CAMBRIDGE SYSTEMATICS

Northwest Toll Expressway Value Pricing Program Pilot Study

final

report

prepared for

Georgia State Road and Tollway Authority

prepared by

Cambridge Systematics, Inc.

with

Jordan Jones & Goulding
GeoStats
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Executive Summary

BACKGROUND

Financing the construction of roadways using road pricing strategies is increasingly a popular consideration for transportation agencies. The use of tolls is seen as a method to generate funds, increase the efficiency of road operations, and provide travel options for road users. This report summarizes the feasibility of developing the Northwest Toll Expressway as a toll road. The project was originally proposed as part of the Savannah Metropolitan Planning Commission Long-Range Transportation Plan through the Chatham Urban Transportation Study. The Northwest Toll Expressway is located between the fast-growing suburban Effingham County in the north and downtown Savannah to the south (Figure ES.1). The roadway also runs in between the Port of Savannah to the east and the Savannah-Hilton Head International Airport. The roadway is bounded by I-95 in the north and west, by I-16 and I-516 in the south, and the Savannah River to the east. The Northwest Toll Expressway is proposed to run generally parallel to the existing Georgia State Route (SR) 21, a four-lane roadway with signalized intersections in the region.

The study goals for this project are to:

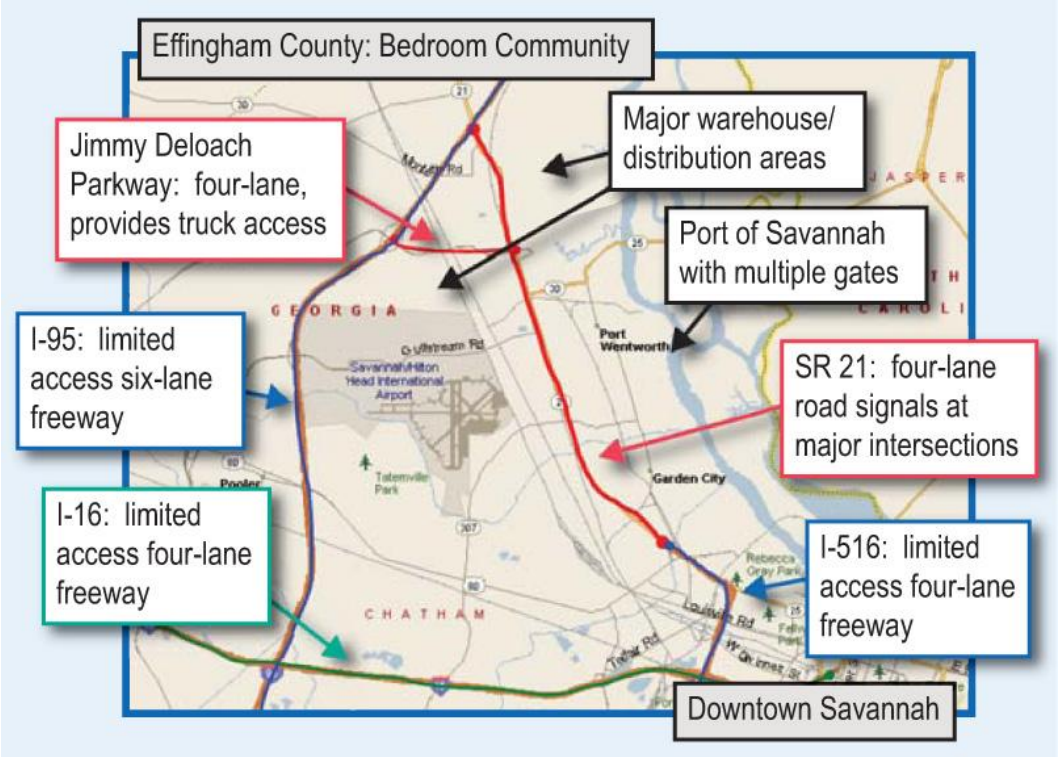
- Identify toll and alignment options for the Northwest Toll Expressway;
- Determine the traffic impacts of various toll and alignment alternatives; and
- Conduct financial analysis to determine the monetary impact of various toll and alignment alternatives.

The methodology for conducting this study consisted of five key steps:

1. Document existing conditions;
2. Model customization;
3. Alternatives analysis – traffic impacts;
4. Alternatives analysis – financial impacts; and
5. Conclusions and next steps.

The key findings of each of these steps are discussed here in the Executive Summary.

Figure ES.1 Distribution of Chatham County Port Truck Trip Origins



EXISTING CONDITIONS

The primary sources for information on existing traffic conditions in the study area were travel time runs in the corridor along Georgia SR 21, truck origin-destination surveys at the Port of Savannah, and travel demand model outputs. The travel time runs were conducted in both directions in the A.M. peak-period (AM), midday (MD), night time (NT), and P.M. peak-period (PM). As shown in Table ES.1, the travel time runs demonstrated that there is a significant reduction in travel speeds in the southbound direction in the morning and in the northbound direction during the afternoon peak. Consistent with these decreased travel speeds, the peak periods also had the longest travel times of all of the runs. The average travel time during the southbound A.M. peak period was 17.8 minutes and the average travel time during the northbound P.M. peak period was 25.3 minutes. These are both significantly higher than the travel time runs for the offpeak periods which ranged from 10.0 minutes to 12.6 minutes. These characteristics are consistent with peak-period travel demand congested conditions with commuters traveling between residences in Effingham County and work locations in downtown Savannah. The travel time runs also isolated the most congested segments of SR 21. Table ES.2 shows that during the A.M. peak-period the southbound congestion is concentrated between Gulfstream Road and Bourne Avenue, while during the P.M. peak-period the northbound

congestion is concentrated between Jimmy DeLoach Parkway and I-95. Both of these segments averaged less than 9 mph compared to travel speeds ranging from 22.2 mph to 43.3 mph for the other segments of SR 21.

Table ES.1 SR 21 Statistics by Time Period and Direction

	Time Period*							
	AM	**AM**	**MD**	**MD**	**NT**	**NT**	**PM**	**PM**
Route	SB	NB	SB	NB	SB	NB	SB	NB
Number of Runs	12	10	9	7	8	8	9	9
Distance (miles)	7.18	7.18	7.18	7.18	7.18	7.18	7.18	7.18
Average Speed (mph)	24.8	40.0	35.1	36.6	42.4	43.2	34.7	17.6
Average Travel Time (minutes)	17.8	11.0	12.6	12.1	10.4	10.0	12.7	25.3

*AM Period: 7:00 A.M. – 9:00 A.M., MD Period: 11:00 A.M. – 1:00 P.M., PM Period: 4:00 P.M. – 6:00 P.M.; NT Period: 7:30 P.M. – 9:30 P.M.

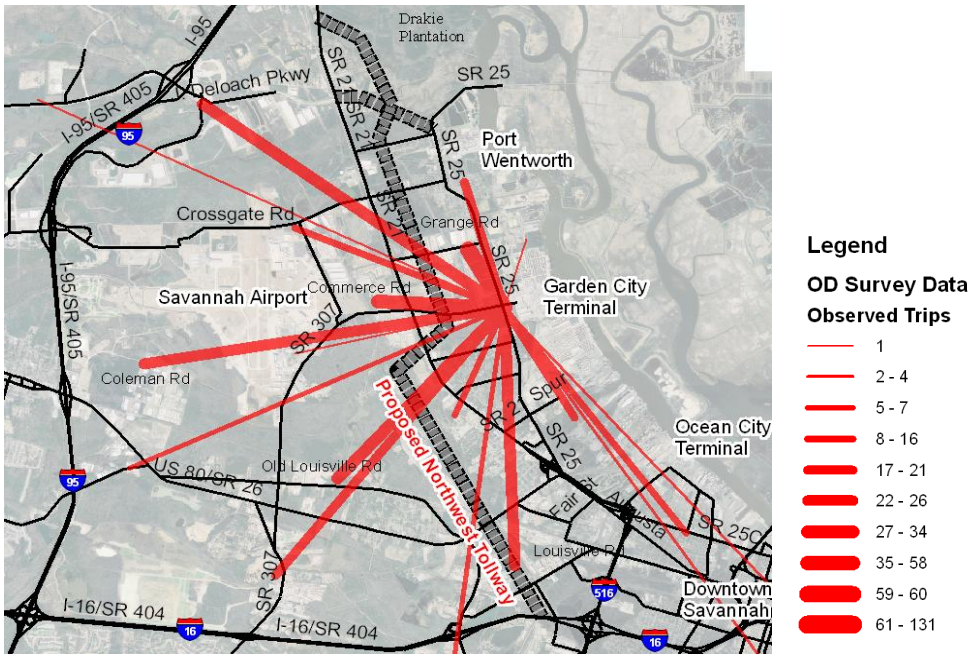
Table ES.2 SR 21 Statistics by Time Period and Direction

Route/Direction	Time Period	From	To	Average Speed (mph)
SR 21 SB	AM	I-95	Jimmy DeLoach Parkway	49.6
SR 21 SB	AM	Jimmy DeLoach Parkway	Gulfstream Road	28.8
SR 21 SB	AM	Gulfstream Road	Bourne Avenue	8.2
SR 21 SB	AM	Bourne Avenue	Wheathill Road	43.3
SR 21 SB	AM	Wheathill Road	I-516	39.0
SR 21 NB	PM	I-516	Wheathill Road	33.5
SR 21 NB	PM	Wheathill Road	Bourne Avenue	35.2
SR 21 NB	PM	Bourne Avenue	Gulfstream Road	22.2
SR 21 NB	PM	Gulfstream Road	Jimmy DeLoach Parkway	35.4
SR 21 NB	PM	Jimmy DeLoach Parkway	I-95	8.4

The truck origin-destination surveys highlighted that there are very few trucks traveling to and from the port gates at the Port of Savannah to the local interstate network. Approximately, 60 percent of all of the truck trips to and from the Port of Savannah have inland trip ends within Chatham County. These trip ends are dispersed throughout the study area to several warehouses and distribution centers as shown in Figure ES.2.

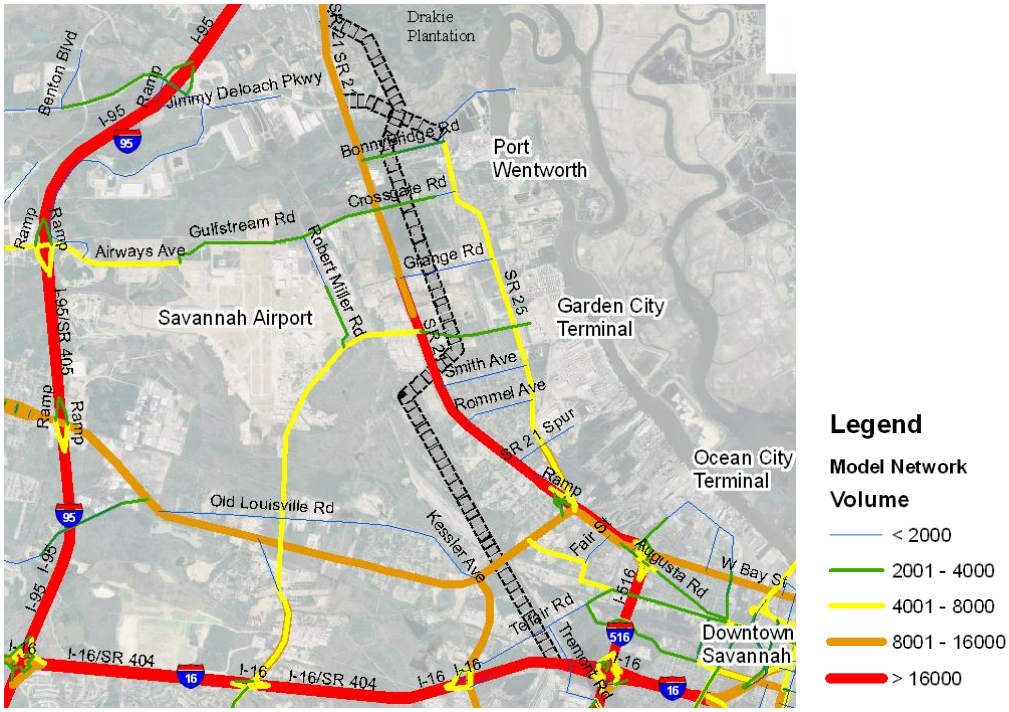
The travel demand model runs for the 2030 forecast year indicate that there are several areas of high volume expected to occur in the study area (Figure ES.3). I-95 and I-16 are projected to carry more than 16,000 vehicles per day in 2030. SR 21 is expected to have a portion of its roadway carry more than 16,000 vehicles per day, while the remaining portions will carry between 8,000 – 16,000 vehicles per day under the No Build Scenario. This is a high volume of traffic for a four-lane signalized road and indicates that capacity expansion would be warranted in the study area.

Figure ES.2 Distribution of Chatham County Port Truck Trip Origins



Source: GDOT Truck-Only Lane Needs Identification Study.

Figure ES.3 2030 Model Network Volume in Northwest Toll Expressway Corridor



This project also included a peer-to-peer exchange to provide information and firsthand examples of facilities with similar characteristics to the Northwest Toll Expressway. Representatives of several transportation planning agencies in Georgia were present at the exchange, including the Georgia State Road and Tollway Authority, the Georgia Department of Transportation (GDOT), the Savannah Metropolitan Planning Commission, and the Port of Savannah. Host agencies in Southern California included the Los Angeles Metropolitan Transportation Authority, the Port of Long Beach, the Orange County Transportation Authority, PierPASS, and the Southern California Association of Governments. The site visit also included a brief driving tour of the I-710 freeway which links the Port of Long Beach and Port of Los Angeles to the warehouse and industrial district in East Los Angeles. The discussion topics at the site visits included value pricing on the SR 91 Facility in Orange County, container fees at the Port of Long Beach, and freight planning for the Southern California region. The information collected through the peer exchange provided examples of alternative methods to generate funds to support the development of freight-related projects such as the Northwest Toll Expressway.

MODEL CUSTOMIZATION

To conduct the alternatives analysis required for this study, the consultant team customized the travel demand model for the Savannah region. The starting point for the model was the model used to conduct the GDOT Interstate Needs

Analysis and Prioritization Plan (INAPP). The INAPP model was a model that adjusted the original Chatham Urban Transportation Study (CUTS) model by updating employment and population forecasts within Chatham County. To customize the INAPP model for analyzing the Northwest Toll Expressway corridor, five key components were added to the model:

- The truck trip generation rates at the port were adjusted to reflect anticipated growth at the port;
- The truck component of the GDOT statewide travel demand model was used to estimate through truck trips in Chatham County;
- The time-of-day analysis in the model was updated to better reflect the congested conditions in the corridor for each of the four time periods;
- A series of auto and truck stated-preference surveys were conducted of users of SR 21 to determine the value-of-time of users of the roadway, and thereby determine the willingness to pay various toll scenarios applied to the roadway; and
- A toll component was added to the model that created diversion away from the proposed road based on willingness to pay for each driver.

ALTERNATIVES DEVELOPMENT AND ANALYSIS

A range of alignments were considered to meet the travel demands of the corridor. Each alignment can be considered to belonging to one of three families of alternatives:

1. A "northern" alignment that is oriented to connect the port with SR 21 and I-95 to the north
2. A full at-grade alignment that is oriented to connect the port with SR 21 and I-95 to the north and connect to I-16 in the south. This alignment also connects Effingham County with downtown Savannah. Additionally, this alignment provides connectivity to the local roadways in the study area; and
3. A full elevated alignment oriented to connect Effingham County with downtown Savannah and to provide limited access from within the study area to I-95 and I-516.

The specific alignments that were examined as part of the traffic and revenue analysis are as follows:

- **Alternative 1A: Northern Alignment – Cars and Trucks.** The northern alignment runs from the Port of Savannah to SR 21 just south of I-95 (Figure ES.4). This alternative would be a 4.7-mile corridor with two lanes in each direction. There would be connections to the local road network at SR 21, Jimmy DeLoach Parkway, Gulfstream Road, and Bourne Avenue. The design speed of this roadway would be 45 miles per hour (mph). The

mainline toll for autos on this roadway would be $1.00 and exit ramp tolls would be $0.50. The mainline toll for trucks on this roadway would be $3.00 and exit ramp tolls would be $1.50.

- **Alternative 1B: Northern Alignment – Trucks Only.** This alignment has the same characteristics as Alternative 1A, except that access to the tollway would be for trucks only. Cars would be restricted from using the road.
- **Alternative 2A: Full At-Grade Alignment.** An at-grade alignment that runs from north of I-95 and extends south to I-516. This alternative would be 10 miles long with two lanes in each direction. Access to this alignment would occur at Georgia SR 30, I-95, Georgia SR 21, Jimmy DeLoach Parkway, Gulfstream Road, Grange Road, Bourne Avenue, and I-16 (Figure ES.5). The design speed of this roadway would be 45 mph. The roadway would be accessible for both trucks and autos. The mainline toll for autos on this roadway would be $1.50 and exit ramp tolls would be $0.75. The mainline toll for trucks on this roadway would be $4.50 and exit ramp tolls would be $1.50.
- **Alternative 3A: Full Elevated Alignment – Access at Gulfstream Road.** A full alignment that runs above SR 21, but within the right-of-way of SR 21. Similar to Alternative 2A, this alignment would start at SR 30 in the north. However, the roadway would end at I-16. This alternative would be 7.7 miles long with intermediate access points at Gulfstream Road and I-95 (Figure ES.6). This reduced access allows for a design speed of 60 mph. The toll rates for this alternative are the same as Alternative 2A. The mainline toll for autos on this roadway would be $1.50 and exit ramp tolls would be $0.75. The mainline toll for trucks on this roadway would be $4.50 and exit ramp tolls would be $1.50.
- **Alternative 3B: Full Elevated Alignment – Access at Bourne Avenue.** This alignment has the same characteristics as Alternative 3A, except there is an access point at Bourne Avenue rather than an access point at Gulfstream Road.
- **Alternative 3C: Full Elevated Alignment – Reversible Lanes.** This alignment has the same general path as Alternative 3A. However, this alignment is designed to focus exclusively on commuter traffic from Effingham County to downtown Savannah. This is a three-lane facility, where the lanes reverse direction depending on the time of day. During the morning commute hours and the midday time period, the lanes operate in the south direction to accommodate drivers leaving Effingham County headed to downtown Savannah. In the afternoon and evening time periods, the lanes operate in the north direction to accommodate drivers leaving downtown Savannah headed towards Effingham County. The design speed for this roadway would also be 60 mph. This roadway is only open to auto traffic. The mainline toll for autos on this roadway would be $1.50.

A summary description of the alternatives is shown in Table ES.3.

