes. This information was developed from a study report prepared for this project by Alliance Transportation Group (Alliance), which is presented in the Appendix A of this report.

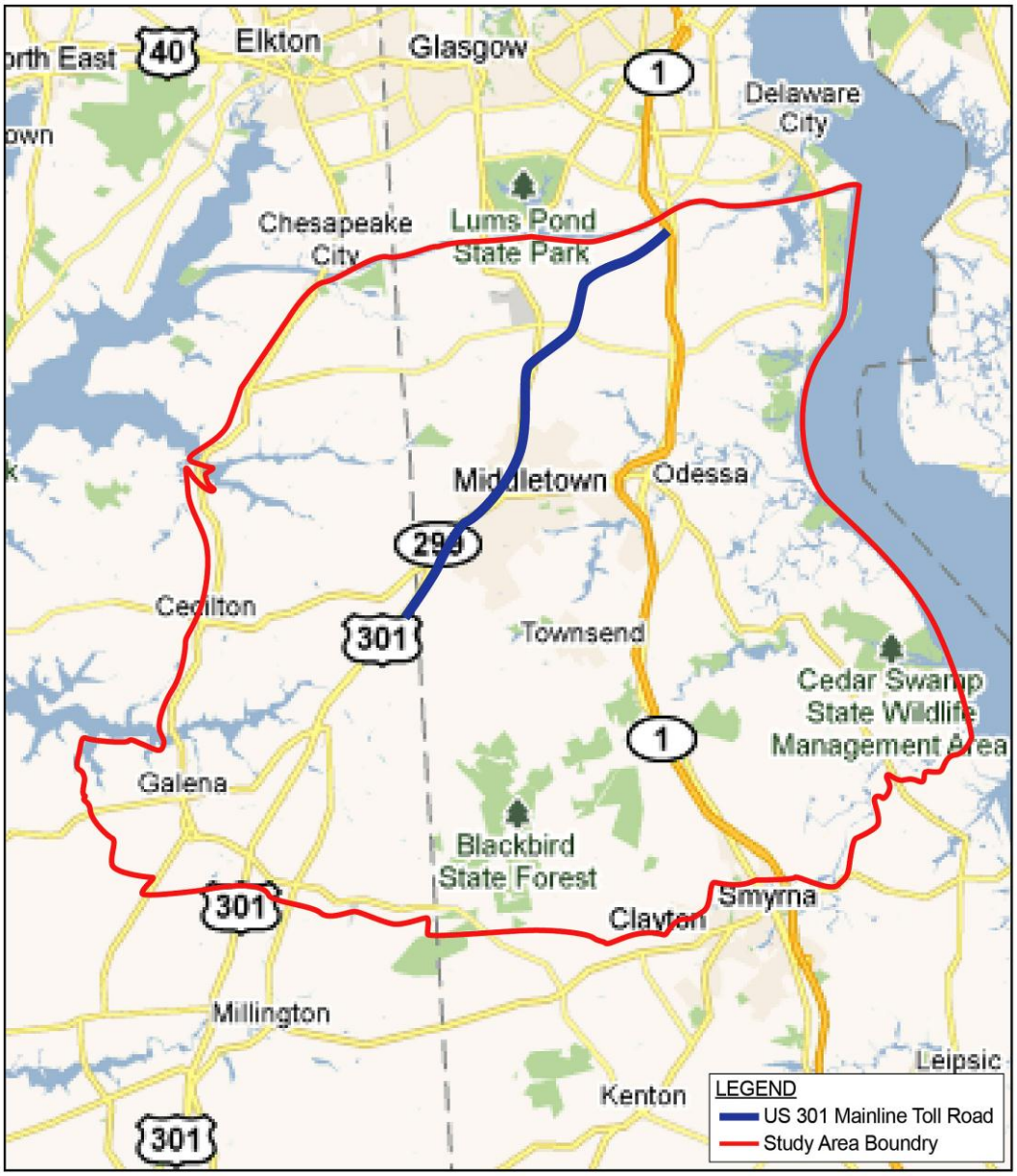
5.1 Socioeconomic Data Review Methodology

For this study, historical population and employment and population forecasts prepared by the U.S. Bureau of Census state agencies were reviewed; conversations were held with representatives of regional and local government agencies; windshield surveys were conducted; inventories were made of platted projects, maps and plans of the study area; and digital aerial photography and other relevant literature were reviewed. Based on this information, and using professional judgment, adjustments were made to the socioeconomic forecasts in the DelDOT 2010 Transportation Model.

The study area for this project is defined at two levels: the 12-county region included in the regional transportation model depicted in Figure 4-1, and sections of three counties in the vicinity of the project, depicted in Figure 5.1

The twelve counties included in the regional transportation model are: Kent, New Castle and Sussex counties in Delaware and Caroline, Dorchester, Kent, Queen Anne's, Somerset, Sussex, Talbot, Wicomico and Worchester counties in Maryland. The US 301 study area in the vicinity of the project consists of New Castle County south of the Chesapeake and Delaware Canal and portions of southwestern Cecil County and northwestern Kent County in Maryland.

Figure 5-1
Study Area in Vicinity of US 301 Mainline Toll Road



5.2 Historical and Projected Population Trends.

The 2010 population within the 12-county DelDOT Regional Model area, as shown previously in Table 4-1, was at 1.3 million according to the U.S. Bureau of Census. This was an increase of more than 167,000 residents since the 2000 U.S. Census as listed in Table 5-1. During this period, the overall growth rate of the 12-county region was 14.2 percent, or a compounded annual growth rate (CAGR) of 1.3 percent.

Table 5-1
Historical Population Delaware Regional Model Area

Area	Estimated Total Population		Change	CAGR
	2000 Census	2010 Census	2000 - 2010	2000 - 2010
Cecil County, MD	85,951	101,108	15,157	1.6%
Kent County, MD	19,200	20,197	997	0.5%
New Castle County, DE	500,272	538,479	38,207	0.7%
Study Area Counties	605,423	659,784	54,361	0.9%
Remaining 9 Counties	574,038	687,376	113,338	1.8%
Total	1,179,461	1,347,160	167,699	1.3%

Source: US Census Bureau

Of the three counties in the vicinity of the project, New Castle County, which contains the city of Wilmington, Delaware and much of the project study area, is the largest with a 2010 population of 538,479 residents. The two other counties in the project study area, Cecil County, Maryland and Kent County, Maryland, had 2010 populations of 101,108 and 20,197 residents, respectively. Growth in New Castle County between the 2000 and 2010 U.S. Census population was a modest 7.6 percent or a CAGR of 0.7 percent. Population growth in Cecil County was higher at 17.6 percent (1.6 percent CAGR); while population growth in Kent County, MD was lower at 5.2 percent (0.5 percent CAGR).

For this study, population forecasts produced by the official forecasting agencies for the two states, the Delaware Population Consortium and the Maryland State Data Center, were reviewed. The most recent projections are based on the 2000 Census and were prepared for five-year intervals between 2000 and 2040.

For the 12-county region, population is anticipated to increase from 1,347,160 in 2010 to 1,725,073 in 2040, an increase of 377,913 persons, or an average annual growth rate of 0.8 percent. Regarding the three counties in the vicinity of the project, these projections show relatively slow and diminishing growth rates for New Castle County through 2040. New Castle County's projected 2040 population is 606,881 residents or an increase of more than 68,400 residents over the 2010 U.S. Census estimate, or a CAGR of 0.4 percent during this period. In Maryland, Cecil County is expected to add 64,692 residents, a CAGR of 1.7 percent, between 2010 and 2040. Kent County's population growth, on the other hand, is expected to be significantly more constrained with approximately 4,000 new residents added during this period, or a CAGR of 0.6 percent.

Projected population for the twelve county area and the three counties in the vicinity of the project are shown in Table 5-2.

Table 5-2
Projected Population

Area	Total Population		Change	CAGR
	2010 Census	Estimated 2040	2010 - 2040	2010 - 2040
Cecil County, MD	101,108	165,800	64,692	1.7%
Kent County, MD	20,197	24,300	4,103	0.6%
New Castle County, DE	538,479	606,881	68,402	0.4%
Study Area Counties	659,784	796,981	137,197	0.6%
Remaining 9 Counties	687,376	928,092	240,716	1.0%
Total	1,347,160	1,725,073	377,913	0.8%

Sources: Delaware Population Consortium, 2010;
Maryland State Data Center, 2010.

5.3 Historical Employment Trends

Table 5-3 provides total employment estimates from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) for counties in the DelDOT Regional Transportation Model for 2001, 2007 and 2010. The data show that the region had no net employment growth over this nine year period. Gains between 2001 and 2007 were lost between 2007 and 2010, typical of the response to the recession throughout the country. Total employment decreased for the 12-county region between 2001 and 2010 by 571 jobs.

In the three counties in the vicinity of the project, total employment decreased 18,343 between 2001 and 2010 primarily due to a loss of 20,337 jobs in New Castle County. In the Maryland counties, Cecil County showed a gain while Kent County was at the same level as 2001.

Table 5-3
Historical Employment Delaware Regional Model Area

	Estimated Total Employment		
	2001	2007	2010
Cecil County, MD	25,573	30,763	27,822
Kent County, MD	7,914	8,600	7,659
New Castle County, DE	282,318	283,231	261,981
Study Area Counties	315,805	322,594	297,462
Remaining 9 Counties	235,414	266,911	253,186
Total	551,219	589,505	550,648

	Change in Employment			
		2001 - 2007	2007 - 2010	2001 - 2010
Cecil County, MD		5,190	(2,941)	2,249
Kent County, MD		686	(941)	(255)
New Castle County, DE		913	(21,250)	(20,337)
Study Area Counties		6,789	(25,132)	(18,343)
Remaining 9 Counties		31,497	(13,725)	17,772
Total		38,286	(38,857)	(571)

	Compounded Annual Growth Rate			
		2001 - 2007	2007 - 2010	2001 - 2010
Cecil County, MD		3.1%	-3.3%	0.9%
Kent County, MD		1.4%	-3.8%	-0.4%
New Castle County, DE		0.1%	-2.6%	-0.8%
Study Area Counties		0.4%	-2.7%	-0.7%
Remaining 9 Counties		2.1%	-1.7%	0.8%
Total		1.1%	-2.2%	0.0%

Source: US Bureau of Labor Statistics.

5.4 US 301 Study Area Growth Patterns

The US 301 study area experienced significant residential and commercial development between 2000 and 2008 and, as residential growth has occurred, so has economic activity. Starting in 2008, there has been a substantial slowing of new residential and commercial construction, but it has not come to a complete halt. The sections below will address recent, ongoing, and anticipated residential and commercial development projects within the US 301 study area.

5.4.1 Recent Residential Development

As of late 2010, there were 16 active subdivisions approved and under construction within the US 301 study area in New Castle County. A total of 6,325 lots have been platted and 1,734 units completed. There are approximately 4,600 available lots. No recent residential construction was identified or observed within the US 301 study area in Cecil or Kent Counties, Maryland.

5.4.2 Future Residential Growth

The recession that began during 2008 substantially slowed the development of existing residential subdivisions within the US 301 project study area and delayed planned projects. Even as the national economy has started to improve and the regional economy is approaching stabilization, it is still not possible to predict precisely when the regional housing market will recover. The market will most likely be depressed for an additional one to three years. Household formation and construction volume will be much slower than in the mid-2000s. As the housing market contracts and eventually recovers, local planners anticipate that slightly more than half of the new population growth in New Castle County will occur within the US 301 study area. In addition to the remaining lots in existing subdivisions under construction (during December 2010), there are almost 12,000 lots or multifamily units in 29 subdivisions that have been either through the platting and subdivision approval process or have been placed on hold due to market conditions.

Most proposed subdivisions in New Castle County fall within the preferred development corridor between the current US 301 and Route 1. However, there are other approved subdivisions that are outside of this corridor and New Castle County government will allow certain ones to proceed. Any future subdivisions seeking approval will need to locate within the preferred growth corridor or would need to supply their own water and wastewater utilities in order to be considered for approval.

Relatively little new residential growth has occurred in the portion of the US 301 study area that lies within Cecil County or Kent County, Maryland and little new growth is expected. Within Cecil County, large areas of land have been set aside, through the purchase of easements, for agricultural or ecological preservation. As a result, current land uses are very unlikely to change over the forecast horizon. In areas that do permit new residential development, future growth has been restricted to very low densities (e.g. one residential unit per 20 acres). In areas without these restrictions, four subdivisions are proposed in Transportation Analysis Zone (TAZ) 1691, ranging in size from 8 to 47 lots. County planners also identified an area of land south of Chesapeake City that might be developed in the future.

While future residential development in Kent County, Maryland is less hindered by easements, there are similar restrictions on housing densities (e.g. one residential unit per 30 acres). Within the town of Galena, a Kent County planner in 2008 identified the new phase of a subdivision with 100 lots. The county planner also identified several proposed rural subdivisions east of the nearby town of Fredericktown with 8 to 10 lots. These factors were considered when assessing and adjusting the population forecasts for the TAZs in the model.

5.4.3 Recent Commercial Development

Commercial development in the US 301 study area has slowed down between the October 2008 and December 2010 field surveys. While Middletown's rapidly growing population and its relative distance from Newark and Wilmington have encouraged new retailers, restaurants, medical services, and other professional service providers to expand into the market, regional job losses have tempered the growth. Many of the newly constructed commercial buildings in the project study area, which house multiple office or retail tenants, had one or more office suites or retail spaces empty during the field survey. These vacant suites or storefronts will certainly be occupied over time, but probably at a slower pace than initially anticipated by their developers. The narrative below describes recent and ongoing commercial development in the US 301 project study area during December 2010.

In New Castle County, west of US 301, there have been some recent developments, including a Wal-Mart super center and the Bunker Hill Elementary School.

East of US 301 and West of Route 1 in New Castle County there is a very active area for commercial development in Middletown. A Home Depot store, two fast food restaurants and a large convenience store were recently completed. Also, St. Andrew's School was building new facilities on its campus and Levels Road Park, a county facility, was opened.

No new commercial development was identified from the aerial photography or during the field survey in the study area East of Route 1 in New Castle County or in Cecil or Kent counties, Maryland.

5.4.4 Future Commercial Development

A number of commercial projects are anticipated in and around the Town of Middletown, although the exact timing for many of these projects is not certain. As the regional economy stabilizes and as the residential and commercial real estate markets continue to underperform, these conditions will likely delay many of the proposed projects. The projects discussed in the narrative below were identified during December 2010 meetings with planners at the Town of Middletown and New Castle, Cecil, and Kent Counties.

The largest commercial project anticipated in the US 301 study area is a 460-bed hospital, located on the east side of Middletown. It is anticipated that this facility will employ between 1,500 and 2,000 workers. A rehabilitation center is also being planned, which is expected to employ several hundred additional workers. In addition, office, retail, and other commercial projects have been proposed for available parcels both in Middletown and in other sections of New Castle County. In February of 2012, Amazon announced that it will open a 1 million square foot fulfillment center off of Levels Road.

In Cecil County, there is the possibility of commercial development in the area south of Chesapeake City, but no specific plans were identified. There is no pending commercial development anticipated in the Kent County, MD portion of the study area.

5.5 Assessing and Adjusting the Population and Employment Forecast

5.5.1 Forecast at County Level

Total population and employment in the model were adjusted to develop control totals for each county in the 12-county study area. The socioeconomic data assessed for this study included Wilmington Area Planning Council's (WILMAPCO) 2011 forecasts for New Castle and Cecil counties and data from DelDOT's Regional Model for the remaining counties. The revised control totals for the counties reflect the trends noted above and anticipate reasonably modest growth through the forecast year of 2040, while also accounting for a stabilization of the local economy in the near term. The baseline 2009 population control totals for each county in the model were adjusted to the U.S. Census Bureau's population estimates for 2009, which took into account the results from the 2010 U.S. Census count. The 2010 population estimates were based upon the same U.S. Census data set.

Baseline employment estimates for the counties were adjusted to the Delaware Department of Labor's and the Maryland Department of Labor, Licensing, and Regulation's QCEW data. Using these data led to a lower employment estimate than the 2010 DelDOT model's assumptions. While there are some shortcomings to the QCEW employment estimates, such as not counting agricultural workers and the self-employed, they also are more likely than other data sources to accurately reflect the number of individuals who commute to work.

The estimated population and employment for 2010 and 2040 for the total 12-county region and the three counties in the vicinity of the project are shown in the following tables. Data at five-year intervals for each of the twelve counties are shown in the full socioeconomic report in the appendix to this report.

Table 5-4
Population Projection for Use in Regional Model

Area	Used in Model		Change	CAGR
	2010	2040	2010 - 2040	2010 - 2040
Cecil County, MD	101,519	155,883	54,364	1.4%
Kent County, MD	20,226	23,580	3,354	0.5%
New Castle County, DE	536,583	598,896	62,313	0.4%
Study Area Counties	658,328	778,359	120,031	0.6%
Remaining 9 Counties	690,518	939,809	249,291	1.0%
Total	1,348,846	1,718,168	369,322	0.8%

Table 5-5
Employment Projection for Use in Regional Model

Area	Used in Model		Change	CAGR
	2010	2040	2010 - 2040	2010 - 2040
Cecil County, MD	27,988	46,071	18,083	1.7%
Kent County, MD	7,645	9,325	1,680	0.7%
New Castle County, DE	262,250	279,228	16,978	0.2%
Study Area Counties	297,883	334,624	36,741	0.4%
Remaining 9 Counties	253,342	320,496	67,154	0.8%
Total	551,225	655,120	103,895	0.6%

5.5.2 Population and Employment Assessment and Adjustment

To develop projections of population and employment on the TAZ level, the existing population and employment forecasts produced for each TAZ in the U.S. 301 project study area were assessed and various additional sources were investigated. These sources include: windshield surveys, interviews with local planning agencies, digital aerial photography, inventories of platted projects, maps, plans, and other relevant literature. Interviews were conducted with the staff of planning offices in New Castle County, Cecil County, Kent County (Maryland), the Town of Middletown, and Wilmington Area Planning Council (WILMAPCO). Based on this information, and the consultant's judgment and experience in the area, adjustments were made to the population and employment projections on the TAZ level.

5.5.3 Other Factors

Other adjustments to other socioeconomic factors in the model include:

- Employment by Sector - The assignment of employment by sector was not changed for the 2009 baseline figures or for any of the forecast periods, except for the TAZs within the US 301 project study area. Outside of that exception, in instances where a TAZ's total forecasted employment was adjusted, the employment by sector was adjusted proportionately to the changes made to the TAZ's total employment forecast.

- Median Household Income - It was judged that WILMAPCO's median household income estimates and the DelDOT 2010 Regional Model's median household income estimates did not adequately account for recent national trends, under which household incomes have declined. The median household income value for all TAZs was reduced by 2.0 percent between 2009 and 2010. The values were further reduced by 0.5 percent for each year between 2010 and 2015. All zonal median household income values were then maintained at the 2015 level for all future forecast periods.

- Households - An assessment used an estimate of persons per household for each forecast period, which was based upon the figures assumed by the DelDOT 2010 Peninsula model for all counties but New Castle and Cecil counties. In New Castle County, due to discrepancies within the agency's data, the 2010 persons per household value was used to produce all future estimates of households by zone. In Cecil County, the WILMAPCO estimates of person per household for each forecast period were judged to be reasonable.

- Adjustments to Forecasts Outside of the Study Area - Adjustments to the population and employment forecasts of TAZs outside of the project area were weighted according to the difference between forecast periods. Forecasts for individual TAZs outside of the study area were not reviewed for reasonableness nor were further adjustments made.

5.6 Conclusions

The 12 counties within the DelDOT Regional Model are currently experiencing modest population growth and stabilizing employment levels after the effects of the national recession. In terms of total population and employment, the 12 counties are dominated by New Castle County but from a broader perspective, the area's growth patterns have also been influenced by changes in the Philadelphia-Washington-Baltimore corridor. The intense downward pressure from the national economy has had an impact on population and employment growth patterns at the local level but these pressures are likely diminishing as the national economy improves.

During the past few years, the region (primarily New Castle County) has experienced significant job losses from individual employers, such as the closure of the Chrysler automobile manufacturing plant in Newark, Delaware and the culling of jobs in the financial sector. As the nation slowly emerges from the current downturn, its and the region's recovery will be modest and will likely require a number of years or even more before economic activity approaches earlier rates of growth, as that the United States has entered into a new period of slower economic growth.

Collectively, ongoing problems in the financial sector, government debt and problems with governance, along with fluctuations in fuel costs, will affect the spatial allocation of land development, since consumers have become reliant upon easy access to credit and fuel to create and sustain cheap housing and sprawling development patterns. However, population growth in the US 301 study area will continue, although at more modest rates. The overall level of employment within the US 301 study area has likely increased during the past few years with the opening of various retail stores and is expected to grow further with the construction of new medical facilities that will provide a significant increase to the study area's future employment. Both trends should support growing traffic volumes on the proposed US 301 Mainline Toll Road.

6 TOLL COLLECTION PLAN

The proposed US 301 Mainline Toll Road is configured as a limited access roadway connecting the existing four-lane section of US 301 at the Maryland state line to SR 1 just south of the C&D Canal. The mainline toll road is 14 miles in length and has interchanges at Jamison Corner Road, Summit Bridge Road just north of Armstrong Corner Road and Levels Road. The toll road configuration was also designed to accommodate the future 3.5 mile Spur Road that provides access to SR 896 just south of the Summit Bridge.

Tolls will be collected by All Electronic Tolling (AET); i.e., by transponder or by video recognition only. There will be no provision for toll collection by cash. Toll charges are assessed at a gantry across the mainline just north of the Maryland state line and at gantries on the ramps serving traffic to/from the north at each of the interchanges. If a motorist does not have a transponder, the vehicle's license plate is recorded by video recognition, the address is obtained from the appropriate motor vehicle registration agency, and an invoice is send to the vehicle owner for the toll charge plus a surcharge for this service.

It is assumed that the July 1, 2016 opening date refers to the commencement of tolled operation for the facility. It is anticipated that the facility will be opened to traffic for a few months prior to July as part of an introductory marketing period in order to introduce travelers to the new roadway and to permit additional testing of electronic toll collection systems. Any revenue obtained during the introductory period is not included in the project revenue stream provided in this report.

6.1 Toll Rates

The toll collection plan for the US 301 Mainline Toll Road utilizes a system of gantries placed across the mainline just north of the state line in the vicinity of Middletown and on the northerly ramps. These points are located to ensure that all traffic using the facility will pay a toll. Table 6-1 lists the assumed toll rates by number of axles for vehicles using transponders for the FY 2017 opening year. Rates for motorists opting to pay by video recognition will be 40 percent higher than the transponder rate for autos and 20 percent higher for trucks. The proposed toll collection plan also assumed a series of periodic toll increases starting in the year 2021.

In addition, the toll setup described above was developed to provide an incentive for truckers to remain on the mainline roadway, instead of diverting from the mainline roadway to avoid the Middletown plaza toll. The toll policy was established to be generally consistent with rates and payment terms provided on the Delaware Turnpike in each horizon year. The two-axle tolls are reduced from the $4.00 Middletown

Table 6-1
Proposed US 301 Mainline Tolls Effective July 2016

Toll Location	Tolls *					
	Auto	Truck				
	2-axle	2-axle 6-tire	3-axle	4-axle	5-axle	6-axle
Middletown Mainline Gantry	$4.00	$4.00	$9.00	$10.00	$11.00	$12.00
Levels Road ramps	$1.00	$1.00	$8.00	$9.00	$10.00	$11.00
Summit Bridge Road ramps	$0.75	$0.75	$8.00	$9.00	$10.00	$11.00
Jamison Corner Road ramps	$0.50	$0.50	$8.00	$9.00	$10.00	$11.00

(*) Tolls are rates for transponder transactions. Video recognition tolls will be 40 percent higher for autos and 20 percent higher for trucks. For example, the 2-axle auto toll for video recognition transactions at the Middletown Mainline Gantry will be $5.60, while the 5-axle truck toll will be $13.20.

mainline gantry toll to 50 cents at the Jamison Corner Road ramps, based on the approximate distance from the SR 1 junction. In contrast, the rates for multi-axle vehicles at all ramp gantries are reduced by $1.00 from the mainline tolls to discourage truck trips from bypassing the mainline plaza. The tolls for payment by transponder were calculated assuming 28.6 cents per mile for passenger cars and were rounded to the nearest 25-cent value to facilitate cash transactions in the initial years of operation. For each axle classification, except the 2-axle group at the ramp plazas, the rates are set to whole dollar amounts and the proposed toll rates for all horizon years are maintained at whole dollar values.

Table 6-2 provides a listing of the tolls by gantry location for each year in which periodic toll increases are assumed. The assumed increases of the proposed toll plan are structured to double the initial toll rates by 2036, which implies a compounded annual growth rate of approximately 3.5 percent. The increases are applied at five-year intervals beginning in 2021 and continue for the entire 40-year horizon period. Under this plan, the 2-axle rate at the Middletown plaza would increase to $5.00 in 2021, $6.00 in 2026, $7.00 in 2031 and $8.00 in 2036. For extending the revenue forecasts beyond 2036, it is assumed that the 2-axle tolls would be increased by $1.00 every five years, reaching $12.00 in 2056. The tolls for multi-axle vehicles would be increased proportionately. This incremental approach to future toll increases would result in a tapering escalation rate, in percentage terms, over time.

The future toll increases for this facility are in-line with historical increases for other toll facilities in Delaware, such as the Newark Toll Plaza. Based on historical data on toll increases at the Newark Toll Plaza between 1995 and 2012, the auto toll increments have been between $0.75 to $1.00 per occurrence, while truck tolls increases were between $1.00 and $3.00.

Table 6-2
US 301 Mainline Transponder Tolls by Project Year, 2016-2056

Year	Middletown Mainline Gantry		Levels Road Ramps		Summit Bridge Road Ramps		Jamison Corner Road Ramps	
	2-Axle	5-Axle	2-Axle	5-Axle	2-Axle	5-Axle	2-Axle	5-Axle
2016	$4.00	$11.00	$1.00	$10.00	$0.75	$10.00	$0.50	$10.00
2021	$5.00	$14.00	$1.25	$13.00	$0.75	$13.00	$0.50	$13.00
2026	$6.00	$17.00	$1.50	$15.00	$1.00	$15.00	$0.50	$15.00
2031	$7.00	$19.00	$1.75	$18.00	$1.00	$18.00	$0.75	$18.00
2036	$8.00	$22.00	$2.00	$20.00	$1.50	$20.00	$0.75	$20.00
2041	$9.00	$25.00	$2.25	$23.00	$1.50	$23.00	$0.75	$23.00
2046	$10.00	$28.00	$2.50	$25.00	$1.75	$25.00	$1.00	$25.00
2051	$11.00	$30.00	$2.75	$28.00	$1.75	$28.00	$1.00	$28.00
2056	$12.00	$33.00	$3.00	$30.00	$2.00	$30.00	$1.00	$30.00

6.2 Toll Collection Policy

The toll collection policy for the US 301 Mainline Toll Road reflects the Department's desire to operate the facility using similar enforcement methods to those applied to the Delaware Turnpike and SR-1. This decision reflects acknowledgement of the loss of potential revenue from video patrons and the need for consistency in the processing of violators, since the roadway will be operated as all electronic tolling (AET) facility. For those vehicles that elect to utilize video recognition as the payment method, there will be a normal invoicing process whereby patrons will be sent up to two separate bills requesting payment of the tolls which will include a video toll surcharge of 40 percent for autos and 20 percent for trucks. There are no additional fees applied as part of the standard billing process. For those transactions that are not paid within the time frame associated with the two-invoice process, it is assumed that those transactions will be converted to violations and the enforcement process for those violations will be identical to that currently used by DelDOT for the other Delaware toll roads. This procedure will include penalties for motorists who do not remit payment within the time period specified in a payment notice in accordance with legislation to be enacted in the State of Delaware.

7 HORIZON YEAR BACKGROUND HIGHWAY ASSUMPTIONS

Stantec reviewed and confirmed future highway network improvement projects to be included in the background networks. As part of this effort, Stantec confirmed the configuration and anticipated completion date of all relevant projects for the specific horizon years in the forecast period. The final list of projects and most probable completion dates were obtained from the DelDOT, WILMAPCO, and Maryland SHA. Stantec also coordinated with RK&K regarding all local roadway improvements that might have an impact on the project.

7.1 Project Improvements

Model highway networks and trip tables were developed for five horizon years (2015, 2021, 2026, 2031, and 2036) as part of the future year estimation process. These years correspond to the planned opening year of the US 301 Mainline Toll Road and the years where planned toll increases are anticipated. For each modeled network, Stantec coded the committed and planned improvements to the highway network based on projects identified in the DelDOT's Statewide Regional Long-Range Transportation Plan, published in October 2010, as well as other sources such as:

- State of Delaware Department of Transportation – Capital Transportation Program Fiscal Years 2011-2016, published in September 2010.
- Dover/Kent County Metropolitan Planning Organization Regional Transportation Plan: A Long Range Transportation Plan for 2030.
- Delaware Statewide Transportation Plan Update, List of Regionally Significant Projects included in Travel Demand model for Conformity, February 16, 2010.

The planned transportation improvements within the future year highway networks included those associated with the SR 1, I-95 and US 301 corridors as well as other locations where significant improvements are anticipated.

From the various public source websites the configuration and anticipated completion dates were obtained. For several projects, opening dates were not provided but could be inferred by anticipated construction funding. For Maryland, Stantec utilized the projects identified in publically available reports, such as "*Maryland DOT – Consolidated Transportation Program FY2011 – 2016*" (published in 2010) and "*WILMAPCO (New*

Castle, DE and Cecil County, MD) 2040 Regional Transportation Plan" (published in January 2011). Using this information, the completion dates and configuration for all projects in Maryland were established. As part of future project improvements, Stantec obtained information about local roadway improvements immediately adjacent to the US 301 Mainline Toll Road alignment that are not included in DelDOT's or WILMAPCO's capital improvement plans from RK&K. These projects would potentially include committed improvements being constructed by developers as part of the access approval process.

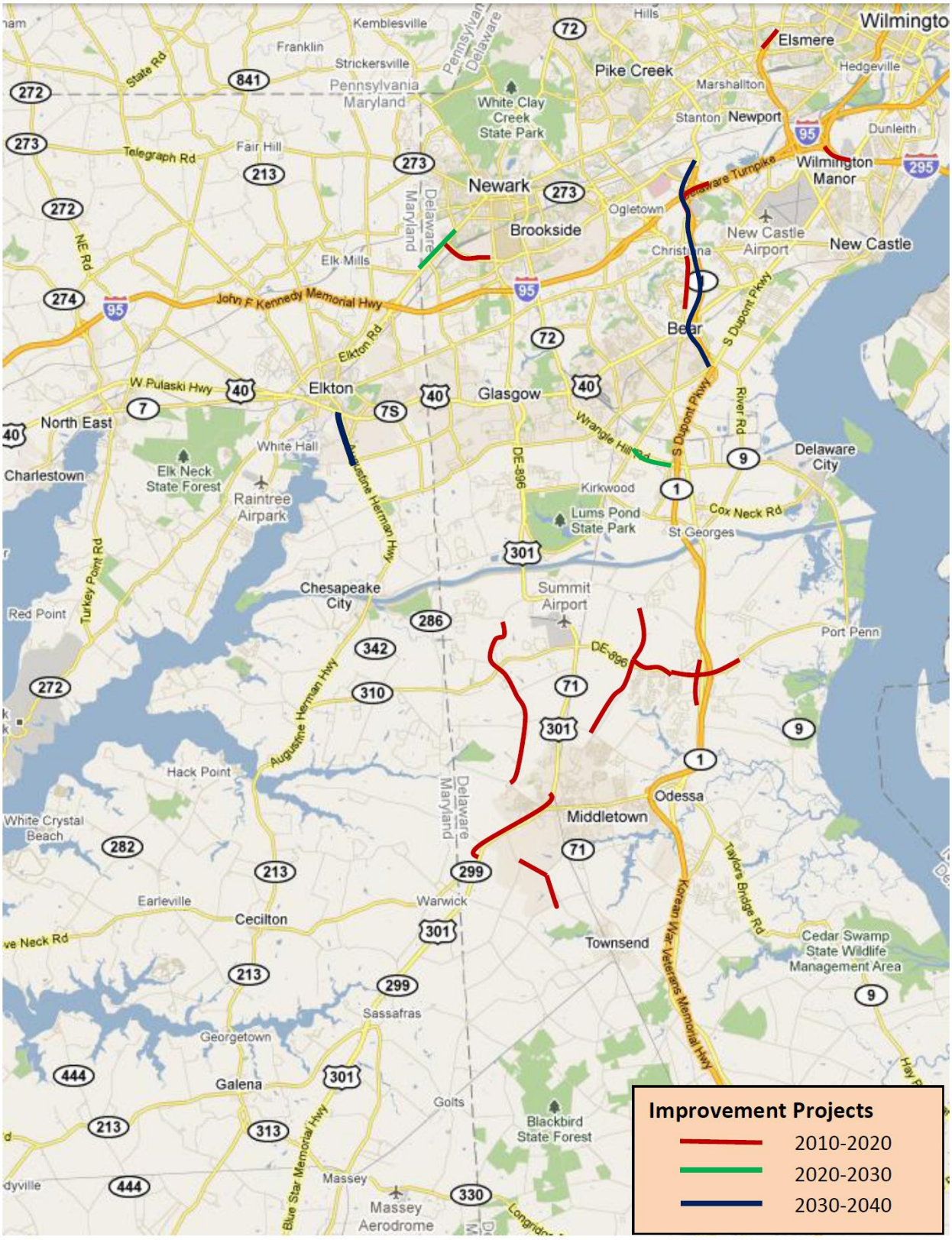
Table 7-1 and Figure 7-1 show the major highway improvements within the corridor in both Delaware and Maryland. The Delaware projects are mostly funded and constructed in the near-term horizon years while most of the Maryland projects are anticipated to be completed in more distant horizon years as noted in the respective long-range plans. For projects to be completed after the 2009 calibration year, the list of projects and most probable completion dates were obtained from the public sources provided by DelDOT, WILMAPCO, and Maryland SHA. The projects listed for completion in 2010 and 2011 were completed and appear as committed improvements in the 2015 model horizon year. Note that the list does not include many minor roadway improvements that provide only localized improvements in traffic flow and therefore do not directly compete with the US 301 Mainline Toll Road. The major projects listed in Table 7-1, along with other minor projects, are included in the future background networks as appropriate.

DelDOT's program to make major improvements to I-95/Delaware Turnpike includes the reconfiguring of the I-95/SR 1 interchange at Christiana and the Christiana Mall (by 2014), and the recently completed modifications of the Newark toll plaza to include three high-speed *E-ZPass* lanes. In addition, the critical section of SR 1, south of I-95 south to Tybouts Corner, has experienced growing congestion and will need to be improved in the future. The need will be particularly acute when the US 301 Mainline Toll Road ties into SR 1 (south of the C&D Canal) in FY 2017. Currently, this improvement project is in the project development and preliminary engineering design stage based on the FY2012 – FY2017 DelDOT's Capital Transportation Program Report,. Due to the uncertainty of the project's schedule, for purposes of this analysis Stantec has assumed that the project will be complete by 2040. If this project were to be completed earlier than 2040, it would likely have a positive impact on the US 301 Mainline Toll Road.

Table 7-1
Project Improvements in Study Area

Project Name	Project Limit		Estimated Completion Year	Project Description
	From	To		
Boyds Corner Road (SR 896)	Greylag Road	Augustine Creek Bridge	2010	Construction of auxiliary on the Boyds Corner Road approach and the US 13 approach
US 301	Middle Neck Road	Peterson Road	2010	Widen from 2 lanes to 4 lanes
I-295	I-95 Interchange	US 13 Interchange	2011	New Collector/Distributor ramp and barrier at the southbound I-95 to eastbound I-295
SR 7	Newtown Road	SR 274	2013	Widening from two to four travel lanes
Jamison Corner Road	Boyds Corner Road	Hyetts Corner Road	2013	Reconstruction to provide two 12-foot lanes with 8-foot shoulders
Wiggins Mill Road	Green Giant Road	St. Annes Church Road	2013	Reconstruction to provide two 11-foot travel lanes and 5-foot shoulders
I-95 / US 202 Interchange	at Exit 8		2014	Extension of the current one-lane ramp to two-lane ramp from I-95 Northbound to US 202 Northbound
I-95 / SR 1 Interchange	at Exit 4		2014	Construction of a new multi-lane interchange from NB SR 1 to NB I-95 and SB I-95 to SB SR 1
Boyds Corner Road (SR 896)	Cedar Lane Road	US 13	2015	Widen Boyds Corner Road to four 12-foot lanes with 10-foot shoulders and 20-foot median
Cedar Lane Road	Marl Pit Road	Boyds Corner Road	2015	Reconstruction to provide two 12-foot lanes with 8-foot shoulders
Christiana Parkway (SR 4)	Elkton Road (SR 2)	SR 896	2015	Widen eastbound lanes from one to two lanes
SR 72	McCoy Road	SR 71	2020	Widen SR 72 from two to four travel lanes
Elkton Road (SR 2)	Maryland State Line	Casho Mill Road	2020	Capacity improvement on Elkton Road
MD 213	Frenchtown Road	US 40	2030	Widen from 2 lanes to 4 lanes
SR 1	Tybouts Corner	SR 273 (Christiana Rd)	2040	Widen from 4 lanes to 6 lanes

Figure 7-1
Highway Project Improvements



7.2 Future Year Toll Policy Assumptions

Table 7-2 lists the current and future year toll rates assumed for the toll plazas on the competing toll path along the I-95 corridor. Under current conditions the I-95 path requires tolls that significantly exceed the tolls encountered on the US 301 Corridor which currently requires tolls only at the Chesapeake Bay Bridge. In developing the current forecasts, it was assumed that tolls would escalate both along the I-95 corridor and SR-1 in Delaware. As noted previously in Chapter 6, the toll rates for the US 301 Mainline Toll Road were structured to be nearly identical to the toll rates assessed at the Newark Plaza on the Delaware Turnpike. In keeping with this assumption, the same years for periodic toll increases were assumed for the US 301 Mainline Toll Road and the Turnpike. Future year toll rates increases for SR-1 were set on a different schedule reflecting the different characteristics of travelers in that corridor. Tolls for the US 301 Mainline Toll Road are structured to escalate at an annual compounded rate of 3.5 percent for the first 20 years of operation with planned increases approximately every 5 years. The percentage increases for the Turnpike are nearly identical with the exception of the autos since the 2017 auto rate would be $5.00 as opposed to $4.00 for the US 301 Mainline Toll Road. Over the longer term, tolls on the Delaware Turnpike would be continue to increase in a coordinated pattern with the increased tolls on the US 301 Mainline Toll Road. Note that all toll increases are assumed to occur on January 1st of the stated year.

Within Maryland, the years for periodic toll increases and the escalated rates were established using the toll rate increase implemented January 1,2012 and recently approved FY 2014 toll increase and general assumptions for the timing and increases beyond the near-term period. The toll rates for FY 2012 increased cash tolls by approximately 20 percent at the I-95 JFK Toll Plaza and 44 percent for the Chesapeake Bay Bridge. For FY 2014, toll rates will increase 33 percent at the JFK Toll Plaza and 50 percent at the Chesapeake Bay Bridge. Beyond 2014, tolls were assumed to escalate at approximately 3.5 percent which is similar to the general trend of the most recent increase on the MdTA toll facilities. The assumed escalation rate of 3.5 percent is generally consistent with the historical growth in median household income obtained from the Maryland State Data Center. For the Eastern Shore counties the median household income increased at a compounded rate of 3.2 percent for the 20-year period between 1989 and 2009. The years for proposed increases on the Maryland toll facilities beyond 2014 were assumed to be consistent with the years designated for toll increases on the Delaware Turnpike and US 301.

Table 7-2
Background Network Toll Rates

Year	AUTO					TRUCK				
	DELAWARE		MARYLAND			DELAWARE		MARYLAND		
	US 301 Mainline Gantry[1]	I-95 Newark Toll Plaza[2]	I-95 Kennedy Highway[3][7]	I-95 Fort McHenry Tunnel[4][7]	US 50/301 Bay Bridge[5][7]	US 301 Mainline Gantry[1]	I-95 Newark Toll Plaza[2]	I-95 Kennedy Highway[3][7]	I-95 Fort McHenry Tunnel[4][7]	US 50/301 Bay Bridge[5][7]
2010		$4.00	$5.00	$2.00	$2.50		$9.00	$30.00	$12.00	$15.00
2011		$4.00	$6.00	$3.00	$4.00		$9.00	$36.00	$18.00	$24.00
2012		$4.00	$6.00	$3.00	$4.00		$9.00	$36.00	$18.00	$24.00
2013		$4.00	$8.00	$4.00	$6.00		$9.00	$48.00	$24.00	$36.00
2014		$4.00	$8.00	$4.00	$6.00		$9.00	$48.00	$24.00	$36.00
2015	$4.00	$5.00	$8.50	$4.25	$6.50	$11.00	$11.00	$51.50	$25.75	$38.50
2016	$4.00	$5.00				$11.00	$11.00			
2017	$4.00	$5.00				$11.00	$11.00			
2018	$4.00	$5.00				$11.00	$11.00			
2019	$4.00	$5.00				$11.00	$11.00			
2020	$4.00	$5.00				$11.00	$11.00			
2021	$5.00	$6.00	$10.50	$5.25	$8.00	$14.00	$14.00	$63.25	$31.50	$47.50
2022	$5.00	$6.00				$14.00	$14.00			
2023	$5.00	$6.00				$14.00	$14.00			
2024	$5.00	$6.00				$14.00	$14.00			
2025	$5.00	$6.00				$14.00	$14.00			
2026	$6.00	$7.00	$12.50	$6.25	$9.50	$17.00	$17.00	$75.00	$37.50	$56.25
2027	$6.00	$7.00				$17.00	$17.00			
2028	$6.00	$7.00				$17.00	$17.00			
2029	$6.00	$7.00				$17.00	$17.00			
2030	$6.00	$7.00				$17.00	$17.00			
2031	$7.00	$8.00	$14.75	$7.50	$11.25	$19.00	$19.00	$89.25	$44.50	$66.75
2032	$7.00	$8.00				$19.00	$19.00			
2033	$7.00	$8.00				$19.00	$19.00			
2034	$7.00	$8.00				$19.00	$19.00			
2035	$7.00	$8.00				$19.00	$19.00			
2036	$8.00	$9.00	$17.75	$8.75	$13.25	$22.00	$22.00	$106.00	$53.00	$79.50
2037	$8.00	$9.00				$22.00	$22.00			
2038	$8.00	$9.00				$22.00	$22.00			
2039	$8.00	$9.00				$22.00	$22.00			
2040	$8.00	$9.00				$22.00	$22.00			
2041	$9.00	$10.00	$21.00	$10.50	$15.75	$25.00	$25.00	$125.75	$63.00	$94.25
2042	$9.00	$10.00				$25.00	$25.00			

Note:
(1) It is assumed that US 301 Toll Connector Road would be opened in July, 2016.
(2) I-95 auto and truck tolls at the Newark Plaza were increased in 1991 and 2000 as well as on October 1, 2005 and October 1, 2007.
(3) I-95 auto tolls for the John F. Kennedy Memorial Highway were increased on October 8, 1991, November 1, 2001, and November 15, 2003. Truck tolls were also increased on May 1, 2009. Tolls are collected northbound only
(4) I-95 auto and truck tolls at the Fort McHenry Tunnel were increased on July 1, 1989, and November 15, 2003. Truck Tolls were also increased on May 1, 2009. Tolls are collected in both directions.
(5) US 50/301 auto and truck tolls in Maryland were increased on April 2, 1989. Truck tolls were also increased on May 1, 2009. Tolls for US 50/301 Bay Bridge are collected eastbound only.
(6) Toll increases are assumed at general rate of 3.5% annually. This rate is above the general rate of inflation which is 2.7% using CPI growth during 1997-2009 for the Northeast Region.
(7) Toll rates for Maryland increased in 2011 and will increase againin 2013.

In comparing the rates for the long-distance trips via US 301 and I-95, it is important to note that the US 301 routing will maintain a lower overall toll cost when considering the total cost of all the paypoints on the I-95 routing. Table 7-3 lists the total toll costs for patrons paying by transponder on the US 301 Mainline Toll Road route and cash on the I-95 route for several horizon years. As shown in the table, cost savings for the US 301 Mainline Toll Road are increasing as the over time, providing a competitive advantage over the I-95 routing through Maryland.

Table 7-3
Comparison of Toll Cost by Path and Vehicle Type

Year	Auto Tolls			5-Axle Truck Tolls		
	I-95	Bay Bridge / US 301	Cost Savings	I-95	Bay Bridge / US 301	Cost Savings
2016	$ 17.75	$ 10.50	$ 7.25	$ 88.25	$ 49.50	$ 38.75
2021	$ 21.75	$ 13.00	$ 8.75	$ 108.75	$ 61.50	$ 47.25
2031	$ 30.25	$ 18.25	$ 12.00	$ 152.75	$ 85.75	$ 67.00
2041	$ 41.50	$ 24.75	$ 16.75	$ 213.75	$ 119.25	$ 94.50

7.3 Local Road Truck Prohibitions

In order to restrict trucks from using local roadways in Maryland and Delaware to by-pass the mainline toll gantry, DelDOT and Maryland SHA have agreed to implement a series of truck prohibitions on the adjacent local roadways. In addition to enforcing the provision for tolling long-distance truck trips, these prohibitions also reflect safety concerns as well as geometric and weight limitations of these local roads. Table 7-4 provides a list of the proposed locations of truck prohibitions.

Table 7-4
Local Road Truck Restrictions

ROAD NAME	LIMIT		JURISDICTION
	FROM	TO	
Sassafras Caldwell Rd	MD 299	Caldwell Corner Road	Maryland
Edgar Price Road	MD 299	Levels Road	Delaware, Maryland
Wards Hill Road	MD 282	MD 299	Maryland
Strawberry Lane	DE 15	MD 299	Delaware, Maryland
DE 15 (Levels Road)	Strawberry Lane	St. Annes Church Road	Delaware
DE 299 (Warwick Road)	Old Telegraph road	Middle Neck Road	Delaware, Maryland
Middle Neck Road	Old Telegraph road	DE 299	Delaware, Maryland
Old Telegraph Road	MD 299	Middle Neck Road	Maryland
Bunker Hill Road	Old Telegraph road	Choptank Road	Delaware, Maryland

In addition to these prohibitions, there are current weight restrictions and geometric constraints on several of the local roadways which could serve as potential bypasses of the mainline toll plaza. The traffic and revenue forecasts developed herein are based on the assumption that these truck prohibitions will be established and enforced in addition to the existing limitations on vehicle weights. It is assumed that truck traffic with local destinations that currently utilize Warwick Road would be permitted to retain this routing for local deliveries, but all other truck movements would be prohibited.

8 TRAFFIC FORECASTS

Utilizing the revised socioeconomic data sets provided by ATG in Chapter 5 and the updated future highway networks developed in Chapter 7, Stantec executed the DelDOT's Regional Model to forecast future travel within the corridor by horizon year. The model was executed for the selected horizon years required for the forecasting process. The specific horizon years include 2015 and the year 2041 as well as additional interim years that were included as necessary to reflect the impacts of the planned periodic toll increases.

Stantec reviewed the results of the model executions to ensure that the results in the corridor are reasonable. The summary tables and comparisons provided in this section of the report describe the impacts of the toll facility and the anticipated growth in traffic in the corridor.

8.1 Daily Toll Transactions

Using the validated toll diversion model along with the anticipated growth in the socioeconomic data and the planned transportation improvements in the DelDOT Regional Model, Stantec developed traffic and revenue forecasts for the US 301 Mainline Toll Road, taking into account the initial (FY 2017) toll schedule and the periodic toll increases in 2021, 2026, 2031, 2036 and 2041. The forecast period (2015-2041) reflects the model's five horizon years ending with 2041.

Beyond 2041, the projected twentieth year of operation, revenues were projected out to 2057, the fortieth year of operation, with tolls continuing to increase every five years to reach $12.00 for autos and $33.00 for 5-axle trucks by 2056. The development of the traffic and revenue estimates for the non-modeled years from 2016 through 2041 were performed with standard interpolation techniques. After 2041, the forecast was based on a linear extrapolation using the growth from the last 10 years of the modeled period which results in a tapering traffic growth rate (in percentage terms) over time.

Toll evasion for ETC and video recognition tolling options was included in the forecast as noted in Section 9.1.4. A moderate ramp-up factor of 90 percent (traffic discounted by 10 percent) for the first year of operation (increasing to 100 percent by 2018) reflects the fact that US 301 is an established traffic corridor.

Table 8-1 shows the estimated 2016 transactions by paypoint on a daily basis and the revenue for the July – December period. Note that the revenue from the mainline gantry and its large portion of truck trips provides the majority of the revenue for the facility.

Table 8-1
US 301 Mainline Forecast for Base Toll Option, 2016

Toll Location	Transactions[(A)]	Average Toll	Revenue[(B)] (000)
Middletown Gantry	8,761	$5.87	$9,134
Levels Road Ramps	2,362	$1.40	$589
Summit Bridge Ramps	3,820	$1.22	$826
Jamison Corner Road Ramps	1,627	$0.69	$198
Total	16,570	$3.65	$10,747

(A) Discounted by toll evasion and ramp-up in 2016

(B) Revenue for half-year (July - December) based on assumed opening, July 2016

Table 8-2 provides a similar summary of transactions and revenue for each of the modeled years out to 2041. Note that the truck share of overall revenue is approximately 40 to 45 percent over the forecast period. This is attributed to the large share of truck traffic at the mainline gantry and the associated toll rates paid by trucks. It should be noted the majority of transactions at the mainline gantry are out-of-state travelers, whereas the transactions at the ramps are more locally oriented and thus dominated by local travelers. While the Levels Road ramps are a mixture of local residents from adjacent communities in Maryland and Delaware residents, the ramps at Summit Bridge Road and Jamison Corner Road serve predominately local Delaware residents and businesses.

As shown in Table 8-2, given the toll plan and the higher level of truck transactions at the mainline toll gantry, the dominant share of revenue is related to tolls collected at the mainline gantry. Over the forecast period approximately 86 percent of the total revenue is obtained from vehicles at the malinline gantry, many of which are long-distance trips.

Table 8-2
Daily Transactions and Revenue by Model Horizon Year

Toll Location	Daily Transactions																	
	2016			2021			2026			2031			2036			2041		
	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total
Middletown Gantry	6,798	1,963	8,761	9,037	2,565	11,602	10,788	2,930	13,718	11,073	3,318	14,391	12,001	3,728	15,729	12,971	4,204	17,175
Levels Road Ramps	2,251	111	2,362	3,131	171	3,302	3,590	214	3,804	3,859	241	4,100	4,087	270	4,357	4,327	290	4,617
Summit Bridge Ramps	3,605	215	3,820	4,102	252	4,354	4,126	283	4,409	4,209	286	4,495	4,235	318	4,553	4,392	329	4,721
Jamison Corner Road Ramps	1,593	34	1,627	2,242	49	2,291	2,699	68	2,767	2,752	82	2,834	3,189	97	3,286	3,768	114	3,882
Total	14,247	2,323	16,570	18,512	3,037	21,549	21,203	3,495	24,698	21,893	3,927	25,820	23,512	4,413	27,925	25,458	4,937	30,395

Toll Location	Annual Revenue ($1,000)																	
	2016			2021			2026			2031			2036			2041		
	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total	Auto	Truck	Total
Middletown Gantry	$5,378	$3,756	$9,134	$17,470	$12,314	$29,784	$24,662	$17,032	$41,694	$29,404	$21,603	$51,007	$36,356	$28,088	$64,444	$44,233	$35,934	$80,167
Levels Road Ramps	$419	$170	$589	$1,436	$670	$2,106	$1,965	$970	$2,935	$2,459	$1,307	$3,766	$2,973	$1,633	$4,606	$3,541	$2,012	$5,553
Summit Bridge Ramps	$500	$326	$826	$1,122	$991	$2,113	$1,499	$1,285	$2,784	$1,527	$1,553	$3,080	$2,302	$1,920	$4,222	$2,390	$2,283	$4,673
Jamison Corner Road Ramps	$145	$53	$198	$405	$192	$597	$487	$314	$801	$744	$443	$1,187	$861	$583	$1,444	$1,019	$785	$1,804
Total	$6,442	$4,305	$10,747	$20,433	$14,167	$34,600	$28,613	$19,601	$48,214	$34,134	$24,906	$59,040	$42,492	$32,224	$74,716	$51,183	$41,014	$92,197

Average Toll Per Transactions	$3.65	$4.52	$5.50	$6.44	$7.54	$8.54
Percent Truck Revenue	40.1%	40.9%	40.7%	42.2%	43.1%	44.5%
Mainline Gantry Revenue Share	**85.0%**	**86.1%**	**86.5%**	**86.4%**	**86.3%**	**87.0%**

8.2 Corridor Screenline Analysis / Diversion

Figure 8-1 displays two screenlines established to track the growth of traffic among the various roadways that would be influenced by the US 301 Mainline Toll Road. Screenline 1 intercepts all traffic crossing the C&D Canal and traffic for the base year 2009 and each modeled horizon year is listed in Figure 8-2. Traffic along the US 301 Corridor south of Middletown is intercepted on Screenline 2 and is listed in Figure 8-3. Note that all of these values are unadjusted model estimates and therefore do not account for the loss of transactions due to ramp-up and evasion that were incorporated into the estimates provided in Table 8-1 and Table 8-2.