Table ES.3 Summary Description of Alternatives

Alternative	Length (miles)	Number of Lanes	Number of Intermediate Access Points	Direction of Traffic, Grade Status	Vehicles Served	Mainline Auto Toll	Mainline Truck Toll
1A	4.7	4	4	2-way, At-Grade	Autos, Trucks	$1.00	$3.00
1B	4.7	4	4	2-way, At-Grade	Trucks Only	n/a	$3.00
2A	10.0	4	5	2-way, At-Grade	Autos, Trucks	$1.50	$4.50
3A	7.7	4.	1 at Gulfstream Road, 1 at I-95	2-way, Elevated	Autos, Trucks	$1.50	$4.50
3B	7.7	4	1 at Bourne Avenue, 1 at I-95	2-way, Elevated	Autos, Trucks	$1.50	$4.50
3C	7.7	3	1 at I-95	Reversible, Elevated	Autos Only	$1.50	n/a

Figure ES.4 Location of Alternative 1A, 1B (Northern Alignment)

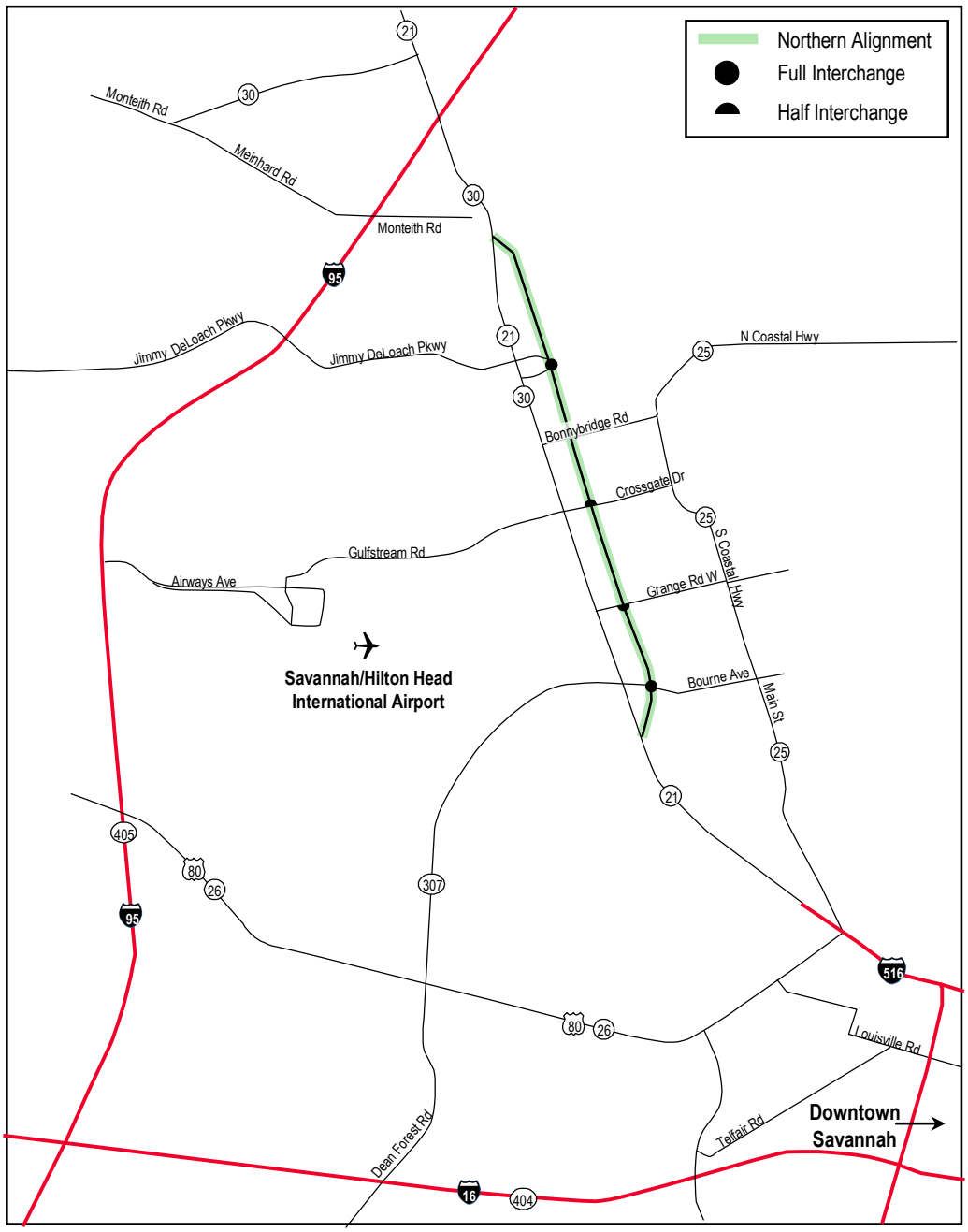


Figure ES.5 Location of Alternative 2A (Full At-Grade Alignment)

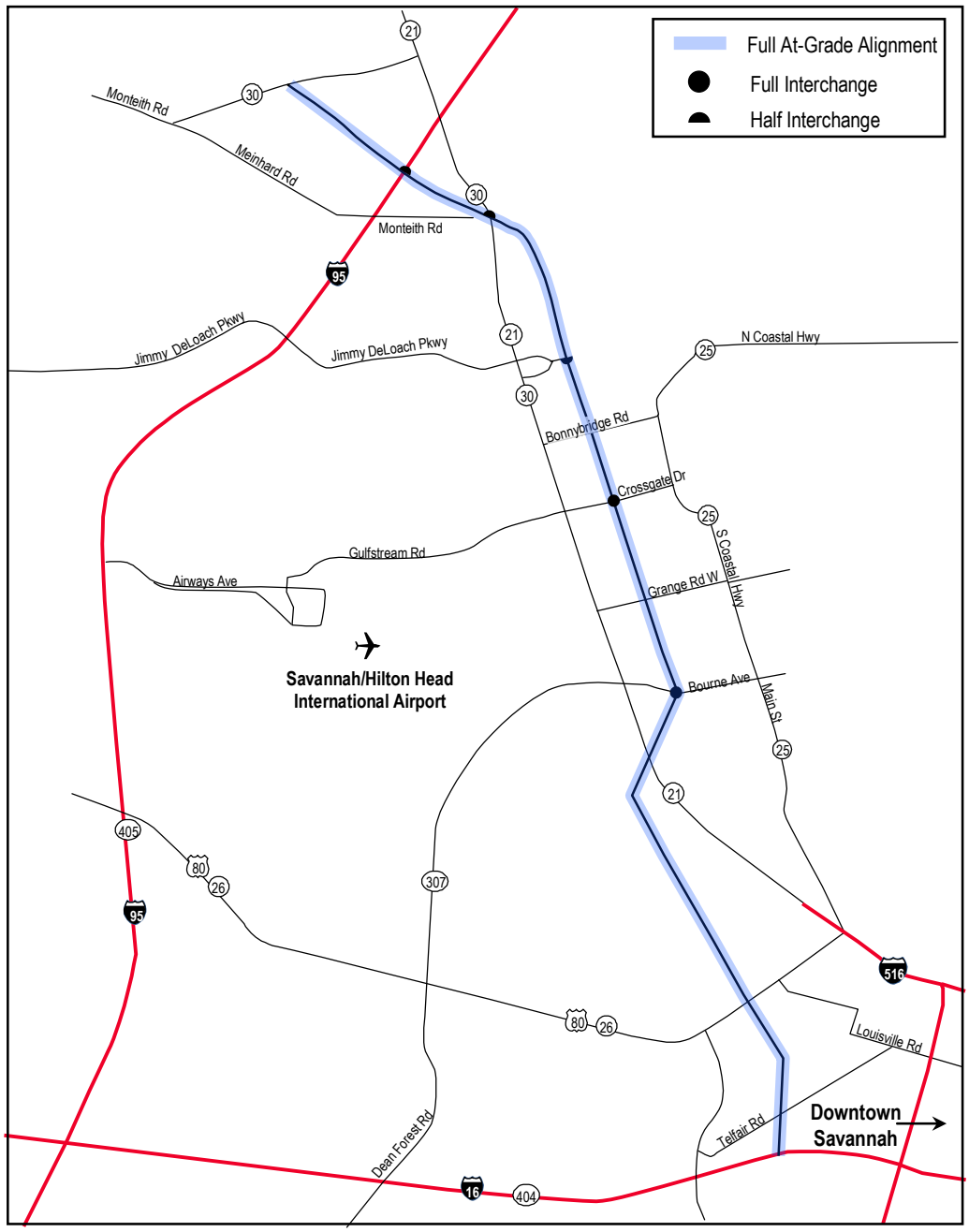
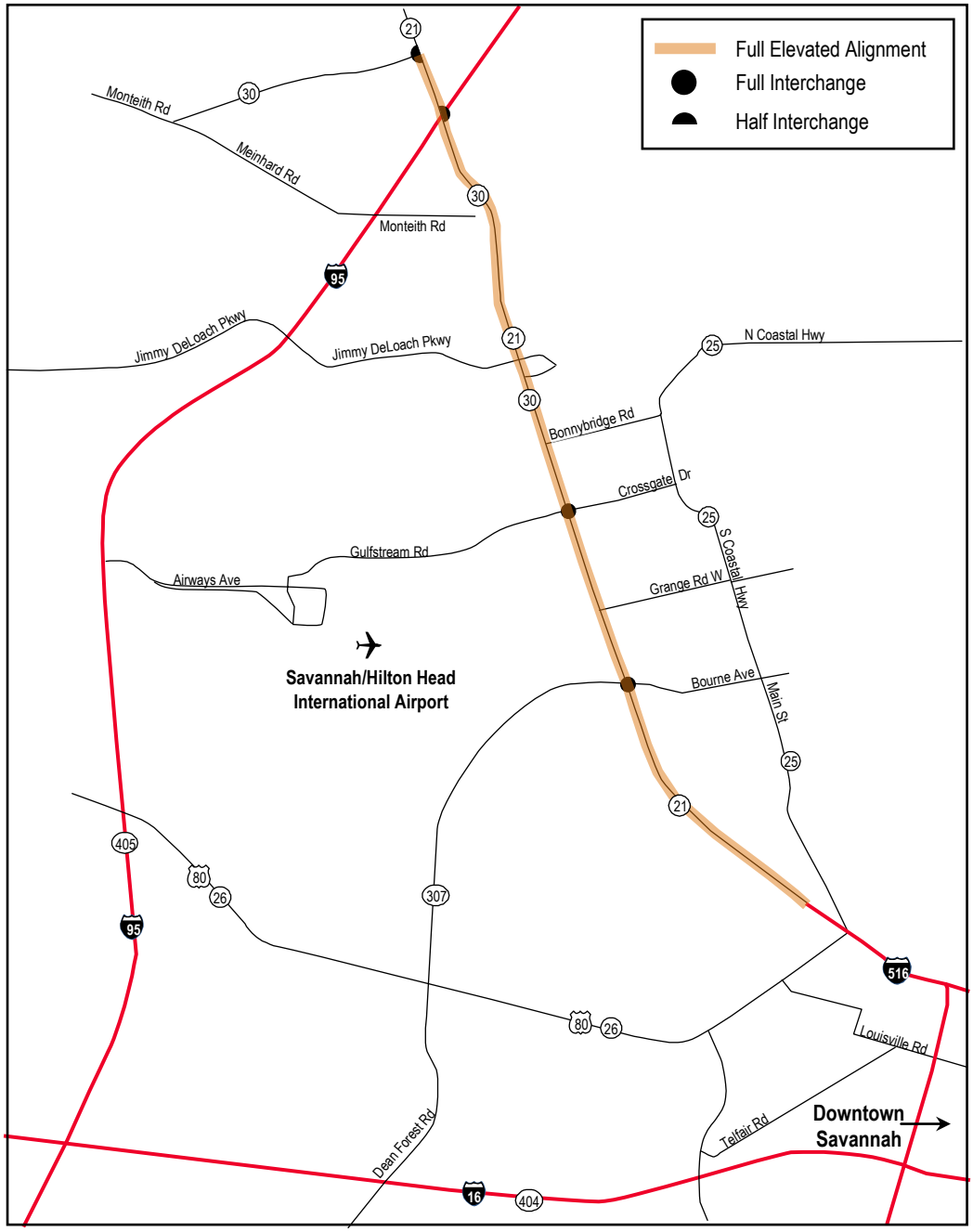


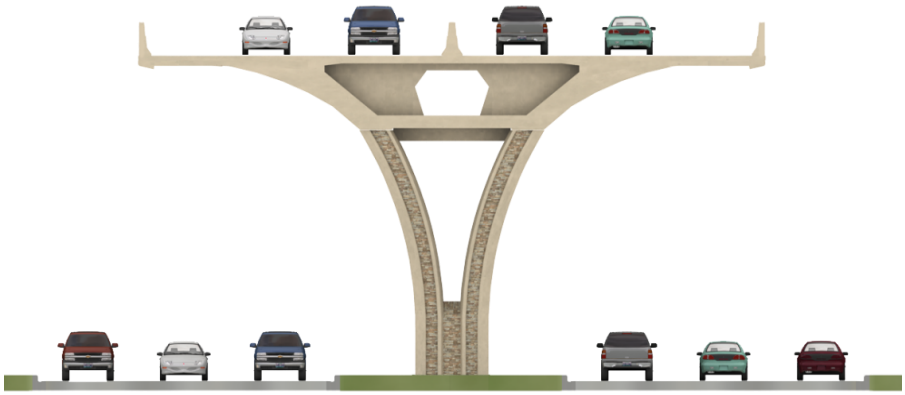
Figure ES.6 Location of Alternative 3A, 3B, and 3C (Full Elevated Alignment)



The Elevated Scenario shown in Figure ES.6 has some distinctive characteristics relative to at-grade alignments. First, there is less right-of-way required for construction. This reduces costs and time to construct the roadway. Second, there is less impact on wetlands and fewer complications related to environmental justice, since there is less right-of-way taken. The Elevated Alignment also reduces ground noise to the surrounding environment by elevating the noise above the vertical height of the local buildings in the study area. Third, the Elevated Alignment can be built with segmented construction which allows for large segments of the roadway to be prefabricated off-site and assembled quickly at the construction site. This, in turn, creates less traffic impacts during construction and less disruption to local businesses from construction as well. The Elevated Alignment also provides ease in terms of designing a new roadway above the currently congested I-95/SR 21 interchange. A schematic of an elevated roadway is shown in Figure ES.7.

An elevated scenario is particularly well-suited for the Northwest Toll Expressway studies area, because it allows for the separation of local traffic and through traffic for the study area. The Expressway would carry the through traffic, while the existing road network would service the local traffic. This has the benefit of separating through traffic from the port-related trucks in the study area which are primarily traveling locally between the port and local warehouses and distribution centers and then from the port and local warehouses to the interstate system. The Northwest Toll Expressway orientation towards serving through traffic also has the benefit of not imposing a "tax" on the port or shippers in the study area.

Figure ES.7 Schematic of Elevated Alignment



Traffic and Financial Impact Analysis

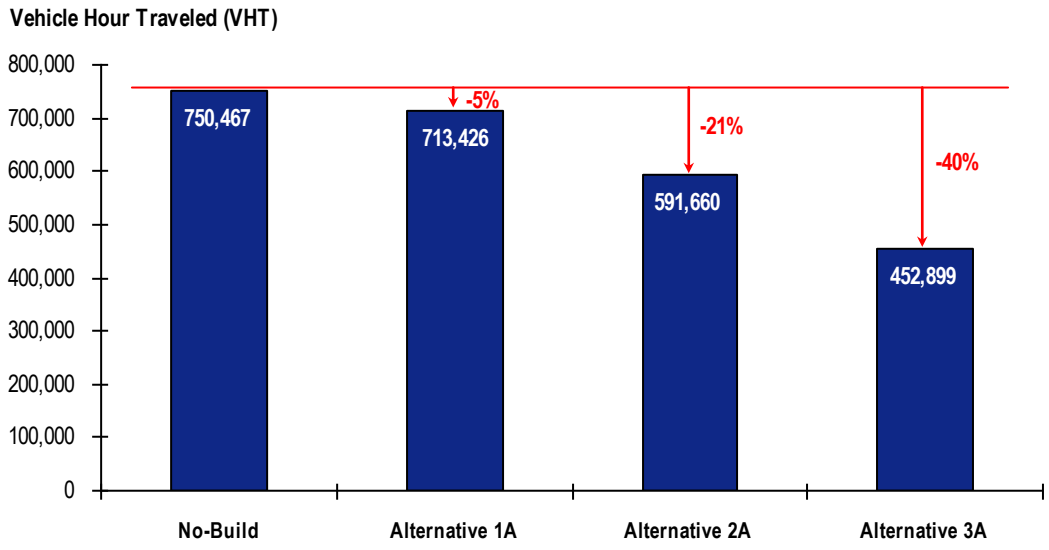
The traffic impact analysis identified the most effective alternative within each of the three families of alignments. The most effective alternatives were: Alternative 1A (Northern Alignment – Cars and Trucks), Alternative 2A (Full, At-Grade Alignment, and Alternative 3A (Full Elevated Alignment with Access at Gulfstream). These three alternatives were the focus for the system performance and financial analysis for this study. All three of the alternatives reduce travel delay in Chatham County relative to the No Build Scenario (Figure ES.8). However, Alternative 3A reduces delay by twice the amount of Alternative 2A and eight times the amount of Alternative 1A. Similarly, travel speeds were found to increase much more for Alternative 3A relative to the other alignments. The VMT of each scenario was relatively equivalent. Therefore, the system performance benefits of Alternative 3A do not generate additional fuel consumption or emissions in the region. These performance benefits are in large part a result of the reduced access points for Alternative 3A which allow for a design speed of 60 mph compared to the design speed of 45 mph achieved for the other two alignments.

The total projects costs for each of the alternatives are: $63.4 million, $478.7 million, and $545.5 million for Alternatives 1A, 2A, and 3A respectively. The lower cost for Alternative 1A is primarily a function of its shorter length relative to the other alternatives.

A financial analysis conducted on each of these alternatives to determine the amount of the total development costs that are covered by toll revenues. The total development costs include construction costs, costs for toll operations of the facility, maintenance of the road, and interest payments on bonds used to raise the funds to construct the facility. For Alternative 1A, 100 percent of the development costs can be covered by toll revenues. For Alternative 2A, 60 percent of these costs can be covered by toll revenues. For Alternative 3A, 54 percent of these costs can be covered by toll revenues.

It is important to note that the gross revenues calculated in this study are very preliminary and an investment grade traffic and revenue study would need to be conducted in order to determine actual bonding capacity. Beyond tolling, innovative financing options should be considered as options for funding for each of the alignments.

Figure ES.8 Total Chatham County Vehicle Hours Traveled by Alternative (2030)



CONCLUSIONS AND POTENTIAL NEXT STEPS

Based on the analysis of traffic patterns, design options, and financial feasibility, the alternatives considered for the Northwest Toll Expressway have different impacts on long-term travel options in the study area. Alternative 1A (The Northern Alignment with Cars and Trucks) services the near-term truck traffic needs, but does not address long-term auto traffic needs. This alignment is the least expensive option, but does not provide regional traffic relief. Additionally, the freight community has reservations regarding the tolling of a roadway that is in the port subarea. Alternative 2A (the Full At-Grade Alignment) addresses both truck and auto traffic needs. However, it will require significant right-of-way acquisitions in the region and it provides significantly less regional traffic relief relative to Alternative 3A (the Elevated Alignment with Access at Gulfstream Road).

Alternative 3A also addresses both truck and auto traffic needs in the region. It provides improved system connectivity to I-95, I-516, and the proposed Effingham Parkway. This elevated alignment also provides the best system benefits in terms of congestion, VMT, and average speed for the region. These benefits are primarily the result of increased design speeds that can be achieved using an Elevated Alignment with one access point in the middle of the corridor. Each of these alternatives has its own unique set of benefits and challenges for stakeholders in the region to consider in terms of whether to move forward with the Northwest Toll Expressway. If a decision is made to proceed with the implementation of the expressway, then the following steps should occur:

- Investment-grade traffic and revenue study including in-depth national research into truck and auto value-of-time distributions;
- Detailed financial analysis, including consideration of alternative and innovative finance techniques;
- Detailed engineering design including the need for environmental permitting and documentation;
- Coordination of efforts between SRTA, GDOT, the Savannah Metropolitan Planning Commission, and the Federal Highway Administration regarding roadway planning in and around the study area; and
- Education and outreach to the general public in the Savannah region regarding the use of tolls in roadway development.

1.0 Introduction

The purpose of this study is to examine the feasibility of developing the Northwest Toll Expressway. The original intent of the study was to address the following questions as they relate to the feasibility of the Northwest Toll Expressway:

- Are truck-only toll lanes feasible in the development of the corridor?
- What pricing options are required to manage demand efficiently?
- Would toll revenue generated as part of the truck-only toll lane implementation be sufficient to accelerate implementation?
- What access points and connections to activity centers (such as warehouses and distribution centers) are needed to improve traffic conditions in the region and provide the volumes of traffic to validate the use of tolls as a part of the financing of the corridor?
- How much is the freight community willing to pay for reliable travel times to access the Interstate System from the Port?
- What are the impacts of truck-only toll implementation on the local transportation network?
- Would full tollway implementation be a better option to accelerate the implementation of this regionally significant roadway?

As the study progressed, the questions broadened to encompass a much more holistic approach to managing traffic in the study area including consideration of all vehicles traveling to, from, within, and through the region. The original concept for the Northwest Toll Expressway was proposed as part of the Savannah Metropolitan Planning Commission Long-Range Transportation Plan through the Chatham Urban Transportation Study (CUTS). As described in the CUTS plan, the roadway is situated between the fast-growing Effingham County in the north and downtown Savannah to the south. The roadway also runs between the Port of Savannah to the east and the Savannah-Hilton Head International Airport. The roadway is bounded between I-95 in the north and west and by I-16 and I-516 in the south. The Northwest Toll Expressway is proposed to run roughly parallel to the existing Georgia State Route (SR) 21, a four-lane roadway with signalized intersections in the region.

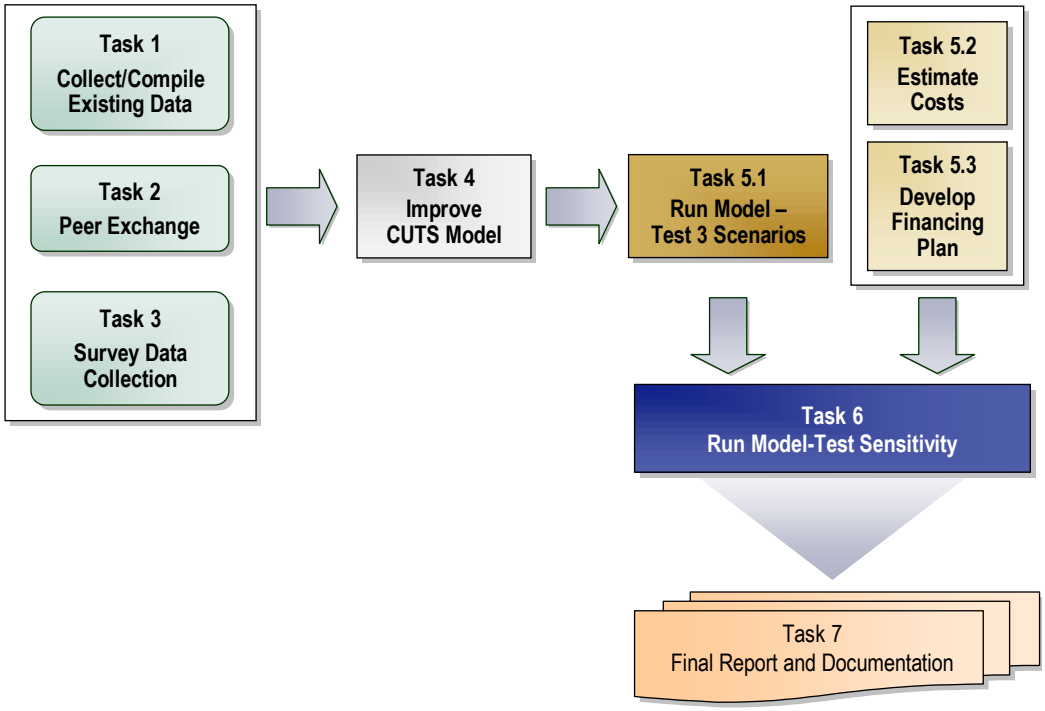
The study goals for this project evolved to become:

- Identify toll and alignment options for the Northwest Toll Expressway;
- Determine the traffic impacts of various toll and alignment alternatives; and
- Conduct financial analysis to determine the monetary impact of various toll and alignment alternatives.

The methodology for conducting this study consisted of seven tasks sequenced as shown in Figure 1.1:

- Task 1 - Collect/Compile Existing Data;
- Task 2 - Peer exchange;
- Task 3 - Survey Data Collection
- Task 4 - Improve CUTS Model;
- Task 5 - Run the Model, Estimate Costs, Develop Financing Plan;
- Task 6 – Run Model – Test Sensitivity; and
- Task 7 – Final Report and Documentation.

Figure 1.1 Distribution of Chatham County Port Truck Trip Origins



2.0 Existing Conditions

This chapter describes existing data and information on current conditions in the Northwest Toll Expressway study area. It includes discussions of both auto and truck demand along with the current and future performance of the roadways. The study area is roughly defined as being bordered by I-16, I-95, and the Savannah River as shown in Figure 2.1. The study area includes the Port of Savannah and several warehouses and distribution centers near the port. Information was collected from the 1998 Chatham County Intermodal Freight Study. However, the focus of the data collection effort consisted of assembling data from two previous studies in the Northwest Toll Expressway subarea: the Georgia Department of Transportation (GDOT) Truck Lanes Needs Identification Study; and the GDOT Chatham County Interstate Needs Analysis and Prioritization Plan. New information collected for this study included data collected from travel time runs on SR 21 and input received during a trucking roundtable in Savannah, Georgia.

The GDOT Truck Lane Needs Identification Study explored the feasibility of implementing truck-only lanes on sections of interstate and other limited-access highways across the state. The study identified specific locations where truck lanes can be used to decrease congestion and improve safety for all types of traffic. Data collection efforts in the truck lane study included collecting roadside truck surveys and interviewing shippers at the Port of Savannah. The GDOT Chatham County Interstate Needs Analysis and Prioritization Plan examined the county's existing Interstate transportation network and developed a list of proposed improvements. This study considered congestion, the impact of development, truck and freight traffic, port access, and the impacts any proposed alternatives would have on the historic, community, and natural resources in Chatham County. This study also included a survey of over 100 motor carriers in Chatham County, interviews with key stakeholders, and mapping software to pinpoint the locations of all the freight haulers and warehouse centers throughout the county. Information on current operating performance also was collected from the 2004 Chatham County-Savannah MPC Congestion Management Study. Additionally, model outputs from the Chatham County regional travel demand model will be discussed in future chapters of this report.

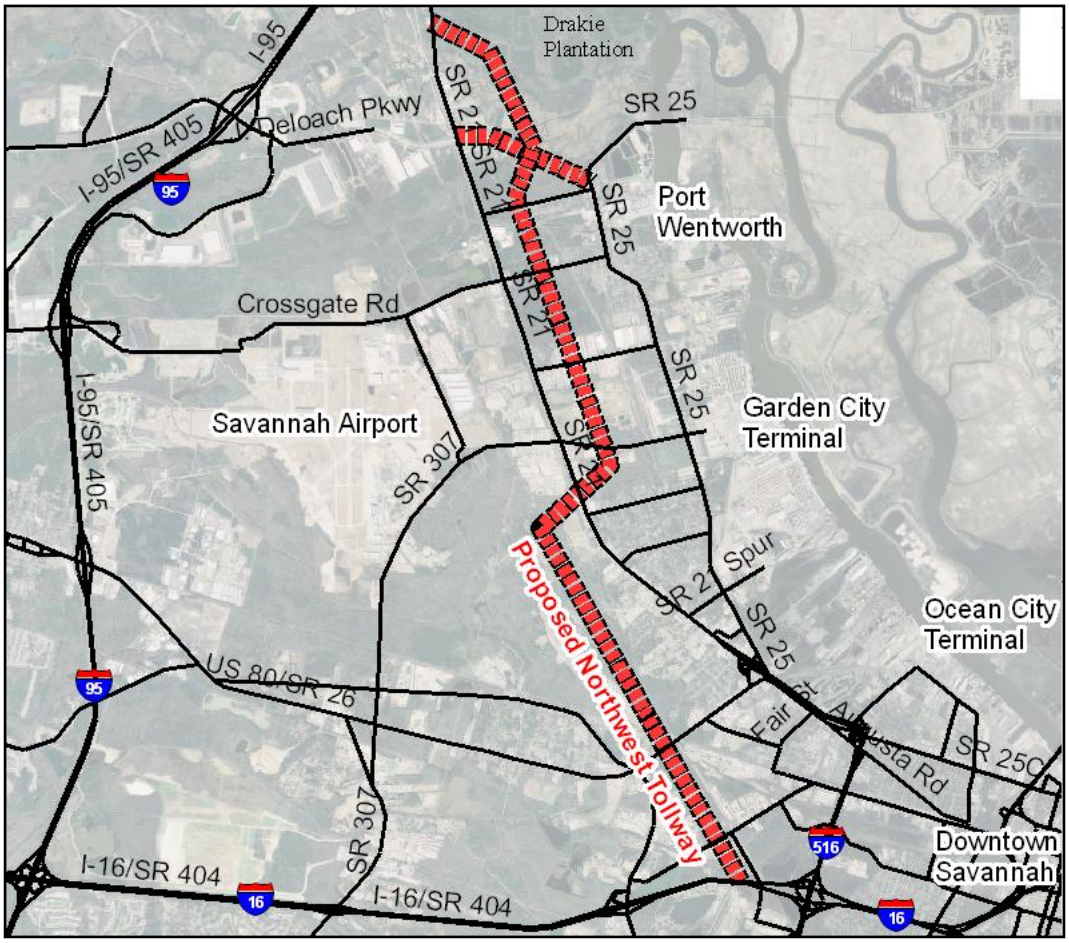
2.1 CHATHAM COUNTY INTERMODAL FREIGHT STUDY

The Port of Savannah is the primary generator of truck activity in the study area. Understanding the relationship between port activity and truck trips is

important to estimate traffic conditions on the proposed corridor. The Chatham County Intermodal Freight Study was conducted in 1998[1] and featured two conclusions of relevance to the Northwest Toll Expressway:

- There is significant congestion along major truck routes providing access to GPA and other waterfront industries. Unacceptable delays exist or are projected to exist through Garden City on SR 25, SR 21, and U.S. 80 through Port Wentworth on SR 25 and through downtown Savannah on Bay Street. This congestion is due in large part to the lack of good roadway connections; and
- Higher levels of production, consumption, and goods movement in Chatham County, combined with anticipated increases in automobile traffic based on regional population growth, will result in the steady deterioration of levels of service on County's rail and highway networks.

Figure 2.1 Northwest Toll Expressway Study Area



[1] Georgia Department of Transportation, *Chatham County Intermodal Freight Study*, Draft Final Report, 1998.

Even accounting for the significant highway improvements proposed for the Chatham County Intermodal Freight Study, it was forecast that the level of service would be "D" for SR 25, the Jimmy DeLoach Parkway (noted as J. DeLoach Pkwy in Figure 2.1), and SR 307. These corridors are all located in the Northwest Toll Expressway study area as shown in Figure 2.1. The implication of the findings of this study is that the Northwest Toll Expressway study area has been suffering from the negative impacts of congestion for many years. Additionally, previous studies of the study area have also determined that there is the need for additional capacity.

2.2 GDOT STATEWIDE TRUCK LANE NEEDS IDENTIFICATION STUDY

The GDOT Statewide Truck Lane Needs Identification Study explored the feasibility of implementing truck-only lanes on sections of interstate and other limited-access highways across Georgia. This study had a special emphasis in the Savannah region where detailed information was collected at the Port of Savannah terminal gates and other locations close to the port. The data collection included truck origin/destination (O/D) surveys along I-95 north and south of the Port of Savannah, truck counts in the study area, truck O/D surveys at the port gates, and a small establishment survey in the Northwest Toll Expressway study area.

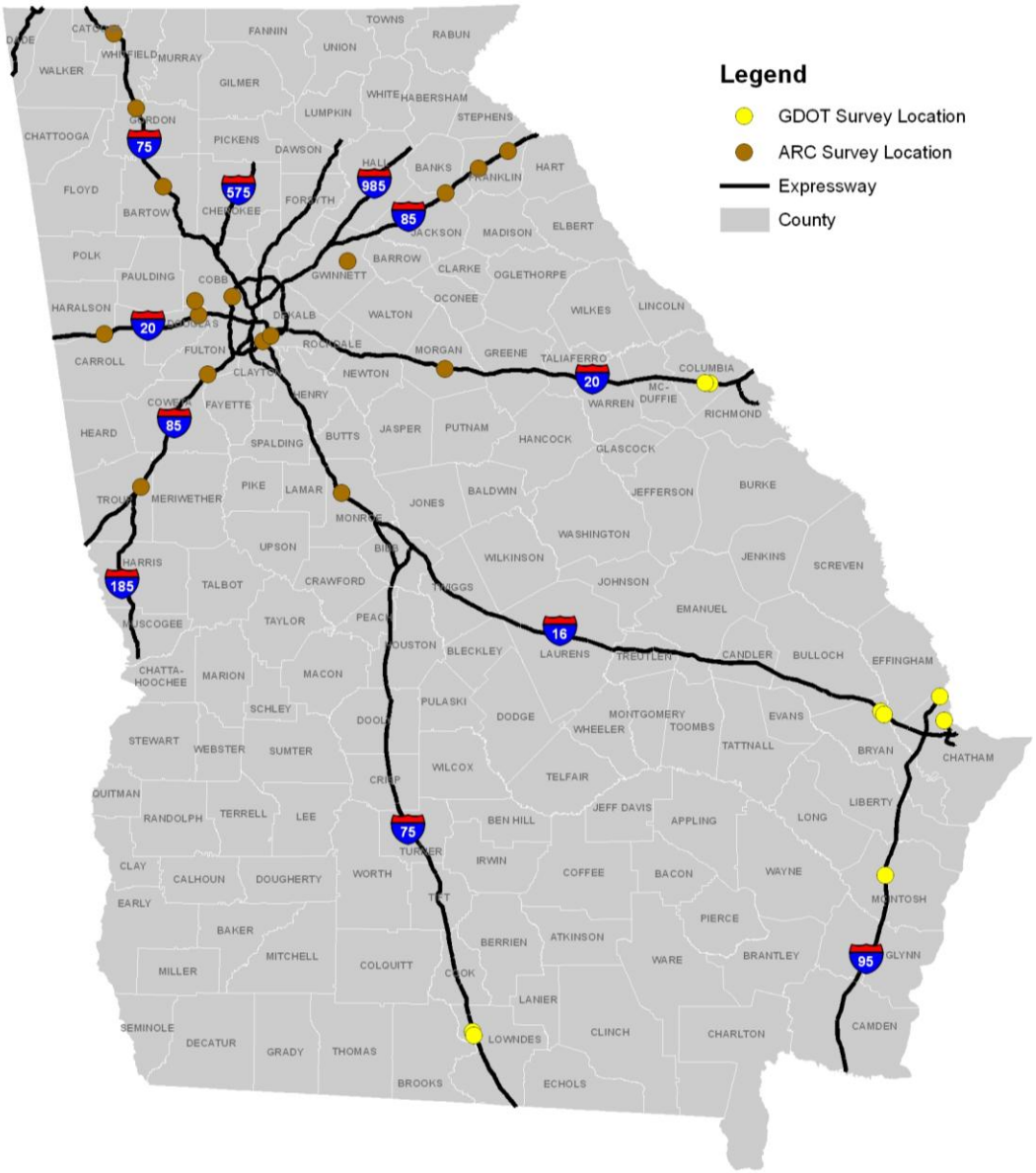
2.2.1 Count Data

For the GDOT Truck Lane Needs Identification Study, vehicle classification counts were assembled from the GDOT Office of Transportation Data (OTD) permanent and temporary count locations for 2005. This data was compared to the statewide model truck average daily traffic (ADT) output in the Savannah region. There is a cluster of counts in the Northwest Toll Expressway study area. These truck counts are shown in Table 2.1. Based on the statewide comparison of truck counts with truck ADT from the model, it was determined that the statewide model provides reasonable estimates of truck ADT around the State and in the Savannah region. This is important because the statewide model was used to generate external truck trips during the model customization process described in Chapter 4.

Vehicle classification count data collected as part of the GDOT Truck Lane Needs Identification Study was used to expand the data from partial-day data to 24-hour estimates. The data collection locations are shown in Figure 2.2. The data was collected using radar devices programmed to classify all vehicles into three categories based on vehicle length. The largest vehicle length category is greater than 40 feet. This is the vehicle length category for large trucks which includes all combination trucks and large single-unit trucks.

The count data collected by radar was disaggregated into hourly distributions near the Port of Savannah on SR 21 and SR 25 (Figure 2.3). This data shows a long peak between the hours of 8:00 A.M. and 4:00 P.M. and a severe drop-off during the evening and late night hours. This is consistent with the hours of operation of the port and reinforces the notion that trucks using these corridors are generated by port activity.

Figure 2.2 GDOT and ARC Truck O/D Survey Locations



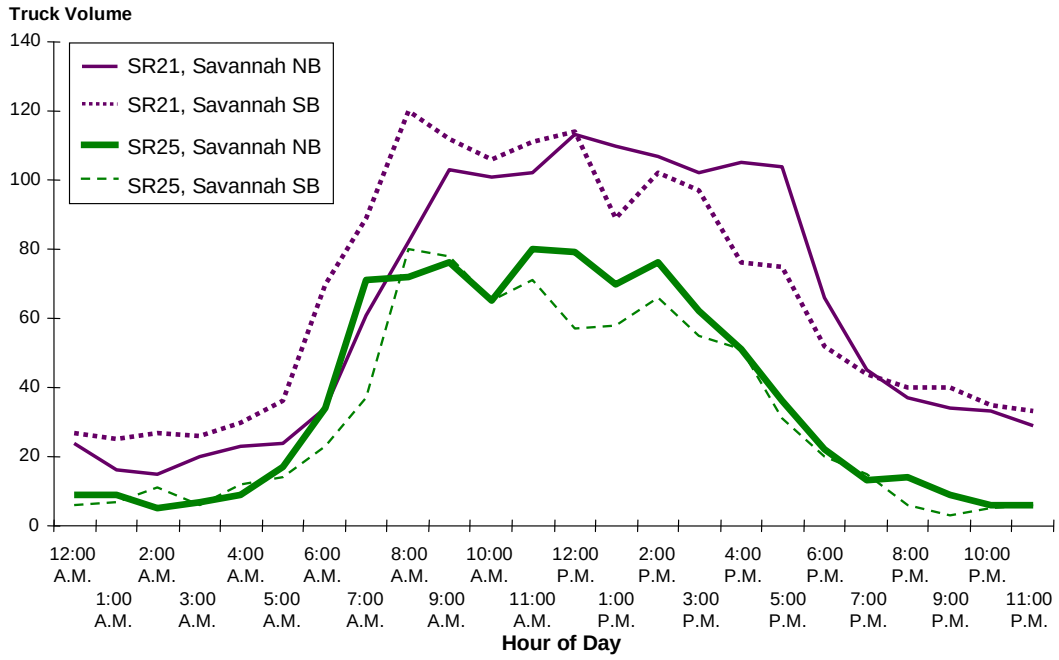
Source: GDOT Truck Lane Needs Identification Study.

Table 2.1 Daily Truck Counts in Savannah Region

Site	Source	Direction	Truck Volume
Brampton Road	GDOT OTD	Bidirectional	639
Bypass Road between I-516 and U.S. 80	GDOT OTD	Bidirectional	1,288
I-516 Northbound at Louisville	GDOT OTD	Bidirectional	494
Habersham and McLaws	GDOT OTD	Bidirectional	167
I-95 Port Wentworth	GDOT OTD	Northbound	10,350
I-95 Northbound Pooler	GDOT OTD	Northbound	12,470
I-16 Eastbound near MLK Jr	GDOT OTD	Eastbound	1,005
I-16 Eastbound Pooler	GDOT OTD	Eastbound	5,204
I-95 in Eulonia (south of Savannah)	GDOT TOL Study	Northbound	5,553
I-95 in Eulonia (south of Savannah)	GDOT TOL Study	Southbound	5,310
I-95 Georgia-South Carolina Border	GDOT TOL Study	Northbound	8,768
I-95 Georgia-South Carolina Border	GDOT TOL Study	Southbound	8,209
I-16 Pembroke (west of Savannah)	GDOT TOL Study	Eastbound	2,141
I-16 Pembroke (west of Savannah)	GDOT TOL Study	Westbound	3,901
SR 21 Savannah	GDOT TOL Study	Northbound	1,494
SR 21 Savannah	GDOT TOL Study	Southbound	1,576
SR 25 Savannah	GDOT TOL Study	Northbound	901
SR 25 Savannah	GDOT TOL Study	Southbound	783
Port of Savannah	GDOT TOL Study	Gate 3	3,189
Port of Savannah	GDOT TOL Study	Gate 4	2,128

Source: GDOT Truck Lane Needs Identification Study.

Figure 2.3 Hourly Truck Counts Near the Port of Savannah



2.2.2 Port Gate Surveys

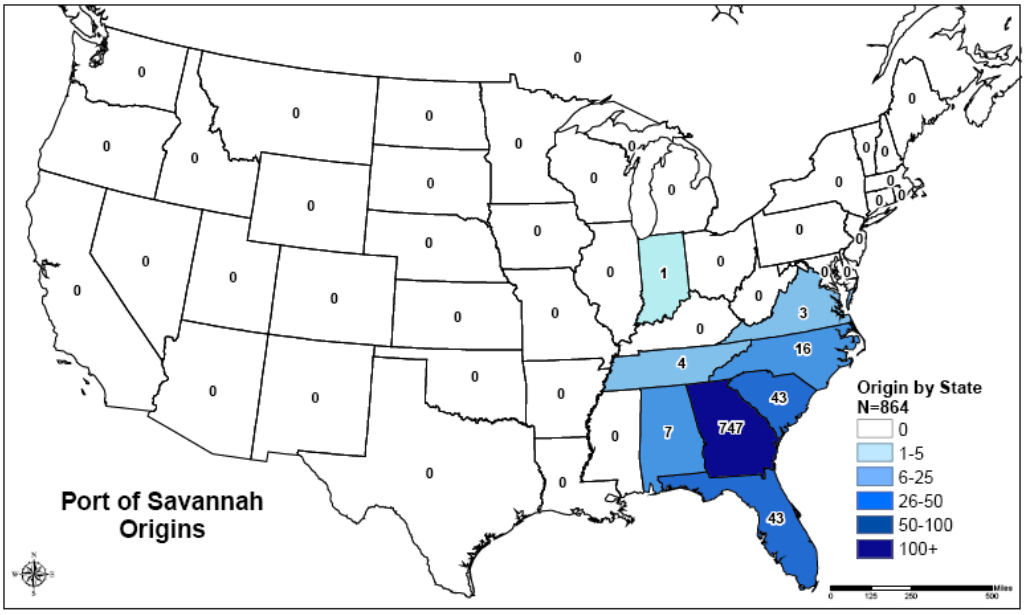
A series of truck O/D surveys were conducted in the spring and summer of 2006 as part of the GDOT Truck Lane Study to collect real-world information on truck movements and O/D pairs throughout the State. Of most relevance for the Northwest Toll Expressway study is that there were 411 surveys conducted at Gate 3 at the Port of Savannah and 476 surveys conducted at Gate 4 at the Port of Savannah. These are the most heavily trafficked gates in the Port of Savannah representing roughly 80 percent of the total truck movements generated by the port.

The data collected through the port gate surveys is the most accurate depiction of truck travel patterns generated at the port. As shown in Figure 2.4, the survey found that 86 percent (747 of 864 respondents) of the trucks arriving to the Port of Savannah are from locations within the State of Georgia with the neighboring States of South Carolina and Florida representing roughly five percent of the total respondents and only one truck originating from outside the southeastern United States.

Figure 2.5 shows truck trip origins within the State of Georgia based on the port O/D surveys. Sixty-three percent of surveyed trucks had trip origins within Chatham County with the vast majority of those trip origins occurring within the Northwest Toll Expressway study area as shown in Figure 2.6. These survey results demonstrate that roughly 60 percent of the truck trips from the port are short-distance truck trips to and from the warehouse district near the port. The nature of the truck trips from the port has implications on the effectiveness of alternative alignments that are considered in Chapter 5 of this report. It should

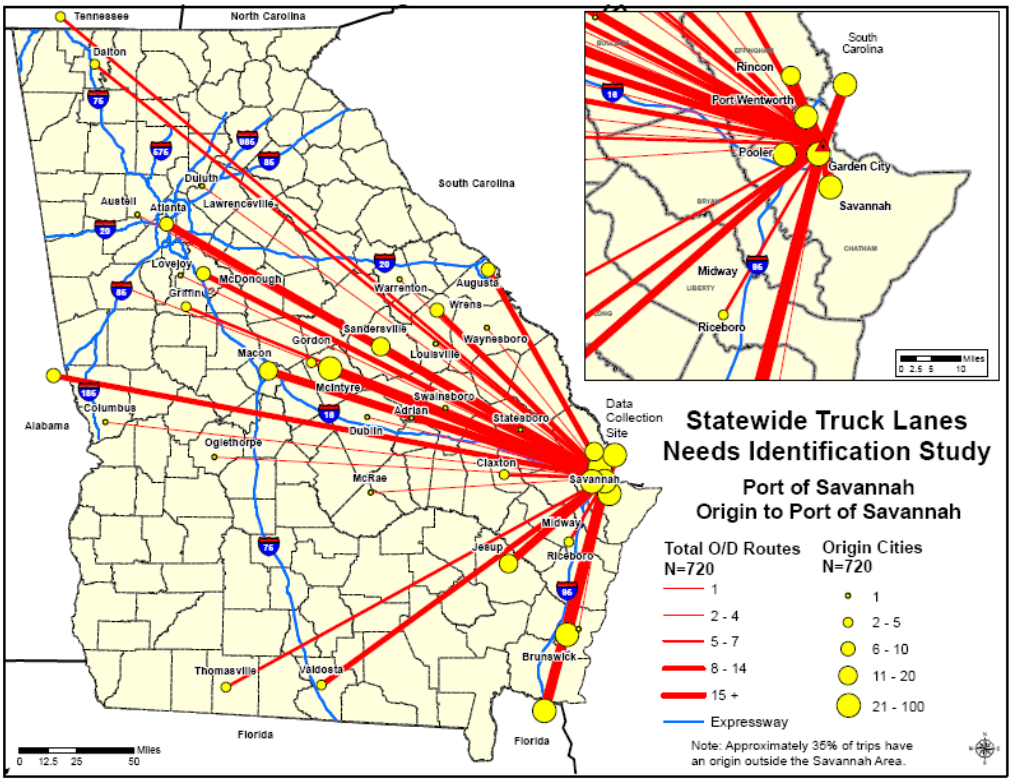
also be noted that the port gate O/D survey data was also used to customize the Savannah region travel demand model in future tasks of this study.