Figure 8-1
Corridor Screenline Locations

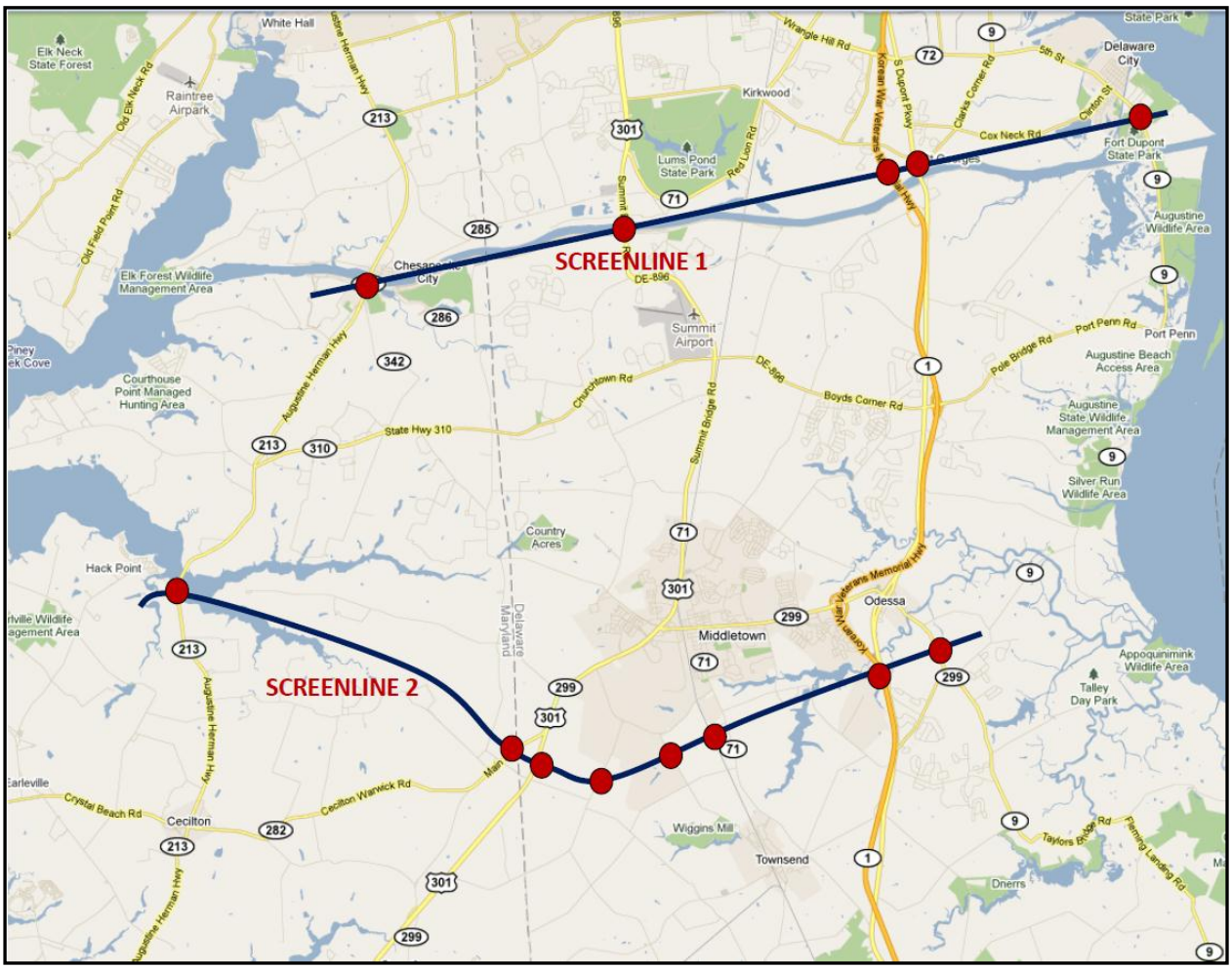
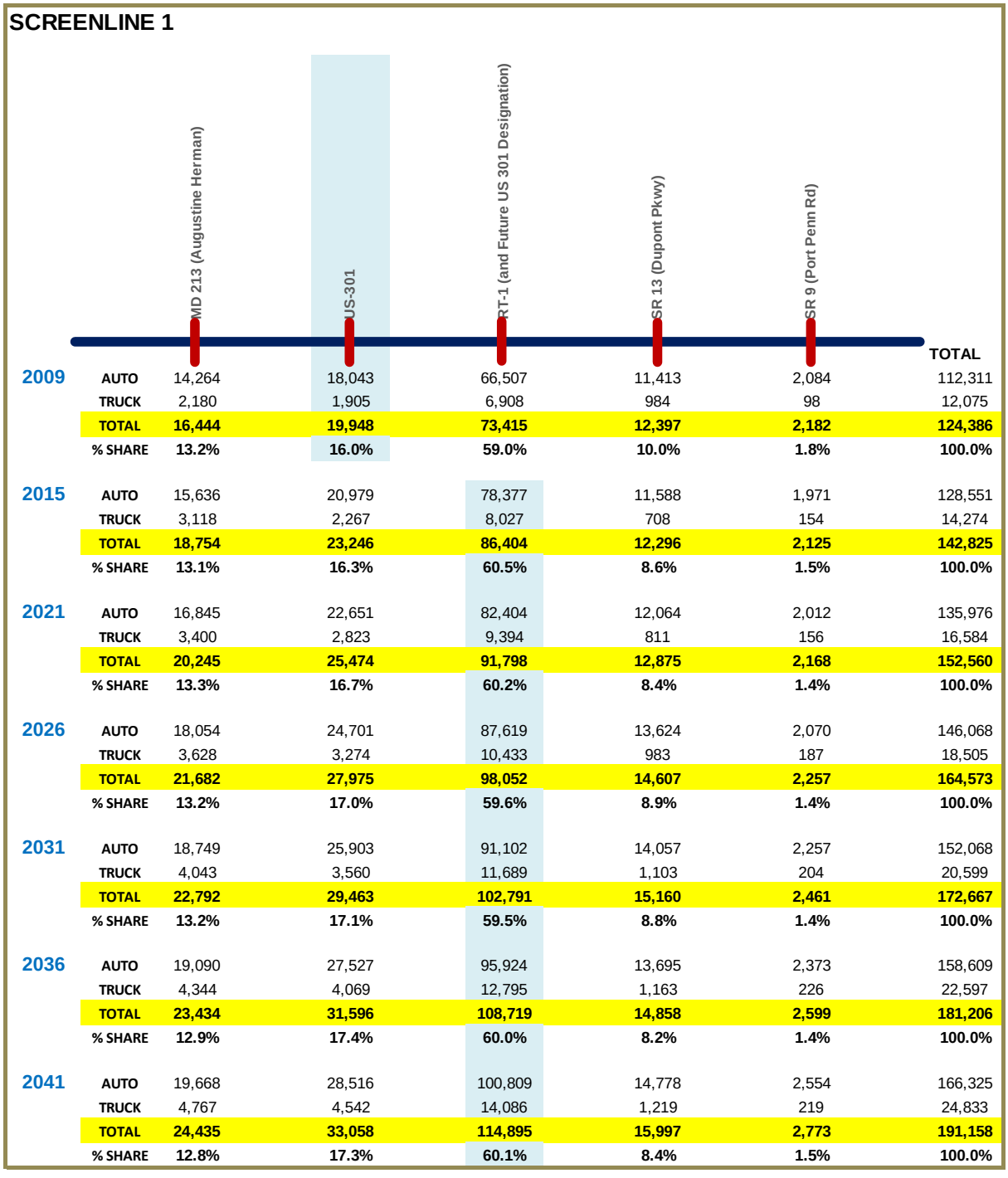


Figure 8-2
Daily Traffic Comparison by Analysis Year at Screenline 1



		MD 213 (Augustine Herman)	US-301	RT-1 (and Future US 301 Designation)	SR 13 (Dupont Pkwy)	SR 9 (Port Penn Rd)	TOTAL
2009	AUTO	14,264	18,043	66,507	11,413	2,084	112,311
	TRUCK	2,180	1,905	6,908	984	98	12,075
	TOTAL	**16,444**	**19,948**	**73,415**	**12,397**	**2,182**	**124,386**
	% SHARE	**13.2%**	**16.0%**	**59.0%**	**10.0%**	**1.8%**	**100.0%**
2015	AUTO	15,636	20,979	78,377	11,588	1,971	128,551
	TRUCK	3,118	2,267	8,027	708	154	14,274
	TOTAL	**18,754**	**23,246**	**86,404**	**12,296**	**2,125**	**142,825**
	% SHARE	**13.1%**	**16.3%**	**60.5%**	**8.6%**	**1.5%**	**100.0%**
2021	AUTO	16,845	22,651	82,404	12,064	2,012	135,976
	TRUCK	3,400	2,823	9,394	811	156	16,584
	TOTAL	**20,245**	**25,474**	**91,798**	**12,875**	**2,168**	**152,560**
	% SHARE	**13.3%**	**16.7%**	**60.2%**	**8.4%**	**1.4%**	**100.0%**
2026	AUTO	18,054	24,701	87,619	13,624	2,070	146,068
	TRUCK	3,628	3,274	10,433	983	187	18,505
	TOTAL	**21,682**	**27,975**	**98,052**	**14,607**	**2,257**	**164,573**
	% SHARE	**13.2%**	**17.0%**	**59.6%**	**8.9%**	**1.4%**	**100.0%**
2031	AUTO	18,749	25,903	91,102	14,057	2,257	152,068
	TRUCK	4,043	3,560	11,689	1,103	204	20,599
	TOTAL	**22,792**	**29,463**	**102,791**	**15,160**	**2,461**	**172,667**
	% SHARE	**13.2%**	**17.1%**	**59.5%**	**8.8%**	**1.4%**	**100.0%**
2036	AUTO	19,090	27,527	95,924	13,695	2,373	158,609
	TRUCK	4,344	4,069	12,795	1,163	226	22,597
	TOTAL	**23,434**	**31,596**	**108,719**	**14,858**	**2,599**	**181,206**
	% SHARE	**12.9%**	**17.4%**	**60.0%**	**8.2%**	**1.4%**	**100.0%**
2041	AUTO	19,668	28,516	100,809	14,778	2,554	166,325
	TRUCK	4,767	4,542	14,086	1,219	219	24,833
	TOTAL	**24,435**	**33,058**	**114,895**	**15,997**	**2,773**	**191,158**
	% SHARE	**12.8%**	**17.3%**	**60.1%**	**8.4%**	**1.5%**	**100.0%**

Figure 8-3
Daily Traffic Comparison by Analysis Year at Screenline 2

SCREENLINE 2

		MD 213 (Augustine Herman)	Warwick Road	US-301	Levels Road	Wiggins Mill Road	SR 71 (Summit Bridge Road)	SR 1 & US 13	SR 299	TOTAL
2009	AUTO	9,718	3,093	8,736	1,993	1,578	3,612	46,991	5,395	81,116
	TRUCK	1,872	411	2,439	189	169	514	4,945	403	10,942
	TOTAL	**11,590**	**3,504**	**11,175**	**2,182**	**1,747**	**4,126**	**51,936**	**5,798**	**92,058**
	% SHARE	**12.6%**	**3.8%**	**12.1%**	**2.4%**	**1.9%**	**4.5%**	**56.4%**	**6.3%**	**100.0%**
2015	AUTO	11,054	4,669	8,139	2,215	1,734	3,358	52,672	5,622	89,463
	TRUCK	3,083	0	2,634	0	285	517	5,699	444	12,662
	TOTAL	**14,137**	**4,669**	**10,773**	**2,215**	**2,019**	**3,875**	**58,371**	**6,066**	**102,125**
	% SHARE	**13.8%**	**4.6%**	**10.5%**	**2.2%**	**2.0%**	**3.8%**	**57.2%**	**5.9%**	**100.0%**
2021	AUTO	12,180	4,962	9,986	2,487	2,298	3,670	55,148	6,205	96,936
	TRUCK	3,317	0	3,173	0	392	551	6,856	544	14,833
	TOTAL	**15,497**	**4,962**	**13,159**	**2,487**	**2,690**	**4,221**	**62,004**	**6,749**	**111,769**
	% SHARE	**13.9%**	**4.4%**	**11.8%**	**2.2%**	**2.4%**	**3.8%**	**55.5%**	**6.0%**	**100.0%**
2026	AUTO	13,329	5,274	11,707	2,720	2,593	3,922	60,136	6,751	106,432
	TRUCK	3,543	0	3,598	0	467	598	7,783	683	16,672
	TOTAL	**16,872**	**5,274**	**15,305**	**2,720**	**3,060**	**4,520**	**67,919**	**7,434**	**123,104**
	% SHARE	**13.7%**	**4.3%**	**12.4%**	**2.2%**	**2.5%**	**3.7%**	**55.2%**	**6.0%**	**100.0%**
2031	AUTO	13,885	5,498	11,927	2,905	2,871	4,117	62,999	7,135	111,337
	TRUCK	3,886	0	4,054	0	541	636	8,637	802	18,556
	TOTAL	**17,771**	**5,498**	**15,981**	**2,905**	**3,412**	**4,753**	**71,636**	**7,937**	**129,893**
	% SHARE	**13.7%**	**4.2%**	**12.3%**	**2.2%**	**2.6%**	**3.7%**	**55.2%**	**6.1%**	**100.0%**
2036	AUTO	14,359	5,682	12,881	2,926	3,110	4,372	66,549	7,621	117,500
	TRUCK	4,195	0	4,546	0	588	643	9,700	909	20,581
	TOTAL	**18,554**	**5,682**	**17,427**	**2,926**	**3,698**	**5,015**	**76,249**	**8,530**	**138,081**
	% SHARE	**13.4%**	**4.1%**	**12.6%**	**2.1%**	**2.7%**	**3.6%**	**55.2%**	**6.2%**	**100.0%**
2041	AUTO	15,027	5,833	13,926	3,280	3,445	4,761	70,949	8,223	125,444
	TRUCK	4,639	0	5,125	0	715	550	10,794	983	22,806
	TOTAL	**19,666**	**5,833**	**19,051**	**3,280**	**4,160**	**5,311**	**81,743**	**9,206**	**148,250**
	% SHARE	**13.3%**	**3.9%**	**12.9%**	**2.2%**	**2.8%**	**3.6%**	**55.1%**	**6.2%**	**100.0%**

The columns of numbers highlighted in blue in Figures 8-2 and 8-3 are the volumes of roadways at either end of the US 301 Mainline Toll Road. Note that the shading in Figure 8-2 is altered in the 2015 model year to reflect the changes in the route designation of US 301.

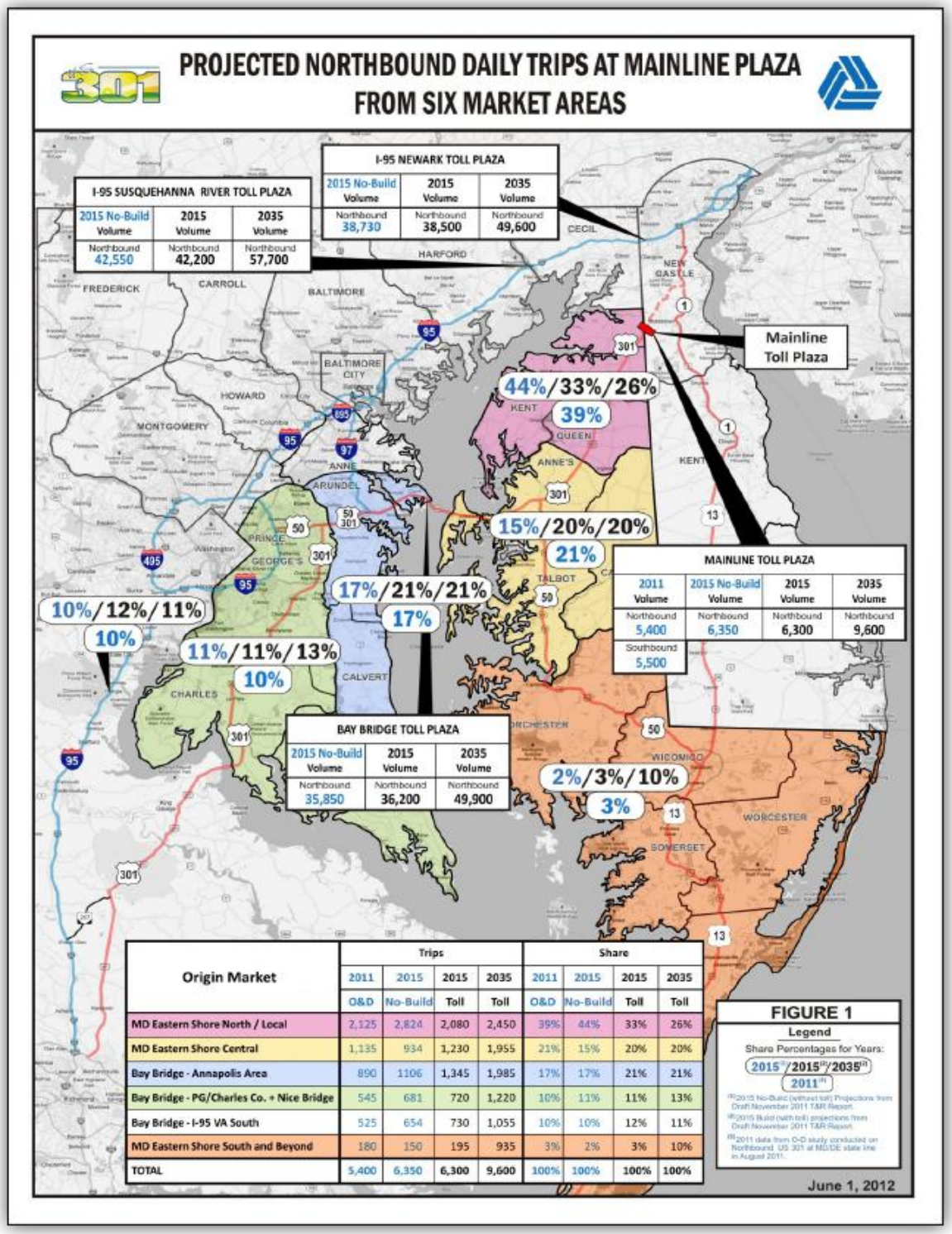
Screenline 1 north of the project paralleling the C & D Canal indicates that there will be a noticeable increase in 2015 to the SR 1 Bridge across the C&D Canal just above the merge point with the new toll road. This increase is partially related to the improved travel times for accessing locations north of the canal provided by US 301 Mainline Toll Road and the fact that the US 301 route designation will be altered such that US 301 will now merge with SR-1 rather than use the existing alignment that is shared with SR 896 over the Summit Bridge. Future traffic on the existing US 301 alignment that uses the Summit Bridge shows some growth attributed to local development. The percentage shares of screenline traffic for the other north-south roadways show some minimal reductions in response to the new toll road.

Screenline 2 south of the project corridor identifies diversions for traffic south and west of Middletown. Traffic volumes on US 301 south of Middletown near the southern terminus of the US 301 Mainline Toll Road continues to shows an increasing share of the overall corridor traffic in response to the reduced travel times provided by the new toll road. Note that several local roads indicate an increase in the share of corridor traffic. This increase is due to development growth and for some local traffic as these roads provide non-tolled routes into Middletown.

8.3 Toll Traffic Origin – Destination Analysis

The forecasts of trip origins and destinations for selected horizon years were reviewed against patterns obtained from the survey of northbound trips conducted in 2011. Figure 8-4 provides a display of the northbound trips estimated by the toll diversion model to traverse the US 301 Mainline Toll Gantry for the 2015 and 2035 horizon years. The origins of these trips were grouped into six larger districts, three of which represent the counties of Maryland's Eastern Shore. The eastern shore districts are designated as 'Eastern Shore North/Local' which accounts for the areas immediately west of the state line, 'Eastern Shore Central' and 'Eastern Shore South'. The remaining three districts represent areas in Maryland's west shore encompassing Prince George and Charles Counties, the Annapolis Area, and Virginia and south, all of which use the Chesapeake Bay Bridge as the entry point into the US 301 Corridor.

Figure 8-4
Estimated Northbound Trips on US 301 Mainline Plaza Toll Gantry



Origin Market	Trips 2011 O&D	Trips 2015 No-Build	Trips 2015 Toll	Trips 2035 Toll	Share 2011 O&D	Share 2015 No-Build	Share 2015 Toll	Share 2035 Toll
MD Eastern Shore North / Local	2,125	2,824	2,080	2,450	39%	44%	33%	26%
MD Eastern Shore Central	1,135	934	1,230	1,955	21%	15%	20%	20%
Bay Bridge - Annapolis Area	890	1106	1,345	1,985	17%	17%	21%	21%
Bay Bridge - PG/Charles Co. + Nice Bridge	545	681	720	1,220	10%	11%	11%	13%
Bay Bridge - I-95 VA South	525	654	730	1,055	10%	10%	12%	11%
MD Eastern Shore South and Beyond	180	150	195	935	3%	2%	3%	10%
TOTAL	5,400	6,350	6,300	9,600	100%	100%	100%	100%

As shown in the small table inside the figure, the northbound traffic volumes from the 2011 origin-destination survey are provided along the unadjusted model estimates (before post model refinements including ramp-up and toll evasion) for the 2015 no-build, 2015 build, and 2035 build forecasts. As expected in the early years of operation, the highest volumes of trips using the toll road have origins on the eastern shore's North and Central Districts and the Annapolis area. Over the forecast period, an increasing share of the trips traversing the mainline gantry will originate in the districts other than the eastern shore North/Local district. Note that the majority of the trips are long-distance movements and have destinations to areas north of the C & D Canal.

In contrast to the discussion of the previous figure that focused only on the origins of trips, Table 8-3 provides estimates of individual origin – destination movements between districts. The estimates include both the 'total' and number of tolled trips that will pass though the mainline gantry. The origin and destination districts are displayed in Figure 8-5. From the six origin districts described previously, the destination of northbound trips to one of three possible destination areas were established. The first destination district is the areas near Middletown, Delaware south of the C&D Canal. The second destination district covers the areas in northern Delaware north of the C&D Canal. The third destination district encompasses all areas beyond Delaware.

Table 8-3
Origin-Destination Movements Between Districts

ORIGIN DISTRICT	DESTINATION DISTRICT	TOTAL TRIPS	TOLL TRIPS	% TOLL TRIPS
MD Eastern Shore South	South of Canal	5	4	80.0%
	North of Canal	74	53	71.6%
	Beyond Delaware	188	100	53.2%
MD Eastern Shore Central	South of Canal	95	37	38.9%
	North of Canal	633	358	56.6%
	Beyond Delaware	785	509	64.8%
MD Eastern Shore Local	South of Canal	2,203	545	24.7%
	North of Canal	2,026	823	40.6%
	Beyond Delaware	459	253	55.1%
Ann Arundel (Annapolis Area)	South of Canal	145	128	88.3%
	North of Canal	260	233	89.6%
	Beyond Delaware	617	524	84.9%
Prince George's & Charles Counties	South of Canal	78	69	88.5%
	North of Canal	139	125	89.9%
	Beyond Delaware	330	280	84.8%
Virginia / I-95 South	South of Canal	90	80	88.9%
	North of Canal	161	145	90.1%
	Beyond Delaware	383	325	84.9%

Figure 8-5
Origin – Destination District Map

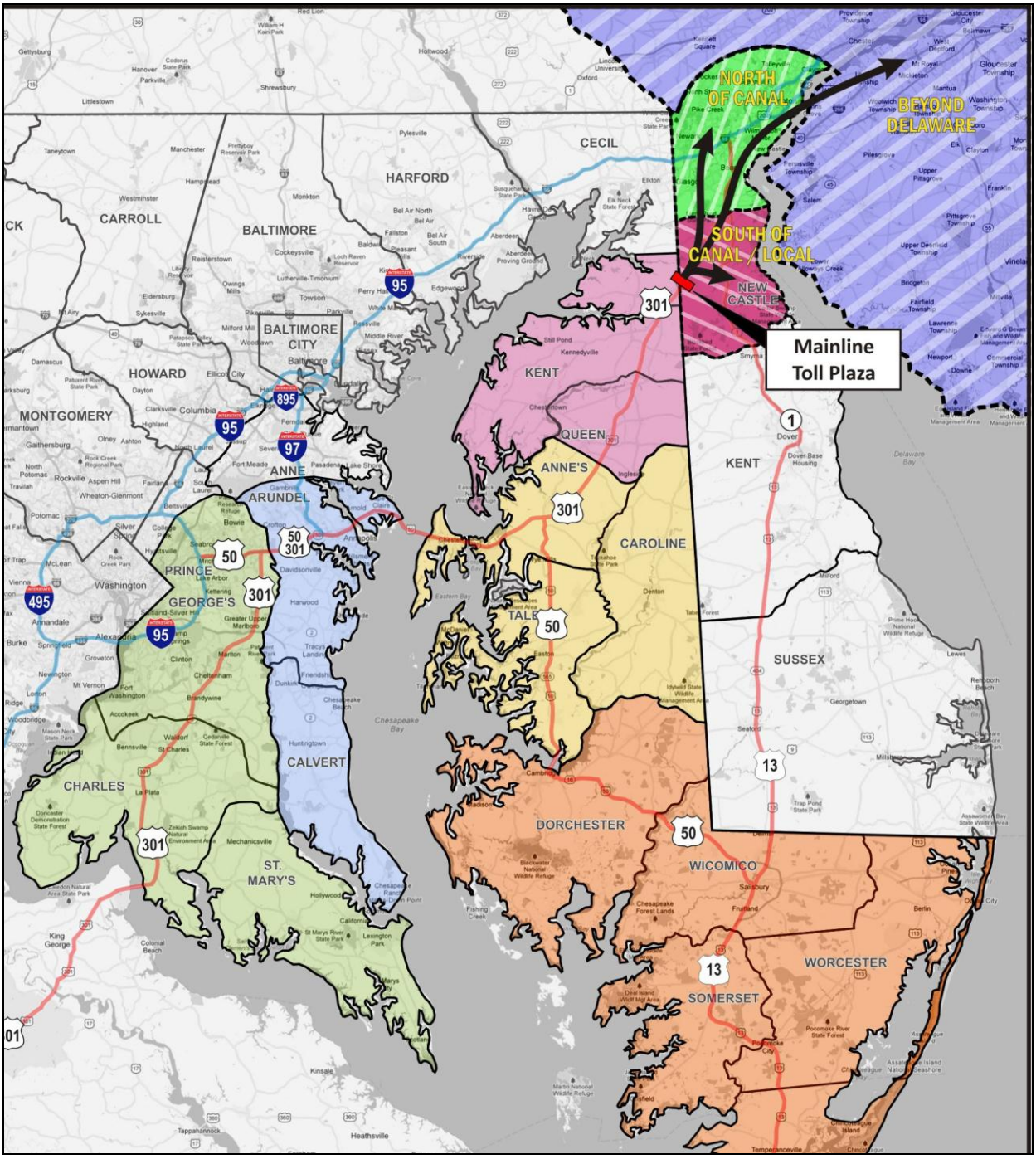


Table 8-3 also provides estimates of the share of trips moving between the individual origin and destination districts that elect to use the toll road. As noted in the yellow-shaded row of the table, the local movements between areas immediately adjacent to either side of the mainline gantry represent a relatively low share of trips using the toll road. In the 2015 horizon year, which approximates conditions of the opening year, the model estimates that only 24.7 percent of the locally-oriented trips will use the toll option. The other 75.3 percent of the trips will use the non-tolled alternatives, such as Warwick Road, to bypass the mainline gantry. For the longer distance movements from the Eastern Shore Central district, shown in red shading, the share of trips using the toll road is much higher, particularly for those destination districts that are north of the C&D Canal or beyond Delaware. As an example, the model predicts that 56.6 percent of the trips from the Eastern Shore Central district that are destined areas within Delaware north of the C&D Canal will utilize the toll road, while the share of trips using the toll road from that same district destined to locations beyond Delaware is 64.8 percent.

For those trips that currently would use the Bay Bridge from origin districts west of the Chesapeake Bay, the share of traffic assumed is generally higher. For these long distance trips destined to the Middletown area south of the C&D Canal, the toll share is approximately 88 percent. For the trips to destinations above the Canal, the toll share rises to 90 percent. These higher percentages reflect the relatively infrequent nature of these trips and lack of viable competing non-tolled routes. The model indicates that only a small percentage of these trips would utilize a non-tolled route. Note also that a significant percentage of these longer distance trips are truck trips and the truck prohibitions on the local roadways near the mainline gantry, as discussed in Chapter 7, severely restrict the non-tolled options for truck traffic attempting to bypass the mainline gantry.

8.5 External Diversion Forecast Development

In addition to the traffic originating in the Maryland western shore counties that currently uses the Bay Bridge, there is the potential to divert other trips that use the I-95 corridor through Baltimore to reach destinations in northern Delaware and beyond. While the exact time savings for the individual trips with origins west of the Chesapeake Bay will vary depending on their proximity to the I-95-based routing and the US 50/US 301 routing, the improved travel times from the US 301 Mainline Toll Road should result in some diversion to the new toll road. Currently these trips are crossing the I-95 Bridge over the Susquehanna River as part of the travel path and therefore, the volumes of the I-95 Susquehanna River Bridge provide a means of estimating this potential market segment.

In order to quantify the potential trips that could divert from selected areas from the western shore of Maryland that are generally within the US 301 Corridor that extends southward from the Chesapeake Bay Bridge to the Governor Nice Bridge into Virginia, analysis was performed to isolate trips from this region that currently cross the I-95 Bridge over the Susquehanna River. Trip tables from the Baltimore Metropolitan Council (BMC) were obtained in order to provide an estimate of trips that might be subject to diversion to an improved US 301 roadway with reduced travel time compared to the I-95 routing through Baltimore. The BMC trip tables were developed with data obtained from some recent surveys and provided an initial estimate of the potential market of divertible trips. Given the uncertainty inherent in the survey data and its influence within the trip tables estimated by BMC, it was necessary to restrict the diversion potential of these trips.

The Susquehanna River forms the eastern boundary of the BMC regional model. At the external zone representing the I-95 Bridge over the river, the estimated 2015 total daily traffic is 84,500 trips and approximately 5.5 percent of these trips (4,600) originate or terminate in the portions of Anne Arundel, Charles, and Prince George Counties, as well as Virginia via the Governor Nice Bridge where diversion to the US 301 toll road was deemed feasible. To be conservative Stantec assumed that only 10.0 percent would actually divert which yielded 460 two-way trips or 230 trips moving in each direction. Table 8-4 provides the summary of these calculations with ramp-up and evasion post-processing.

Table 8-4
External Diversion Forecast Calculations

DIVERSION CALCULATION PROCESS	TRAFFIC BY PROCESSING STAGE
Projected 2015 Total Traffic on I-95 Susquehanna River Bridge	84,500
Potential Choice Market (from Annapolis area, Prince George's and Charles Counties, and Virginia / I-95 South) - 5.5% of I-95 Trips at Susquehanna River	4,600
	(5.5% of 84,000)
Assumed Traffic Diverted to US 301 - 10% of Potential Choice Market (Before Ramp-Up and Evasion Post Processing)	460
	(10% of 4,600)

As shown in the table, the number of diverted vehicles is only 460 two-way trips in the opening year and after accounting for ramp-up and evasion, this represents only 2.1 percent of transactions on the US 301 Mainline Toll Road. With this assumed diversion, these trips are assigned through the US 301 Mainline Toll Road Middletown gantry as opposed to passing through the Delaware Turnpike's I-95 Newark Toll Plaza. Given the

general consistency of the toll rates between each of these plazas the diversion of traffic away from the Newark toll plaza on I-95 would be offset by the gain in revenue occurring on the US 301 Mainline Toll Road. To quantify the impacts on US 301 Mainline Toll Road if this assumed diversion does not occur, a sensitivity trial was conducted, which is summarized in Chapter 10.

9 TOLL REVENUE ESTIMATES

Toll revenue forecasts for the proposed US 301 Mainline Toll Road were based on the tolled traffic estimated by the customized toll diversion model. Future year toll traffic forecasts were developed for 2015, 2021 and subsequent horizon years at 5-year intervals out to 2041. These horizon years were utilized to estimate the impacts of scheduled toll increases, demographic growth and assumptions regarding the changes in the background highway network. To develop the required 40-year toll revenue stream for the project, the toll transactions and toll revenue estimates for the intermediate years between model runs were estimated using straight-line interpolation. Transaction and toll revenue estimates for the years beyond the model horizon year of 2041 were developed using standard extrapolation techniques. The toll revenue estimates that are provided in this chapter are the gross annual toll revenue for the US 301 Mainline Toll Road and do not include revenue from the future Spur Road.

9.1 Toll Revenue Estimation Assumptions

As part of toll revenue estimation assumptions regarding evasion, general 'ramp-up', split of traffic between payment by transponder and payment by video recognition, a truck axle factor, and an annualization factor were adopted as described in the following sections. All of these assumptions were developed using traffic characteristics obtained from within the US 301 Corridor or from observed statistics from DelDOT's existing toll facilities or other similar US toll roads.

9.1.1 Truck Axle Factors

The truck toll revenue estimates were developed by multiplying the truck toll transactions with the base 2-axle toll rate times an average truck axle factor. The truck axle multipliers were applied to the truck transactions by paypoint using the vehicle classification data obtained from locations on US 301 and the other Delaware Toll Roads. Table 9-1 lists truck axle factors for US 301 and these major toll facilities within Delaware. Note that all vehicles with two-axle and six tires or greater than two axles are defined as trucks in the modeling process. However, for toll revenue calculations, two-axle and six-tire trucks are charged the same tolls as autos. For the US 301 Mainline Toll Road, a truck axle factor of 2.46 was derived by using the truck count data at new permanent counter on US 301 at the state line that was installed in 2008 and the truck toll rate values in the adopted toll policy.

Table 9-1
Truck Axle Factor by Toll Plaza

Toll Facility Location	Truck Axle Factor
US 301 Connector (1)	2.46
I-95 Newark Plaza (2)	1.90
SR 1 Biddle Plaza (2)	3.42
SR 1 Dover Toll Plaza (2)	3.36

(1) 2009 average Weekday Traffic Count from ATR 8025 (US 301 at MD/DE State Line)
(2) 2009 Average Daily Toll Transactions

The I-95 Newark toll plaza has a lower truck axle factor of 1.90 when compared to 3.36 and 3.42 factors at SR 1 mainline toll facilities (Biddles and Dover plazas). The variation in the factors reflects the relationship between the auto and truck tolls on each facility As an example, the I-95 Newark toll rates ($4.00 per 2-axle & $9.00 per 5-axle) have a lower ratio than the ratio of auto and truck tolls on SR 1 ($1.00 per 2-axle & $5.00 per 5-axle). The composition of trucks, in terms of the number of vehicles in each truck axle group, also contributed to some of the differences in the truck multiplier factors.

9.1.2 Annualization Factor

The annual toll revenue estimates were developed by using an annualization process that calculates ‘annual toll revenue days’ and converts weekday transaction estimates to an equivalent value of annual revenue. In order to determine an annualization factor for the US 301 Mainline Toll Road, Stantec utilized permanent traffic count data from DelDOT for the count station on US 301 at the state line. Since the level of truck traffic during weekend periods is less than on weekdays and given the differences in the toll rates by vehicle type, a blended factor of 360 for the mainline gantry was estimated initially. This factor was then reduced to account for the contribution of toll revenue on the ramps which are assumed to have a significantly lower weekend usage. It was assumed that the daily ‘weekend” traffic and revenue would be approximately 60% of the weekday traffic on the ramps. A composite factor of 355 was derived from these calculations and applied the daily revenue estimates to generate annual values.

Table 9-2
Annual Day Factor

MAINLINE ONLY

Vehicle Type	Revenue Percent	Annualization	
		Factor	Factor * %
Truck	43.4%	315.0	136.8
Auto	56.6%	396.0	224.0
Total	100.0%		360.8

SYSTEM TOTAL

Location	Revenue Percent	Annualization	
		Factor	Factor * %
Mainline	87.1%	360.8	314.3
Ramps	12.9%	319.0	41.2
Total	100.0%		355.4

Annualization is assumed as 355

9.1.3 Ramp-Up Factors

Ramp-up is a term used to describe the period from the time when a toll road first opens to traffic until it achieves the steady-state traffic flows predicted by the travel demand model. It accounts for the time needed for toll paying customers to find and become acquainted with the project, and to decide whether it offers a good value proposition.

The initial toll revenue estimates for the early years of the project were reduced by applying ramp-up factors. Since the project is being built on an existing alignment and the travelers in the corridor are already familiar with the travel characteristics of the existing roads, a relatively short ramp-up period was assumed for the project. Table 9-3 lists the yearly ramp-up factors used. The ramp-up factors were applied only to the first two years of operation 2016 and 2017.

Table 9-3
Ramp-Up Factors

Year	Ramp-Up Factor
2016	90%
2017	95%
2018	100%

9.1.4 Toll Evasion Factors

The adjustment to the revenue estimates included reducing the revenues to account for potential toll evasion. For this study, toll evasion rates for video recognition transactions and toll location (mainline or ramp) were adopted. The toll evasion rates for ETC transactions were developed from available data provided by the Delaware Turnpike and the assumptions for video evasion were obtained from experience with other toll roads that are providing video tolling as payment option. Evasion rates for the transponder transactions are assumed to 1.5 percent regardless of pay point type. For video tolling 44 percent of the transactions were assumed not to pay the toll either because of limitations with the process for capturing usable images of license plates, the inability to obtain a valid address to invoice the vehicle's owner or the intentional non-payment by the owner. Toll evasion rates for autos and trucks were assumed to be the same.

Table 9-4
Toll Evasion Factors

Toll Payment Type	Mainline Plaza	Ramp Plaza
ETC	1.5%	1.5%
Video	44.0%	44.0%

9.1.5 Video Recognition Assumptions

Assumptions regarding the percentage of traffic paying by video recognition in future years were developed based on usage data from other toll facilities across the country, in particular, the newly-opened sections of toll roads. Assumptions regarding the opening-year ETC share is based on the traffic data in the existing US 301 corridor. The percentage of vehicles already equipped with transponders at the state line was obtained from the monitoring equipment placed at the new permanent count station, as shown previously in Table 3-3. In the period from 2008 through 2011, approximately 40 percent of the vehicles crossing the state line were equipped with transponders. It is anticipated that the introduction of a new toll facility and the competitive travel time saving it will provide with respect the I-95 corridor should induce a larger share of vehicles equipped with transponders. The share of vehicles equipped with transponders will also be influenced by the lack of a cash payment option.

Table 9-5 lists the estimated ETC share of traffic for the years for which model runs were conducted. The table shows the estimated ETC percentages by vehicle type. The share of trucks using transponders is estimated to be slightly less than the auto market. This reflects an assumption that many of the trucks using US 301 are attempting to

minimize their toll costs and therefore these vehicles initially will be less likely to have transponders.

Table 9-5
Assumed ETC Transponder Percentage

Year	Auto ETC %	Truck ETC %
2016	72%	64%
2021	79%	69%
2026	82%	72%
2031	83%	73%
2036	83%	74%
2041	83%	74%

Note that the percentage shares describe the portion of vehicles using transponders. The remaining percentage of each vehicle type will be processed as video transactions although a significant percentage of these transactions may not actually pay the toll due to the inability to properly identify and bill the vehicle owner as described previously.

9.1.6 Preparation of Fiscal Year Estimates

In this study, the toll revenue estimations were conducted under the calendar year basis for the project years from 2016 through-2056. Thus, in the calendar year analysis, the toll revenue for the assumed opening year, 2016 included only the six-month toll revenue because US 301 Mainline Toll Road will open in July 2016. The DelDOT fiscal year runs from July 1st through June 30th of the following year. Stantec developed the process converting the calendar year toll revenue estimated into fiscal year values utilizing the conversion factors listed in Table 9-6. The conversion factors by auto and truck were derived from 2009 daily traffic counts in I-95 Newark Toll Plaza. The auto traffic showed a higher percentage as 52.7% in the second six-month period (July 1st – December 31st), but there was slightly higher share of truck traffic than auto traffic during the first six-month period (January 1st – June 30th).

Table 9-6
Fiscal Year Conversion Factors

Period	Auto	Truck
Jan - Jun	47.3%	50.8%
Jul - Dec	52.7%	49.2%

Source: 2009 Traffic Data at I-95 Newark Toll Plaza

9.2 Calendar Year Transaction and Revenue Estimates

Table 9-7 lists the daily toll transactions for US 301 Mainline Toll Road by vehicle type for the calendar years from 2016 through 2057. For the period beyond the last model year of 2041, the annual growth rates for transactions were estimated using a customized approach that utilizes the trend in the growth in the final 10 years (2031-2041) of the model forecast and the elasticity of periodic toll increases applied at each 5-year interval. Tables 9-8 lists annual toll revenue estimates for US 301 Mainline Toll Road by vehicle type. The toll revenue estimates reported are in current year dollar terms. For the early years, the growth in transactions and toll revenue are significant due to the application of the ramp-up factors. It is important to note that the annual revenue changes include the combined effect of both increasing transactions and the periodic increases in toll rates. Note also that the 2016 calendar estimate for revenue includes only the period of July through December, since the average daily transactions represent the condition for the six-month period after the toll road is opened.

The transactions data show that the truck percentage will be approximately 14 to 17 percent of total transactions over the duration of the forecast. This value represents the inclusion of a higher truck percentage of transactions at the mainline gantry along with a lower percentage of trucks on the ramps. Overall growth beyond the two-year ramp-up period is initially near 3 percent and then gradually transitions down towards 1.5 percent over the 40-year horizon period. The variation by year includes both the growth in the corridor as well as the impacts of new roads in the background network and the change in toll rates.

9.3 Fiscal Year Transaction and Revenue Estimates

Using the conversion process discussed in Section 9.1.6, the transactions and revenue were converted from calendar year estimates into fiscal year values. Table 9-9 lists the transactions by vehicle type and Table 9-10 lists the revenue by vehicle type by fiscal year. Note that the general trend of increases is similar to the model-based calendar year forecasts although the impacts of the periodic increases are blended across fiscal years because, for modeling purposes, the toll rate increases were assumed effective at the beginning of the calendar year.

Table 9-7
US 301 Mainline Toll Road Daily Transactions by Vehicle Type
Calendar Year

CALENDAR YEAR	AUTO			TRUCK			TOTAL				
	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	%ANNUAL GROWTH	%TRUCK
2016	11,564	2,683	14,247	1,731	592	2,323	13,295	3,275	16,570		14.0%
2017	12,878	2,793	15,671	1,955	628	2,583	14,833	3,421	18,254	10.2%	14.2%
2018	14,266	2,901	17,167	2,192	664	2,856	16,458	3,565	20,023	9.7%	14.3%
2019	14,974	2,872	17,846	2,323	670	2,993	17,297	3,542	20,839	4.1%	14.4%
2020	15,688	2,834	18,522	2,459	673	3,132	18,147	3,507	21,654	3.9%	14.5%
2021	15,888	2,624	18,512	2,390	647	3,037	18,278	3,271	21,549	-0.5%	14.1%
2022	16,569	2,640	19,209	2,511	657	3,168	19,080	3,297	22,377	3.8%	14.2%
2023	17,262	2,659	19,921	2,633	665	3,298	19,895	3,324	23,219	3.8%	14.2%
2024	17,945	2,671	20,616	2,754	677	3,431	20,699	3,348	24,047	3.6%	14.3%
2025	18,627	2,688	21,315	2,875	686	3,561	21,502	3,374	24,876	3.4%	14.3%
2026	18,653	2,550	21,203	2,822	673	3,495	21,475	3,223	24,698	-0.7%	14.2%
2027	18,942	2,553	21,495	2,929	685	3,614	21,871	3,238	25,109	1.7%	14.4%
2028	19,229	2,557	21,786	3,036	695	3,731	22,265	3,252	25,517	1.6%	14.6%
2029	19,522	2,562	22,084	3,141	706	3,847	22,663	3,268	25,931	1.6%	14.8%
2030	19,810	2,568	22,378	3,247	719	3,966	23,057	3,287	26,344	1.6%	15.1%
2031	19,438	2,455	21,893	3,208	719	3,927	22,646	3,174	25,820	-2.0%	15.2%
2032	19,843	2,501	22,344	3,323	737	4,060	23,166	3,238	26,404	2.3%	15.4%
2033	20,272	2,542	22,814	3,439	754	4,193	23,711	3,296	27,007	2.3%	15.5%
2034	20,692	2,586	23,278	3,555	771	4,326	24,247	3,357	27,604	2.2%	15.7%
2035	21,111	2,629	23,740	3,669	787	4,456	24,780	3,416	28,196	2.1%	15.8%
2036	20,954	2,558	23,512	3,630	783	4,413	24,584	3,341	27,925	-1.0%	15.8%
2037	21,374	2,623	23,997	3,751	807	4,558	25,125	3,430	28,555	2.3%	16.0%
2038	21,791	2,692	24,483	3,875	830	4,705	25,666	3,522	29,188	2.2%	16.1%
2039	22,216	2,759	24,975	3,997	856	4,853	26,213	3,615	29,828	2.2%	16.3%
2040	22,636	2,825	25,461	4,116	880	4,996	26,752	3,705	30,457	2.1%	16.4%
2041	22,657	2,801	25,458	4,059	878	4,937	26,716	3,679	30,395	-0.2%	16.2%
2042	23,019	2,845	25,864	4,162	895	5,057	27,181	3,740	30,921	1.7%	16.4%
2043	23,381	2,890	26,271	4,265	913	5,178	27,646	3,803	31,449	1.7%	16.5%
2044	23,744	2,934	26,678	4,368	931	5,299	28,112	3,865	31,977	1.7%	16.6%
2045	24,106	2,979	27,085	4,471	949	5,420	28,577	3,928	32,505	1.7%	16.7%
2046	24,140	2,944	27,084	4,431	945	5,376	28,571	3,889	32,460	-0.1%	16.6%
2047	24,502	2,989	27,491	4,533	963	5,496	29,035	3,952	32,987	1.6%	16.7%
2048	24,865	3,033	27,898	4,636	981	5,617	29,501	4,014	33,515	1.6%	16.8%
2049	25,227	3,078	28,305	4,739	999	5,738	29,966	4,077	34,043	1.6%	16.9%
2050	25,589	3,122	28,711	4,842	1,016	5,858	30,431	4,138	34,569	1.5%	16.9%
2051	25,638	3,092	28,730	4,853	1,020	5,873	30,491	4,112	34,603	0.1%	17.0%
2052	26,000	3,136	29,136	4,956	1,038	5,994	30,956	4,174	35,130	1.5%	17.1%
2053	26,363	3,181	29,544	5,058	1,056	6,114	31,421	4,237	35,658	1.5%	17.1%
2054	26,725	3,225	29,950	5,161	1,074	6,235	31,886	4,299	36,185	1.5%	17.2%
2055	27,087	3,270	30,357	5,264	1,092	6,356	32,351	4,362	36,713	1.5%	17.3%
2056	27,148	3,243	30,391	5,227	1,088	6,315	32,375	4,331	36,706	0.0%	17.2%
2057	27,510	3,288	30,798	5,330	1,106	6,436	32,840	4,394	37,234	1.4%	17.3%

Table 9-8
US 301 Mainline Toll Road Annual Revenue
Calendar Year

CALENDAR YEAR	AUTO REVENUE ($1,000)			TRUCK REVENUE ($1,000)			TOTAL REVENUE ($1,000)			
	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	%ANNUAL GROWTH
2016[1]	$4,380	$2,062	$6,442	$3,041	$1,264	$4,305	$7,421	$3,326	$10,747	
2017	$9,885	$4,345	$14,230	$6,863	$2,682	$9,545	$16,748	$7,027	$23,775	121.2%
2018	$11,085	$4,570	$15,655	$7,688	$2,836	$10,524	$18,773	$7,406	$26,179	10.1%
2019	$11,764	$4,573	$16,337	$8,140	$2,857	$10,997	$19,904	$7,430	$27,334	4.4%
2020	$12,446	$4,566	$17,012	$8,615	$2,870	$11,485	$21,061	$7,436	$28,497	4.3%
2021	$15,172	$5,261	$20,433	$10,665	$3,502	$14,167	$25,837	$8,763	$34,600	21.4%
2022	$16,050	$5,306	$21,356	$11,203	$3,555	$14,758	$27,253	$8,861	$36,114	4.4%
2023	$16,938	$5,352	$22,290	$11,736	$3,602	$15,338	$28,674	$8,954	$37,628	4.2%
2024	$17,824	$5,389	$23,213	$12,272	$3,664	$15,936	$30,096	$9,053	$39,149	4.0%
2025	$18,702	$5,437	$24,139	$12,803	$3,716	$16,519	$31,505	$9,153	$40,658	3.9%
2026	$22,438	$6,175	$28,613	$15,184	$4,417	$19,601	$37,622	$10,592	$48,214	18.6%
2027	$22,790	$6,177	$28,967	$15,747	$4,497	$20,244	$38,537	$10,674	$49,211	2.1%
2028	$23,140	$6,190	$29,330	$16,304	$4,559	$20,863	$39,444	$10,749	$50,193	2.0%
2029	$23,493	$6,199	$29,692	$16,851	$4,628	$21,479	$40,344	$10,827	$51,171	1.9%
2030	$23,846	$6,217	$30,063	$17,407	$4,708	$22,115	$41,253	$10,925	$52,178	2.0%
2031	$27,205	$6,929	$34,134	$19,589	$5,317	$24,906	$46,794	$12,246	$59,040	13.2%
2032	$27,862	$7,075	$34,937	$20,295	$5,447	$25,742	$48,157	$12,522	$60,679	2.8%
2033	$28,543	$7,208	$35,751	$20,998	$5,573	$26,571	$49,541	$12,781	$62,322	2.7%
2034	$29,221	$7,347	$36,568	$21,700	$5,699	$27,399	$50,921	$13,046	$63,967	2.6%
2035	$29,896	$7,487	$37,383	$22,398	$5,823	$28,221	$52,294	$13,310	$65,604	2.6%
2036	$34,127	$8,365	$42,492	$25,527	$6,697	$32,224	$59,654	$15,062	$74,716	13.9%
2037	$34,883	$8,577	$43,460	$26,381	$6,904	$33,285	$61,264	$15,481	$76,745	2.7%
2038	$35,633	$8,804	$44,437	$27,246	$7,102	$34,348	$62,879	$15,906	$78,785	2.7%
2039	$36,388	$9,025	$45,413	$28,100	$7,316	$35,416	$64,488	$16,341	$80,829	2.6%
2040	$37,148	$9,246	$46,394	$28,943	$7,528	$36,471	$66,091	$16,774	$82,865	2.5%
2041	$40,968	$10,215	$51,183	$32,493	$8,521	$41,014	$73,461	$18,736	$92,197	11.3%
2042	$41,623	$10,377	$52,000	$33,317	$8,696	$42,013	$74,940	$19,073	$94,013	2.0%
2043	$42,278	$10,539	$52,817	$34,140	$8,870	$43,010	$76,418	$19,409	$95,827	1.9%
2044	$42,933	$10,701	$53,634	$34,963	$9,044	$44,007	$77,896	$19,745	$97,641	1.9%
2045	$43,588	$10,864	$54,452	$35,787	$9,218	$45,005	$79,375	$20,082	$99,457	1.9%
2046	$48,209	$11,859	$60,068	$39,481	$10,216	$49,697	$87,690	$22,075	$109,765	10.4%
2047	$48,932	$12,038	$60,970	$40,398	$10,409	$50,807	$89,330	$22,447	$111,777	1.8%
2048	$49,655	$12,217	$61,872	$41,314	$10,603	$51,917	$90,969	$22,820	$113,789	1.8%
2049	$50,379	$12,396	$62,775	$42,231	$10,797	$53,028	$92,610	$23,193	$115,803	1.8%
2050	$51,102	$12,576	$63,678	$43,147	$10,991	$54,138	$94,249	$23,567	$117,816	1.7%
2051	$56,039	$13,631	$69,670	$46,100	$11,760	$57,860	$102,139	$25,391	$127,530	8.2%
2052	$56,830	$13,827	$70,657	$47,077	$11,966	$59,043	$103,907	$25,793	$129,700	1.7%
2053	$57,622	$14,024	$71,646	$48,054	$12,173	$60,227	$105,676	$26,197	$131,873	1.7%
2054	$58,414	$14,220	$72,634	$49,031	$12,379	$61,410	$107,445	$26,599	$134,044	1.6%
2055	$59,205	$14,416	$73,621	$50,008	$12,586	$62,594	$109,213	$27,002	$136,215	1.6%
2056	$64,475	$15,537	$80,012	$54,402	$13,746	$68,148	$118,877	$29,283	$148,160	8.8%
2057	$65,335	$15,750	$81,085	$55,473	$13,972	$69,445	$120,808	$29,722	$150,530	1.6%

NOTE:

[1] - 2016 Revenue is only for half-year since the facility is assumed to be opened on July 1, 2016

Table 9-9
US 301 Mainline Toll Road Daily Toll Transaction
Fiscal Year

FISCAL YEAR	AUTO			TRUCK			TOTAL				
	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	%ANNUAL GROWTH	%TRUCK
2017	11,863	2,666	14,529	1,796	594	2,390	13,659	3,260	16,919		14.1%
2018	13,191	2,781	15,972	2,024	631	2,655	15,215	3,412	18,627	10.1%	14.3%
2019	14,599	2,887	17,486	2,264	667	2,931	16,863	3,554	20,417	9.6%	14.4%
2020	15,308	2,853	18,161	2,395	673	3,068	17,703	3,526	21,229	4.0%	14.5%
2021	15,785	2,734	18,519	2,426	663	3,089	18,211	3,397	21,608	1.8%	14.3%
2022	16,207	2,631	18,838	2,451	650	3,101	18,658	3,281	21,939	1.5%	14.1%
2023	16,892	2,649	19,541	2,575	663	3,238	19,467	3,312	22,779	3.8%	14.2%
2024	17,580	2,668	20,248	2,696	673	3,369	20,276	3,341	23,617	3.7%	14.3%
2025	18,264	2,679	20,943	2,817	681	3,498	21,081	3,360	24,441	3.5%	14.3%
2026	18,638	2,623	21,261	2,850	685	3,535	21,488	3,308	24,796	1.5%	14.3%
2027	18,800	2,555	21,355	2,875	680	3,555	21,675	3,235	24,910	0.5%	14.3%
2028	19,097	2,561	21,658	2,991	693	3,684	22,088	3,254	25,342	1.7%	14.5%
2029	19,398	2,570	21,968	3,100	705	3,805	22,498	3,275	25,773	1.7%	14.8%
2030	19,703	2,583	22,286	3,209	717	3,926	22,912	3,300	26,212	1.7%	15.0%
2031	19,662	2,519	22,181	3,230	727	3,957	22,892	3,246	26,138	-0.3%	15.1%
2032	19,630	2,480	22,110	3,264	730	3,994	22,894	3,210	26,104	-0.1%	15.3%
2033	20,034	2,520	22,554	3,383	746	4,129	23,417	3,266	26,683	2.2%	15.5%
2034	20,464	2,561	23,025	3,500	763	4,263	23,964	3,324	27,288	2.3%	15.6%
2035	20,879	2,604	23,483	3,615	780	4,395	24,494	3,384	27,878	2.2%	15.8%
2036	21,032	2,593	23,625	3,651	790	4,441	24,683	3,383	28,066	0.7%	15.8%
2037	21,154	2,590	23,744	3,692	795	4,487	24,846	3,385	28,231	0.6%	15.9%
2038	21,562	2,650	24,212	3,816	820	4,636	25,378	3,470	28,848	2.2%	16.1%
2039	21,985	2,720	24,705	3,941	844	4,785	25,926	3,564	29,490	2.2%	16.2%
2040	22,409	2,787	25,196	4,059	870	4,929	26,468	3,657	30,125	2.2%	16.4%
2041	22,648	2,813	25,461	4,084	878	4,962	26,732	3,691	30,423	1.0%	16.3%
2042	22,828	2,822	25,650	4,112	887	4,999	26,940	3,709	30,649	0.7%	16.3%
2043	23,191	2,866	26,057	4,215	906	5,121	27,406	3,772	31,178	1.7%	16.4%
2044	23,553	2,911	26,464	4,317	924	5,241	27,870	3,835	31,705	1.7%	16.5%
2045	23,915	2,955	26,870	4,421	943	5,364	28,336	3,898	32,234	1.7%	16.6%
2046	24,122	2,962	27,084	4,451	950	5,401	28,573	3,912	32,485	0.8%	16.6%
2047	24,312	2,965	27,277	4,483	958	5,441	28,795	3,923	32,718	0.7%	16.6%
2048	24,674	3,010	27,684	4,585	976	5,561	29,259	3,986	33,245	1.6%	16.7%
2049	25,036	3,054	28,090	4,689	995	5,684	29,725	4,049	33,774	1.6%	16.8%
2050	25,398	3,099	28,497	4,791	1,014	5,805	30,189	4,113	34,302	1.6%	16.9%
2051	25,612	3,108	28,720	4,848	1,025	5,873	30,460	4,133	34,593	0.9%	17.0%
2052	25,810	3,113	28,923	4,905	1,037	5,942	30,715	4,150	34,865	0.8%	17.0%
2053	26,172	3,157	29,329	5,008	1,055	6,063	31,180	4,212	35,392	1.5%	17.1%
2054	26,534	3,202	29,736	5,111	1,074	6,185	31,645	4,276	35,921	1.5%	17.2%
2055	26,896	3,247	30,143	5,213	1,093	6,306	32,109	4,340	36,449	1.5%	17.3%
2056	27,116	3,257	30,373	5,245	1,100	6,345	32,361	4,357	36,718	0.7%	17.3%
2057	27,320	3,265	30,585	5,279	1,108	6,387	32,599	4,373	36,972	0.7%	17.3%