Figure 2.4 Distribution of Port of Savannah Truck Trip Origins within the United States



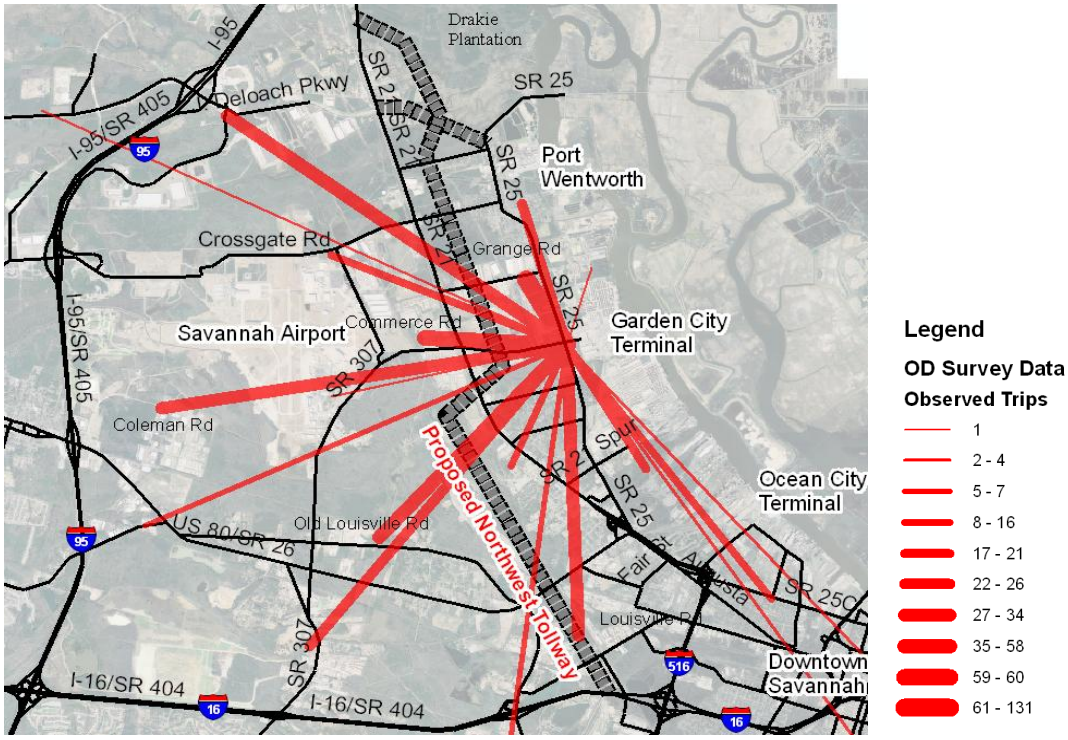
Source: GDOT Truck Lane Needs Identification Study.

Figure 2.5 Distribution of Port Truck Trip Origins within Georgia



Source: GDOT Truck Lane Needs Identification Study.

Figure 2.6 Distribution of Chatham County Port Truck Trip Origins



Source: GDOT Truck Lane Needs Identification Study.

2.2.3 Establishment Survey

The GDOT Truck Lane Needs Identification Study also included a survey of a small sample of establishments in the warehouse district near the port. The primary reason for conducting this survey was to understand travel patterns for trucks that access the local warehouses. Fifteen warehouse operators were identified for interviews for this study by the Savannah Economic Development Authority, including both facilities that ship only their own goods and operators that ship goods for other companies. Each warehouse operator was asked several questions, including the origin region for trucks entering the facility and the destination region for trucks exiting the facility. As shown in Table 2.2 and Table 2.3, the vast majority of trucks leaving the warehouses are destined either for the port of Savannah or an external region outside of Savannah. For trucks coming into the warehouses, an average of seven percent of the trucks were coming from the port with another 53 percent coming from external regions. For trucks leaving the warehouses, an average of 20 percent of the trucks are going to the port with 61 percent of the trucks destined for outside the Savannah region. While the sample for this survey is small, the results do indicate that the function of the warehouses is to transfer goods from the port to regions external to Savannah. Additionally, there is a general distribution center function of these warehouses where goods that are unrelated to the Port of Savannah use these

facilities to store goods brought in from outside the Savannah region to be transported to other locations outside the region.

This establishment survey further indicates that typical trip chain of goods arriving to the Port of Savannah includes the following steps:

- Goods arrive to Port of Savannah;
- Goods are transferred from ships to trucks;
- Goods are delivered from the trucks to the warehouses; and
- Goods are stored in warehouses until another truck picks up the goods for delivery to locations outside the Savannah region.

This trip chain also occurs in reverse for goods being shipped out from the Port of Savannah. Understanding this trip chain will assist in the development and analysis of alternatives conducted later in this study. It should be noted that while this is the typical trip chain, there are other important trip chains for goods related to the port. Thirty-seven percent of the trucks surveyed at the port gates leave the Savannah region. Also, a much smaller fraction of goods is shipped to one of the region's intermodal rail yards. Additionally, there is a large quantity of bulk goods that are transferred from ships directly to rail for delivery to locations further inland.

Table 2.2 Origin of Inbound Trucks in Establishment Survey

Origin of Inbound Trucks	Average
Port	37%
North of Savannah Region	26%
West of Savannah Region	23%
South of Savannah Region	4%
Savannah Region	3%
Don't Know	7%
Total	**100%**

Source: GDOT Truck Lane Needs Identification Study.

Table 2.3 Destination of Outbound Trucks in Establishment Survey

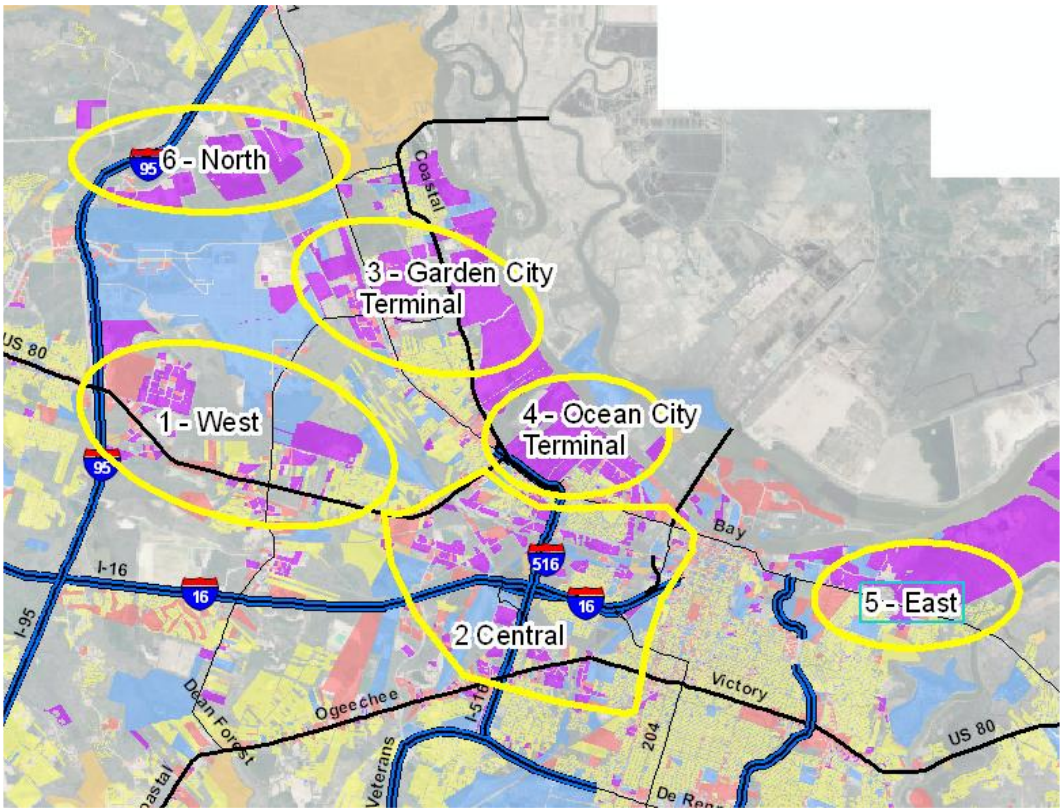
Destination of Outbound Trucks	Average
North of Savannah Region	31%
South of Savannah Region	21%
Port of Savannah	20%
Savannah Region	20%
West of Savannah Region	9%
Total	**100%**

Source: GDOT Truck Lane Needs Identification Study.

2.3 GDOT CHATHAM COUNTY INTERSTATE NEEDS ANALYSIS AND PRIORITIZATION PLAN

GDOT in partnership with the Chatham Urban Transportation Study and the eight municipalities within Chatham County, and various stakeholders, conducted a study of the existing Interstate transportation network for Chatham County and developing a list of proposed improvements to this system. As part of this study, a survey of 130 industrial sites was conducted. The list was generated from a combination of the Georgia Department of Industry, Tourism, and Trade and from independent research of the consultant team. Seventy-nine successful responses were collected from the 130 surveys. These respondents indicated that in total they generate 3,553 trucks per day. This is a figure roughly equivalent to two-thirds of the total volume of trucks generated at the two largest gates at the Port of Savannah. Surveyed facilities were categorized into one of six "pods" as shown in Figure 2.7. Three of these pods are important for the Northwest Toll Expressway study effort: the Garden City Terminal Pod; the Ocean City Terminal Pod; and the North Pod. These are the three pods that are closest to the proposed location for the corridor. There were a total of 19, 10, and 6 responses from each of these Pods respectively. 24 percent of the total 35 respondents stated that they use SR 21. This was the second highest roadway usage in the study area with only U.S. 80 having a higher response rate (38 percent). These responses are consistent with other data collection efforts in that developing the Northwest Toll Expressway has the potential to relieve SR 21 and it also could be beneficial for trucks utilizing the warehouses in the study area.

Figure 2.7 Map of Pods in GDOT Chatham County Interstate Needs Study



Source: GDOT Chatham County Interstate Needs Study.

Using the truck volume data from each of the Pods in the establishment survey, the Chatham County Interstate Needs Study consultant team estimated truck counts on several road segments in the Northwest Toll Expressway study area including SR 21 near Jimmy DeLoach Parkway, SR 25 south of the SR 21 split, I-16 at Pembroke, I-95 at Port Wentworth, and I-95 at Eulonia (Table 2.4). The estimated volumes at these locations compare favorably to the GDOT OTD truck counts which indicates that the Chatham County Interstate Needs Study establishment survey is representative of truck activity in the study area.

Table 2.4 GDOT Chatham County Interstate Needs Study
Estimated Daily Truck Volume

Road Section	Number of Trucks (Both Directions)
President Street	312
Bay Street	338
Lathrop Avenue	102
Highway 17 – from I-516 to Chatham Parkway	250
Chatham Parkway – from Highway 80 to Highway 17	40
Tremont Road – near CSX Intermodal Yard	111
Highway 21 – from Lathrop to Foundation	117
Highway 21 – from Foundation to Brampton	442
Highway 21 – from Brampton to Highway 307	2,316
Highway 21 – from Highway 307 to I-95	4,843
Highway 80 – from Highway 21 to Chatham Parkway	361
Highway 80 – from Chatham Parkway to Highway 307	390
Highway 80 – from Highway 307 to I-95	1,324
Highway 307 – from Highway 21 to Highway 80	1,710
Highway 307 – from Highway 80 to I-16	1,006
Jimmy DeLoach Parkway	2,205

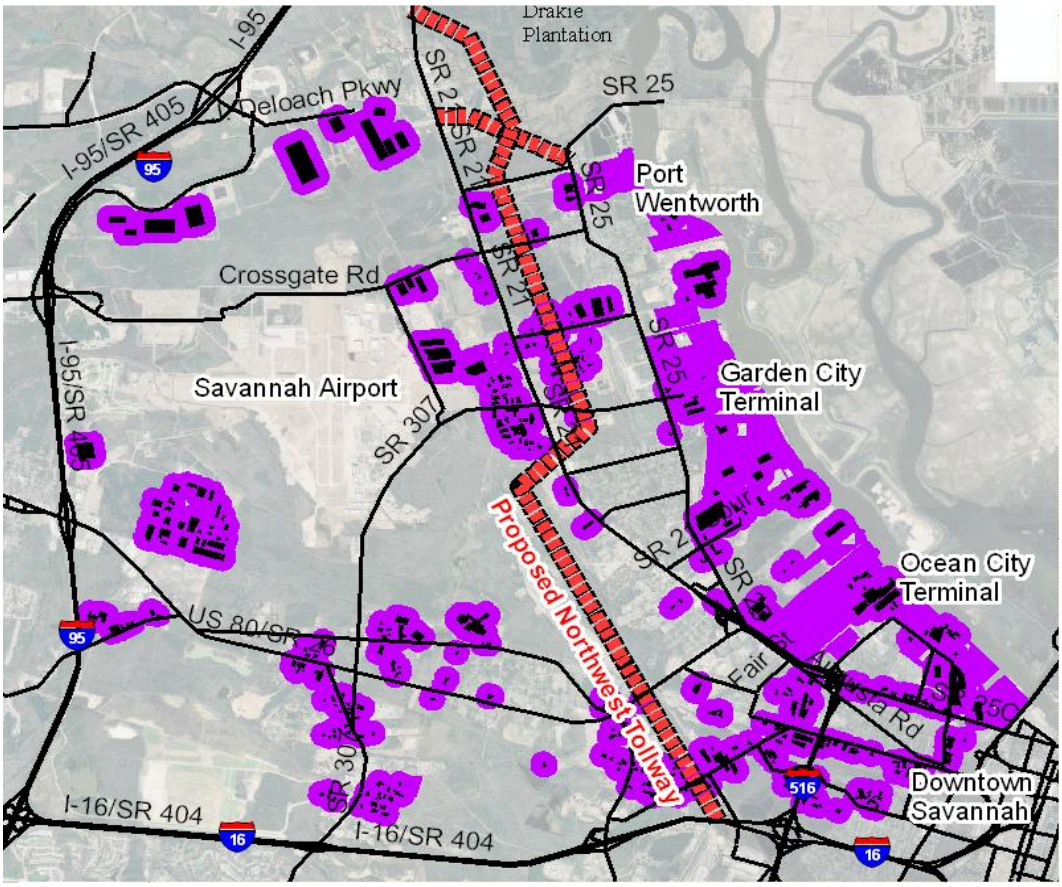
Source: GDOT Chatham County Interstate Needs Study.

2.4 LAND USE DATA

The consultant team also obtained land use information of the Northwest Toll Expressway study area from the Savannah Chatham-County Metropolitan Planning Commission. Figure 2.8 confirms the presence of a significant amount of industrial land in the study area. This is consistent with the freight-intensive activity that has been noted in the other data collection efforts.

Figure 2.8 Industrial Area Map for Northwest Toll Expressway Study Area

Industrial Areas Shown in Purple (2005)



Source: Savannah Chatham-County MPO.

2.5 CHATHAM COUNTY-SAVANNAH MPC 2004 CONGESTION MANAGEMENT STUDY

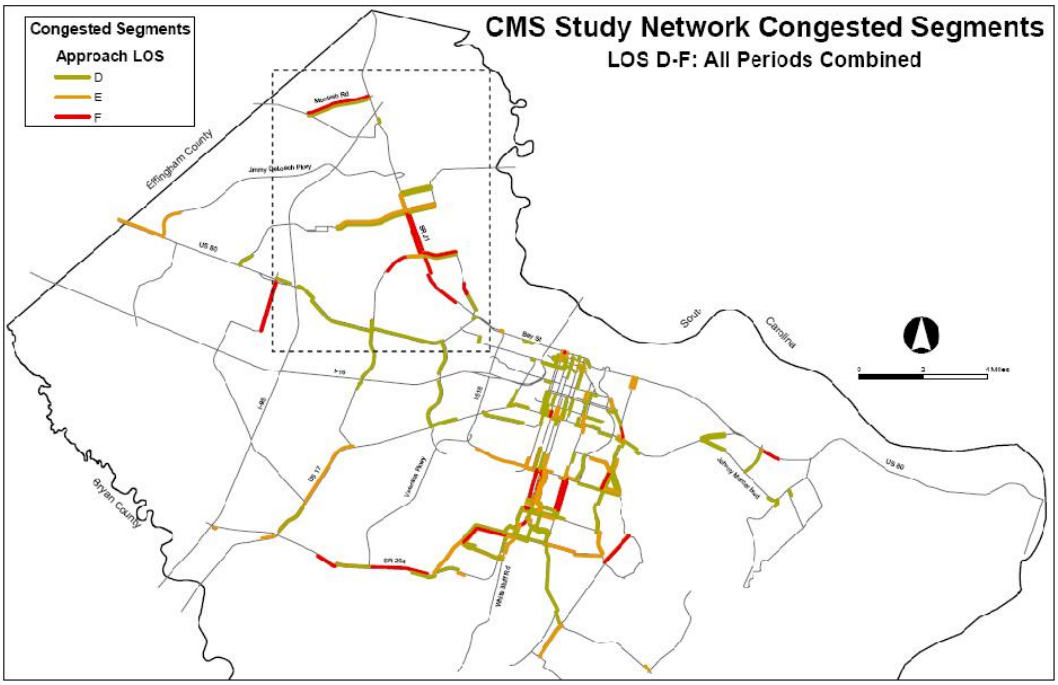
The Chatham County-Savannah 2004 Congestion Management Study (CMS) was conducted to evaluate conditions of the existing roadway network, prepare recommendations for congestion mitigation measures, and project the future conditions of the primary roads within Chatham County. This study used travel time runs performed with GPS and georeferencing digital video to estimate operating conditions on the roads in the region. Multiple vehicles were used to perform three runs in each direction during the morning and afternoon peaks and two runs during the off-peak period. The study was conducted on approximately 336 centerline miles of roadway in Chatham County including 59 different roadways that were divided into 1,049 directional links for the CMS. Directional links were developed based on boundaries with traffic signals, stop signs, and major cross streets.

The CMS defines congested segments as those where average travel run speeds were less than 70 percent of the posted speed limit. There were several congested segments found in the Northwest Toll Expressway study area. These are shown in Figure 2.9 and include:

- SR 21 between the Bonnybridge Road and just south of Highway 307 (Bourne Avenue);
- Gulfstream Road between the Savannah Airport and Highway 25 (Ocean Highway);
- Bourne Avenue between Highway 25 (Ocean Highway) and just west of Highway 21; and
- U.S. 80 between Highway 307 and Chatham Parkway.

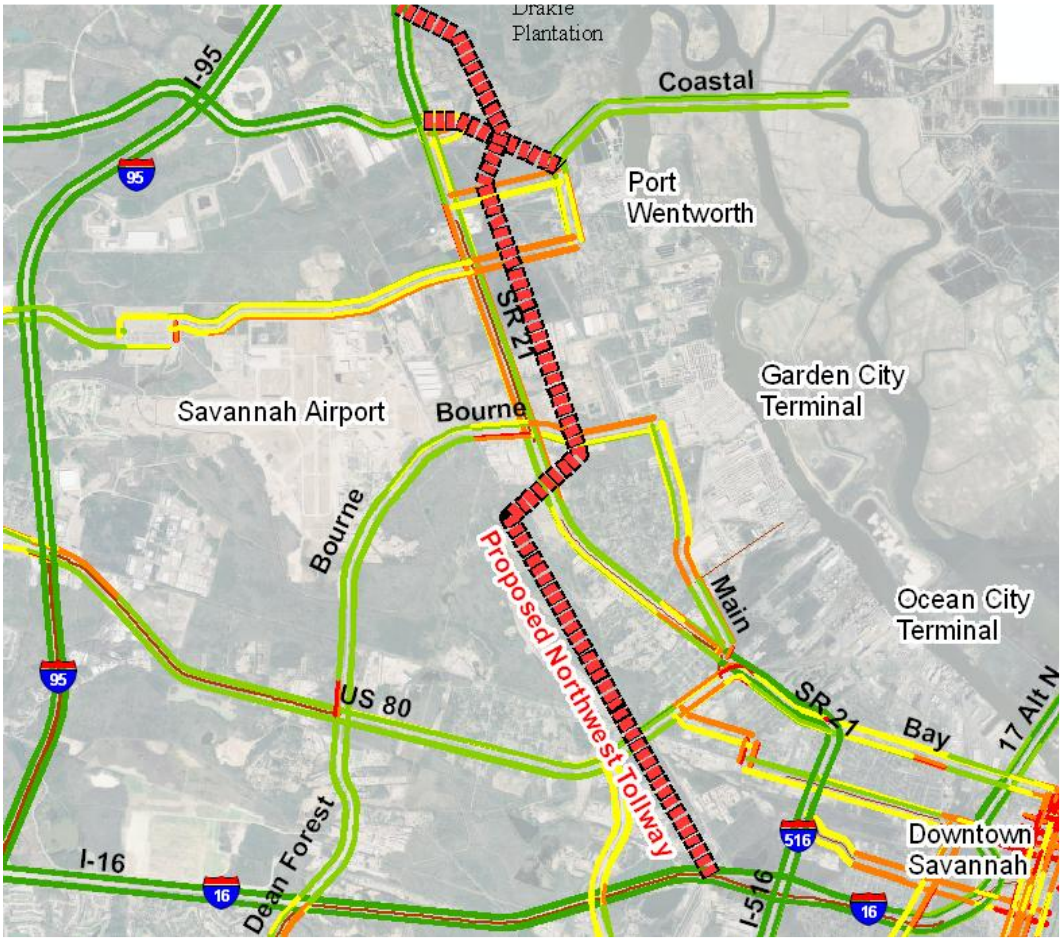
According to the CMS, the eastbound and westbound segments of SR 21 between Bonnybridge Road and just south of SR 307 are the 11th and 12th most congested segments in Chatham County. This is relative to over 1,000 road segments that were included as part of this survey. Average travel speeds in Chatham County were estimated in the CMS and are shown in Figure 2.10. This figure further illustrates the slow speeds that are present in the study area. It also reinforces the need for roadway improvements such as the Northwest Toll Expressway to relieve the congested traffic conditions of SR 21.

Figure 2.9 Map of Chatham County Congested Locations (study area shown in dashed lines)



Source: Savannah Chatham-County 2030 Long-Range Transportation Plan, September 2004

Figure 2.10 Average Speeds in Northwest Toll Expressway Study Area



2004 CMS Travel Time Study

avgSpeed

- < 20 MPH
- 20 to 30 MPH
- 30 to 40 MPH
- 40 to 50 MPH
- > 55 MPH

Source: Savannah Chatham-County Congestion Management Plan.

2.6 SR 21 TRAVEL TIME AND DELAY STUDY

New travel time runs were conducted for SR 21 as part of the Northwest Toll Expressway Study. Travel time and delay studies were completed using GPS probe vehicles throughout the A.M., midday, P.M., and night time periods. These studies were designed to identify the location, intensity, extent, and duration of recurrent congestion between I-95 on the north and I-516 on the south. Data was collected between July 16, 2007 and July 20, 2007.

Vehicles were assigned starting locations and instructed to drive at certain start times during the study period. After starting, drivers made two round-trips. Other important aspects of the data collection method were that:

- Drivers drove back and forth along the routes in two-hour blocks;
- Data was only collected in good weather conditions;
- Runs were not included in the analysis if major incidents were observed or driver went "off route"; and
- Data was collected at one-second intervals using the GeoStats' GeoLogger™.

Analysis of the second-by-second GPS probe vehicle data was conducted using TravTime, a GIS-based software. Raw GPS data was loaded into the software and compared to user-defined routes. Each major intersection along SR 21 was also coded within the routes to generate intersection-intersection travel statistics. TravTime compared the route definition to the GPS data to identify where and when a probe vehicle started and ended a route. Each individual run was validated by an analyst to ensure that the driver of the vehicle followed route instructions. Results of the data analysis are shown in Table 2.5. The table shows that significant delays occur in the morning for the southbound direction and are primarily associated with a bottleneck at Bourne Avenue. Drivers typically experience 10-minute to 15-minute delays to get through the Bourne Avenue intersection during the morning peak. Afternoon congestion is also significant to reach or pass I-95 on the north during the afternoon peak period. Drivers regularly experience 15-minute to 25-minute delays to reach I-95. Queue lengths can exceed 1.5 miles. This data was used to confirm the existence of congestion in the study area. They will also be used in Chapter 4 to validate the travel demand model that was customized for this study.

The detailed travel time survey results are provided in Appendix A.

Table 2.5 Intersection Travel Statistics

Time Period	Route	From	To	Average Speed	Average Travel Time	Minimum Travel Time	Maximum Travel Time	Standard Deviation Travel Time	Average Number Stops	Average Stopped Time	Average Congested Time
AM	SR 21 Northbound	I-516	Wheathill Road	38.9	1.9	1.3	2.5	0.4	0.5	0.23	0.32
AM	SR 21 Northbound	Wheathill Road	Bourne Avenue	32.2	2.8	1.8	3.9	0.8	0.8	0.78	0.9
AM	SR 21 Northbound	Bourne Avenue	Gulfstream Road	35.1	2.1	1.7	2.7	0.4	0.5	0.15	0.29
AM	SR 21 Northbound	Gulfstream Road	Jimmy DeLoach Parkway	40.6	1.6	1.3	2.0	0.3	0.5	0.15	0.24
AM	SR 21 Northbound	Jimmy DeLoach Parkway	I-95	48.9	2.6	2.3	3.8	0.4	0.3	0.14	0.18
AM	SR 21 Southbound	I-95	Jimmy DeLoach Parkway	49.6	2.6	2.3	3.1	0.3	0.5	0.13	0.23
AM	SR 21 Southbound	Jimmy DeLoach Parkway	Gulfstream Road	28.8	2.3	1.6	3.5	0.6	1.0	0.5	0.81
AM	SR 21 Southbound	Gulfstream Road	Bourne Avenue	8.2	8.9	4.5	14.8	3.3	8.2	4.94	7.46
AM	SR 21 Southbound	Bourne Avenue	Wheathill Road	43.3	2.1	1.8	2.5	0.2	0.0	0.0	0.03
AM	SR 21 Southbound	Wheathill Road	I-516	39.0	1.9	1.3	2.5	0.4	0.6	0.28	0.37
MD	SR 21 Northbound	1-516	Wheathill	33.6	2.1	1.5	2.6	0.4	0.7	0.43	0.54
MD	SR 21 Northbound	Wheathill Road	Bourne Avenue	32.1	2.8	2.0	3.6	0.5	1.0	0.6	0.87
MD	SR 21 Northbound	Bourne Avenue	Gulfstream Road	31.4	2.3	1.7	2.8	0.4	0.7	0.35	0.54
MD	SR 21 Northbound	Gulfstream Road	Jimmy DeLoach Parkway	44.0	1.5	1.2	1.9	0.2	0.3	0.03	0.08
MD	SR 21 Northbound	Jimmy DeLoach Parkway	I-95	39.6	3.3	2.6	4.0	0.5	1.1	0.48	0.71
MD	SR 21 Southbound	I-95	Jimmy DeLoach Parkway	47.3	2.7	2.2	3.9	0.5	0.4	0.18	0.24
MD	SR 21 Southbound	Jimmy DeLoach Parkway	Gulfstream Road	30.8	2.2	1.4	4.5	1.0	0.8	0.46	0.7
MD	SR 21 Southbound	Gulfstream Road	Bourne Avenue	21.0	3.5	2.0	4.8	0.9	1.2	1.39	1.66
MD	SR 21 Southbound	Bourne Avenue	Wheathill Road	43.2	2.1	1.9	2.5	0.2	0.0	0.0	0.01
MD	SR 21 Southbound	Wheathill Road	I-516	34.7	2.1	1.5	2.4	0.3	0.9	0.37	0.53
PM	SR 21 Northbound	I-516	Wheathill Road	33.5	2.2	1.5	2.5	0.3	0.7	0.37	0.58
PM	SR 21 Northbound	Wheathill Road	Bourne Avenue	35.2	2.6	1.9	4.0	0.7	0.6	0.46	0.61
PM	SR 21 Northbound	Bourne Avenue	Gulfstream Road	22.2	3.3	2.2	4.8	1.0	1.4	0.98	1.48
PM	SR 21 Northbound	Gulfstream Road	Jimmy DeLoach Parkway	35.4	1.9	1.5	2.4	0.3	0.7	0.15	0.38
PM	SR 21 Northbound	Jimmy DeLoach Parkway	I-95	8.4	15.4	6.6	27.7	7.1	19.6	9.67	13.61

Time Period	Route	From	To	Average Speed	Average Travel Time	Minimum Travel Time	Maximum Travel Time	Standard Deviation Travel Time	Average Number Stops	Average Stopped Time	Average Congested Time
PM	SR 21 Southbound	I-95	Jimmy DeLoach Parkway	49.3	2.6	2.2	2.9	0.3	0.4	0.09	0.17
PM	SR 21 Southbound	Jimmy DeLoach Parkway	Gulfstream Road	26.3	2.5	1.8	3.7	0.5	1.2	0.95	1.19
PM	SR 21 Southbound	Gulfstream Road	Bourne Avenue	22.3	3.3	1.7	4.6	1.0	1.2	1.14	1.38
PM	SR 21 Southbound	Bourne Avenue	Wheathill Road	42.5	2.1	2.0	2.4	0.1	0.2	0.05	0.08
PM	SR 21 Southbound	Wheathill Road	I-516	34.0	2.1	1.4	3.7	0.8	0.9	0.34	0.55
NT	SR 21 Northbound	I-516	Wheathill Road	37.5	1.9	1.6	2.6	0.4	0.4	0.23	0.28
NT	SR 21 Northbound	Wheathill Road	Bourne Avenue	43.6	2.1	1.8	2.6	0.3	0.4	0.12	0.18
NT	SR 21 Northbound	Bourne Avenue	Gulfstream Road	35.7	2.1	1.6	2.5	0.3	0.6	0.22	0.33
NT	SR 21 Northbound	Gulfstream Road	Jimmy DeLoach Parkway	47.4	1.4	1.2	1.6	0.1	0.0	0.0	0.02
NT	SR 21 Northbound	Jimmy DeLoach Parkway	I-95	46.9	2.8	2.4	3.4	0.4	0.6	0.15	0.28
NT	SR 21 Southbound	I-95	Jimmy DeLoach Parkway	49.4	2.6	2.4	3.0	0.2	0.5	0.09	0.16
NT	SR 21 Southbound	Jimmy DeLoach Parkway	Gulfstream Road	41.1	1.6	1.3	2.1	0.4	0.6	0.19	0.26
NT	SR 21 Southbound	Gulfstream Road	Bourne Avenue	32.5	2.3	1.7	2.8	0.4	0.8	0.35	0.47
NT	SR 21 Southbound	Bourne Avenue	Wheathill Road	45.5	2.0	1.9	2.2	0.1	0.1	0.0	0.02
NT	SR 21 Southbound	Wheathill Road	I-516	37.7	1.9	1.5	2.5	0.4	0.8	0.26	0.36

2.7 PEER-TO-PEER EXCHANGE

This study also included a peer-to-peer exchange to provide information and firsthand examples of facilities with similarities to the Northwest Toll Expressway. Representatives of several transportation planning agencies in Georgia were present at the exchange, including the Georgia State Road and Tollway Authority, the Georgia Department of Transportation (GDOT), the Savannah Metropolitan Planning Commission, and the Port of Savannah. Host agencies in Southern California included the Los Angeles Metropolitan Transportation Authority, the Port of Long Beach, the Orange County Transportation Authority, PierPASS, and the Southern California Association of Governments. The site visit also included a brief tour of the I-710 freeway which links the Port of Long Beach and Port of Los Angeles to the warehouse and industrial district in East Los Angeles. The discussion topics at the site visits included value pricing on the SR 91 Facility in Orange County, container fees at the Port of Long Beach, and freight planning for the Southern California region.

2.8 TRUCKING INDUSTRY ROUNDTABLE

One of the consulting team members, the American Transportation Research Institute (ATRI) organized a trucking roundtable with truck operators and trucking firm owners/logistics managers that utilize the Port of Savannah. The roundtable was facilitated by the consulting team and invitees were asked about the existing conditions of the local roadway near to the Port of Savannah. They were also asked about the impacts of congestion on their operations. The consultant team described the forecasts of what travel would be like in the corridor in the 20-30 year timeframe and then inquired about how this might impact their operations and what the general willingness to pay tolls would be if the future scenarios were to unfold. Generally, the invitees expressed that congestion was an issue for them in the corridor, particularly in the morning and evening commute periods. Additionally, there was the general understanding that the growth in the port and the growth of Effingham County would exacerbate already existing conditions. Nevertheless, there was quite a bit of reluctance of the truck drivers to pay tolls to use roadways. Many of the participants felt that it should be covered as part of the diesel fuel tax that they currently pay.

The notes for the roundtable are provided in Appendix G.

2.9 REVIEW OF PORT FINANCE

The consultant team also performed a review of port finance alternatives. This review included the port finance practices of the largest ports in the U.S. in addition to a select number of ports around the world. The findings from this review indicate that there are a number of finance alternatives which have been

utilized or considered for financing roads that connect to port facilities. These alternatives include:

- Container fees;
- Property taxes;
- State dedicated transportation funds;
- Local and sales tax;
- Impact fees; and
- Toll roads.

A full description of port finance alternatives used at other port locations is provided in Appendix I.

3.0 Car and Truck Stated Preference Surveys

Stated preference surveys were conducted by the consultant team to assist in determining the value-of-time for drivers of cars and trucks. This chapter describes the design, implementation, and analysis of these surveys. The stated-preference motorist survey consisted of four generalized steps:

1. Study design, which included sampling, data collection, and operational planning;
2. Implementation, which included a survey pretest and full-scale field implementation ;
3. Data preparation, which included data cleaning, checking and editing; and
4. Data summary, which included an analysis of results, electronic dataset, and summary documentation.

A total of 167 telephone surveys of motorists in the Savannah area were conducted during the month of May in 2007 as part of this data collection effort.

3.1 STUDY DESIGN - CARS

3.1.1 Survey Instrument

The goal of the auto surveys was to collect relevant information on route choice options for trips in the corridor under a variety of toll conditions. For purposes of this survey effort, the study area was defined as the corridor bounded by the cities of Savannah, Garden City, and Monteith. This is loosely referred to as the Savannah-Garden City-Monteith corridor. Respondents were asked sets of questions that were posed as *paired comparisons* in which each set of questions is tailored specifically for each respondent to fully understand the specific tradeoffs that individual motorists make when determining what route to take. The full survey instrument is provided in Appendix A.

Specific survey topics covered in the survey instrument are:

- Frequency of travel in the Savannah-Garden City-Monteith corridor in the past three months;
- Purpose of most recent trip in the Savannah-Garden City-Monteith corridor;
- Time of day the motorist traveled in the Savannah-Garden City-Monteith corridor;

- Length of most recent one-way trip in the Savannah-Garden City-Monteith corridor;
- Choice exercises to determine motorist decisions under toll scenarios;
- Open-ended motorist opinions on proposed toll road options; and
- Demographic information on survey respondent.

3.1.2 Survey Sampling

A telephone survey was administered by using a targeted random-digit dial frame containing phone numbers of 6,387 households in Chatham and Effingham counties. Of the 167 telephone interviews completed, 75 were completed with households in Chatham County and 92 interviews were completed with households in Effingham County.

3.1.3 Data Collection Procedures

The first step was to screen survey participants to ensure the following criteria were met:

- Resident of Chatham County or Effingham County;
- 18 years or older;
- Licensed driver;
- One or more vehicles available to the household;
- Traveled in the Savannah-Garden City-Monteith corridor on Augusta Road (SR 21) or Coastal Highway (SR 25) in the past four months; and
- A recent trip in the corridor must have taken a minimum of 10 minutes.

Telephone numbers were dialed a minimum of six times. The final sample disposition (or outcome) for this project is shown in Table 3.1. The Computer Assisted Telephone Interviewing (CATI) system recorded a disposition for each of the 4,872 dialed phone numbers in the total sample of 6,387 as of May 7, 2007. Call attempts yielded four types of dispositions: Eligible, Interview (1.0); Eligible, Non-Interview (2.0); Unknown Eligibility, Non-Interview (3.0); and Not Eligible (4.0). Subcategories for each of these dispositions are also shown in Table 3.1.

Table 3.1 Sample Disposition for Savannah Motorists

1. Eligible, Interview (1.0)		**207**
	Complete (1.1)	*167*
	Partial (1.2)	*40*
2. Eligible, Non-Interview (2.0)		**777**
	Refusal and break-off (2.10)	*465*
	Refusal (2.11)	*299*
	Break-off (2.12)	*4*
	Language (2.33)	*9*
3. Unknown Eligibility, Non-Interview (3.0)		**2200**
	Always busy (3.12)	*19*
	No answer (3.13)	*791*
	Telephone answering device (3.14)	*757*
	Telecommunication technological barriers (3.15)	*545*
	No screener completed (3.21)	*69*
	Other (3.90)	*19*
4. Not Eligible (4.0)		**1688**
	Fax/data line (4.20)	*275*
	Non-working/disconnected number (4.30)	*562*
	Temporarily out of service (4.33)	*93*
	Number changed (4.41)	*395*
	Nonresidence (4.50)	*245*
	No eligible respondent (4.70)	*114*
	Quota filled (4.80)	*4*

The sample classified as Unknown Eligibility, Non-Interview (3.0) primarily consists of potential respondents that are not picking up the phone (3.13), have an answering machine or voice-mail (3.14), or have privacy services from their telephone company or are on the Federal Do Not Call registry (3.15). Numbers classified as Other (3.90) are primarily households where an adult is never available.

The American Association for Public Opinion Research has developed a methodology for estimating response rates based on the ratio of not eligible and eligible potential respondents. The general formula estimates that the percentage of cases of unknown eligibility that would be found to be eligible (E) equals:

("Eligible, Interview [n=207]" + "Eligible, Non-Interview [n=777]")/("Eligible, Interview [n=207]" + "Eligible, Non-Interview [n=777]" + "Not Eligible [n=1,688]").

The surveyors obtained a 36.8 percent (984/2,672) response rate using the construct described in this equation. This equation further estimates that 1,794 calls were needed for the number of completed surveys to be achieved. The successful response rate is estimated to be 9.4 percent, or (1.1)/[(1.1 + 1.2) + (2.10 + 2.11 + 2.12) + e(3.0)] using the notation shown in Table 3.1.

3.2 SURVEY IMPLEMENTATION - CARS

3.2.1 Pretest

A pilot test of 15 respondents was conducted to assess the procedures proposed for telephone survey data collection. The collected data were reviewed by the consultant team to confirm the quality of the data. The pretest provided information on how to improve the survey logistics, the survey questions, and the data collection software program. The surveys took an average of 15 minutes to administer.

One problem identified during the pre-test was that almost 50 percent of the respondents were 65 or over and/or retired. Over-sampling this demographic can pose potential problems because these people are more likely to cooperate in the survey and, second, they likely have travel patterns that are different from the target population for this study. Consequently, a maximum quota of 12 percent was placed on respondents over 65 years of age. No other changes to the survey were determined to be necessary.

3.2.2 Field Implementation

Once the pretest was completed, the survey was finalized and the full-scale data collection was begun. At the end of the data collection process, a total of 167 usable completed surveys were available for this analysis. This exceeded the target of 150 surveys. The average length of the completed interviews was 14.3 minutes.

3.3 DATA PREPARATION - CARS

The outputs of the survey data collection effort were electronic files with coded survey results taken. This section describes the data cleaning and processing steps that were performed on the collected data.

3.3.1 Data Cleaning, Checking, and Editing

The project team developed a codebook and database format for the survey responses based on the programmed interview script. Once the database was assembled, the data was checked for omissions, out-of-range entries, and internal logical inconsistencies.

Where possible, corrections to the data were made to adjust for identifiable problems. When a data record was judged to be too deficient for analysis, it was dropped. The most common problems were incomplete data (due to interview break-offs), missing key data items such as trip purposes and trip location information, and illogical trip information where a respondent provided round trip information, rather than one-way trip information. For a record to be deemed usable, it had to include valid trip purpose information and responses to

substantially all of the other survey questions, except for age and income for which higher nonresponse levels would be expected. It was determined at the outset that survey data weighting would not be necessary because of the homogenous nature of the sample.

3.4 RESULTS FOR CAR SURVEYS

This section describes the results of the motorist survey. Section 3.4.1 describes frequency of travel in the applicable Highway 21/Highway 25/Bourne Avenue corridor. Section 3.4.2 reports details pertaining to each motorist's most recent trip in the corridor. Section 3.4.3 reports opinions on the toll road concept. Section 3.4.5 contains demographic information about the survey respondents.

3.4.1 Frequency of Travel in Corridor

The objective of the survey was to learn about trips in the corridor from motorists who used these roads on a regular basis. The surveys indicate that most of the drivers in the corridor use it on a regular basis. 39 percent of motorists drive in this corridor 5 or more times in a typical week, 17 percent use the corridor 2 to 4 times per week and 12 percent of motorists use the corridor more than 10 times a week (Figure 3.1). This implies that a toll road in the region could be successful by targeting this focused group of repeat corridor users. It also implies that drivers would likely be favorable of technology that would allow them to pay a toll without stopping at a toll booth.

Motorists from Effingham County drive in the corridor more frequently than motorists from Chatham County. For example, while 48 percent of survey respondents from Effingham county use the corridor five or more times per week, only 29 percent of Chatham county residents do. This confirms data described in Chapter 2 indicating that there is a significant portion of travelers that use SR 21 as a commute corridor.

The residents of both counties who frequently travel in the corridor were more likely to have access to multiple vehicles, as shown in Table 3.3. While 39 percent of the study participants overall ride in the corridor 5 or more times in a typical week, 55 percent of the respondents with four vehicles rode in the corridor this frequently, and 72 percent of the respondents with 5 or more vehicles use the corridor this frequently (Figure 3.2). This indicates that a strong sample was collected and that the vast majority of the respondents were familiar with travel conditions in the corridor and could easily recall characteristics of their most recent trip in the corridor.