Table 9-10
US 301 Mainline Toll Road Annual Toll Revenue
Fiscal Year

FISCAL YEAR	AUTO REVENUE ($1,000)			TRUCK REVENUE ($1,000)			TOTAL REVENUE ($1,000)			
	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	ETC	VIDEO	TOTAL	%ANNUAL GROWTH
2017	$9,048	$4,121	$13,169	$6,307	$2,536	$8,843	$15,355	$6,657	$22,012	
2018	$10,191	$4,347	$14,538	$7,102	$2,695	$9,797	$17,293	$7,042	$24,335	10.6%
2019	$11,407	$4,569	$15,976	$7,935	$2,844	$10,779	$19,342	$7,413	$26,755	9.9%
2020	$12,087	$4,566	$16,653	$8,387	$2,870	$11,257	$20,474	$7,436	$27,910	4.3%
2021	$13,732	$4,899	$18,631	$9,664	$3,204	$12,868	$23,396	$8,103	$31,499	12.9%
2022	$15,584	$5,282	$20,866	$10,940	$3,521	$14,461	$26,524	$8,803	$35,327	12.2%
2023	$16,468	$5,328	$21,796	$11,485	$3,589	$15,074	$27,953	$8,917	$36,870	4.4%
2024	$17,354	$5,376	$22,730	$12,016	$3,641	$15,657	$29,370	$9,017	$38,387	4.1%
2025	$18,239	$5,414	$23,653	$12,547	$3,687	$16,234	$30,786	$9,101	$39,887	3.9%
2026	$20,472	$5,786	$26,258	$14,018	$4,101	$18,119	$34,490	$9,887	$44,377	11.3%
2027	$22,622	$6,181	$28,803	$15,464	$4,463	$19,927	$38,086	$10,644	$48,730	9.8%
2028	$22,997	$6,199	$29,196	$16,068	$4,544	$20,612	$39,065	$10,743	$49,808	2.2%
2029	$23,377	$6,221	$29,598	$16,636	$4,618	$21,254	$40,013	$10,839	$50,852	2.1%
2030	$23,766	$6,249	$30,015	$17,207	$4,698	$21,905	$40,973	$10,947	$51,920	2.1%
2031	$25,501	$6,569	$32,070	$18,530	$5,069	$23,599	$44,031	$11,638	$55,669	7.2%
2032	$27,520	$7,003	$34,523	$19,940	$5,399	$25,339	$47,460	$12,402	$59,862	7.5%
2033	$28,174	$7,139	$35,313	$20,657	$5,518	$26,175	$48,831	$12,657	$61,488	2.7%
2034	$28,856	$7,275	$36,131	$21,365	$5,644	$27,009	$50,221	$12,919	$63,140	2.7%
2035	$29,531	$7,410	$36,941	$22,061	$5,768	$27,829	$51,592	$13,178	$64,770	2.6%
2036	$31,897	$7,904	$39,801	$24,001	$6,300	$30,301	$55,898	$14,204	$70,102	8.2%
2037	$34,484	$8,469	$42,953	$25,970	$6,796	$32,766	$60,454	$15,265	$75,719	8.0%
2038	$35,229	$8,675	$43,904	$26,834	$7,011	$33,845	$62,063	$15,686	$77,749	2.7%
2039	$35,982	$8,900	$44,882	$27,706	$7,217	$34,923	$63,688	$16,117	$79,805	2.6%
2040	$36,739	$9,127	$45,866	$28,536	$7,437	$35,973	$65,275	$16,564	$81,839	2.5%
2041	$38,957	$9,707	$48,664	$30,731	$8,029	$38,760	$69,688	$17,736	$87,424	6.8%
2042	$41,278	$10,291	$51,569	$32,911	$8,613	$41,524	$74,189	$18,904	$93,093	6.5%
2043	$41,933	$10,454	$52,387	$33,735	$8,795	$42,530	$75,668	$19,249	$94,917	2.0%
2044	$42,588	$10,616	$53,204	$34,558	$8,976	$43,534	$77,146	$19,592	$96,738	1.9%
2045	$43,243	$10,778	$54,021	$35,381	$9,157	$44,538	$78,624	$19,935	$98,559	1.9%
2046	$45,774	$11,335	$57,109	$37,662	$9,757	$47,419	$83,436	$21,092	$104,528	6.1%
2047	$48,551	$11,944	$60,495	$39,946	$10,355	$50,301	$88,497	$22,299	$110,796	6.0%
2048	$49,274	$12,123	$61,397	$40,863	$10,557	$51,420	$90,137	$22,680	$112,817	1.8%
2049	$49,997	$12,302	$62,299	$41,780	$10,758	$52,538	$91,777	$23,060	$114,837	1.8%
2050	$50,721	$12,481	$63,202	$42,696	$10,960	$53,656	$93,417	$23,441	$116,858	1.8%
2051	$53,438	$13,075	$66,513	$44,646	$11,456	$56,102	$98,084	$24,531	$122,615	4.9%
2052	$56,413	$13,724	$70,137	$46,596	$11,949	$58,545	$103,009	$25,673	$128,682	4.9%
2053	$57,205	$13,920	$71,125	$47,573	$12,164	$59,737	$104,778	$26,084	$130,862	1.7%
2054	$57,997	$14,116	$72,113	$48,550	$12,379	$60,929	$106,547	$26,495	$133,042	1.7%
2055	$58,788	$14,312	$73,100	$49,527	$12,594	$62,121	$108,315	$26,906	$135,221	1.6%
2056	$61,699	$14,946	$76,645	$52,239	$13,297	$65,536	$113,938	$28,243	$142,181	5.1%
2057	$64,882	$15,637	$80,519	$54,946	$13,997	$68,943	$119,828	$29,634	$149,462	5.1%

9.4 Transactions and Revenue from I-95/Delaware Turnpike Diversion

As mentioned previously, the US 301 routing (via the Chesapeake Bay Bridge) is an alternative to I-95 (via Baltimore) for trips between Wilmington and points north and Washington D.C. and points south. The US 301 Mainline Toll Road will improve the US 301 routing, but there is a tradeoff between this network improvement and the added toll associated with the new toll road. While the exact time savings for the individual trips with an origin or destination west of Chesapeake Bay will vary depending on their proximity to the I-95-based routing and the US 50/US 301 routing, the improved travel times provided by the US 301 Mainline Toll Road should result in some diversion to the new toll road. Using information from the 2011 origin-destination survey and the distribution patterns from the Baltimore Metropolitan Council's regional model, Stantec has made estimates of the number of trips that would divert to US 301 Toll Road. These trips are assumed to travel the entire length of the toll road for trips between the Chesapeake Bay Bridge and SR 1 and destinations beyond Middletown.

In response to the anticipated diversion, the impact on I-95/Delaware Turnpike revenue for the first 26 years following the opening of the US 301 Mainline Toll Road was estimated. Note that since the toll plans for the Delaware Turnpike's I-95 plaza are nearly identical to the toll rates for the US 301 Mainline Toll Road, any revenues diverted from the Turnpike system will be offset by revenues gained on the new toll road. Note that the change in transactions on the Delaware Turnpike is less than 0.5 percent since the magnitude of transactions at the I-95 Newark Toll Plaza is much higher than the transactions estimated for the US 301 Mainline Toll Road Middletown gantry

As shown in Table 9-11, during the first full year of operations, approximately 2.1 percent of the transactions and approximately 2.8 percent of the revenue on the US 301 Mainline Toll Road will be the result of assumed diversions from I-95. By the end of the model-based forecast period (2041), traffic being diverted from I-95 represents 1.9 percent of transactions and 2.4 percent of total revenue on the US 301 Mainline Toll Road. Note also that the loss of revenue on the Delaware Turnpike is relatively minor given that currently there are more than 71,000 daily transactions at the Newark Toll Plaza.

Table 9-11
Impact on I-95/Delaware Turnpike Revenue

Calendar Year	Average Daily Transactions				Revenue Forecast ($1,000)			
	Gross US 301	Impact From I-95	Net US 301	% Transaction Change	Gross US 301	Impact From I-95	Net US 301	% Revenue Change
2016	16,570	-342	16,228	-2.1%	$10,747	($305)	$10,442	-2.8%
2017	18,254	-369	17,885	-2.0%	$23,775	($657)	$23,118	-2.8%
2018	20,023	-395	19,628	-2.0%	$26,179	($694)	$25,485	-2.7%
2019	20,839	-406	20,433	-1.9%	$27,334	($711)	$26,623	-2.6%
2020	21,654	-417	21,237	-1.9%	$28,497	($732)	$27,765	-2.6%
2021	21,549	-421	21,128	-2.0%	$34,600	($921)	$33,679	-2.7%
2022	22,377	-426	21,951	-1.9%	$36,114	($928)	$35,186	-2.6%
2023	23,219	-438	22,781	-1.9%	$37,628	($952)	$36,676	-2.5%
2024	24,047	-447	23,600	-1.9%	$39,149	($979)	$38,170	-2.5%
2025	24,876	-457	24,419	-1.8%	$40,658	($997)	$39,661	-2.5%
2026	24,698	-461	24,237	-1.9%	$48,214	($1,213)	$47,001	-2.5%
2027	25,109	-465	24,644	-1.9%	$49,211	($1,214)	$47,997	-2.5%
2028	25,517	-481	25,036	-1.9%	$50,193	($1,264)	$48,929	-2.5%
2029	25,931	-483	25,448	-1.9%	$51,171	($1,257)	$49,914	-2.5%
2030	26,344	-495	25,849	-1.9%	$52,178	($1,296)	$50,882	-2.5%
2031	25,820	-505	25,315	-2.0%	$59,040	($1,528)	$57,512	-2.6%
2032	26,404	-509	25,895	-1.9%	$60,679	($1,539)	$59,140	-2.5%
2033	27,007	-516	26,491	-1.9%	$62,322	($1,557)	$60,765	-2.5%
2034	27,604	-526	27,078	-1.9%	$63,967	($1,588)	$62,379	-2.5%
2035	28,196	-537	27,659	-1.9%	$65,604	($1,627)	$63,977	-2.5%
2036	27,925	-549	27,376	-2.0%	$74,716	($1,908)	$72,808	-2.6%
2037	28,555	-549	28,006	-1.9%	$76,745	($1,894)	$74,851	-2.5%
2038	29,188	-560	28,628	-1.9%	$78,785	($1,938)	$76,847	-2.5%
2039	29,828	-568	29,260	-1.9%	$80,829	($1,966)	$78,863	-2.4%
2040	30,457	-575	29,882	-1.9%	$82,865	($1,996)	$80,869	-2.4%
2041	30,395	-585	29,810	-1.9%	$92,197	($2,286)	$89,911	-2.5%
2042	30,921	-593	30,328	-1.9%	$94,013	($2,319)	$91,694	-2.5%

9.5 Revenue Forecast Assumptions

The development of the revenue forecasts for the US 301 Mainline Toll Road Traffic and Revenue Report required a series of assumptions pertaining to future conditions. These assumptions include, but are not limited to, the following list of conditions:

1. The toll collection plans and rates as adopted for the US Mainline Toll Road and the other toll roads in the region will be implemented as noted in this report. This includes the 2014 increase in toll rates for MdTA facilities along the I-95 corridor and at the Chesapeake Bay Bridge.

2. Transponder market shares assumed for US 301 Mainline Toll Road will occur as forecast in Sections 9.1.5 of the report.

3. The traffic mix for trucks will remain approximately as forecasted such that the average truck toll multiplier (for revenue-estimation purposes) will be approximately 2.46 for the duration of the forecast period. Note that the truck definition used in the calculation includes 2-axle 6-tire trucks.

4. The socioeconomic growth discussed in Chapter 5 of the report will occur as forecast.

5. The planned highway network improvements will be constructed and truck restrictions will be enforced as discussed in Chapter 7 of the report.

6. Inflation will continue at 2.4 percent annually (compounded) during the forecast period through 2056. The 2.4 rate reflects the historical increase in CPI from 2000 to 2010.

7. Traffic growth on the US 301 Mainline Toll Road will substantially follow the assumed trend for the early year *ramp-up* period as formulated in Sections 9.1.3 of the report.

8. The US 301 Mainline Toll Road will be efficiently maintained and operated, but even under the most efficient operation, there will be some toll evasion and revenue 'leakage'. It is assumed that these impacts on the model-produced traffic and revenue forecasts (after ramp-up) will be at the level discussed in Section 9.1.4 of the report.

9. Motor fuel will remain in adequate supply during the forecast period, and motor fuel prices (i.e., the average price for regular gasoline) in the foreseeable future

will not increase above the 1980 peak, which, if adjusted for inflation, in current dollars would not be more than $3.50 per gallon for an extended period.

10. Federal and state fuel tax increases will not increase to the extent that, together with fuel price increases, pump prices exceed $3.50 per gallon, adjusted for inflation going forward.

11. No radical change in travel modes or technology, which would drastically curtail motor vehicle use, is expected during the forecast period. It is assumed that no policies for discounted tolls for certain vehicle types (zero/ low emission vehicles or carpools/vanpools) will be permitted.

9.6 Disclaimers and Limitations

It is Stantec's opinion that the revenue projections are reasonable and that they have been prepared in accordance with accepted practice for investment-grade studies. However, given the uncertainties within the current international and economic climate, Stantec considers it is necessary to state that the traffic and revenue projections are based on the following caveats:

1. This report presents the results of Stantec's consideration of the information available to us as of the date hereof and the application of Stantec's experience and professional judgment to that information. It is not a guarantee of any future events or trends.

2. The traffic and revenue forecasts will be subject to future economic and social conditions and demographic developments that cannot be predicted with certainty.

3. The projections contained in this report, while presented with numerical specificity, are based on a number of estimates and assumptions which, though considered reasonable to us, are inherently subject to significant economic and competitive uncertainties and contingencies, many of which will be beyond Stantec's control and that of DelDOT. In many instances, a broad range of alternative assumptions could be considered reasonable. Changes in the assumptions used could result in material differences in projected outcomes.

4. If, for any reason, any of these conditions should change due to changes in the economy or competitive environment, or other factors, Stantec's opinions or estimates may require amendment or further adjustments.

5. Stantec's toll revenue projections only represent its best judgment and Stantec does not warrant or represent that actual toll revenues will not vary from its projections, estimates and forecasts.

6. Many statements contained in this report that are not historical facts are forward-looking statements, which are based on Stantec's beliefs, as well as assumptions made by, and information currently available to, the management and staff of Stantec. Because the statements are based on expectations about future events and economic performance and are not statements of fact, actual results may differ materially from those projected. The words "anticipate", "assume", "estimate", "expect", "objective", "projection", "plan", "forecast", "goal", "budget", or similar words are intended to identify forward-looking statements. The words or phrases "to date", "now", "currently", and the like are intended to mean as of the date of this official statement.

As for the projections themselves, while they are stated year-by-year, they are intended to show the trends that may reasonably be anticipated on the basis of the above assumptions. The report contains forward-looking statements, revenue projections, and statements of opinion based upon certain information. These forward-looking opinions statements and projections include statements relating to preexisting conditions not caused or created by Stantec and external conditions beyond our control. We believe that our expectations are reasonable and are based on reasonable assumptions. However, such forward-looking statements, projections and opinions, by their nature involve risks and uncertainties beyond our control. We caution that a variety of factors could cause the actual revenue associated with the US 301 Mainline Toll Road project to differ from that expressed or implied in this document. We assume no obligation with respect to the differences between this document and the actual performance of the US 301 Mainline Toll Road. This document was prepared in our role as a subconsultant to RK&K solely for the use of DelDOT that commissioned it. It may only be relied upon by third parties at their own risk. Under no circumstance will Stantec be liable to third parties for claims or damage arising out of this document unless expressly agreed between the third party and Stantec. Any unauthorized use of this document is at the user's sole risk.

10 SENSITIVITY ANALYSIS

Stantec analyzed four alternative scenarios to quantify the impact of changes in the assumptions used in the baseline forecasts on estimated transactions and revenue for the US 301 Mainline Toll Road. It is anticipated that these sensitivity analyses will be useful as a starting point for the analyses performed by the rating agencies. ***Note that Sensitivity Trials 1 and 3 were conducted with a base condition where the toll road was structured as an ORT/Cash roadway. Therefore, the estimated sensitivity values for these two trials will potentially vary if applied to against a base case with an AET configuration.***

The four sensitivity scenarios are:

1. Reduced growth rates for external trips;
2. Existing DelDOT Toll Collection System (Open Road Tolling/Cash);
3. Discounted tolls for local trips to and from the south; and
4. Assumption that there will be no diversion from I-95 to US 301 Mainline Toll Road.

These sensitivity analyses were performed using the same methodology and regional transportation model as the Base Case. Adjustments were made to the model input only where it was necessary to reflect the specific characteristic being evaluated.

10.1 Lower Socioeconomic Growth Rates for External Trips

The first sensitivity test is based on the assumption that the growth rates for the socioeconomic factors affecting long distance trips will be lower than those used for the Base Case analysis.

Estimated growth for external (long-distance) trips using the proposed US 301 Mainline Toll Road was based on an analysis of historical population and employment growth in the regions served by the new road and historical traffic growth patterns on competing routes as well as on routes that will “feed“ traffic to the new route. For the forecast of transactions for the Base Case, Stantec assumed a relatively flat growth rate of 0.5 percent per year from 2009 to 2015, and then assumed an annual growth rate of 1.5 percent annually for the remainder of the forecast period which results in a compounded annual rate of 1.3 percent. For the scenario with lower growth rates for external trips, it was assumed that the socioeconomic characteristics of the trip origin and destination areas would be 50 percent of the growth rates for the Base Case. This would result in a

rate of growth of 0.25 percent per year from 2009 to 2015 and 0.75 per year for 2015 through 2040 and a compounded annual rate of 0.7 percent.

A comparison of the projections for the low growth scenario and the Base Case indicates 5.2 percent fewer transactions in the low growth scenario for the 40-year period included in this analysis. As a result of the curtailed growth for the sensitivity scenario, annual revenue is estimated to be 9.0 percent less than the Base Case.

10.2 Existing DelDOT Toll Collection System (Open Road Tolling/Cash)

The second sensitivity analysis is based on the assumption that tolls will be collected electronically or by cash, but that a video billing option would not be provided. High speed lanes will be available for collection by transponder and traditional toll lanes will be available for cash payment of tolls. This is same toll collection system currently in effect on the Delaware Turnpike and SR 1 toll roads.

The Base Case assumes All Electric Tolling (AET); i.e., toll collection will be by transponder or by video recognition. If a motorist does not have a transponder, the vehicle's license plate is recorded by video recognition, the address is obtained from the appropriate motor vehicle registration agency, and an invoice is send to the vehicle owner for the toll charge plus a surcharge for this service. The surcharge is assumed to be 40 percent of the toll amount for passenger cars and 20 percent for trucks.

If the ORT/Cash system currently was implemented, tolls would still be assessed at the same collection points. Toll collection will be by transponder and cash, with video being used only as part of the enforcement process. At the mainline barrier, toll collectors will be staffing the toll booths, while there will be automated coin machines on the ramps. There will be no toll discounts for payment by transponder.

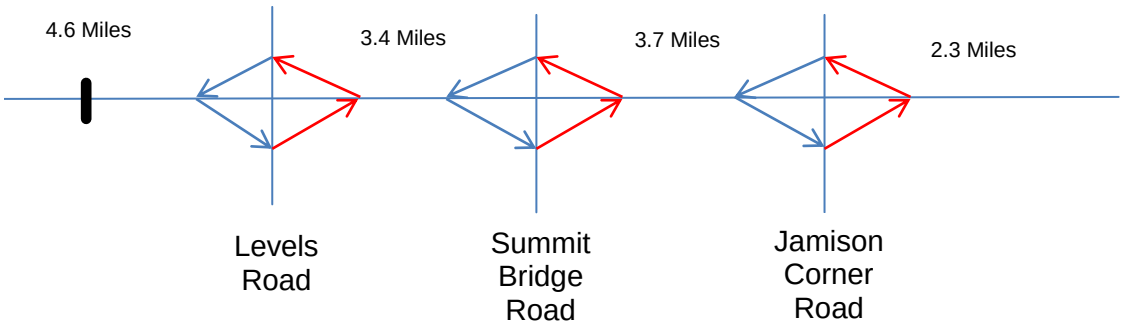
For both the Base Case and the ORT Scenario, it is estimated that the toll evasion rate for ETC transactions is 1.5 percent. For the Base Case, it is assumed that the toll evasion rate for video recognition transactions is 44 percent. This higher evasion rate accounts for the fact that the video recognition equipment will not capture all images in a usable format and that valid address information will not be available for some portion of the images that are readable.

A comparison of the projections for the ORT/Cash toll collection system scenario and the Base Case indicates there are 12.3 percent more transactions for which tolls are collected in the ORT/Cash scenario. As a result of the availability of cash toll payment, toll evasion is less and annual revenue is estimated to be 11.4 percent greater than the Base Case.

10.3 Discounted Tolls for Local Trips to/from the South

An additional sensitivity analysis was performed for a scenario with reduced tolls for passenger car trips on the US 301 Mainline Toll Road between the southern terminus and the local interchanges. For this sensitivity test, the discounted toll is available only to trips with payment by ETC.

The US 301 Toll Road is approximately 14 miles in length, with spacing shown as follows:



For the Base Case, tolls will be assessed at an across-the-road Middletown gantry at the southern end of the US 301 Mainline Toll Road and on gantries on the ramps to and from the north at the Levels Road, Summit Bridge Road and Jamison Corner Road interchanges. The ramps with gantries are shown in red in the above schematic.

In the opening year, the auto toll for the entire length of the US 301 Mainline Toll Road is $4.00 which implies a toll rate of 28.6 cents per mile for through trips. On a per mile basis, the toll for long-distance travelers using the entire length of the roadway is relatively high compared to the toll for shorter distance trips using intermediate interchanges

For this sensitivity analysis, in order to analyze the impacts of providing a similar reduced rate for trips to/from the south, an adjustment was made to provide a discounted toll for trips passing through any ramp gantry for trips to/from the south and the Middletown gantry. (The ramps that will be affected are shown in blue in the above schematic.) Toll rates will remain unchanged for all through trips and all movements to/from the north. Truck toll rates for all movements will also remain unchanged. The discount will be applied only to ETC transactions for autos.

The toll rates per mile for each interchange-to-interchange movement are shown in Table 10-1. As shown in the table, the rates per mile with the discounted tolls are similar to, but slightly higher than, the rates for other interchange-to-interchange movements. Note that the rates for the discounted trips should be slightly higher than the rates for the other trips since there are added processing costs for matching the ETC transactions and applying the discount for these trips but not for the other trips.

Table 10-1
Toll Rates per Mile with and without Discounted Tolls

Interchange -to- Interchange Movement			Rate per Mile	
			No Discount	With Discount
Southern End	--	Levels Road	$ 0.87	$ 0.22
	--	Summit Bridge Road	$ 0.50	$ 0.16
	--	Jamison Corner Road	$ 0.34	$ 0.13
	--	Northern End	$ 0.29	$ 0.29
Levels Road	--	Summit Bridge Road	$ 0.29	$ 0.29
	--	Jamison Corner Road	$ 0.14	$ 0.14
	--	Northern End	$ 0.11	$ 0.11
Summit Bridge Road	--	Jamison Corner Road	$ 0.20	$ 0.20
	--	Northern End	$ 0.13	$ 0.13
Jamison Corner Road	--	Northern End	$ 0.22	$ 0.22

A comparison of the projections for the scenario with discounted rates for trips to/from the south and the Base Case indicates 3.6 percent more transactions in the discounted rate scenario as a result of the increase in the number of local, short distance trips over the 40-year period included in this analysis. Annual revenue on the US 301 Mainline Toll Road is estimated to be 6.5 percent less than the Base Case by reason of the reduced rates for the discounted rate scenario.

10.4 No Diversion from I-95 to US 301 Mainline Toll Road

The fourth sensitivity analysis is based on the assumption that there will be no diversion of traffic from I-95 to the US 301 Mainline Toll Road. At the present time, long distance trips between the Washington, DC area and points south thereof and the Wilmington area and points north thereof have the option of taking either the existing I-95 routing or the US 301 route. Accordingly, the I-95 corridor and the US 301 corridor compete to

some extent, particularly for long-haul movements. The toll plan assumed for US 301 is similar in structure to the I-95 Newark Toll Plaza. For the Base Case, it is anticipated that the new toll road will attract a small percentage of vehicles from the existing long-haul movements that currently utilize I-95. For this sensitivity analysis, the regional transportation model was run with the same demographic growth rates, the same assumptions regarding toll rates and the same regional highway network; however, traffic from I-95 for selected markets (as discussed in Chapter 8) was not be provided the option of diverting to the US 301 Mainline Toll Road route. As a result, it is estimated that there will be 1.9 percent less transactions and 2.5 percent less revenue on the US 301 Toll Road for the scenario with no diversion of traffic from the I-95 to the US 301, when compared to the Base Case.

10.5 Summary of Sensitivity Analyses

A comparison of toll transactions for the Base Case with the four sensitivity scenarios – low external growth, ORT/Cash toll collection, discounted tolls for trips to/from the south and no diversion from I-95 – is presented in Table 10.2.

Table 10-2
Summary Comparison of Base Case and Sensitivity Scenarios

Scenario	Percent Different from Base Case	
	Toll Transactions	Revenue
#1 Reduced growth rates for external trips	-5.2%	-9.0%
#2 ORT/Cash toll collection	+12.3%	+11.4%
#3 Discounted tolls to/from south	+3.6%	-6.5%
#4 No diversion from I-95	-1.9%	-2.5%

As shown in the table, two of the sensitivity scenarios (reduced rates for external trips and no diversion from I-95) are estimated to result in fewer transactions and less revenue over the 40-year period included in this analysis. The sensitivity case with ORT, since it provides for cash toll collection, is estimated to result in additional transactions and revenue. The scenario with reduced toll rates for local trips to/from the south is estimated to result in additional trips due to the availability of a discounted toll; however, this is estimated to result in lower toll revenues.

11 ESTIMATED CUSTOMER SERVICE REVENUES

Toll collection on the US 301 Mainline Toll Road will be by transponder or by video recognition only. There will be no provision for cash toll collection. Accordingly, a procedure will be established in order to collect tolls from motorists who do not have transponders and therefore opt to pay their toll by video recognition. While the gross toll revenue from all transactions that are eventually paid either under normal billings or the violations process are accounted for as part of the toll revenue estimation, DelDOT will also earn some added revenue from the enforcement process administered as part of the Customer Service Center operations. This chapter of the document describes the estimation of that revenue.

For those vehicles that elect to utilize video recognition as the payment method, there will be a normal invoicing process whereby patrons will be sent up to two separate bills requesting payment of the tolls which will include a video toll surcharge of 40 percent for autos and 20 percent for trucks. There are no additional fees applied as part of the standard billing process. For those transactions that are not paid within the time frame associated with the two-invoice process, those transactions are converted to violations. The enforcement process for those violations will be identical to that currently used by DelDOT for the other Delaware toll roads. This procedure will include penalties for motorists who do not remit payment within the time period specified in a payment notice in accordance with legislation to be enacted in the State of Delaware. For internal DelDOT planning purposes, Stantec has estimated potential gross Customer Service Revenues resulting from administrative and penalty charges as provided by the proposed legislation, with rates similar to those currently included in Delaware legislation for the Delaware Turnpike and SR-1.

There will be a three-step process to collect tolls from motorists who do not remit payment in a timely manner under the standard billing process:

1. A first notice for the amount of the toll plus an administrative fee will be send to the owner of the vehicle.
2. Owners who do not pay the toll and the administrative fee specified in the first invoice will be send a second notice including, in addition to the toll amount and the administrative fee, a penalty for non-payment.
3. If an owner does not respond to the second notice, the transaction will be forwarded to a collection agency for further processing. The owner will still be responsible for payment of the amount noted for Step 2; that is, the toll, an administrative fee, a civil penalty and a civil penalty surcharge.

To estimate Customer Service Revenues accruing to DelDOT as a result of the process noted above, the following assumptions were made based on current experience on the Delaware Turnpike and SR 1 and on other toll facilities with similar toll collection systems:

- 83.9 percent of the license plates of the vehicles paying by video recognition will be identifiable and will receive an invoice. 16.1 percent will not be identifiable or will not have a viable address available for use.
- Of the total vehicles that have opted to pay by video recognition, 56.0 percent will pay their toll at some point in the process and 27.9 percent will not pay tolls. As noted above 16.1 percent will not have a viable address and cannot be sent an invoice.
- Of total transactions billed with the standard invoices, 60 percent will pay their toll in the allotted time and not receive any violation notices.
- Owners paying during the violation process, 70.8 percent will pay after receiving the first notice, 8.4 percent will pay after receiving the second notice, and 20.8 percent will pay after the transaction has been forwarded to a collection agency.
- The administrative fee for a transaction will be $25.00 and the civil penalty fee and surcharge for failure to pay after the first notice will be a total of $37.50. These rates are based on rates currently included in Delaware legislation for the Delaware Turnpike and SR 1 and the assumption that similar rates will be in place for the US 301 Mainline Toll Road. Note that these fees are held constant for the entire forecast period.
- Transactions that are not paid in response to the two violation notices are transferred to a collection 'vendor'. The vendor will receive a fee of 20 percent of the administrative revenues. The remaining 80 percent will accrue to DelDOT. DelDOT will receive 100 percent of the revenues due to civil penalties and surcharges.

Table 11-1 provides the revenue estimates over the forecast period. Based on the estimated number of video recognition toll transactions and toll violation rate and the assumptions noted above, it is estimated that DelDOT Service Center Revenues will be $4.1 million in 2017, the first full year of operations of the US 301 Mainline Toll Road, increasing to $5.5 million in 2057, the last year included in this analysis. Note that these revenues are gross values and do not include the toll component, only the administrative fees, civil penalties and the civil penalty surcharges. Note also that administrative fees only will also be subject to a compensation agreement between DelDOT and the administrative processing firm. The costs for that compensation agreement are not yet known, but estimates of the likely costs were separately estimated and are included in the operations and maintenance costs for the project.

It should be noted that these customer service revenues were prepared only to provide an estimates of additional revenue that would be available to DelDOT. This additional revenue is not included in the projected revenue stream for bond support.

Table 11-1
Customer Service Revenue

Fiscal Year	Transactions						Estimated DelDOT Revenues from Violations		
	Total Annual Video Transactions	Total Paying Transactions (1)	Paying in Billing Process (2)	Paying after First Notice	Paying after Second Notice	Paying in Collection Process	Administrative Revenue	Penalty Fee Revenue	Total
2017	2,066,810	1,157,414	1,040,432	82,824	9,826	24,332	$ 2,802,890	$ 1,280,925	$ 4,083,815
2018	2,163,370	1,211,487	1,089,040	86,692	10,286	25,469	$ 2,933,830	$ 1,340,813	$ 4,274,643
2019	2,253,185	1,261,784	1,134,253	90,292	10,713	26,526	$ 3,055,645	$ 1,396,463	$ 4,452,108
2020	2,235,080	1,251,645	1,125,139	89,566	10,627	26,313	$ 3,031,085	$ 1,385,250	$ 4,416,335
2021	2,153,430	1,205,921	1,084,037	86,294	10,238	25,352	$ 2,920,340	$ 1,334,625	$ 4,254,965
2022	2,079,945	1,164,769	1,047,044	83,349	9,889	24,487	$ 2,820,690	$ 1,289,100	$ 4,109,790
2023	2,099,470	1,175,703	1,056,873	84,131	9,982	24,717	$ 2,847,165	$ 1,301,213	$ 4,148,378
2024	2,117,575	1,185,842	1,065,987	84,857	10,068	24,930	$ 2,871,725	$ 1,312,425	$ 4,184,150
2025	2,130,355	1,192,999	1,072,421	85,369	10,129	25,080	$ 2,889,050	$ 1,320,338	$ 4,209,388
2026	2,096,630	1,174,113	1,055,444	84,018	9,968	24,683	$ 2,843,310	$ 1,299,413	$ 4,142,723
2027	2,050,480	1,148,269	1,032,212	82,168	9,749	24,140	$ 2,780,725	$ 1,270,838	$ 4,051,563
2028	2,062,550	1,155,028	1,038,287	82,653	9,806	24,282	$ 2,797,115	$ 1,278,300	$ 4,075,415
2029	2,076,040	1,162,582	1,045,079	83,192	9,870	24,441	$ 2,815,370	$ 1,286,663	$ 4,102,033
2030	2,092,370	1,171,727	1,053,299	83,847	9,948	24,633	$ 2,837,535	$ 1,296,788	$ 4,134,323
2031	2,057,935	1,152,444	1,035,964	82,468	9,784	24,228	$ 2,790,860	$ 1,275,450	$ 4,066,310
2032	2,034,860	1,139,522	1,024,349	81,542	9,675	23,956	$ 2,759,545	$ 1,261,163	$ 4,020,708
2033	2,070,715	1,159,600	1,042,398	82,979	9,845	24,378	$ 2,808,160	$ 1,283,363	$ 4,091,523
2034	2,107,635	1,180,276	1,060,984	84,458	10,021	24,813	$ 2,858,235	$ 1,306,275	$ 4,164,510
2035	2,145,265	1,201,348	1,079,926	85,967	10,199	25,256	$ 2,909,270	$ 1,329,563	$ 4,238,833
2036	2,144,910	1,201,150	1,079,747	85,953	10,198	25,252	$ 2,908,815	$ 1,329,375	$ 4,238,190
2037	2,145,620	1,201,547	1,080,105	85,981	10,201	25,260	$ 2,909,750	$ 1,329,788	$ 4,239,538
2038	2,199,580	1,231,765	1,107,269	88,143	10,458	25,895	$ 2,982,925	$ 1,363,238	$ 4,346,163
2039	2,259,220	1,265,163	1,137,292	90,533	10,741	26,597	$ 3,063,790	$ 1,400,175	$ 4,463,965
2040	2,318,505	1,298,363	1,167,136	92,909	11,023	27,295	$ 3,144,200	$ 1,436,925	$ 4,581,125
2041	2,340,160	1,310,490	1,178,036	93,778	11,126	27,550	$ 3,173,600	$ 1,450,350	$ 4,623,950
2042	2,350,810	1,316,454	1,183,398	94,203	11,177	27,676	$ 3,188,020	$ 1,456,988	$ 4,645,008
2043	2,391,280	1,339,117	1,203,770	95,826	11,369	28,152	$ 3,242,915	$ 1,482,038	$ 4,724,953
2044	2,431,040	1,361,382	1,223,786	97,418	11,558	28,620	$ 3,296,800	$ 1,506,675	$ 4,803,475
2045	2,471,155	1,383,847	1,243,979	99,026	11,749	29,093	$ 3,351,235	$ 1,531,575	$ 4,882,810
2046	2,480,385	1,389,016	1,248,626	99,396	11,793	29,201	$ 3,363,745	$ 1,537,275	$ 4,901,020
2047	2,487,130	1,392,793	1,252,021	99,666	11,825	29,281	$ 3,372,895	$ 1,541,475	$ 4,914,370
2048	2,526,890	1,415,058	1,272,037	101,259	12,014	29,748	$ 3,426,785	$ 1,566,075	$ 4,992,860
2049	2,566,650	1,437,324	1,292,051	102,853	12,203	30,217	$ 3,480,740	$ 1,590,750	$ 5,071,490
2050	2,607,120	1,459,987	1,312,424	104,475	12,395	30,693	$ 3,535,610	$ 1,615,800	$ 5,151,410
2051	2,620,255	1,467,343	1,319,036	105,001	12,458	30,848	$ 3,553,435	$ 1,623,975	$ 5,177,410
2052	2,631,260	1,473,506	1,324,576	105,443	12,510	30,977	$ 3,568,365	$ 1,630,763	$ 5,199,128
2053	2,670,310	1,495,374	1,344,234	107,007	12,696	31,437	$ 3,621,315	$ 1,654,988	$ 5,276,303
2054	2,710,780	1,518,037	1,364,606	108,629	12,888	31,914	$ 3,676,205	$ 1,680,075	$ 5,356,280
2055	2,751,250	1,540,700	1,384,979	110,250	13,081	32,390	$ 3,731,075	$ 1,705,163	$ 5,436,238
2056	2,762,255	1,546,863	1,390,519	110,691	13,133	32,520	$ 3,746,000	$ 1,711,988	$ 5,457,988
2057	2,772,195	1,552,429	1,395,523	111,090	13,180	32,636	$ 3,759,470	$ 1,718,100	$ 5,477,570

NOTES:

(1) 56% of all transactions are paid. The other 44% do not pay a toll (16% non-billable and 28% non-paying).

(2) Of total transactions billed, 60% pay prior to Violation process.

APPENDIX A

ASSESSMENT OF DELAWARE DOT'S SOCIOECONOMIC FORECASTS IN THE US 301 STUDY AREA – OCTOBER 2011

A.1 Socioeconomic Data Review Methodology

The purpose of this technical memorandum is to identify current demographic and economic trends in the Middletown, Delaware region and to incorporate these trends into a review and adjustment of socioeconomic forecasts from the Delaware Department of Transportation's (DelDOT) 2010 Peninsula transportation model for the U.S. Highway 301 (US 301) project study area. The US 301 study area consists of all portions of New Castle County, Delaware south of the Chesapeake and Delaware Canal. The US 301 study area also includes portions of southwestern Cecil County and northwestern Kent County, both of which are located in the state of Maryland. For descriptive purposes, this memorandum divides the overall project study area into multiple areas and assesses development trends of each one, in terms of location and scale of growth. The memorandum also compares the revised county control total figures for the overall DelDOT Peninsula transportation model study area to the original county control totals from the DelDOT Peninsula model and provides a brief description of the methodology used to adjust the socioeconomic data at the Traffic Serial Zone (TSZ) level.

A.2 Recent Regional Population and Employment Trends

A.2.1 Population

The population within the 12-county DelDOT Peninsula transportation model was 1.3 million residents according to the 2010 U.S. Census, which was an increase of more than 167,000 residents since the 2000 U.S. Census (See Table 1). During this period, the overall growth rate of the 12-county region was 14.22 percent, which was a compounded annual growth rate (CAGR) of 1.34 percent. New Castle County, which contains the city of Wilmington, Delaware and much of the project study area, was the largest county with a 2010 population of 538,479 residents. The two other counties in the project study area, Cecil County, Maryland and Kent County, Maryland, had 2010 populations of 101,108 and 20,197 residents, respectively. In terms of percentage growth, population growth in New Castle County between the 2000 and 2010 U.S. Censuses was a modest 7.64 percent or a CAGR of 0.74 percent. Population growth in Cecil County was higher at 17.63 percent (1.64 percent CAGR); while population growth in Kent County, MD was lower at 5.19 percent (0.51 percent CAGR).

Table A-1
Delaware Regional Model 2000 and 2010 U.S. Census Counts

	2000 Census	2010 Census	Total Difference	Percent Change	CAGR
Caroline County, MD	29,772	33,066	3,294	11.06%	1.05%
Cecil County, MD	85,951	101,108	15,157	17.63%	1.64%
Dorchester County, MD	30,675	32,618	1,943	6.33%	0.62%
Kent County, DE	126,704	162,310	35,606	28.10%	2.51%
Kent County, MD	19,200	20,197	997	5.19%	0.51%
New Castle County, DE	500,272	538,479	38,207	7.64%	0.74%
Queen Anne's County, MD	40,560	47,798	7,238	17.85%	1.66%
Somerset County, MD	24,747	26,470	1,723	6.96%	0.68%
Sussex County, DE	156,581	197,145	40,564	25.91%	2.33%
Talbot County, MD	33,812	37,782	3,970	11.74%	1.12%
Wicomico County, MD	84,644	98,733	14,089	16.65%	1.55%
Worchester County, MD	46,543	51,454	4,911	10.55%	1.01%
Total	**1,179,461**	**1,347,160**	**167,699**	**14.22%**	**1.34%**

Source: U.S. Census Bureau, 2011.

A.2.2 Agency Population Projections

Recent population projections for Delaware were produced by the Delaware Population Consortium for five-year intervals between 2010 and 2040. The Delaware Population Consortium consists of members from municipalities, county governments, metropolitan planning organizations, state government, and academic institutions. The Consortium produces and shares an annual set of population projections for the State of Delaware, its counties, and major municipalities. The projections are produced using the cohort-component method with future migration rates based upon anticipated future employment levels. The Consortium's 2010 population projections were released during October 2010 and are provided below in Table 2. These projections show relatively slow and diminishing growth rates for New Castle County through 2040. New Castle County's projected 2040 population is 606,881 residents or an increase of more than 68,000 residents since the 2010 U.S. Census or a CAGR of 0.40

Table A-2
2010 Delaware Population Consortium Population Projections

POPULATION PROJECTIONS			
	Kent	New Castle	Sussex
2010	162,310	538,479	197,145
2015	169,884	554,405	216,160
2020	178,817	567,764	235,341
2025	186,202	578,739	254,556
2030	192,853	589,267	272,511
2035	199,065	598,817	290,363
2040	204,952	606,881	308,690
TOTAL POPULATION CHANGE			
	Kent	New Castle	Sussex
2010-2015	7,574	15,926	19,015
2015-2020	8,933	13,359	19,181
2020-2025	7,385	10,975	19,215
2025-2030	6,651	10,528	17,955
2030-2035	6,212	9,550	17,852
2035-2040	5,887	8,064	18,327
2010-2040	**42,642**	**68,402**	**111,545**
COMPOUNDED ANNUAL GROWTH RATE			
	Kent	New Castle	Sussex
2010-2015	0.87%	0.56%	1.77%
2015-2020	1.03%	0.48%	1.71%
2020-2025	0.81%	0.38%	1.58%
2025-2030	0.70%	0.36%	1.37%
2030-2035	0.64%	0.32%	1.28%
2035-2040	0.58%	0.27%	1.23%
2010-2040	**0.77%**	**0.40%**	**1.49%**

Note: The 2010 population data are from the U.S. Census Bureau's count for April 1, 2010. The population projections for total population are for July 1st of each year.

Sources: U.S. Census Bureau, 2011 and Delaware Population Consortium, 2011.

percent during this period. The Consortium projected relatively strong population growth for Sussex County, which is expected to grow by approximately 111,000 new residents. More modest growth was projected for Kent County. The Consortium's projected 2040 population for Kent County is 204,952 residents, which is an increase of almost 42,600 residents from the 2010 U.S. Census.

Population projections for Maryland counties were produced by the Maryland State Data Center, which is part of the Maryland Department of Planning. The agency's population projections are provided below in Table 3 and were updated during December 2010. Although the agency's website does not specifically describe how the forecasts were prepared or list migration rate assumptions, it is reasonable to assume that the cohort component method was used.

Among the nine counties in Maryland that are in the 12-county DelDOT model, Cecil County's population is expected to grow the most. Between 2000 and 2040, the Cecil County is expected to add almost 65,000 residents at a CAGR of 1.65 percent. Kent County's population growth, on the other hand, is expected to be significantly more constrained with approximately 4,100 new residents being added during this period or a CAGR of 0.61 percent.

Table A-3
2010 Maryland State Data Center Population Projections

POPULATION PROJECTIONS

	Caroline	Cecil	Dorchester	Kent	Queen Anne's	Somerset	Talbot	Wicomico	Worchester
2010	33,066	101,108	32,618	20,197	47,798	26,470	37,782	98,733	51,454
2015	35,900	113,800	34,050	21,300	51,950	27,050	38,300	100,800	52,650
2020	38,300	125,100	35,700	22,200	55,650	27,800	39,800	106,450	55,300
2025	40,800	136,100	37,050	22,900	58,900	28,450	41,000	111,650	57,350
2030	43,300	146,800	38,250	23,400	61,900	28,850	41,850	116,450	58,950
2035	45,700	156,300	39,300	23,850	64,700	29,200	42,500	120,900	60,350
2040	48,100	165,800	40,200	24,300	67,300	29,500	42,950	124,900	61,500

TOTAL POPULATION CHANGE

	Caroline	Cecil	Dorchester	Kent	Queen Anne's	Somerset	Talbot	Wicomico	Worchester
2010-2015	2,834	12,692	1,432	1,103	4,152	580	518	2,067	1,196
2015-2020	2,400	11,300	1,650	900	3,700	750	1,500	5,650	2,650
2020-2025	2,500	11,000	1,350	700	3,250	650	1,200	5,200	2,050
2025-2030	2,500	10,700	1,200	500	3,000	400	850	4,800	1,600
2030- 2035	2,400	9,500	1,050	450	2,800	350	650	4,450	1,400
2035- 2040	2,400	9,500	900	450	2,600	300	450	4,000	1,150
2010-2040	**15,034**	**64,692**	**7,582**	**4,103**	**19,502**	**3,030**	**5,168**	**26,167**	**10,046**

COMPOUNDED ANNUAL GROWTH RATE

	Caroline	Cecil	Dorchester	Kent	Queen Anne's	Somerset	Talbot	Wicomico	Worchester
2010-2015	1.58%	2.28%	0.82%	1.02%	1.60%	0.41%	0.26%	0.40%	0.44%
2015-2020	1.30%	1.91%	0.95%	0.83%	1.39%	0.55%	0.77%	1.10%	0.99%
2020-2025	1.27%	1.70%	0.75%	0.62%	1.14%	0.46%	0.60%	0.96%	0.73%
2025-2030	1.20%	1.53%	0.64%	0.43%	1.00%	0.28%	0.41%	0.85%	0.55%
2030- 2035	1.08%	1.26%	0.54%	0.38%	0.89%	0.24%	0.31%	0.75%	0.47%
2035- 2040	1.03%	1.19%	0.45%	0.37%	0.79%	0.20%	0.21%	0.65%	0.38%
2010-2040	**1.25%**	**1.65%**	**0.69%**	**0.61%**	**1.14%**	**0.36%**	**0.42%**	**0.78%**	**0.59%**

Note: The 2010 population data are from the U.S. Census Bureau's count for April 1, 2010. The population projections for total population are for July 1st of each year.

Source: U.S. Census Bureau, 2011 and Maryland State Data Center, 2011.

A.3 Recent Employment Trends

Table 4 provides total employment estimates from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) for counties in the DelDOT Peninsula transportation model for 2001 and 2010. The data show that the region essentially had no net growth, in terms of employment over the nine year period. Moderate gains in some counties were offset by large losses in others with a few counties breaking even. Total employment for the 12-county region, between 2001 and 2010, fell by 571 jobs or an overall change of -0.10 percent. The overall CAGR for employment, during the period between 2001 and 2010, was -0.01 percent.

Table A-4
2001 and 2010 Delaware Regional Model Employment Estimates

County	2001	2010	Total Difference	Percent Change	CAGR
Caroline County, MD	8,596	8,539	-57	-0.66%	-0.07%
Cecil County, MD	25,573	27,822	2,249	8.79%	0.94%
Dorchester County, MD	11,295	11,288	-7	-0.06%	-0.01%
Kent County, DE	50,760	60,027	9,267	18.26%	1.88%
Kent County, MD	7,914	7,659	-255	-3.22%	-0.36%
New Castle County, DE	282,318	261,981	-20,337	-7.20%	-0.83%
Queen Anne's County, MD	11,167	13,193	2,026	18.14%	1.87%
Somerset County, MD	6,965	6,688	-277	-3.98%	-0.45%
Sussex County, DE	61,813	69,131	7,318	11.84%	1.25%
Talbot County, MD	18,642	17,712	-930	-4.99%	-0.57%
Wicomico County, MD	41,753	43,656	1,903	4.56%	0.50%
Worchester County, MD	24,423	22,952	-1,471	-6.02%	-0.69%
Total	**551,219**	**550,648**	**-571**	**-0.10%**	-0.01%

Source: U.S. Bureau of Labor Statistics, 2011.

Recent employment data from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) show that the employment levels in Kent County, Delaware and Sussex County have grown significantly between 2001 and 2010 (See Table 5). During this period, Kent County's total employment increased by 9,267 jobs and Sussex County's employment increased by 7,318 jobs. In both counties, year-over-year employment increased during most years between 2001 and 2010, with exceptions between the years of 2007 and 2010 in Kent County and between 2006 and 2009 in Sussex County. Overall, the CAGR for employment growth in Kent and Sussex Counties between 2001 and 2010 was 1.88 percent and 1.25 percent, respectively.

Total employment in New Castle County actually fell by 20,337 jobs between 2001 and 2010, largely affected by losses between 2008 and 2009, when total employment dropped by more

than 20,000 jobs. Modest gains in some years were offset by losses in others, resulting in an overall CAGR of -0.83% for the 2001 to 2010 period.

Table A-5
Delaware County Employment Estimates (2001-2010)

EMPLOYMENT TOTALS

	Kent	New Castle	Sussex
2001	50,760	282,318	61,813
2002	52,444	275,491	63,109
2003	56,191	277,069	63,816
2004	58,845	280,482	66,933
2005	61,267	281,675	69,916
2006	62,146	282,884	71,440
2007	63,154	283,231	70,766
2008	62,659	281,652	70,625
2009	60,221	266,258	68,572
2010	60,027	261,981	69,131

TOTAL EMPLOYMENT CHANGE

	Kent	New Castle	Sussex
2001-2002	1,684	-6,827	1,296
2002-2003	3,747	1,578	707
2003-2004	2,654	3,413	3,117
2004-2005	2,422	1,193	2,983
2005-2006	879	1,209	1,524
2006-2007	1,008	347	-674
2007-2008	-495	-1,579	-141
2008-2009	-2,438	-15,394	-2,053
2009-2010	-194	-4,277	559
2001-2010	**9,267**	**-20,337**	**7,318**

ANNUAL GROWTH RATE

	Kent	New Castle	Sussex
2001-2002	3.32%	-2.42%	2.10%
2002-2003	7.14%	0.57%	1.12%
2003-2004	4.72%	1.23%	4.88%
2004-2005	4.12%	0.43%	4.46%
2005-2006	1.43%	0.43%	2.18%
2006-2007	1.62%	0.12%	-0.94%
2007-2008	-0.78%	-0.56%	-0.20%
2008-2009	-3.89%	-5.47%	-2.91%
2009-2010	-0.32%	-1.61%	0.82%
2001-2010†	**1.88%**	**-0.83%**	**1.25%**

† Compounded annual growth rate.

Source: U.S. Bureau of Labor Statistics, 2011.

Among the Maryland counties within DelDOT's Peninsula transportation model, Cecil, Wicomico, and Queen Anne's Counties experienced the most vigorous employment growth between 2001 and 2010. Table 6 shows that Cecil County's employment grew the most, adding 2,249 jobs (CAGR 0.94 percent); followed by Queen Anne's County with 2,026 jobs (CAGR 1.87 percent) and Wicomico County with 1,903 new jobs (CAGR 0.50 percent).

In the remaining Maryland counties, overall employment change during the 2001 to 2010 period was negative. Caroline and Dorchester Counties experienced very minor job losses, while the other counties had more significant losses. Employment losses between 2007 and 2009 generally erased any employment gains made earlier. Some counties also experienced losses between 2001 and 2003, as well as during other years.

Table A-6
Maryland County Employment Estimates (2001-2010)

TOTAL EMPLOYMENT

	Caroline	Cecil	Dorchester	Kent	Queen Anne's	Somerset	Talbot	Wicomico	Worchester
2001	8,596	25,573	11,295	7,914	11,167	6,965	18,642	41,753	24,423
2002	8,580	26,830	11,251	8,022	11,791	6,830	18,924	41,486	25,549
2003	8,502	27,091	11,456	7,731	12,482	6,973	19,030	41,867	25,057
2004	8,646	28,283	12,128	8,025	12,799	6,940	18,893	43,706	24,378
2005	8,727	29,193	12,028	8,082	12,918	6,969	19,148	45,351	24,504
2006	8,676	30,012	11,772	8,384	13,575	7,211	19,295	46,944	24,998
2007	8,932	30,763	11,760	8,600	14,308	7,112	19,444	46,902	24,533
2008	8,872	30,733	11,431	8,251	14,114	7,065	19,568	46,447	24,107
2009	8,568	30,204	11,188	7,908	13,379	6,855	18,191	44,621	23,211
2010	8,539	27,822	11,288	7,659	13,193	6,688	17,712	43,656	22,952

TOTAL EMPLOYMENT CHANGE

	Caroline	Cecil	Dorchester	Kent	Queen Anne's	Somerset	Talbot	Wicomico	Worchester
2001-2002	-16	1,257	-44	108	624	-135	282	-267	1,126
2002-2003	-78	261	205	-291	691	143	106	381	-492
2003-2004	144	1,192	672	294	317	-33	-137	1,839	-679
2004-2005	81	910	-100	57	119	29	255	1,645	126
2005-2006	-51	819	-256	302	657	242	147	1,593	494
2006-2007	256	751	-12	216	733	-99	149	-42	-465
2007-2008	-60	-30	-329	-349	-194	-47	124	-455	-426
2008-2009	-304	-529	-243	-343	-735	-210	-1,377	-1,826	-896
2009-2010	-29	-2,382	100	-249	-186	-167	-479	-965	-259
2001-2010	**-57**	**2,249**	**-7**	**-255**	**2,026**	**-277**	**-930**	**1,903**	**-1,471**

Table A-6 (Continued)
Maryland County Employment Estimates (2001-2010)

	ANNUAL GROWTH RATE								
	Caroline	Cecil	Dorchester	Kent	Queen Anne's	Somerset	Talbot	Wicomico	Worchester
2001-2002	-0.19%	4.92%	-0.39%	1.36%	5.59%	-1.94%	1.51%	-0.64%	4.61%
2002-2003	-0.91%	0.97%	1.82%	-3.63%	5.86%	2.09%	0.56%	0.92%	-1.93%
2003-2004	1.69%	4.40%	5.87%	3.80%	2.54%	-0.47%	-0.72%	4.39%	-2.71%
2004-2005	0.94%	3.22%	-0.82%	0.71%	0.93%	0.42%	1.35%	3.76%	0.52%
2005-2006	-0.58%	2.81%	-2.13%	3.74%	5.09%	3.47%	0.77%	3.51%	2.02%
2006-2007	2.95%	2.50%	-0.10%	2.58%	5.40%	-1.37%	0.77%	-0.09%	-1.86%
2007-2008	-0.67%	-0.10%	-2.80%	-4.06%	-1.36%	-0.66%	0.64%	-0.97%	-1.74%
2008-2009	-3.43%	-1.72%	-2.13%	-4.16%	-5.21%	-2.97%	-7.04%	-3.93%	-3.72%
2009-2010	-0.34%	-7.89%	0.89%	-3.15%	-1.39%	-2.44%	-2.63%	-2.16%	-1.12%
2001-2010[†]	**-0.07%**	**0.94%**	**-0.01%**	**-0.36%**	**1.87%**	**-0.45%**	**-0.57%**	**0.50%**	**-0.69%**

[†] Compounded annual growth rate.

Source: U.S. Bureau of Labor Statistics, 2011.

A.4 Growth Patterns within the US 301 Study

The US 301 study area experienced significant residential and commercial development between 2000 and 2008 and, as residential growth has occurred, so has economic activity. Starting in 2008, there has been a substantial slowing of new residential and commercial construction, but it has not come to a complete halt. The sections below will detail recent, ongoing, and anticipated residential and commercial development projects within the US 301 study area.

A.4.1 Recent Residential Development

Table 7 identifies the names of active subdivisions—approved and under construction— within the US 301 study area. The table also lists the number of lots platted in each subdivision, and the number of units completed during late 2010. At that time, there were 16 subdivisions under construction, which contained approximately 4,600 available lots.

Table A-7
US 301 Study Area ActiveSubdivision Projects

TSZ	Subdivision Name	Number of Lots	Units Completed
279/280	Bayberry North	949	0
302/303	Odessa National	761	255
197	Willow Grove Mill	~700	478
190	Spring Arbor	521	104
191	Parkside	492	161
292/293	Estates at St. Anne	466	165
190	Parkway at South Ridge	446	24
194	Canalview at Crossland	432	27
192	Shannon Cove	410	67
300	Townsend Village II	336	149
289	Townsend Village	242	83
303	Enclave at Odessa	205	66
275/278	Augustine Creek Phase I & II	177	118
190	Merrimack Commons	78	0
302	Fairways at Odessa National	70	14
279	Ashbury Chase II	40	23
	TOTAL	**~6,325**	**1,734**

Source: New Castle County, Delaware, 2010.

No recent residential construction was identified or observed in Cecil or Kent Counties, Maryland.

A.4.2 Future Residential Growth

The recession that began during 2008 substantially slowed the development of existing residential subdivisions within the US 301 project study area and delayed planned projects. Even as the national economy has started to improve and the regional economy is approaching stabilization, it is still not possible to predict precisely when the regional housing market will recover. The market will most likely be depressed for an additional one to three years. Regardless of the nation's economic problems, there will likely still be new housing construction in the project study area to meet the needs of a growing population. However, household formation and construction volume will be much slower than in the mid-2000s. These factors were considered when assessing and adjusting the population forecasts. As the housing market contracts and eventually recovers, local planners anticipate that slightly more than half of the new population growth in New Castle County will occur within the US 301 study area. In addition to the remaining lots in existing subdivisions under construction (during December 2010), there are almost 12,000 lots or multifamily units in 29 subdivisions that have undergoing the platting and subdivision approval process or have been placed on hold due to market conditions.

The locations of these proposed subdivisions by TSZ and the number of proposed lots in each one are shown in Table 8. Most of these subdivisions fall within New Castle County's preferred development corridor between the current US 301 and Route 1. However, there are other approved subdivisions that are outside of this corridor and New Castle County government will allow certain ones to proceed. Any future subdivisions seeking approval will need to locate within the preferred growth corridor or would need to supply their own water and wastewater utilities in order to be considered for approval.

Table A-8
US 301 Study Area Proposed Residential Subdivision Projects

TSZ	Subdivision Name	Proposed Number of Lots
291	Westown (Levels)	1,800
309	Deat's Farm	1,381
210	The Highlands	1,250
274	Village of Bayberry South	1,186
193	Carter Farm	578
279	Winchelsea	513
216	Pleasanton	434
277	Country Club Estates	407
321	High Hook Farms	390
267	Poole Property	385
302/303	Robinson Farms	333
303	Smith Farm	328
274	Boyd's Corner Farm	287
312	Churchtown Manor	273
266	Promenade at Middletown	273
336	Spring Oaks	242
272	Tides at Silver Run	241
294/296	Odessa Commons	240
199/306	Roberts Farm	208
272	Ponds at Odessa	207
271	Silver Maple Farm	187
321	Baymont Farms	157
310	Rothwell Village	150
280	Hyett's Corner	143
216	Cedar Lane	81
275	Ashby's Place	54
213	The Highlands at Back Creek	50
193	Biggs Farm	20
213	Estates at Ridgefield	16
	TOTAL	**11,814**

Source: New Castle County, Delaware, 2010.