Figure 3.1 Travel in Corridor – All Survey Participants

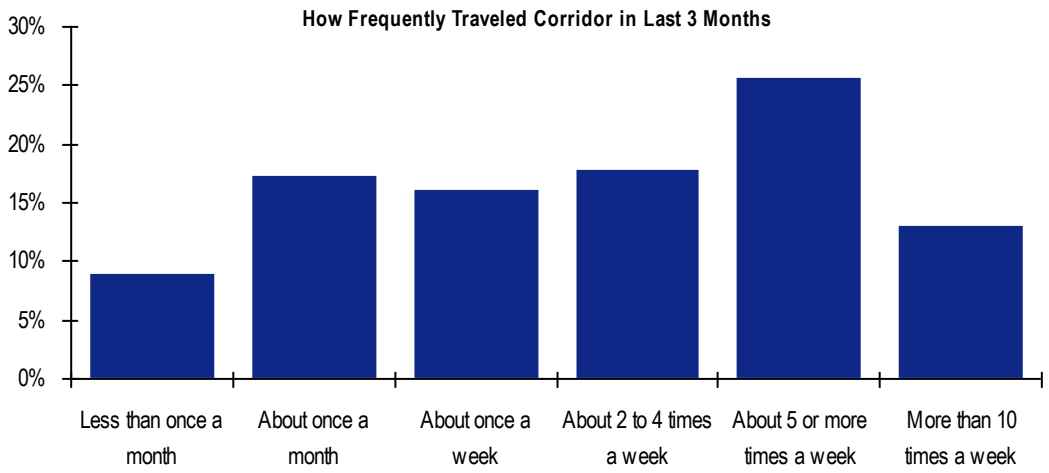
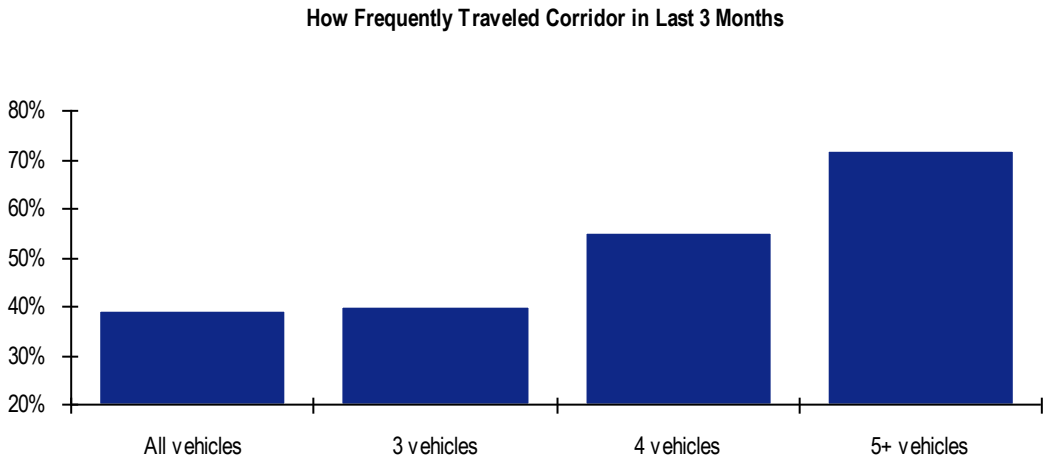


Figure 3.2 Travel in Corridor – Frequent Travelers



3.4.2 Most Recent Trip

Survey respondents were asked to recall their most recent trip in the Highway 21/ Highway 25/Bourne Avenue corridor. The study found that the majority of trips were taken to commute between home and the workplace (37 percent) or some kind of travel between home and another place (41 percent). The remaining responses (23 percent) were for travel between two places, neither of which was the respondent's home. This trip purpose data is summarized in Figure 3.3.

Residents of Effingham County were somewhat more likely than residents of Chatham County to be commuting from their homes to work – 45 percent versus 27 percent respectively. Residents of Chatham County, alternatively, were more likely to be traveling between two places that were not their homes – 36 percent versus 12 percent respectively. This also indicates that while this is not a typical

commute corridor, there is still a relatively large fraction of commute trips occurring on the roadway.

Vehicle occupancy for this most recent trip is shown in Figure 3.4. The largest share of trips (47 percent) was taken by motorists who were alone in their car, followed by trips with two occupants in the vehicle (34 percent). The remaining motorists (19 percent) reported that they had three or more occupants in the vehicle. While this indicates that the vast majority of trips are single-occupant vehicles, the percent of multi-occupant vehicles in this corridor is much larger than the typical commute corridor.

Figure 3.3 Purpose of Motorist's Most Recent Trip

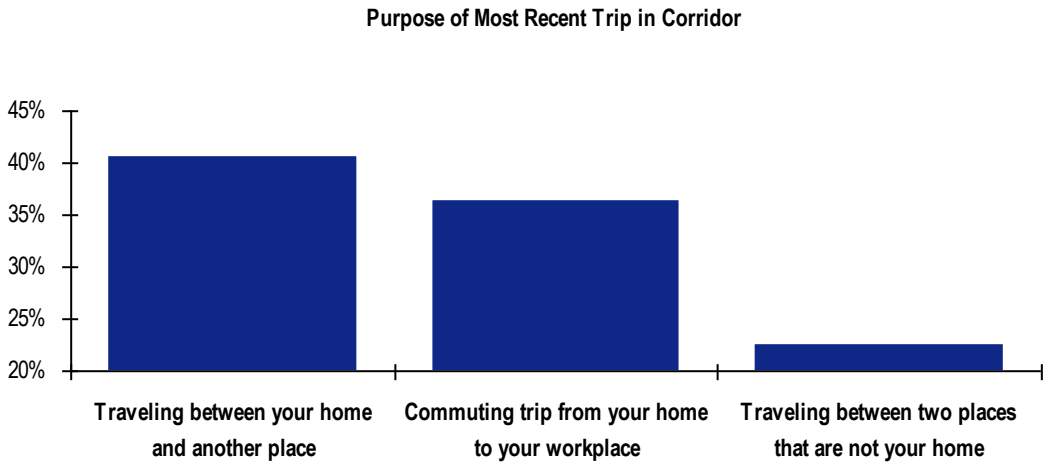
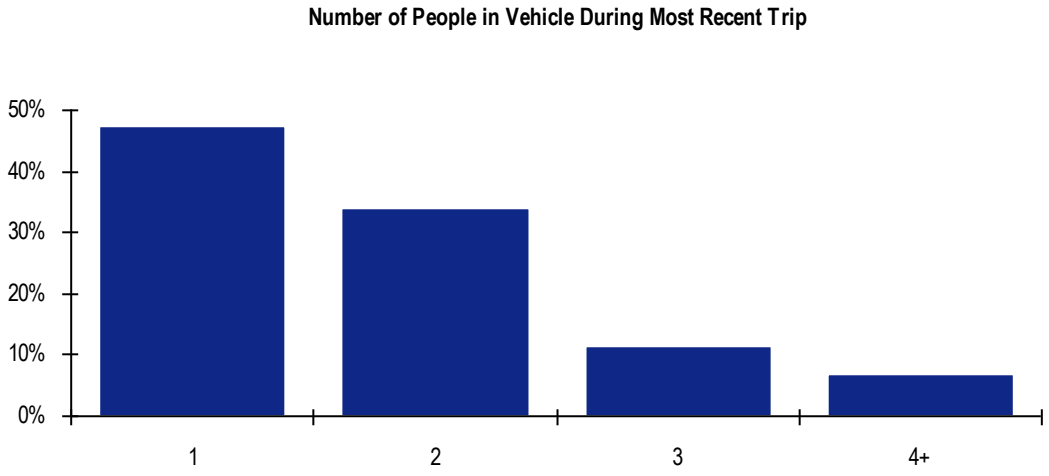


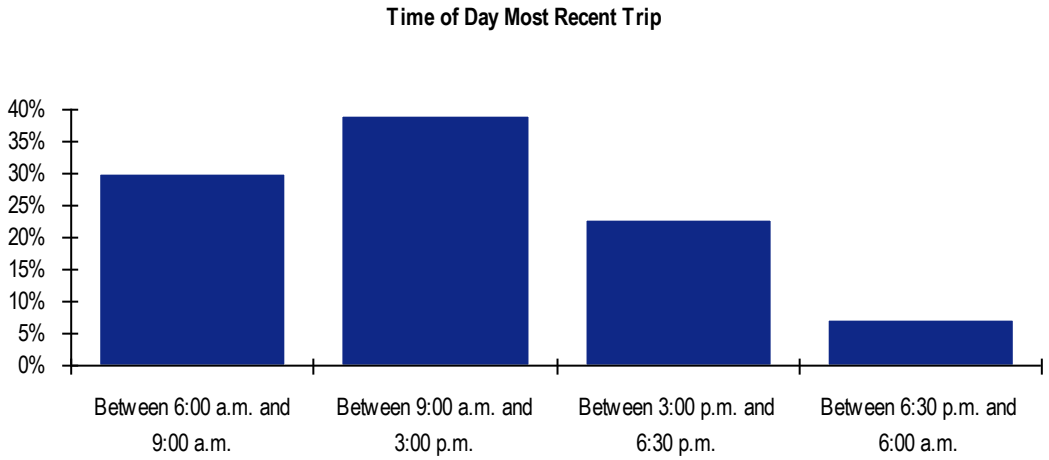
Figure 3.4 Vehicle Occupancy



As shown in Figure 3.5, the largest share of trips (39 percent) was taken between 9:00 A.M. and 3:00 P.M., followed by trips during the morning commute (30 percent) taken between 6:00 A.M. and 9:00 A.M. Among the remaining

corridor trips, the late afternoon/early evening, defined here as 3:00 P.M. to 6:30 P.M., represented 23 percent of trips and nighttime trips between 6:30 P.M. and 6:00 A.M. the remaining seven percent of trips. This distribution shows that over half of the truck trips in the region occurred during the two commute periods. However, there are a higher percentage of off-peak trips in the corridor than most commonly found in commute corridors.

Figure 3.5 Time of Day



The largest share of corridor trips started from home, which represented 66 percent of all trip origins. This is followed by 13 percent of trips in the corridor that started at a place of work, and 5 percent at a residence that was not the respondent's home, as shown in Figure 3.6. Trip destinations were more varied than trip origins. The most common destination was work, representing 23 percent of trips, followed by a residence other than the respondent's own which represented 13 percent, a store which was another 13 percent, home which was 8 percent, medical office which was also 8 percent, and a variety of other destinations, shown in Figure 3.7. Trip origins and destinations were not found to be correlated with the county of residence or other respondent characteristics.

Figure 3.6 Trip Origin

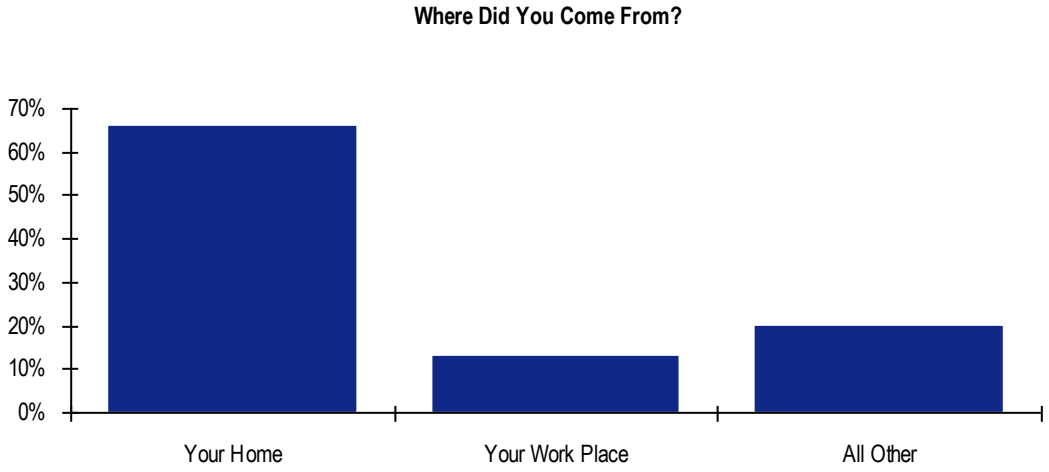
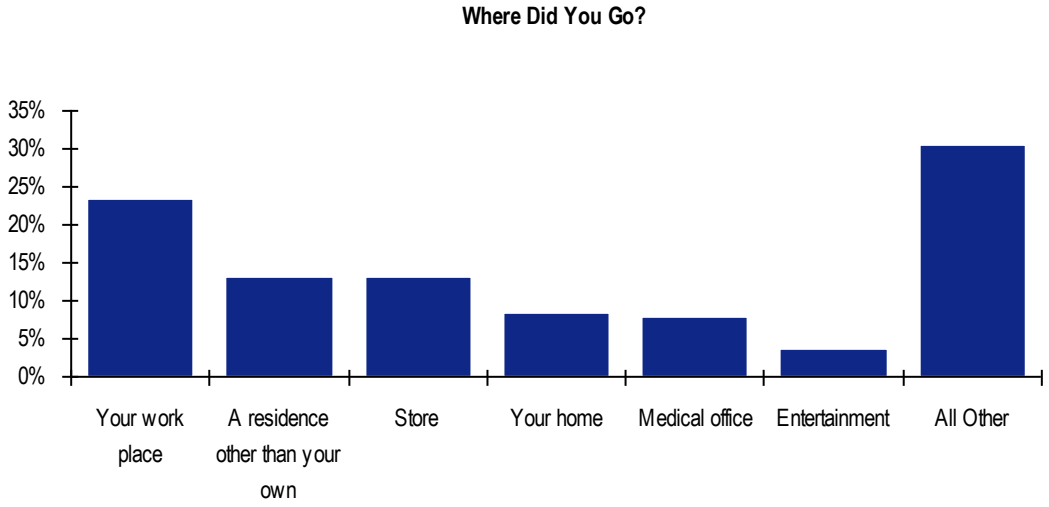


Figure 3.7 Trip Destination



Two-thirds of the total trip times in the corridor took between 20 minutes and 45 minutes, with the average trip time (both mean and mode) being 45 minutes. There was considerable variation in trip time between various respondents, as illustrated in Figure 3.8. The longest of these trip times are long enough to consider the examination of a toll road in the corridor to be reasonable.

The distribution of trip times specifically on SR 21 is shown in Figure 3.9. The mean amount of time spent on SR 21 was found to be 27 minutes, and the mode 25 minutes. A total of 62 percent of the SR 21 trips took between 10 minutes and 30 minutes. This variation in trip times indicates that there are varying levels of congestion throughout the day on SR 21. This further indicates that a toll road would be valued by some of the current users of SR 21.

Figure 3.8 Total Trip Time (minutes)

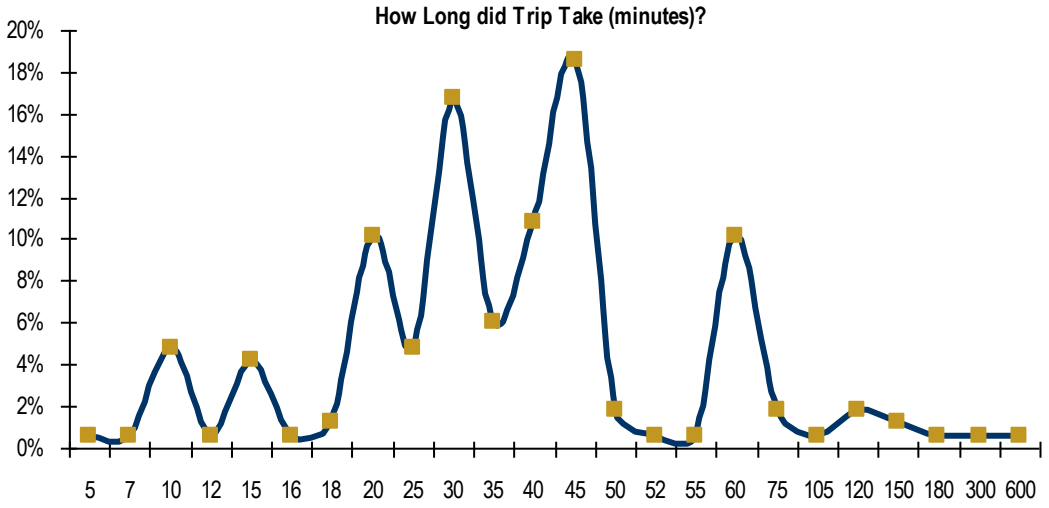
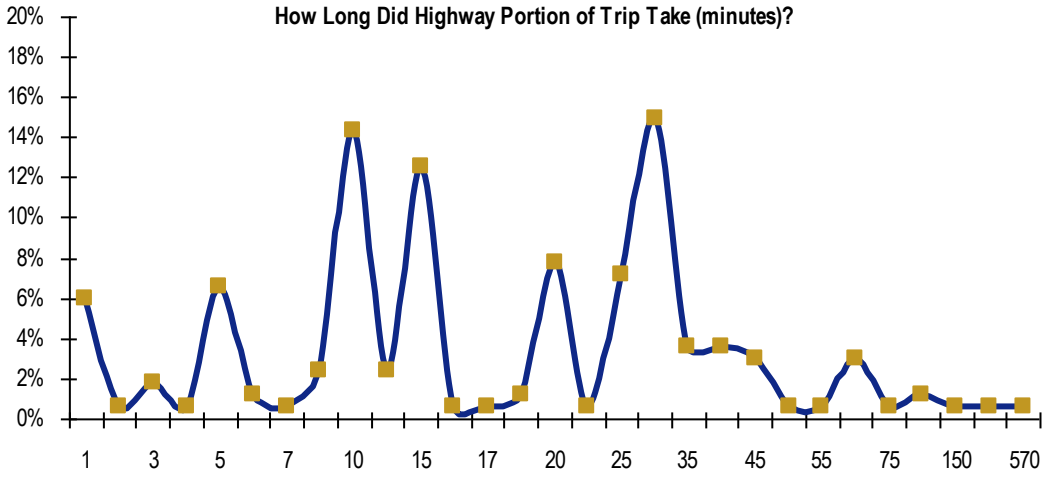


Figure 3.9 Highway Trip Duration (minutes)



3.4.3 Response to Toll Road Concept

Motorists had very mixed feelings about whether the toll road concept was a good thing. As shown in Figure 3.10, just over one-third (34 percent) were definitely or probably interested in the truck-only toll road concept and a larger share (46 percent) were probably or definitely not interested in this concept. The characteristics of survey respondents, such as county of residence, were not found to be correlated with stated opinions about the toll road concept. Nevertheless, as shown in Figure 3.11, many of these same respondents who were lukewarm on the concept said that they would not mind a truck-only toll

road in which cars were not allowed. Indeed, 72 percent said they definitely or probably would not mind, and only 16 percent said they definitely or probably would mind.

These two figures taken together indicate that there is likely a need for increased education to the general public in the Savannah region in regards to the beneficial elements of a toll road in the local transportation system, even if it is applied to cars.

Figure 3.10 Interest in Truck-Only Toll Road

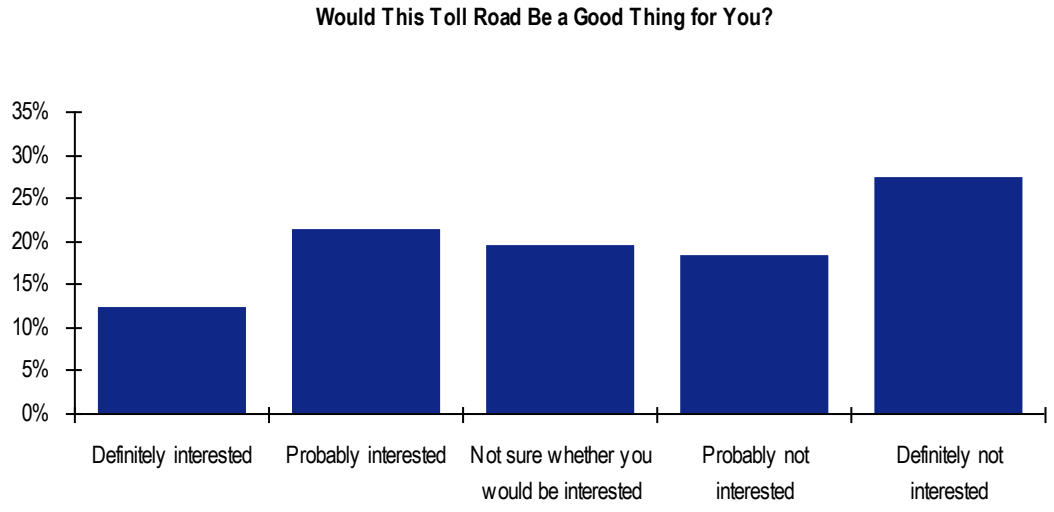
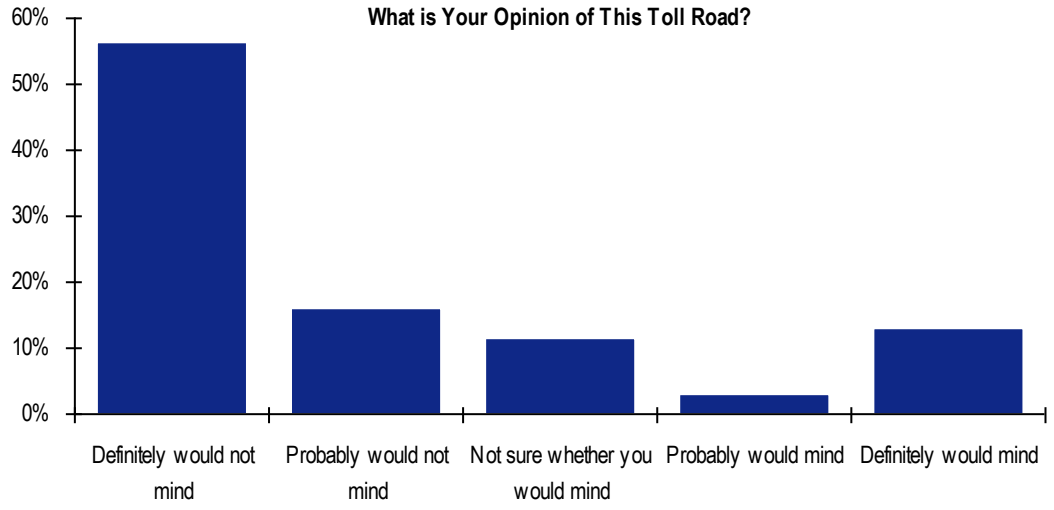


Figure 3.11 Opinion of Truck-Only Toll Road



3.4.4 Demographic Characteristics

The majority of survey respondents, 79 percent, live in households with two to four members. Household size was found to be slightly larger in Effingham County than Chatham County. As far as income is concerned, 56 percent of survey respondents said they had an annual household income of over $50,000 per year, and 30 percent over $75,000 per year, as shown in Figure 3.12. This is considerably larger than the median income in the region.