In stark contrast, relatively little new residential growth has occurred in the portion of the US 301 study area that lies within Cecil County or Kent County, MD and little new growth is expected. Within Cecil County, large areas of land have been set aside, through the purchase of easements, for agricultural or ecological preservation. As a result, current land uses are very unlikely to change over the forecast horizon. In areas that do permit new residential development, future growth has been restricted to very low densities (e.g. one residential unit per 20 acres). In areas without these restrictions, four subdivisions are proposed in TSZ 1691, ranging in size from 8 to 47 lots. County planners also identified an area of land south of Chesapeake City that might be developed in the future. While future residential development in Kent County, MD is less hindered by easements, there are similar restrictions on housing densities (e.g. one residential unit per 30 acres). Within the town of Galena, a Kent County planner in 2008 identified the new phase of a subdivision with 100 lots. The county planner also identified several proposed rural subdivisions east of the nearby town of Fredericktown with 8 to 10 lots. Each of these Kent County residential developments is located in TSZ 1712.

A.4.3 Recent Commercial Development

The number of commercial projects that are recently completed or with construction underway in the US 301 study area has slowed between the October 2008 and December 2010 field survey. While, Middletown's rapidly growing population and its relative distance from Newark and Wilmington have encouraged new retailers, restaurants, medical services, and other professional service providers to expand into the market, regional job losses have tempered the growth. Many of the newly constructed commercial buildings in the project study area, which house multiple office or retail tenants, had one or more office suites or retail spaces empty during the field survey. These vacant suites or storefronts will certainly be occupied over time, but probably at a slower pace than initially anticipated by their developers. The narrative below describes recent and ongoing commercial development in the US 301 project study area during December 2010.

West of US 301 – New Castle County

Starting from the northern portion of this study subarea, in TSZ 217, a warehouse or hangar was under construction at Summit Airport. Further south, along US 301 at the northwest corner of its intersection with Churchtown Road (TSZ 313), two commercial buildings were recently completed. One building was approximately half occupied and the other had a single tenant and was mostly vacant. Further south, along US 301 and on the north side of TSZ 211, the Middletown Corporate Center, which is an office park with seven small one-story and two-story office buildings, is continuing to slowly fill with tenants. Further south in TSZ 211 and along US 301, a bank building and an auto parts store were constructed. Also in TSZ 211 and along Sandhill Drive, a new two-story office building and a building for a credit union were recently completed. The office building was vacant at the time of the field survey. Nearby, the southwest corner of US 301 and SH 15 has been an active area for new commercial construction during the past few years. Recently, a Walmart super center was built and is operating in TSZ 190. Additionally, a drug store was built nearby in the same TSZ. Along SH 15 (Bunker Hill Road) and also in TSZ 190, Bunker Hill Elementary School has recently completed and is opened to students.

East of US 301 and West of Route 1 – New Castle County

Starting at the north side of the study subarea, east of US 301 and west of Route 1, a four-story office building in TSZ 266 continues to add various private and non-profit tenants, in addition to the Appoquinimink Public Library and a community center that were located there during the previous field survey. The building's fourth floor appeared to be unoccupied. TSZ 212 has

been a very active area for commercial development in Middletown during the past few years. A Home Depot store was recently completed at the corner of US 301 and SH 299 (Main Street). On the north side of Main Street in TSZ 211, a fast food restaurant was also built. Further east along Main Street, another fast food restaurant was built in TSZ 307 and a large convenience store in TSZ 197. Along Noxontown Road and in TSZ 297, St. Andrew's School was building new facilities on its campus. A county park was also recently completed in TSZ 308, called Levels Road Park.

East of Route 1 – New Castle County

East of Route 1, no recent or ongoing commercial development was identified from the aerial photography or during the December 2010 field survey.

Cecil County

Existing commercial development in the study area portion of Cecil County centers on tourism in Chesapeake City, agriculture, horse farms, and plant nurseries, along with the supporting retailers and services for these industries and the population. No new commercial development was identified in the study area from the aerial photography or during the field survey.

Kent County, MD

Existing economic activity in this portion of Kent County, MD in the US 301 study area is similar to Cecil County, although with less emphasis on tourism. No recent commercial construction was identified from a review of aerial photography or during the field survey.

A.4.4 Future Commercial Development

A number of commercial projects are anticipated in and around the Town of Middletown, although the exact timing for many of these projects is not certain. As the regional economy stabilizes and as the residential and commercial real estate markets continue to underperform, these conditions will likely delay many of the proposed projects. The projects discussed in the narrative below were identified during December 2010 meetings with planners at the Town of Middletown and New Castle, Cecil, and Kent Counties.

The largest commercial project anticipated in the US 301 study area is a 460-bed hospital, which will be located on the east side of Middletown in TSZ 294. It is anticipated that this facility will employ between 1,500 and 2,000 workers. A rehabilitation center is also being planned in TSZ 197, which is expected to employ several hundred additional workers. Another proposed project, east of downtown, is a mixed-use development called the Promenade in TSZ 266. However, the developer has since abandoned the project, after starting the initial site preparation. The Peterson property, which is located along the north side of SH 299 and east of Silver Lake Road, is being proposed as a medium-density office and retail development. On the west side of Middletown, commercial development will continue to concentrate around the intersection of US 301 and SH 299, although no new construction was underway at the time of the field survey. In TSZ 212, the Middletown Auto Park, originally planned as a common location for automobile dealerships, will likely attract other retailers there instead. Further south in TSZ 212, the Westown commercial development has set aside large tracts (e.g. 50-acre parcels) for distribution and warehousing or industrial activity. Developers have also proposed hundreds of thousands of square feet of office, retail, and other commercial space will be built along US 301 in TSZ 190 and TSZ 267. One location, the Poole property, would have 240,000 square feet of office space, 90,000 square feet of retail space, and 90,000 square feet of warehouse space. Additional commercial development is also likely in TSZ 211, where there

has been a substantial amount of recent construction, primarily small professional offices, strip retail, and restaurants. Similarly, there are still vacant parcels along many of Middletown's arterials that would be desirable for commercial development, primarily for smaller free-standing retail or office buildings. Outside of Middletown, but within New Castle County, the Scott Run Business Park in TSZ 335 is being proposed as a very large commercial development. To date, no buildings have been built and probably will not be for several more years, at the earliest. Similarly, the Bayberry Town Center is proposed as a retail development in the southwest corner of TSZ 279 and the southeast corner of TSZ 314. There is also industrial zoned land east of Route 1 and south of the community of St. Georges in TSZ 282, but no signs of imminent or even contemplated activity.

In Cecil County, there is the possibility of commercial development in the aforementioned area south of Chesapeake City, but no specific plans were identified. There is no pending commercial development anticipated in the Kent County, MD portion of the study area. Future commercial activity could include the reactivation of the proposed mushroom farm and the development of solar farms.

A.5 Assessing and Adjusting the Population and Employment Forecasts

The socioeconomic data assessed for this study included WILMAPCO's 2011 forecasts for New Castle and Cecil Counties and data from DelDOT's 2010 Peninsula model for the remaining counties. The adjusted population and employment control totals used for this study anticipate reasonably modest growth for the 12-county study area through the forecast year of 2040 (See Tables 9, 10, and 11), while also accounting for a stabilization of the local economy in the near term. The baseline 2009 population control totals for each county in the model were adjusted to the U.S. Census Bureau's 2000-2010 Intercensal estimates population estimates for 2009, which took into account the results from the 2010 U.S. Census count. The 2010 population estimates were based upon the same U.S. Census data set. Baseline employment estimates for the counties were adjusted to the Delaware Department of Labor's and the Maryland Department of Labor, Licensing, and Regulation's QCEW data. Using these data led to a lower employment estimate than the 2010 DelDOT model's assumptions. While there are some shortcomings to the QCEW employment estimates, such as not counting agricultural workers and the self-employed, they also are more likely than other data sources to accurately reflect the number of individuals who commute to work.

Table A-9
Population Control Total Adjustments

CAROLINE COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	33,650	--	33,699	--	33,013	--	-637	-686
2010	34,117	1.39%	34,100	0.79%	33,153	0.42%	-964	-947
2015	37,188	1.74%	37,250	1.19%	35,103	1.15%	-2,085	-2,147
2020	40,258	1.60%	40,299	1.78%	37,409	1.28%	-2,849	-2,890
2030	45,894	1.32%	46,000	1.59%	42,989	1.40%	-2,905	-3,011
2035	48,189	0.98%	48,972	1.26%	45,271	1.04%	-2,918	-3,701
2040	50,484	0.93%	52,136	1.26%	47,205	0.84%	-3,279	-4,931

CECIL COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	102,082	--	102,448	--	100,818	--	-1,264	-1,630
2010	103,858	1.74%	103,847	1.37%	101,519	0.70%	-2,339	-2,328
2015	117,107	2.43%	117,796	2.55%	109,528	1.53%	-7,579	-8,268
2020	130,356	2.17%	130,350	2.05%	118,451	1.58%	-11,905	-11,899
2030	154,837	1.74%	155,000	1.65%	138,973	1.61%	-15,864	-16,027
2035	163,573	1.10%	168,217	1.65%	147,878	1.25%	-15,695	-20,339
2040	172,309	1.05%	182,560	1.65%	155,883	1.06%	-16,426	-26,677

DORCHESTER COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	32,094	--	32,182	--	32,469	--	375	287
2010	32,304	0.65%	32,350	0.53%	32,668	0.61%	364	318
2015	34,242	1.17%	34,651	1.38%	33,829	0.70%	-413	-822
2020	36,180	1.11%	36,300	0.93%	35,027	0.70%	-1,153	-1,273
2030	38,713	0.68%	38,849	0.63%	37,709	0.74%	-1,004	-1,140
2035	39,681	0.50%	40,088	0.63%	39,008	0.68%	-673	-1,080
2040	40,648	0.48%	41,367	0.63%	40,151	0.58%	-497	-1,216

Table A-9 (Continued)
Population Control Total Adjustments

KENT COUNTY, DE

Year	2010 DelDOT Peninsula Model Population Forecast	CAGR	2009 US 301 ADJUSTED Population Forecast	CAGR	2011 US 301 ADJUSTED Population Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	157,151	--	157,350	--	160,082	--	2,931	2,732
2010	159,657	1.60%	159,979	1.66%	163,314	2.02%	3,657	3,335
2015	169,069	1.15%	169,351	1.15%	174,812	1.37%	5,743	5,461
2020	178,481	1.09%	177,821	0.98%	184,371	1.07%	5,890	6,550
2030	192,194	0.74%	190,866	0.65%	198,286	0.73%	6,092	7,420
2035	198,263	0.62%	197,150	0.65%	204,401	0.61%	6,138	7,251
2040	204,331	0.60%	203,642	0.65%	210,611	0.60%	6,280	6,969

KENT COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	CAGR	2009 US 301 ADJUSTED Population Forecast	CAGR	2011 US 301 ADJUSTED Population Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	20,219	--	20,193	--	20,133	--	-86	-60
2010	20,364	0.72%	20,298	0.51%	20,226	0.46%	-138	-72
2015	21,280	0.88%	21,300	0.97%	20,764	0.53%	-516	-536
2020	22,197	0.85%	22,201	0.83%	21,481	0.68%	-716	-720
2030	23,307	0.49%	23,401	0.43%	22,691	0.55%	-616	-710
2035	23,668	0.31%	23,908	0.43%	23,228	0.47%	-440	-680
2040	24,029	0.30%	24,427	0.43%	23,580	0.30%	-449	-847

NEW CASTLE COUNTY, DE

Year	2010 DelDOT Peninsula Model Population Forecast	CAGR	2009 US 301 ADJUSTED Population Forecast	CAGR	2011 US 301 ADJUSTED Population Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	532,036	--	532,343	--	533,697	--	1,661	1,354
2010	535,567	0.66%	534,416	0.39%	536,583	0.54%	1,016	2,167
2015	550,164	0.54%	547,632	0.49%	548,011	0.42%	-2,153	379
2020	564,761	0.53%	561,173	0.49%	559,679	0.42%	-5,082	-1,494
2030	586,348	0.38%	589,278	0.49%	581,432	0.38%	-4,916	-7,846
2035	595,091	0.30%	603,857	0.49%	591,124	0.33%	-3,967	-12,733
2040	603,834	0.29%	618,798	0.49%	598,896	0.26%	-4,938	-19,902

Table A-9 (Continued)
Population Control Total Adjustments

QUEEN ANNE'S COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	47,500	--	47,950	--	47,530	--	30	-420
2010	48,238	1.55%	48,651	1.47%	47,996	0.98%	-242	-655
2015	52,001	1.51%	52,450	1.52%	51,732	1.51%	-269	-718
2020	55,764	1.41%	55,650	1.19%	55,481	1.41%	-283	-169
2030	61,340	0.96%	61,900	1.00%	61,042	0.96%	-298	-858
2035	63,640	0.74%	65,058	1.00%	63,335	0.74%	-305	-1,723
2040	65,940	0.71%	68,376	1.00%	65,617	0.71%	-323	-2,759

SOMERSET COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	26,316	--	26,371	--	26,424	--	108	53
2010	26,474	0.60%	26,550	0.68%	26,516	0.35%	42	-34
2015	27,163	0.51%	27,501	0.71%	27,212	0.52%	49	-289
2020	27,851	0.50%	28,299	0.57%	28,023	0.59%	172	-276
2030	29,578	0.60%	29,350	0.28%	29,428	0.49%	-150	78
2035	29,874	0.20%	29,763	0.28%	29,723	0.20%	-151	-40
2040	30,170	0.20%	30,182	0.28%	30,021	0.20%	-149	-161

SUSSEX COUNTY, DE

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	192,447	--	189,455	--	194,746	--	2,299	5,291
2010	196,554	2.13%	192,088	1.39%	198,285	1.82%	1,731	6,197
2015	215,704	1.88%	209,576	1.76%	217,958	1.91%	2,254	8,382
2020	234,854	1.72%	225,403	1.47%	237,601	1.74%	2,747	12,198
2030	270,997	1.44%	253,221	1.06%	274,652	1.46%	3,655	21,431
2035	289,187	1.31%	266,929	1.06%	293,260	1.32%	4,073	26,331
2040	307,377	1.23%	281,380	1.06%	311,894	1.24%	4,517	30,514

Table A-9 (Continued)
Population Control Total Adjustments

TALBOT COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	36,491	--	36,693	--	37,495	--	1,004	802
2010	36,822	0.91%	36,951	0.69%	37,888	1.05%	1,066	937
2015	38,406	0.85%	38,550	0.85%	39,486	0.83%	1,080	936
2020	39,989	0.81%	40,050	0.77%	41,151	0.83%	1,162	1,101
2030	41,988	0.49%	42,098	0.41%	43,255	0.50%	1,267	1,157
2035	42,411	0.20%	42,968	0.41%	43,689	0.20%	1,278	721
2040	42,834	0.20%	43,856	0.41%	44,129	0.20%	1,295	273

WICOMICO COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	94,996	--	95,256	--	98,071	--	3,075	2,815
2010	96,062	1.12%	96,099	0.88%	99,114	1.06%	3,052	3,015
2015	101,826	1.17%	101,847	1.17%	104,481	1.06%	2,655	2,634
2020	107,590	1.11%	107,450	1.08%	110,139	1.06%	2,549	2,689
2030	117,190	0.86%	117,549	0.85%	120,217	0.88%	3,027	2,668
2035	121,409	0.71%	122,630	0.85%	124,674	0.73%	3,265	2,044
2040	125,628	0.69%	127,932	0.85%	129,101	0.70%	3,473	1,169

WORCHESTER COUNTY, MD

Year	2010 DelDOT Peninsula Model Population Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Population Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Population Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	50,289	--	50,156	--	51,318	--	1,029	1,162
2010	50,736	0.89%	50,548	0.79%	51,584	0.52%	848	1,036
2015	53,573	1.09%	53,649	1.20%	53,148	0.60%	-425	-501
2020	56,411	1.04%	56,250	0.95%	55,091	0.72%	-1,320	-1,159
2030	60,132	0.64%	59,999	0.56%	58,254	0.56%	-1,878	-1,745
2035	61,485	0.45%	61,698	0.56%	59,665	0.48%	-1,820	-2,033
2040	62,838	0.44%	63,445	0.56%	61,080	0.47%	-1,758	-2,365

Table A-10
Total Number of Households Adjustments

CAROLINE COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Household Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Household Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	12,868	--	12,633	--	12,140	--	-728	-493
2010	13,064	1.52%	12,783	1.19%	12,695	4.57%	-369	-88
2015	14,370	1.92%	13,963	1.78%	13,565	1.33%	-805	-398
2020	15,676	1.76%	15,107	1.59%	14,567	1.44%	-1,109	-540
2030	18,341	1.58%	17,246	1.26%	17,179	1.66%	-1,162	-67
2035	19,350	1.08%	18,360	1.26%	18,178	1.14%	-1,172	-182
2040	20,359	1.02%	19,546	1.26%	19,036	0.93%	-1,323	-510

CECIL COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Household Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Household Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	37,979	--	37,892	--	36,766	--	-1,213	-1,126
2010	38,324	0.91%	38,412	1.38%	37,005	0.65%	-1,319	-1,407
2015	43,769	2.69%	43,578	2.56%	43,242	3.16%	-527	-336
2020	49,214	2.37%	48,248	2.06%	44,136	0.41%	-5,078	-4,112
2030	58,958	1.82%	57,437	1.67%	52,749	1.80%	-6,209	-4,688
2035	62,719	1.24%	62,396	1.67%	56,411	1.35%	-6,308	-5,985
2040	66,479	1.17%	67,783	1.67%	59,175	0.96%	-7,304	-8,608

DORCHESTER COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Household Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Household Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	13,775	--	13,682	--	13,461	--	-314	-221
2010	13,886	0.81%	13,754	0.53%	14,042	4.32%	156	288
2015	14,928	1.46%	14,731	1.38%	14,748	0.99%	-180	17
2020	15,969	1.36%	15,433	0.94%	15,460	0.95%	-509	27
2030	17,087	0.68%	16,516	0.63%	16,645	0.74%	-442	129
2035	17,514	0.50%	17,043	0.63%	17,217	0.68%	-297	174
2040	17,941	0.48%	17,587	0.63%	17,721	0.58%	-220	134

Table A-10 (Continued)
Total Number of Households Adjustments

KENT COUNTY, DE

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	60,358	--	57,510	--	59,451	--	-907	1,941
2010	61,817	2.42%	58,428	1.61%	63,235	6.36%	1,418	4,807
2015	66,237	1.39%	61,654	1.08%	68,487	1.61%	2,250	6,833
2020	70,658	1.30%	64,461	0.89%	72,986	1.28%	2,328	8,525
2030	77,571	0.94%	68,355	0.51%	80,033	0.93%	2,462	11,678
2035	80,397	0.72%	70,116	0.51%	82,888	0.70%	2,491	12,772
2040	83,224	0.69%	71,922	0.51%	85,780	0.69%	2,556	13,858

KENT COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	8,246	--	8,623	--	8,139	--	-107	-484
2010	8,313	0.81%	8,669	0.52%	8,255	1.43%	-58	-414
2015	8,812	1.17%	9,102	0.98%	8,597	0.82%	-215	-505
2020	9,311	1.11%	9,488	0.83%	9,012	0.95%	-299	-476
2030	10,149	0.87%	10,005	0.45%	9,880	0.92%	-269	-125
2035	10,311	0.32%	10,232	0.45%	10,118	0.48%	-193	-114
2040	10,473	0.31%	10,464	0.45%	10,278	0.31%	-195	-186

NEW CASTLE COUNTY, DE

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	206,720	--	201,740	--	202,042	--	-4,678	302
2010	208,696	0.96%	202,442	0.35%	202,914	0.43%	-5,782	472
2015	217,923	0.87%	206,315	0.38%	207,032	0.40%	-10,891	717
2020	227,150	0.83%	210,745	0.43%	211,521	0.43%	-15,629	776
2030	242,308	0.65%	219,883	0.43%	219,444	0.37%	-22,864	-439
2035	247,344	0.41%	224,651	0.43%	222,899	0.31%	-24,445	-1,752
2040	252,381	0.40%	229,523	0.43%	225,725	0.25%	-26,656	-3,798

Table A-10 (Continued)
Total Number of Households Adjustments

QUEEN ANNE'S COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	18,291	--	18,030	--	17,916	--	-375	-114
2010	18,645	1.93%	18,306	1.53%	18,551	3.54%	-94	245
2015	20,370	1.79%	19,802	1.58%	20,264	1.78%	-106	462
2020	22,094	1.64%	21,093	1.27%	21,983	1.64%	-111	890
2030	25,850	1.58%	23,673	1.09%	25,725	1.58%	-125	2,052
2035	26,329	0.37%	24,992	1.09%	26,329	0.47%	0	1,337
2040	26,807	0.36%	26,384	1.09%	26,675	0.26%	-132	291

SOMERSET COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	8,827	--	9,123	--	8,773	--	-54	-350
2010	8,880	0.60%	9,185	0.68%	8,895	1.39%	15	-290
2015	9,280	0.88%	9,515	0.71%	9,296	0.89%	16	-219
2020	9,679	0.85%	9,789	0.57%	9,737	0.93%	58	-52
2030	10,066	0.39%	10,155	0.28%	10,015	0.28%	-51	-140
2035	10,167	0.20%	10,298	0.28%	10,167	0.30%	0	-131
2040	10,268	0.20%	10,443	0.28%	10,217	0.10%	-51	-226

SUSSEX COUNTY, DE

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	79,745	--	76,256	--	78,406	--	-1,339	2,150
2010	81,653	2.39%	77,312	1.37%	82,368	5.05%	715	5,056
2015	90,560	2.09%	84,292	1.74%	91,505	2.13%	945	7,213
2020	99,467	1.89%	90,575	1.45%	100,622	1.92%	1,155	10,047
2030	118,320	1.75%	101,535	1.04%	119,918	1.77%	1,598	18,383
2035	126,870	1.41%	106,926	1.04%	128,649	1.42%	1,779	21,723
2040	135,420	1.31%	112,603	1.04%	137,411	1.33%	1,991	24,808

Table A-10 (Continued)
Total Number of Households Adjustments

TALBOT COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	16,142	--	15,874	--	16,036	--	-106	162
2010	16,338	1.21%	15,983	0.70%	16,811	4.83%	473	828
2015	16,991	0.79%	16,673	0.85%	17,469	0.77%	478	796
2020	17,645	0.76%	17,324	0.77%	18,158	0.78%	513	834
2030	18,880	0.68%	18,211	0.41%	19,450	0.69%	570	1,239
2035	19,144	0.28%	18,587	0.41%	19,722	0.28%	578	1,135
2040	19,409	0.27%	18,972	0.41%	19,994	0.27%	585	1,022

WICOMICO COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	36,874	--	36,526	--	36,969	--	95	443
2010	37,398	1.42%	36,846	0.87%	38,586	4.37%	1,188	1,740
2015	40,203	1.46%	39,037	1.16%	41,252	1.35%	1,049	2,215
2020	43,008	1.36%	41,164	1.07%	44,028	1.31%	1,020	2,864
2030	47,419	0.98%	44,986	0.84%	48,644	1.00%	1,225	3,658
2035	49,316	0.79%	46,907	0.84%	50,638	0.81%	1,322	3,731
2040	51,212	0.76%	48,911	0.84%	52,640	0.78%	1,428	3,729

WORCHESTER COUNTY, MD

Year	2010 DelDOT Peninsula Model Household Forecast	CAGR	2009 US 301 ADJUSTED Household Forecast	CAGR	2011 US 301 ADJUSTED Household Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	22,009	--	22,522	--	22,167	--	158	-355
2010	22,254	1.11%	22,699	0.79%	22,628	2.08%	374	-71
2015	23,659	1.23%	24,097	1.20%	23,473	0.74%	-186	-624
2020	25,063	1.16%	25,267	0.95%	24,480	0.84%	-583	-787
2030	27,194	0.82%	26,952	0.56%	26,349	0.74%	-845	-603
2035	28,077	0.64%	27,715	0.56%	27,250	0.67%	-827	-465
2040	28,960	0.62%	28,500	0.56%	28,156	0.66%	-804	-344

Table A-11
Employment Control Total Adjustments

CAROLINE COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	13,907	--	8,782	--	8,567	--	-5,340	-215
2010	14,100	1.39%	8,707	-0.84%	8,474	-1.09%	-5,626	-233
2015	14,876	1.08%	9,511	1.78%	8,728	0.59%	-6,148	-783
2020	15,651	1.02%	10,291	1.59%	9,138	0.92%	-6,513	-1,153
2030	16,434	0.49%	11,747	1.26%	9,797	0.70%	-6,637	-1,950
2035	16,516	0.10%	12,506	1.26%	10,044	0.50%	-6,472	-2,462
2040	16,598	0.10%	13,314	1.26%	10,298	0.50%	-6,300	-3,016

CECIL COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	38,306	--	30,246	--	30,249	--	-8,057	3
2010	39,008	1.83%	29,990	-0.84%	27,988	-7.47%	-11,020	-2,002
2015	47,354	3.95%	34,020	2.55%	29,015	0.72%	-18,339	-5,005
2020	55,700	3.30%	37,649	2.05%	32,546	2.32%	-23,154	-5,103
2030	60,300	0.80%	44,766	1.65%	39,854	2.05%	-20,446	-4,912
2035	61,000	0.23%	48,583	1.65%	43,367	1.70%	-17,633	-5,216
2040	61,700	0.23%	52,726	1.65%	46,071	1.22%	-15,629	-6,655

DORCHESTER COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	16,490	--	11,563	--	11,187	--	-5,303	-376
2010	16,530	0.24%	11,466	-0.84%	11,271	0.75%	-5,259	-195
2015	17,356	0.98%	12,280	1.38%	11,526	0.45%	-5,830	-754
2020	18,183	0.93%	12,866	0.94%	12,036	0.87%	-6,147	-830
2030	19,456	0.68%	13,770	0.63%	12,881	0.68%	-6,575	-889
2035	19,670	0.22%	14,209	0.63%	13,102	0.34%	-6,568	-1,107
2040	19,884	0.22%	14,663	0.63%	13,319	0.33%	-6,565	-1,344

Table A-11 (Continued)
Employment Control Total Adjustments

KENT COUNTY, DE

Year	2010 DelDOT Peninsula Model Employment Forecast	CAGR	2009 US 301 ADJUSTED Employment Forecast	CAGR	2011 US 301 ADJUSTED Employment Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	64,037	--	61,986	--	60,260	--	-3,777	-1,726
2010	65,158	1.75%	61,383	-0.97%	60,077	-0.30%	-5,081	-1,306
2015	67,605	0.74%	64,911	1.12%	61,606	0.50%	-5,999	-3,305
2020	70,052	0.71%	68,140	0.98%	64,607	0.96%	-5,445	-3,533
2030	73,179	0.44%	73,150	0.66%	69,738	0.77%	-3,441	-3,412
2035	75,431	0.61%	75,596	0.66%	71,860	0.60%	-3,571	-3,736
2040	77,682	0.59%	78,124	0.66%	73,965	0.58%	-3,717	-4,159

KENT COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	CAGR	2009 US 301 ADJUSTED Employment Forecast	CAGR	2011 US 301 ADJUSTED Employment Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	12,798	--	8,455	--	7,907	--	-4,891	-548
2010	12,905	0.84%	8,383	-0.84%	7,645	-3.31%	-5,260	-738
2015	13,680	1.17%	8,797	0.97%	7,871	0.58%	-5,809	-926
2020	14,454	1.11%	9,167	0.83%	8,243	0.93%	-6,211	-924
2030	15,466	0.68%	9,665	0.43%	8,872	0.74%	-6,594	-793
2035	15,504	0.05%	9,875	0.43%	9,095	0.50%	-6,409	-780
2040	15,543	0.05%	10,089	0.43%	9,325	0.50%	-6,218	-764

NEW CASTLE COUNTY, DE

Year	2010 DelDOT Peninsula Model Employment Forecast	CAGR	2009 US 301 ADJUSTED Employment Forecast	CAGR	2011 US 301 ADJUSTED Employment Forecast	CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	283,540	--	276,205	--	266,171	--	-17,369	-10,034
2010	283,489	-0.02%	272,741	-1.24%	262,250	-1.47%	-21,239	-10,491
2015	299,778	1.12%	276,757	0.29%	264,600	0.18%	-35,178	-12,157
2020	298,599	-0.08%	280,788	0.29%	269,383	0.36%	-29,216	-11,405
2030	295,706	-0.10%	289,067	0.29%	275,333	0.22%	-20,373	-13,734
2035	295,590	-0.01%	293,283	0.29%	277,284	0.14%	-18,306	-15,999
2040	296,582	0.07%	297,560	0.29%	279,228	0.14%	-17,354	-18,332

Table A-11 (Continued)
Employment Control Total Adjustments

QUEEN ANNE'S COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	22,379	--	14,068	--	13,379	--	-9,000	-689
2010	22,727	1.55%	13,951	-0.84%	13,202	-1.32%	-9,525	-749
2015	25,340	2.20%	15,039	1.51%	13,650	0.67%	-11,690	-1,389
2020	27,954	1.98%	15,956	1.19%	15,124	2.07%	-12,830	-832
2030	29,631	0.58%	17,747	1.00%	18,184	1.86%	-11,447	437
2035	29,927	0.20%	18,652	1.00%	19,518	1.43%	-10,409	866
2040	30,224	0.20%	19,604	1.00%	20,882	1.36%	-9,342	1,278

SOMERSET COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	11,338	--	6,994	--	6,854	--	-4,484	-140
2010	11,406	0.60%	6,935	-0.84%	6,683	-2.49%	-4,723	-252
2015	12,300	1.52%	7,184	0.71%	6,914	0.68%	-5,386	-270
2020	13,193	1.41%	7,392	0.57%	7,363	1.27%	-5,830	-29
2030	13,879	0.51%	7,666	0.27%	8,062	0.91%	-5,817	396
2035	14,052	0.25%	7,770	0.27%	8,241	0.44%	-5,811	471
2040	14,226	0.25%	7,876	0.27%	8,419	0.43%	-5,807	543

SUSSEX COUNTY, DE

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	76,482	--	69,481	--	68,627	--	-7,855	-854
2010	77,107	0.82%	68,806	-0.97%	69,223	0.87%	-7,884	417
2015	81,838	1.20%	74,964	1.73%	72,140	0.83%	-9,698	-2,824
2020	86,570	1.13%	80,590	1.46%	76,724	1.24%	-9,846	-3,866
2030	94,290	0.86%	90,565	1.07%	84,135	0.93%	-10,155	-6,430
2035	98,150	0.81%	95,515	1.07%	87,121	0.70%	-11,029	-8,394
2040	102,010	0.77%	100,736	1.07%	90,130	0.68%	-11,880	-10,606

Table A-11 (Continued)
Employment Control Total Adjustments

TALBOT COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	28,698	--	19,119	--	18,192	--	-10,506	-927
2010	29,061	1.27%	18,959	-0.84%	17,761	-2.37%	-11,300	-1,198
2015	30,224	0.79%	19,779	0.85%	18,309	0.61%	-11,915	-1,470
2020	31,386	0.76%	20,548	0.77%	19,073	0.82%	-12,313	-1,475
2030	32,328	0.30%	21,601	0.41%	20,229	0.59%	-12,099	-1,372
2035	32,490	0.10%	22,047	0.41%	20,636	0.40%	-11,854	-1,411
2040	32,651	0.10%	22,503	0.41%	21,043	0.39%	-11,608	-1,460

WICOMICO COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	59,226	--	46,118	--	44,620	--	-14,606	-1,498
2010	59,947	1.22%	45,729	-0.84%	43,701	-2.06%	-16,246	-2,028
2015	62,945	0.98%	48,465	1.17%	45,069	0.62%	-17,876	-3,396
2020	65,942	0.93%	51,132	1.08%	48,219	1.36%	-17,723	-2,913
2030	69,499	0.53%	55,935	0.84%	52,578	0.87%	-16,921	-3,357
2035	70,059	0.16%	58,324	0.84%	53,667	0.41%	-16,392	-4,657
2040	70,619	0.16%	60,815	0.84%	54,778	0.41%	-15,841	-6,037

WORCHESTER COUNTY, MD

Year	2010 DelDOT Peninsula Model Employment Forecast	2010 DelDOT Peninsula Model CAGR	2009 US 301 ADJUSTED Employment Forecast	2009 US 301 ADJUSTED CAGR	2011 US 301 ADJUSTED Employment Forecast	2011 US 301 ADJUSTED CAGR	2010 DelDOT-2011 US 301 Total Change	2009 US 301-2011 US 301 Total Change
2009	34,037	--	23,956	--	23,210	--	-10,827	-746
2010	34,272	0.69%	23,675	-1.19%	22,950	-1.12%	-11,322	-725
2015	35,986	0.98%	25,131	1.20%	23,543	0.51%	-12,443	-1,588
2020	37,700	0.93%	26,350	0.95%	25,311	1.46%	-12,389	-1,039
2030	39,208	0.39%	28,106	0.56%	27,082	0.68%	-12,126	-1,024
2035	39,490	0.14%	28,902	0.56%	27,372	0.21%	-12,118	-1,530
2040	39,772	0.14%	29,720	0.56%	27,662	0.21%	-12,110	-2,058

A.5.1 Assessment and Adjustment at the TSZ level

The existing population and employment forecasts for each TSZ in the U.S. 301 project study area were assessed and adjustments were made based upon a review of various data sources including: windshield surveys, interviews with local planning agencies, digital aerial photography, inventories of platted projects, maps, plans, and other relevant literature. Interviews were conducted with the staff of planning offices in New Castle County, Cecil County, Kent County (Maryland), the Town of Middletown, and WILMAPCO.

A.5.2 Employment by Sector

The assignment of employment by sector was not changed for the 2009 baseline figures or for any of the forecast periods, except for the TSZs within the US 301 project study area. Outside of that exception, in instances where a TSZ's total forecasted employment was adjusted, the employment by sector was adjusted proportionately to the changes made to the TSZ's total employment forecast.

A.5.3 Median Household Income

It was judged that WILMAPCO's median household income estimates and the DelDOT 2010 Peninsula Transportation Model's median household income estimates did not adequately account for recent national trends, under which household incomes have declined. The median household income value for all TSZs was reduced by 2.0 percent between 2009 and 2010. The values were further reduced by 0.5 percent for each year between 2010 and 2015. All zonal median household income values were then maintained at the 2015 level for all future forecast periods.

A.5.4 Households

The 2010 estimate of households for each county was adjusted to its respective 2010 U.S. Census based figure. At the zonal level, the assessment used an estimate of persons per household, which was based upon the figures assumed by the DelDOT 2010 Peninsula model for all counties but New Castle County and Cecil County. In New Castle County, due to discrepancies within the agency's data, the 2010 persons per household value was used to produce all future estimates of households by zone. In Cecil County, the WILMAPCO estimates of person per household for each forecast period were judged to be reasonable.

A.5.5 Adjustments to Forecasts Outside of the Study Area

The assessment and adjustments to the population and employment forecasts of TSZs outside of the project area occurred during the adjustments to the county population and employment control totals. All adjustments were weighted according to the difference between forecast periods. The population and employment forecasts for individual TSZs outside of the study area were not reviewed for reasonableness nor were further adjustments made.

A.6 Conclusions

The 12 counties within the DelDOT 2010 Peninsula Transportation Model are currently experiencing modest population growth and stabilizing employment levels after the effects of the most recent national recession. In terms of total population and employment, the 12 counties are dominated by New Castle County but from a broader perspective, the area's growth patterns are also influenced by changes in the Philadelphia, Pennsylvania, Washington, D.C. and Baltimore, Maryland metropolitan areas. The intense downward pressure from the national economy has impacted population and employment growth patterns at the local level but these pressures are diminishing somewhat as the national economy improves. During the past few years, the region (primarily New Castle County) has experienced significant job losses from large employers, such as the closure of the Chrysler automobile manufacturing plant in Newark, Delaware and the culling of jobs in the financial sector. As the nation continues its slow emergence from the global financial crisis, its and the region's recovery will be modest and it will likely require a number of years before economic activity approaches earlier rates of growth. Undeniably, the United States has entered into a new period of slower economic growth. Collectively, ongoing problems in the financial sector, government debt and problems with governance, along with fluctuations in fuel costs, will affect the spatial allocation of land development, since consumers have become reliant upon easy access to credit and fuel to create and sustain cheap housing and sprawling development patterns. However, population growth in the US 301 study area will continue, although at more modest rates than during the recent past. The overall level of employment within the US 301 study area has likely increased during the past few years with the opening of various retail stores and is expected to grow further with the construction of new medical facilities that will provide a significant increase to the study area's future employment. Both trends should contribute to growing traffic volumes on the proposed US 301 roadway.

APPENDIX B
PROCEDURE FOR FORECASTING EXTERNAL TRIPS

The purpose of this Appendix is to describe the procedure used to develop the long term forecast of external trips for the proposed US 301 Toll Road. To this end, Stantec investigated traffic data for facilities in the area of the proposed US 301 Toll Road and demographic data for the regions likely to provide the major portion of long distance trips for the new facility. For this analysis, the relationship between forecasted traffic and demographic growth rates were compared to the same relationships for historical data.

Traffic Data

Traffic data included Annual Average Daily Traffic (AADT) volumes at selected major toll facilities located in the area of the proposed US 301 and currently serving traffic that will likely use the new road. These locations include I-95 at the Newark Plaza of the Delaware Turnpike, I-95 at the JFK Plaza of the Maryland Turnpike, US 301 at the Chesapeake Bay Bridge and I-295 at the Delaware Memorial Bridge.

AADT for 2000 and 2010 for each of these facilities and the Average Annual Growth Rates (AAGR) are shown in Table 1. Annual data for the period 2000 – 2010 are shown in Attachment A. The detailed data show the impacts of toll changes, construction projects and the recession.

The AAGR over the 11 year period ranges from a reduction of 0.2 percent at the I-95 Toll Plaza to an increase of 2 percent at the Bay Bridge. The Bay Bridge is the most likely contributor of traffic to the proposed Toll Road since it is along the US 301 route. With the exception of the recession years 2008 and 2009, the Bridge has consistently shown traffic increases. Except for the recession year of 2009, the Bay Bridge has outperformed the other facilities in the area. Most recently, Bridge traffic increased 2.5 percent in 2010 and 2.0 percent in 2011, very strong performance given current economic conditions. These rates of change include not only the natural increase due to economic development but also the negative impacts of toll increases. Tolls were revised at the Newark Plaza in 2005 and 2007 and toll changes on the Maryland toll facilities in fiscal years 2002, 2004 and 2009. Without these toll rate changes, the growth rates would be higher.

Table B-1
Historical Traffic Growth Rates

Facility	AADT		2000 -2010
	2000	2010	AAGR
I-95 at Newark Plaza	71,612	69,978	-0.2%
I-95 at JFK Plaza	39,211	40,687	0.7%
US 301 at Bay Bridge	32,432	35,804	2.0%
I-295 at Delaware Memorial Br.	44,363	46,531	1.0%

Demographic Data

Demographic data reviewed for this response included the historical and projected growth rates for population and employment provided by Metropolitan Planning Organizations (MPO) and an independent forecasting concern, IHS Global Insight (Global Insight). The MPOs for the region covered include: Metropolitan Washington Council of Governments (MWCOG), Delaware Valley Regional Planning Commission (DRVPC), South Jersey Transportation Planning Organization (SJTPO), Baltimore Metropolitan Council (BMC), North Jersey Transportation Planning Authority (NJTPA) and New York Metropolitan Transportation Council (NYMTC). The areas represented by these organizations extend from Poughkeepsie, NY (Dutchess County) in the north to Prince William County, VA in the south. The counties covered are listed in Attachment A.

Historical population data from the MPOs for 2000, 2005 and 2010 are shown in Table 2. Also shown are the AAGRs for the five-year periods 2000 to 2005 and 2005 to 2010 and for the 10-year period 2000 to 2010. With the exception of the Washington metropolitan area, growth rates are consistently below one percent, as would be expected in the Middle Atlantic and Northeast US. The average rate of growth for the full region for the ten-year period 2000 to 2010 is 0.7 percent.

Population data for the same time periods from Global Insight are shown in Table 3. The estimates prepared by the independent source are generally at the same level and indicate an overall average annual growth rate for population of 0.6 percent for 2000 through 2010.

Comparable data from the MPOs for employment are show in Table 4. Growth rates for employment are similar to those for population, with an overall average annual rate of change of 0.8 percent for the 2000 – 2010 period.

Estimates of employment prepared by Global Insight, shown in Table 5, indicate a decrease in employment between 2005 and 2010 as a result of the economic downturn. The estimates show declines in employment in all areas except Washington and New York. For the ten-year period, 2000 to 2010, the AAGR is 0.2 percent.

Table B-2
MPO Historical Population Growth

	Population		
	2000	**2005**	**2010**
MWCOG	5,762,101	6,262,499	6,626,923
BMC Region	2,515,389	2,630,300	2,716,500
Phila. Region	5,388,462		5,626,186
NJTPA Region	6,310,989	6,472,725	6,735,974
NYC Region	12,475,851	12,864,091	12,930,305
Mercer-Trenton	346,727	365,022	376,666
SJTPO	565,601		594,795
Total	**33,365,120**		**35,607,349**
	AAGR		
	2000-2005	**2005-2010**	**2000 - 2010**
MWCOG	1.7%	1.1%	1.4%
BMC Region	0.9%	0.6%	0.8%
Phila. Region			0.4%
NJTPA Region	0.5%	0.8%	0.7%
NYC Region	0.6%	0.1%	0.4%
Mercer-Trenton	1.0%	0.6%	0.8%
SJTPO			0.5%
Total			0.7%

Source: MPOs

Table B-3
Historical Population Growth from Global Insight

	2000	**2005**	**2010**	**2000-2005**	**2005-2010**
MWCOG	5,794,770	6,284,270	6,706,212	1.6%	1.3%
Baltimore	2,521,708	2,612,392	2,666,868	0.7%	0.4%
DVRPC	5,393,844	5,517,312	5,634,282	0.5%	0.4%
NJTPA	6,331,129	6,466,323	6,594,502	0.4%	0.4%
NYC Region	12,707,387	12,910,405	13,053,072	0.3%	0.2%
SJTPO	567,319	586,282	595,116	0.7%	0.3%

. Source: Global Insight

Table B-4
MPO Historical Employment Growth

	Employment		
	2000	**2005**	**2010**
MWCOG	3,506,663	3,780,290	4,012,116
BMC Region	1,534,400	1,615,200	1,710,400
Phila. Region	2,717,851		2,841,765
NJTPA Region	3,006,691	2,979,032	3,112,163
NYC Region	5,661,918	5,694,451	6,089,578
Mercer-Trenton	216,641	213,976	236,339
SJTPO	270,754		259,782
Total	**16,914,918**		**18,262,143**
	AAGR		
	2000-2005	**2005-2010**	**2000 - 2010**
MWCOG	1.5%	1.2%	1.4%
BMC Region	1.0%	1.2%	1.1%
Phila. Region			0.4%
NJTPA Region	-0.2%	0.9%	0.3%
NYC Region	0.1%	1.4%	0.7%
Mercer-Trenton	-0.2%	2.0%	0.9%
SJTPO			-0.4%
Total			0.8%

Table 5. Historical Employment Growth from Global Insight

	2000	**2005**	**2010**	**2000-2005**	**2005-2010**
MWCOG	3,103,579	3,389,651	3,454,607	1.8%	0.4%
Baltimore	1,239,811	1,272,660	1,257,051	0.5%	-0.2%
DVRPC	2,611,992	2,663,167	2,608,525	0.4%	-0.4%
NJTPA	2,934,563	2,971,008	2,836,488	0.2%	-0.9%
NYC Region	5,727,090	5,666,099	5,737,070	-0.2%	0.2%
SJTPO	271,264	282,869	260,724	0.8%	-1.6%

Comparison of Growth Rates

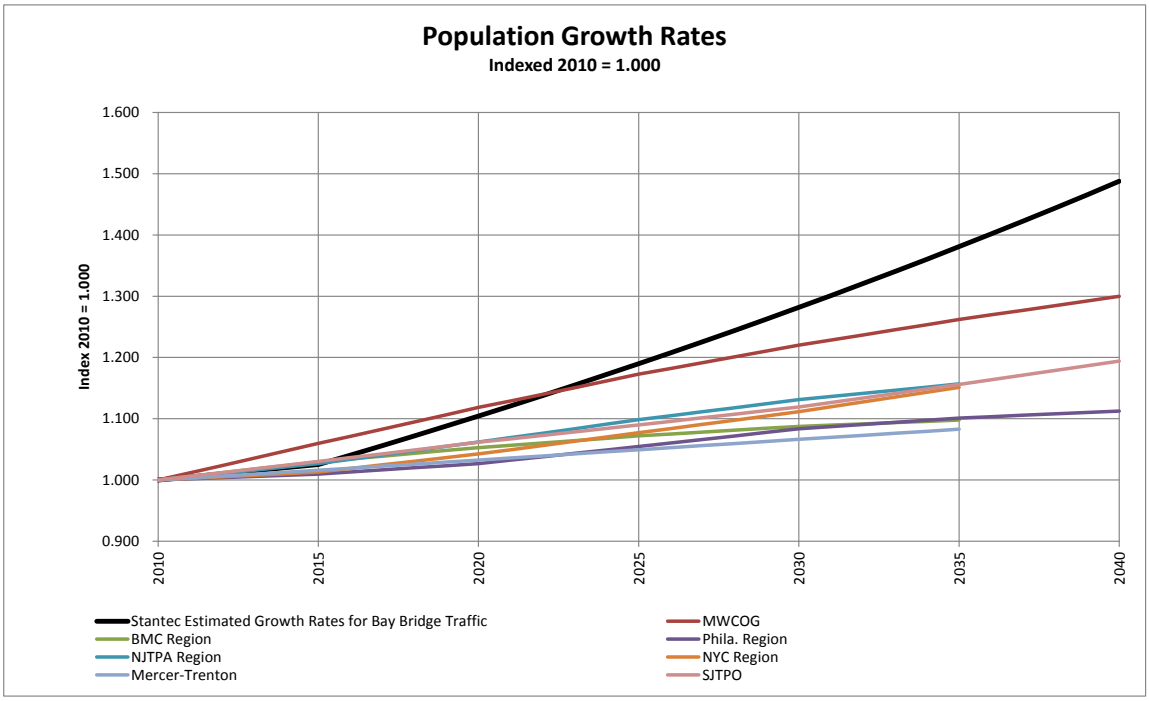
Historically, traffic performance outpaces population and employment growth. A comparison of the growth rates for the demographic and traffic data shown above indicates that traffic on the existing toll facilities in the US 301 Toll Road area has also increased at a higher rate than population or employment. It should be noted that the 2000 -2010 growth rate for population was 0.7 percent and for employment, 0.2 to 0.8 percent (depending upon the source). During the same period, traffic on the Bay Bridge grew at 2.0 percent, or almost three times the population and employment growth rates.

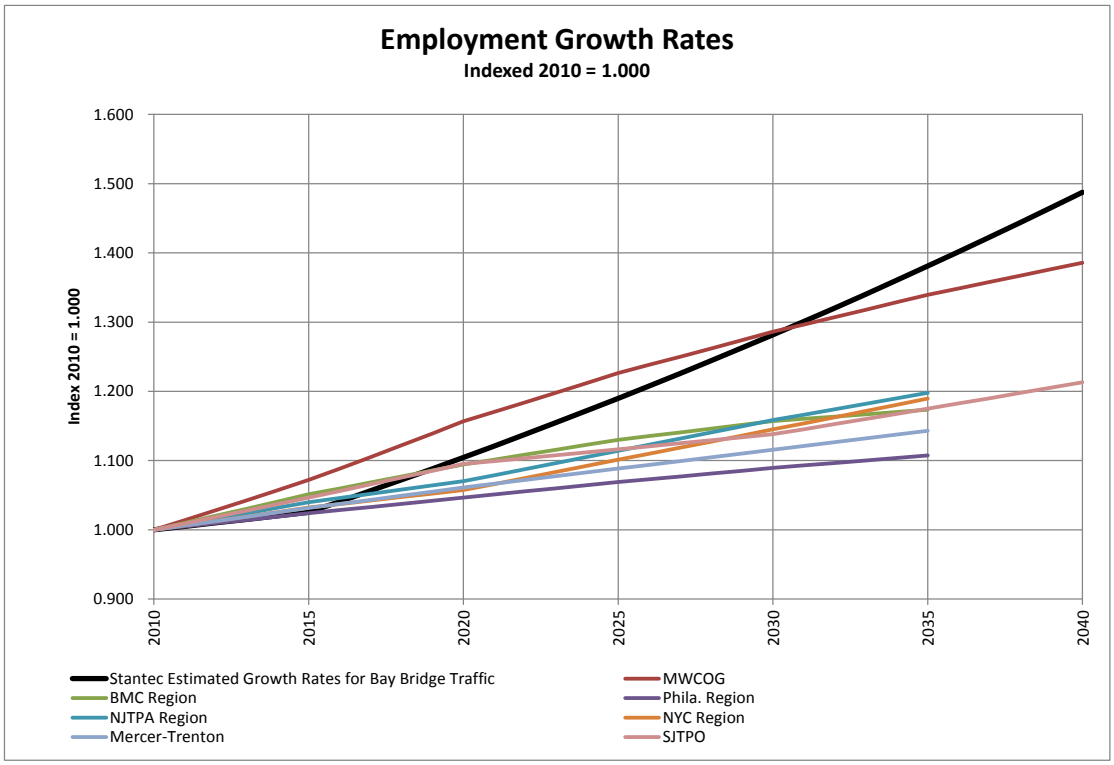
Forecast of External Trips

For the estimates of for the proposed US 301, Stantec projected that external trips would increase 0.5 percent annually between 2009 and 2015 and then 1.5 percent from 2015 to 2040. This results in an AAGR of 1.3 percent.

During the forecast period, the regional population and employment growth rates vary, as shown in Graphs 1 and 2. Details presented in Attachment B show that forecasts of annual growth rates for population range from 0.3 percent to 0.9 percent. For employment, annual increases are projected to range from 0.3 percent to 1.1 percent.

As noted above, traffic growth on the Bay Bridge currently is almost 3 times population and employment growth. Using the lowest population growth rate for the regions noted above, the implied ratio between traffic and population (1.3/.5) is consistent with recent historical trends.




Employment Growth Rates
Indexed 2010 = 1.000
Index 2010 = 1.000
1.600
1.500
1.400
1.300
1.200
1.100
1.000
0.900
2010
2015
2020
2025
2030
2035
2040
Stantec Estimated Growth Rates for Bay Bridge Traffic
BMC Region
NJTPA Region
Mercer-Trenton
MWCOG
Phila. Region
NYC Region
SJTPO

Attachment A
13-Feb-12

20000 - 2011 Annual Average Daily Traffic
on Toll Facilities in US 301 Toll Road Area

	I-95 at Newark Plaza		I-95 at JFK Plaza		US 301 at Bay Bridge		I-295 at Delaware Memorial Br.	
Fiscal Year	AADT	Percent Change	AADT	Percent Change	AADT	Percent Change	AADT	Percent Change
2000	71,612		39,211		32,432		44,363	
2001	73,217	2.2%	39,816	1.5%	32,771	1.0%	44,978	1.4%
2002	75,707	3.4%	NA	NA	NA	NA	46,972	4.4%
2003	75,965	0.3%	39,818	NA	33,646	NA	47,166	0.4%
2004	78,227	3.0%	41,538	4.3%	35,389	5.2%	48,551	2.9%
2005	77,838	-0.5%	40,947	-1.4%	35,501	0.3%	48,201	-0.7%
2006	75,416	-3.1%	40,372	-1.4%	36,358	2.4%	48,514	0.6%
2007	74,274	-1.5%	40,658	0.7%	36,971	1.7%	48,339	-0.4%
2008	72,355	-2.6%	39,710	-2.3%	36,523	-1.2%	46,358	-4.1%
2009	70,717	-2.3%	40,114	1.0%	34,936	-4.3%	46,923	1.2%
2010	69,978	-1.0%	40,687	1.4%	35,804	2.5%	46,531	-0.8%
2011	67,014	-4.2%	41,337	1.6%	36,550	2.1%	46,404	-0.3%

Attachment B
February 14,2012

Definition of MPO Regions

Metropolitan Washington Council of Governments		
Maryland Counties	**Virginia Counties**	**Virginia Indipendent Cities and Other Jurisdictions**
Montgomery County, MD	Arlington County, VA	Alexandria, VA
Prince Georges County, MD	Fairfax County, VA	Fairfax, VA
Frederick County, MD	Loudoun County, VA	Falls Church, VA
Carroll County, MD	Prince William County, VA	Manassas, VA
Howard County, MD	King George County, VA	Manassas Park, VA
Anne Arundel County, MD	Stafford County, VA	Fredericksburg, VA
Calvert County, MD	Spotsylvania County, VA	Washington, DC
St Marys County, MD	Fauquier County, VA	Jefferson County, WV
Charles County, MD	Clarke County, VA	

Delaware Valley Regional Planning Commission	
Pennsylvania Counties	**New Jersey Counties**
Bucks County, PA	Burlington County, NJ
Chester County, PA	Camden County, NJ
Delaware County, PA	Gloucester County, NJ
Montgomery County, PA	Mercer County, NJ
Philadelphia County, PA	

South Jersey Transportation Planning Organization	
New Jersey Counties	
Atlantic County, NJ	Cumberland County, NJ
Cape May County, NJ	Salem County, NJ

Baltimore Metropolitan Council	
Maryland Counties and Indipendent City	
Baltimore, MD	Carroll County, MD
Ann Arundel County, MD	Harford County, MD
Baltimore County, MD	Howard County, MD

North Jersey Transportation Planning Authority		
New Jersey Counties		
Bergen County, NJ	Middlesex County, NJ	Passaic County, NJ
Essex County, NJ	Monmouth County, NJ	Somerset County, NJ
Hudson County, NJ	Morris County, NJ	Sussex County, NJ
Hunterdon County, NJ	Ocean County, NJ	Union County, NJ
		Warren County, NJ

New York City and NY State Suburbs		
New York City Counties	**Counties North of NYC**	**Long Island Counties**
Bronx County, NY	Dutchess County, NY	Nassau County, NY
Kings County, NY (Brooklyn)	Orange County, NY	Suffolk County, NY
New York County, NY (Manhattan)	Putnam County, NY	
Queens County, NY	Rockland County, NY	
Richmond County, NY (Staten Island)	Westchester County, NY	

Attachment C
February 14, 2012

Growth Rate of Population and Employment Forecasts

Time Period	Stantec Estimated Growth Rates for Bay Bridge Traffic	Population						
		MWCOG	BMC Region	Phila. Region	NJTPA Region	NYC Region	Mercer-Trenton	SJTPO
2009-2015	0.5%	1.2%	0.6%	0.2%	0.5%	0.3%	0.3%	0.6%
2015 - 2020	1.5%	1.1%	0.4%	0.3%	0.7%	0.6%	0.3%	0.6%
2020-2025	1.5%	1.0%	0.4%	0.5%	0.7%	0.7%	0.3%	0.5%
2025-2030	1.5%	0.8%	0.3%	0.5%	0.6%	0.6%	0.3%	0.5%
2030-2035	1.5%	0.7%	0.2%	0.3%	0.5%	0.7%	0.3%	0.6%
2035-2040	1.5%	0.6%		0.2%				0.6%
2010-2040	1.3%	0.9%	0.3%	0.4%	0.5%	0.5%	0.3%	0.6%
		Employment						
2009-2015	0.5%	1.4%	1.0%	0.5%	0.8%	0.6%	0.6%	0.9%
2015 - 2020	1.5%	1.5%	0.8%	0.4%	0.6%	0.5%	0.6%	0.9%
2020-2025	1.5%	1.2%	0.6%	0.4%	0.8%	0.8%	0.5%	0.4%
2025-2030	1.5%	1.0%	0.5%	0.4%	0.8%	0.8%	0.5%	0.4%
2030-2035	1.5%	0.8%	0.3%	0.3%	0.7%	0.8%	0.5%	0.6%
2035-2040	1.5%	0.7%						0.6%
2010-2040	1.3%	1.1%	0.5%	0.3%	0.6%	0.6%	0.4%	0.6%

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