Figure 3.13 illustrates the employment status of survey respondents. A total of 73 percent work full or part-time, 18 percent are retired, 8 percent do not work outside the home, and 1 percent of the respondents are students. The number of wage earners per household is shown in Table 3.2.

Figure 3.12 Total Household Income of Survey Respondents

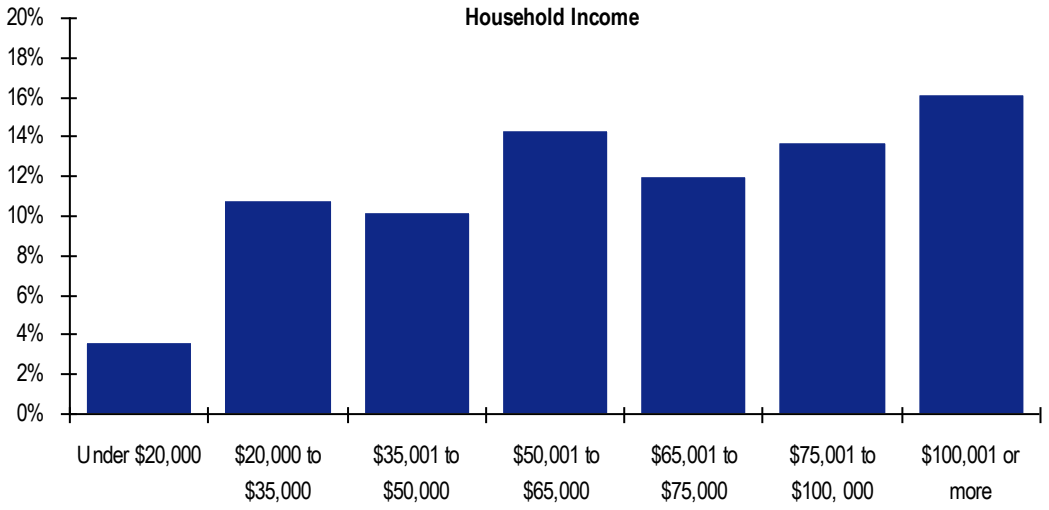


Figure 3.13 Employment Status

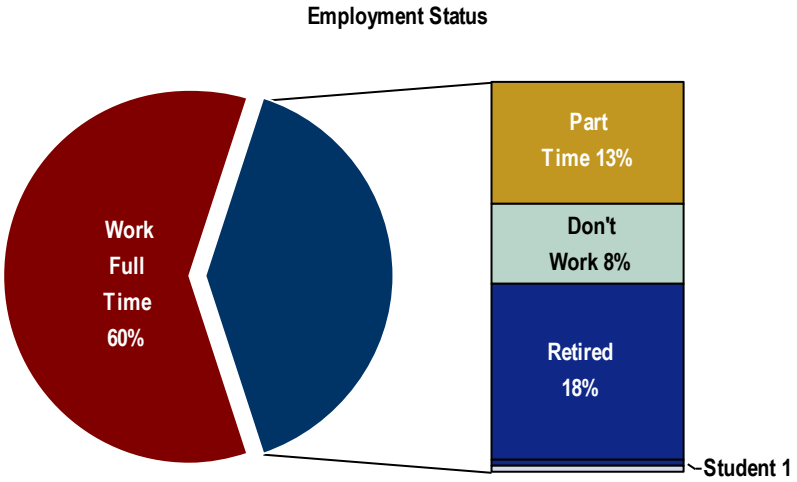


Table 3.2 Number of Wage Earners in Household

Members of your household work outside home	Percent
1	26%
2	38%
3	12%
4	2%
No Answer	21%

3.4.5 Open-Ended Responses

The open-ended responses to survey questions provided some interesting insight into these somewhat conflicted views of the toll road concept. What motorists like most about the general toll road concept is that it could reduce traffic congestion, making travel in the corridor faster, cheaper in terms of gas use, and safer. What motorists are most unanimous about is that they do not support any plan that would require them to pay a toll; motorists feel that they are already paying enough in taxes to cover any new roads that are necessary. As mentioned earlier, these responses indicate the need for more education regarding the potential beneficial aspects of toll roads to overall travel conditions. The verbatim responses to the open-ended survey questions can be found in Appendix B.

3.5 TRUCK STATED PREFERENCE SURVEY

The purpose of the trucking industry survey was to develop an estimate for the value-of-time of trucking operators in the Northwest Toll Expressway subarea. This value-of-time information was ultimately incorporated into a toll component of the customized travel demand model to estimate the traffic impacts of building the Expressway.

The truck stated preference survey instrument was implemented by the American Trucking Research Institute. A beta version of the survey instrument was developed and tested within a small, select group of motor carriers to offer final assurance of survey validity. Based on results of the beta version, the survey instrument was finalized and prepared for full implementation.

The survey was distributed among a large portion of the targeted truck driver population. The survey was accessible to industry members through an on-line platform, and industry members were made aware of the survey instrument through e-mail and other direct communications. A fax version of the survey was sent to potential survey participants through the Georgia Motor Trucking Association, the South Carolina Motor Trucking Association, and the American Trucking Associations (ATA). A fax or electronic version of the survey was sent to 954 trucking firms that operated in the study area based on a list provided to the project team by the project's Steering Committee.

3.6 SAVANNAH SURVEY ANALYSIS

Raw truck survey responses were recorded electronically into a Microsoft Excel spreadsheet without specific company identifiers such as company name and address. Raw data included information regarding whether each surveyed firm is private, LTL, or truckload. The process of developing the truck value-of-time is described in Section 4.6.

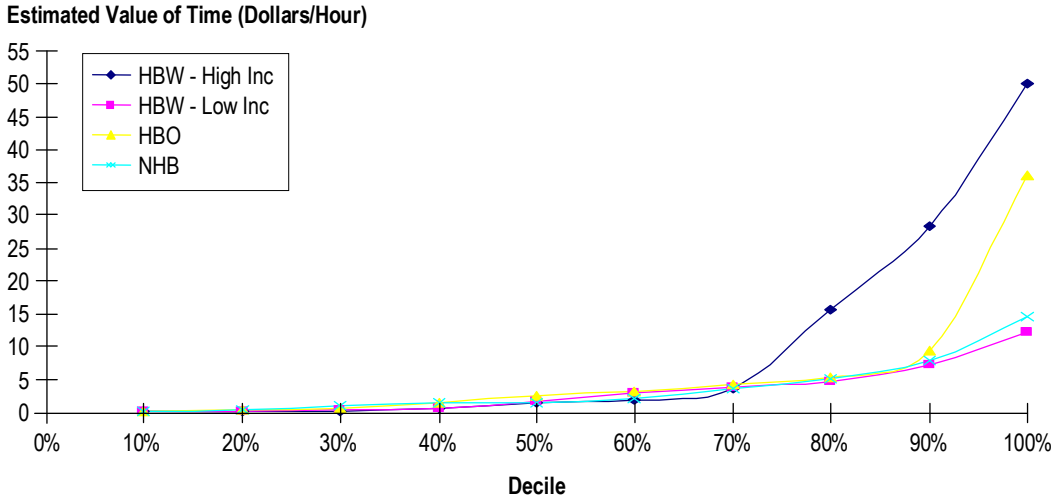
Paired survey tests from the auto stated preference surveys were utilized to determine the value-of-time for autos utilizing the corridor. Analysis of the auto survey responses provided the following information on the value-of-time for autos in the study area (Table 3.4, Figure 3.14). The detailed methodology for developing these estimates is also provided in Section 4.6.

Table 3.3 Value-of-Time by Trip Purpose*
Dollars per Minute

Deciles	HBW – All	HBW – High Inc	HBW – Low Inc	HBO	NHB
0.1	$0.15	$0.15	$0.23	$0.23	$0.30
0.2	$0.23	$0.23	$0.30	$0.38	$0.45
0.3	$0.45	$0.30	$0.45	$0.68	$1.05
0.4	$0.75	$0.68	$0.75	$1.50	$1.50
0.5	$1.43	$1.43	$1.73	$2.48	$1.58
0.6	$2.63	$1.95	$3.08	$3.30	$2.25
0.7	$3.75	$3.60	$3.90	$4.20	$3.75
0.8	$4.65	$15.60	$4.65	$5.48	$5.18
0.9	$9.98	$28.35	$7.28	$9.45	$7.95
1.0	$42.23	$50.10	$12.15	$36.00	$14.70

*HBW = Home-Based Work, HBO = Home-Based Other, NHB = Non-Home Based

Figure 3.14 Average Value-of-Time by Trip Purpose and Deciles



3.7 KEY FINDINGS FROM SURVEYS

The key finding from the auto survey is that SR 21 has many characteristics of a typical commute roadway. Nearly 40 percent of the survey respondents said that their most recent commute on the roadway was for commute purposes. Additionally, the perception of congestion on that corridor is consistent with the travel time run data that were collected in the corridor and described in Chapter 2 of this report. Over half of the survey respondents indicated that the last trip they took in the corridor was over 45 minutes in length. These two characteristics taken together indicate that there is likely some willingness of the passenger car drivers to absorb tolls on a new roadway if there are perceived time savings from its usage. This is contrary to the open-ended responses, but consistent with the results noted in other metropolitan areas. Similarly, the value-of-time curve generated through the truck surveys indicates that there is willingness for truck drivers to pay for reduced travel time in the corridor.

4.0 Model Customization

This chapter describes the procedures used to modify the Chatham County Interstate Needs Analysis and Prioritization Plan (INAPP) version of the Savannah-Chatham County travel demand (SCCTD) model for use in the Northwest Toll Expressway Study. The INAPP was examined and it was confirmed that the INAPP model had been adjusted to reflect the most recent population and employment forecasts for the region. The inputs used for the Northwest Toll Expressway Study modification include:

- The 2001 and 2030 Chatham County INAPP Travel Demand Model (TP+ format); and
- The 2005 and 2035 GDOT Statewide Transportation Plan (SWTP) Model (TP+ format).

The modification to the travel model consisted of two steps. The first was to adjust the INAPP model to reflect the results of the SWTP model; growth factors for the Port of Savannah by the Georgia Ports Authority (GPA); and gate surveys conducted at the Port of Savannah for GDOT's Truck Lane Needs Identification Study. The second step was to add improved time of day functionality to the travel demand model developed in the first step.

4.1 ADJUSTMENT OF TRUCK TRIP TABLES

Using subarea extraction, Chatham County was separated from the Georgia Statewide Transportation Plan (SWTP) model for the years 2005 and 2035. Truck growth factors were developed based on comparing 2035 truck volumes with 2005 truck volumes. Since the SWTP model treats each county as a traffic analysis zone (TAZ), all trips into and out of Chatham County ended in the Chatham County TAZ.

Truck growth forecasts were developed for Northwest Toll Expressway Model by using projected growth rates at the Port of Savannah and long-term constraints on growth based on space and technology considerations at the port. Growth factors were obtained by starting with the one-way centroid connector truck counts from the INAPP base year 2001 model and the 2006 one-way gate truck counts from the gate survey conducted at the Port of Savannah for the GDOT Truck Lane Needs Identification Study. Then, a growth rate of 150 percent from 2006 to 2021 was applied to account for current growth conditions at the port and a growth rate of 1 percent was applied from 2021 to 2035 to account for the likelihood of growth constraints at the port due to space and technology constraints. The 2006 to 2021 growth factor was provided by the Georgia Ports Authority, and the 2021 to 2035 growth factor was estimated by the project team assuming currently known landside constraints would slow the

Port of Savannah growth to a more typical annual growth rate for all types of traffic. Based on this data, the average annual compound growth rates for the Port of Savannah Ocean and Garden City Terminals were found to be 1.56 and 2.12 respectively.

For four other TAZs near the port, the growth factor was obtained by calculating the ratio of the 2030 and 2001 truck trip tables. These zones were treated separately from others in the model due to the large existing and planned concentration of warehouse and distribution facilities proximate to the port which would best be reflected by the projected growth in truck trips. For the other internal TAZs in the model, the growth rate was derived from the statewide truck model used for the GDOT Truck Lane Needs Identification Study. Using the 2001 INAPP model truck trip table and growth rates, total external-internal (E-I), internal-external (I-E), and external-external (E-E truck trips were factored to 2030. For I-I truck trips, the 2030 INAPP truck trip table was allocated to the factored 2030 trip table. The final truck trip table is composed of:

- I-I trips from the 2030 INAPP truck trip table; and
- I-E, E-I, and E-E truck trips factored to 2030 from growth rates in the statewide truck model and the 2001 INAPP truck trip table.

Table 4.1 shows the distribution of truck trips between the port, the study area, the rest of Chatham County, and the external stations. From Table 4.1, it can be seen that 90 percent of truck trips to and from the port are made within the study area.

As a result of this process, the modified INAPP model should reflect the underlying growth rates for the county/region as a whole as used in other ongoing studies, modified to reflect the newest information relative to the growth of truck trips statewide and regionally, and the growth forecasts for the port and associated facilities and zones. These modifications to the truck trip tables are critical to correctly forecasting demand for the various versions of the Northwest Toll Expressway Study.

Table 4.1 Distribution of 2030 Truck Trips

Total Trucks	Port	Study Area	Rest of Chatham	External	Origin Total
Port	1,283	8,236	927	6,225	16,671
Study Area	8,140	11,757	18,898	9,936	48,731
Rest of Chatham	916	18,898	63,650	11,301	94,765
External	6,171	8,868	10,200	30,388	55,627
Destination Total	**16,510**	**47,759**	**93,675**	**57,850**	**215,794**

4.2 ADJUSTMENT TO TIME OF DAY COMPONENT

During the review of the future year toll free traffic assignment, the consultant team identified a problematic time of day assignment methodology for producing the results used in the INAPP model. The model validation process revealed that the model performed well in terms of generating a daily trip table and total daily volumes in the network and study corridor. However, the time of day portion of the model was not functioning properly and could not be fully validated against peak-period counts. The time-of-day period trip tables were created in the CUTS model, and retained in the INAPP model. However, all trip tables were assigned to exactly the same network. The time of day portion of the model is composed of three time periods: peak A.M. hour, peak P.M. hour, and off-peak. A one-hour capacity network was generated by taking the maximum capacity of the A.M. and P.M. network. In the existing model structure, the trip tables for each of these time periods were assigned to this one-hour capacity network. This is acceptable for the A.M. and P.M. peak-hour assignment, but not for the off-peak assignment where multiple hours of capacity need to be used.

The time of day process in the INAPP model creates some major challenges for use in a toll analysis where congestion in peak periods should result in greater usage of a toll facility. The use of a single off-peak table rather than separate midday and night periods does not allow the possibility of establishing different toll rates or operations for the midday and night periods. Additionally, the one-hour period for the A.M. and P.M. peak periods in the CUTS model does not allow for the testing of different toll rates or operations, such as reversible lanes, during extended peak periods.

In order to create the time-of-day functionality needed to test all potential toll alternatives, the following steps were undertaken:

- The A.M. and P.M. peak-hour base year trip tables were expanded to peak-period trip tables. The A.M. trip table was expanded to 2 hours: 7:00 A.M. to 9:00 A.M. The P.M. table was expanded to 3 hours: 3:00 P.M. to 6:00 P.M. Those tables were expanded based on a household survey conducted in Augusta, Georgia that was used in establishing the time of day distribution in the Augusta region's MPO model, and by examining the hourly traffic distribution within the peak periods from permanent count locations in the Savannah study area, especially hourly counts at the external stations at the Chatham county line.
- Midday and Night trip tables were created. The off-peak table was adjusted to reflect the trips shifted to the A.M. and P.M. peak periods. The remaining trips were split into a Midday trip table: 9:00 A.M. to 3:00 P.M. and a Night trip table: 6:00 P.M. to 7:00 A.M., based on the same Augusta household survey.

- New period-specific capacity networks were developed by applying a factor of:
  - 1.5 times the hourly capacities for the A.M. period network
  - 2.5 times the hourly capacities for the P.M. period network;
  - 5 times the hourly capacities for the midday period network; and
  - 10 times the hourly capacities for the night period network.

The new time-of-day model was revalidated based on the time period counts at existing screenlines in the local study area and travel time runs conducted on SR 21 (as described in Chapter 2 of this report). The link speeds and/or capacities were adjusted such that the time period observed travel speeds were consistent with the time period modeled travel speeds and the screenline time period volumes were consistent with observed time period counts. Additionally, to better reflect the P.M. peak conditions, the factor used to convert hourly capacities to time period capacities was reduced from 2.5 to 2.25.

Development of the future year time period trip tables and networks followed these same procedures, with all base year factors applied to the future year trip tables and networks.

The use of time of day trip tables and assignments was instrumental in improving the market share analysis that will occur with the toll analysis, as it recognizes the different levels of congestion that will occur during the peak and off-peak periods, in addition to the recognition of different trip purposes that also occur throughout the day.

4.3 INCORPORATION OF TOLL COMPONENT

The stated preference survey data described in Chapter 3 was used to quantify how Chatham County travelers value their travel time. This value-of-time data was then used to develop toll/time tradeoff sub-models and to incorporate a toll/time tradeoff sub-model into the INAPP model as adjusted. The most directly relevant questions from the stated preference surveys for the purposes of estimating values-of-time were a series of paired comparison choice exercises that were based on information provided by the respondent on her/his most recent travel in the Savannah – Garden City – Monteith corridor, in which respondents were asked questions of the following type:

- *Suppose you had the choice between two travel routes to make this trip.*
- *Alternative A would take you __ minutes and would not include a toll.*
- *Alternative B would take you __ minutes and would have a toll of ___.*
- *Which of these two alternatives would you have used for your trip?*

Respondents were given five of these questions. The values provided to the respondents were based on their actual reported travel times and were varied according to an experimental plan. The initial toll levels and toll road time

savings provided to the respondent were selected randomly, and subsequent toll levels were based on earlier responses. For example, if a person was asked about a $3.00 toll, and said that they preferred the toll road alternative, they would then be asked to evaluate the choice with (say) a $4.00 toll. If the person preferred the free alternative when the $3.00 toll was offered, they would be asked about a lower toll, like $1.50. By going through a series of questions, respondents' values-of-time were bounded by a high and low value.

These tradeoff questions were analyzed through tabulations and the development of discrete choice (multinomial logit) models. The result of the analyses developed value-of-time distributions for auto travelers by trip purpose. Figure 4.1 shows the value-of-time distributions for auto trips by purpose and income segment. Home-based work trips (basic commute trips to work) by high-income travelers have the highest values-of-time, as one would expect; followed by home-based other, nonhome-based, and low-income home-based work trips. It is important to note that a substantial proportion of the travelers in the survey indicated a very low value-of-time for their trips. For example, more than half of the auto trips in all the purpose categories have values-of-time of less than $2.00 per hour. The mean auto values-of-time for the travel segments were:

- Home-Based Work – High Income: $9.11 per hour;
- Home-Based Work – Low Income: $3.17 per hour;
- Home-Based Other: $5.66 per hour; and
- Nonhome-Based: $3.68 per hour.

As shown in Figure 4.1, the mean values-of-time for autos are skewed toward the high end by the extreme willingness-to-pay for a small number of travelers at the high end.

The response to the trucking survey yielded 20 surveys. Nevertheless, since data was collected on more than one shipment, and we asked multiple tradeoff questions about each shipment, we were able to perform cursory analyses and to identify a reasonable distribution of travel time values. The value-of-time distributions for trucks that were obtained through the modeling effort were compared to a similar effort performed by NuStats on the I-75 corridor in the Atlanta region to validate the results. The SR 21 average value-of-time for truck shipments was $18.72. The I-75 Study average was $22.00. Figure 4.4 compares the measured value-of-time distributions from the efforts. As shown, there is a reasonable correspondence between the two survey results, except at the high end where there is a higher value-of-time among a small number of carriers in the I-75 survey as one might expect given the greater congestion levels in the Atlanta region. This comparison appears to validate the reasonableness of the value-of-time distribution estimated from the small sample of truckers surveyed in Savannah region. Therefore, this value of time was utilized in the toll analysis conducted for this study.

Figure 4.1 Distribution of Auto Trip Values-of-Time

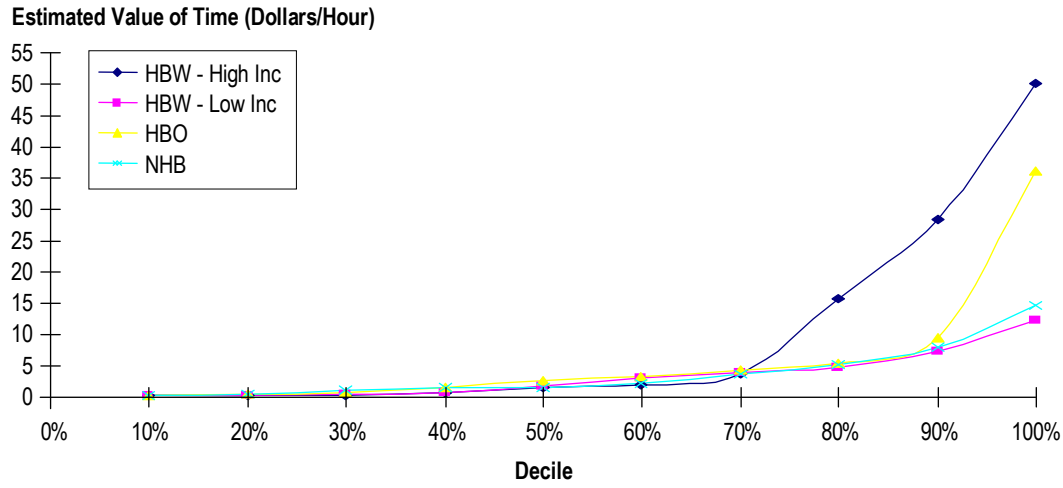
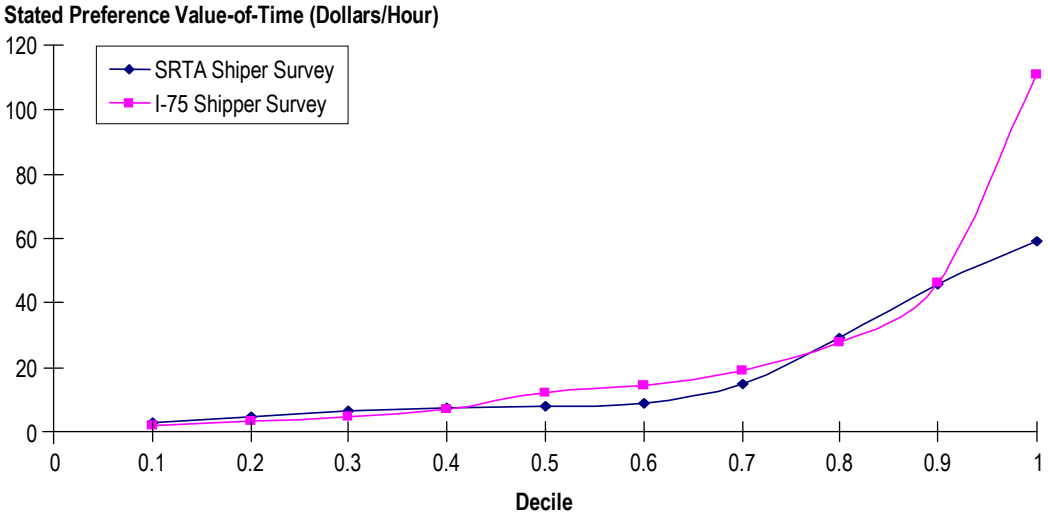


Figure 4.2 Distribution of Truck Trip Values-of-Time
Comparison with the I-75 Study Results



Next, the auto and truck value of travel time distributions were incorporated into the INAPP Model. This was accomplished by dividing the vehicle trip tables by purpose and vehicle type into separate categories based on the value-of-time distributions, and then by using the TP+ toll processing capabilities in performing multi-class assignments to assign trips to the toll network.

The first step was to subdivide the vehicle trip tables into quartile categories. First, the home-based work trips were divided based on income level. Based on zone average income levels and the regional distribution of income levels, percentages of the home-based work trips produced in each zone were assigned to high- and low-income levels. Then, each of the purpose-specific trip tables were divided into four equal trip tables. This resulted in four trip tables for each of the following categories:

- Home-Based Work – Low Income;
- Home-Based Work – High Income;
- Home-Based Shopping;
- Home-Based Other;
- Nonhome-Based;
- Internal-External;
- External-External; and
- Truck trips.

The value-of-time distributions from the market research were summarized in quartiles, and the average value-of-times for each quartile were assigned to the new segmented trip tables. Table 4.2 shows the average values-of-time for the quartiles. One-fourth of the low-income home-based work trips were assigned to a value-of-time of $1.125; one-fourth were assigned to a value-of-time of $1.35; one-fourth were assigned to a value-of-time of $3.15; and one-fourth were assigned to a value-of-time of $9.75. The other purposes were treated similarly with their corresponding quartile values-of-time. The stated-preference modeling could not discern home-based shopping and home-based other trips, so the same value-of-time distributions were used for both. Similarly, since models were not developed for internal-external or external-external trip purposes, we used the quartile values for home-based other and nonhome-based trips, respectively. Prior to trip assignment, the trip tables with the same values-of-time were combined. This allowed us to maintain 20 trip tables, the maximum number that TP+ allows in its multi-class assignment routine.

Table 4.2 Value-of-Time Quartiles for the Modified Savannah-Chatham County Travel Demand Model

Purpose	Quartile Values-of-Time			
Home-Based Work – Low	$1.125	$1.35	$3.15	$9.75
Home-Based Work – High	$1.125	$1.35	$5.55	$39.45
Home-Based Shopping	$0.525	$1.875	$3.975	$15.525
Home-Based Other	$0.525	$1.875	$3.975	$15.525
Nonhome-Based	$0.45	$1.125	$3.675	$12.45
Internal – External	$0.525	$1.875	$3.975	$15.525
External – External	$0.45	$1.125	$3.675	$12.45
Truck Trips – Internal/External	$4.67	$7.55	$8.93	$28.93
Other Truck Trips	$4.67	$7.55	$8.93	$28.93

One of the TP+ toll analysis methods, the "CTOLL" method was used to assign the trip tables. With this method, the tolls on a link were converted to a pseudo-

time penalty. The separate values-of-time were captured in the assignment process through different time penalties for the different trip tables. For instance, for a toll link with a one dollar toll and for trips in a trip table with a $6.00 value-of-time, a pseudo-time penalty of ten minutes would be calculated (60 minutes/ $6.00 = 10-minute penalty). For the same link, trips in a trip table with a $3.00 value-of-time, a pseudo-time penalty of 20 minutes would be calculated. The result is that trips in the higher value-of-time trip tables were more likely to be assigned to the toll link. Since all of the trips were assigned with a user equilibrium method, they were all subject to other delays due to congestion in addition to the toll pseudo-time delays, so in most cases only a portion of trips in a trip table were assigned to the same routing, and the resulting assignments included a mix of trips from both high and low value-of-time trip tables using the toll links. The toll network was created during the trip assignment process. The trip distribution process did not use any toll analysis in order to keep the trip table the same before the drivers start making their choice during their trips based on toll and congested time.

Application of the customized Northwest Toll Expressway model was conducted successfully for several no toll and toll scenarios. It was also conducted successfully for several build and no build scenarios. The customized model proved to be an indispensable tool for analyzing the alternatives that were considered for this corridor. A description of the model application is provided in Chapter 6 of this report.

5.0 Description of Alignments and Cost Estimates

5.1 DESCRIPTION OF ALIGNMENTS

A range of alignments were considered to meet the travel demands of the corridor. Each alignment can be considered to belonging to one of three families of alternatives:

1. A "northern" alignment that is oriented to connect the port with SR 21 to the north near the I-95/SR 21 interchange.
2. A full at-grade alignment that is oriented to connect the port with SR 21 and I-95 to the north and connect to I-16 in the south. This alignment also connects Effingham County with downtown Savannah. Additionally, this alignment provides connectivity to the local roadways in the study area; and
3. A full elevated alignment oriented to connect Effingham County with downtown Savannah and to provide limited access from within the study area to I-95 and I-516.

The specific alignments that were examined as part of the traffic and revenue analysis are as follows:

- **Alternative 1A: Northern Alignment – Cars and Trucks.** The northern alignment runs from the Port of Savannah to SR 21 just south of I-95 (Figure 5.1). This alternative would be a 4.7-mile corridor with two lanes in each direction. There would be connections to the local road network at SR 21, Jimmy DeLoach Parkway, Gulfstream Road, Grange Road, and Bourne Avenue. The design speed of this roadway would be 45 miles per hour (mph). The mainline toll for autos on this roadway would be $1.00 and exit ramp tolls would be $0.50. The mainline toll for trucks on this roadway would be $3.00 and exit ramp tolls would be $1.50.
- **Alternative 1B: Northern Alignment – Trucks Only.** This alignment has the same characteristics as Alternative 1A, except that access to the tollway would be for trucks only. Cars would be restricted from using the road.
- **Alternative 2A: Full At-Grade Alignment.** An at-grade alignment that runs from north of I-95 and extends south to I-516. This alternative would be 10 miles long with two lanes in each direction. Access to this alignment would occur at Georgia SR 30, I-95, Georgia SR 21, Jimmy DeLoach Parkway, Gulfstream Road, Grange Road, Bourne Avenue, and I-16 (Figure 5.2). The design speed of this roadway would be 45 mph. The roadway would be accessible for both trucks and autos. The mainline toll for autos on this

roadway would be $1.50 and exit ramp tolls would be $0.75. The mainline toll for trucks on this roadway would be $4.50 and exit ramp tolls would be $1.50.

- **Alternative 3A: Full Elevated Alignment – Access at Gulfstream Road.** A full alignment that runs above SR 21, but within the right-of-way of SR 21. Similar to Alternative 2A, this alignment would start at SR 30 in the north. However, the roadway would end at I-16. This alternative would be 7.7 miles long intermediate access points at Gulfstream Road and I-95 (Figure 5.3). This reduced access allows for a design speed of 60 mph. The mainline toll for autos on this roadway would be $1.50 and exit ramp tolls would be $0.75. The mainline toll for trucks on this roadway would be $4.50 and exit ramp tolls would be $1.50.
- **Alternative 3B: Full Elevated Alignment – Access at Bourne Avenue.** This alignment has the same characteristics as Alternative 3A, except there is an access point at Bourne Avenue rather than at Gulfstream Road.
- **Alternative 3C: Full Elevated Alignment – Reversible Lanes.** This alignment has the same general path as Alternative 3A. However, this alignment is designed to focus exclusively on commuter traffic from Effingham County to downtown Savannah. This is a three-lane facility, where the lanes reverse direction depending on the time of day. During the morning commute hours and the midday time period, the lanes operate in the south direction to accommodate drivers leaving Effingham County headed to downtown Savannah. In the afternoon and evening time periods, the lanes operate in the north direction to accommodate drivers leaving downtown Savannah headed towards Effingham County. The design speed for this roadway would also be 60 mph. This roadway is only open to auto traffic. The mainline toll for autos on this roadway would be $1.50.

A summary description of the alternatives is shown in Table 5.1.

Table 5.1 Summary Description of Alternatives

Alternative	Length (miles)	Number of Lanes	Number of Intermediate Access Points	Direction of Traffic, Grade Status	Vehicles Served	Mainline Auto Toll	Mainline Truck Toll
1A	4.7	4	4	2-way, At-Grade	Autos, Trucks	$1.00	$3.00
1B	4.7	4	4	2-way, At-Grade	Trucks Only	n/a	$3.00
2A	10.0	4	5	2-way, At-Grade	Autos, Trucks	$1.50	$4.50
3A	7.7	4.	1 at Gulfstream Road, 1 at I-95	2-way, Elevated	Autos, Trucks	$1.50	$4.50
3B	7.7	4	1 at Bourne Avenue, 1 at I-95	2-way, Elevated	Autos, Trucks	$1.50	$4.50
3C	7.7	3	1 at I-95	Reversible, Elevated	Autos Only	$1.50	n/a

Figure 5.1 Location of Alternatives 1A, 1B (Northern Alignment)

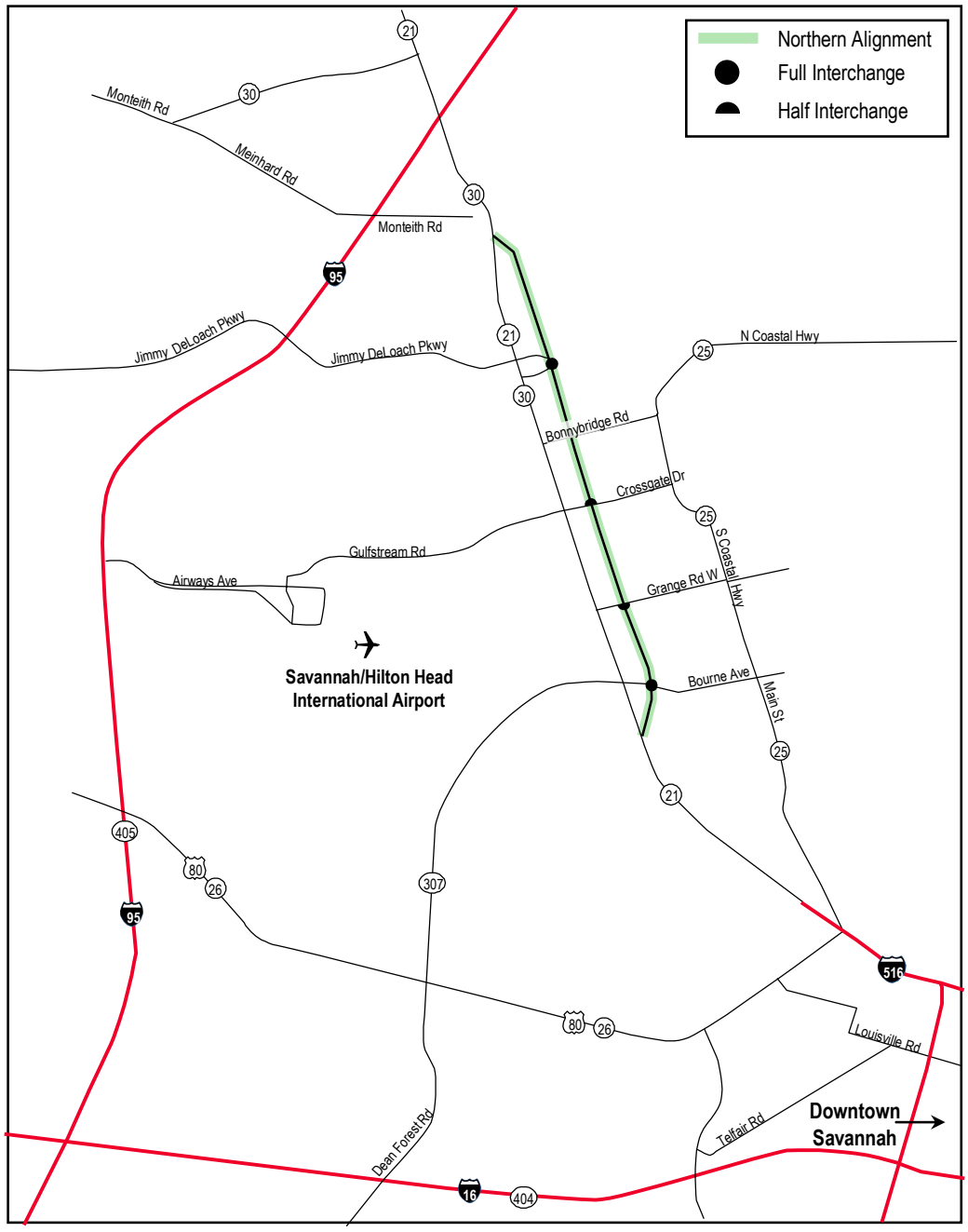


Figure 5.2 Location of Alternative 2A (Full At-Grade Alignment)

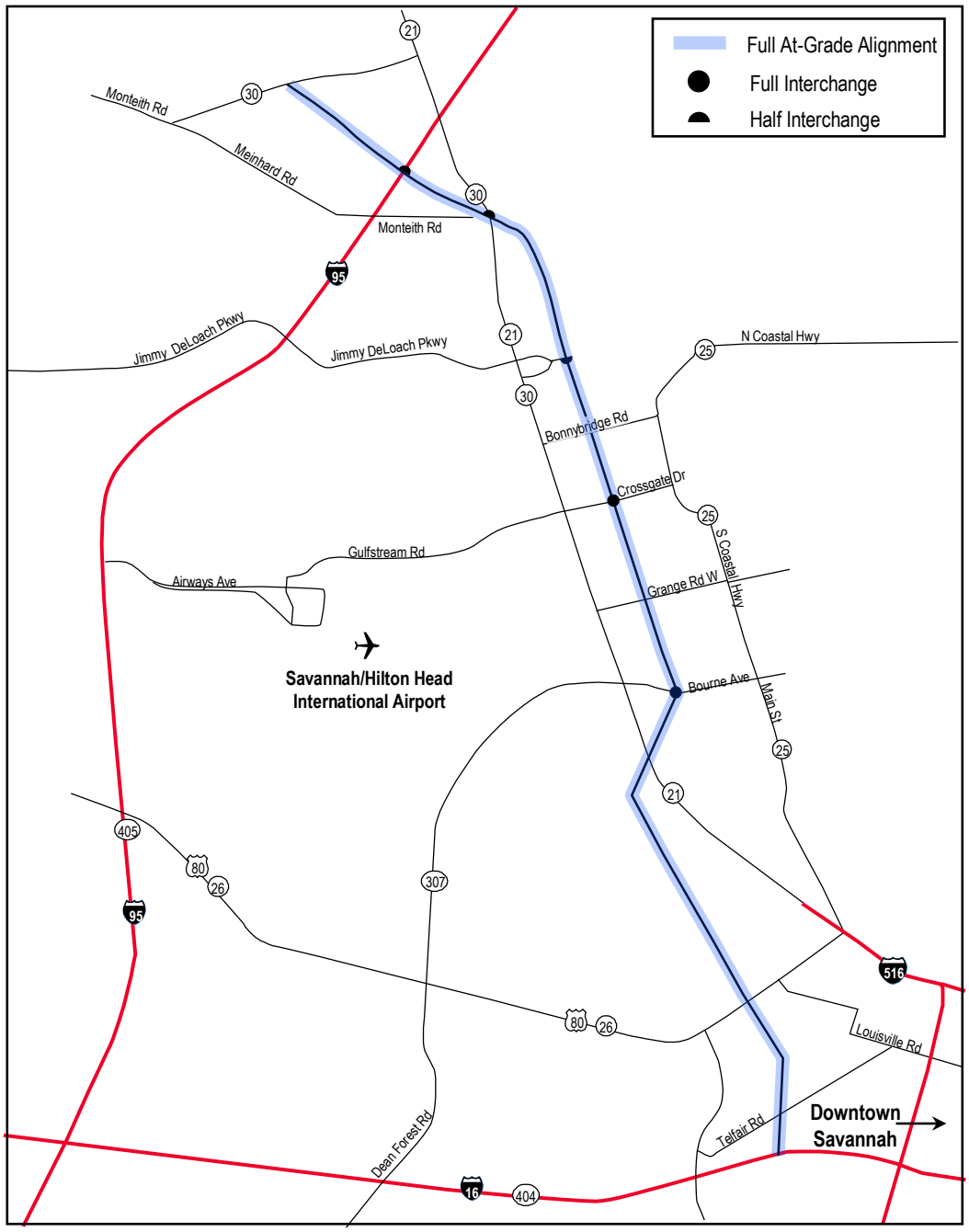
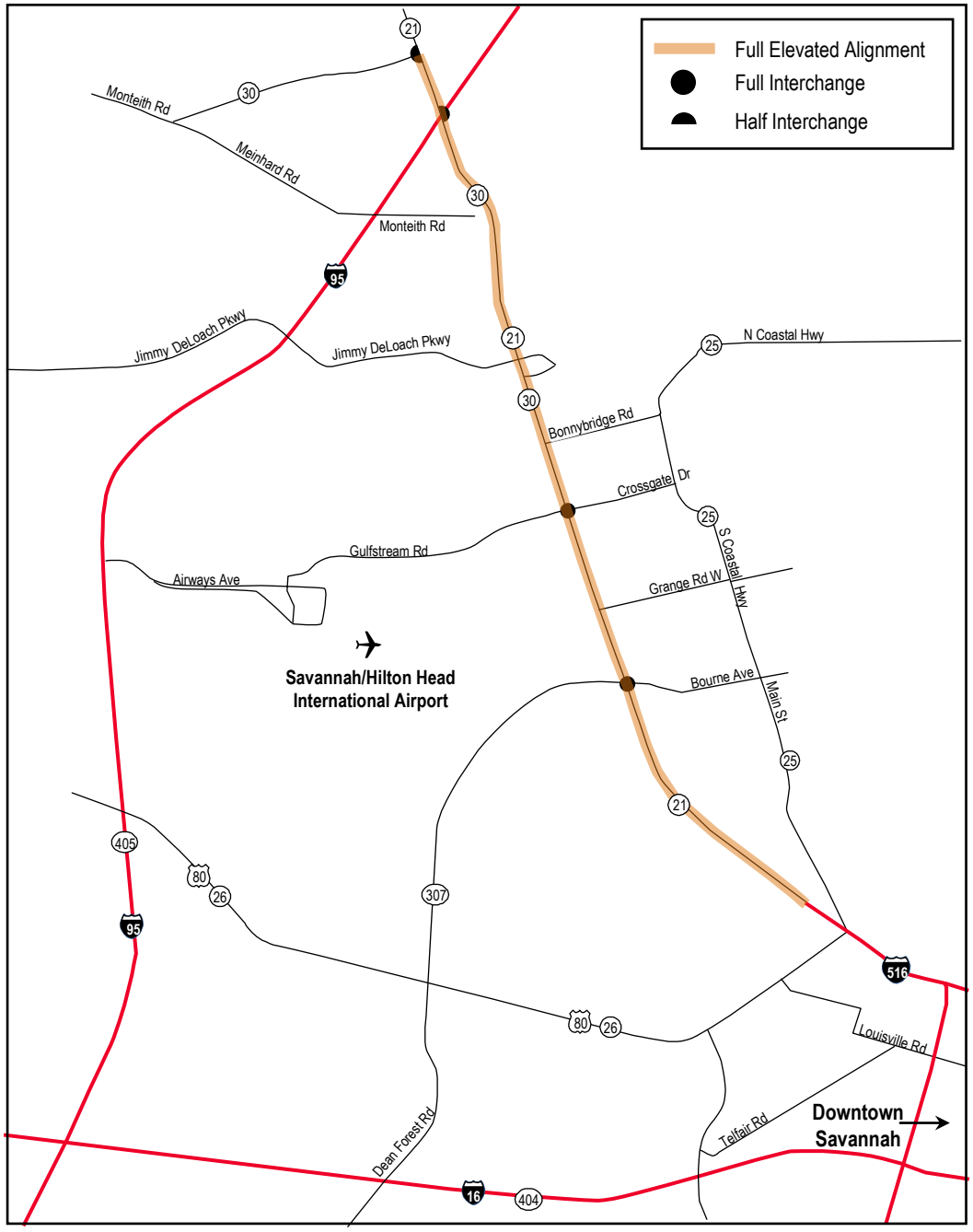


Figure 5.3 Location of Alternatives 3A, 3B, and 3C (Full Elevated Alignment)



Note: Alternative 3A has an interchange at Gulfstream Road only, Alternative 3B has an interchange at Bourne Avenue only, and Alternative 3C has no intermediate interchanges.

5.2 DETAILED DESCRIPTION OF ELEVATED ALIGNMENT

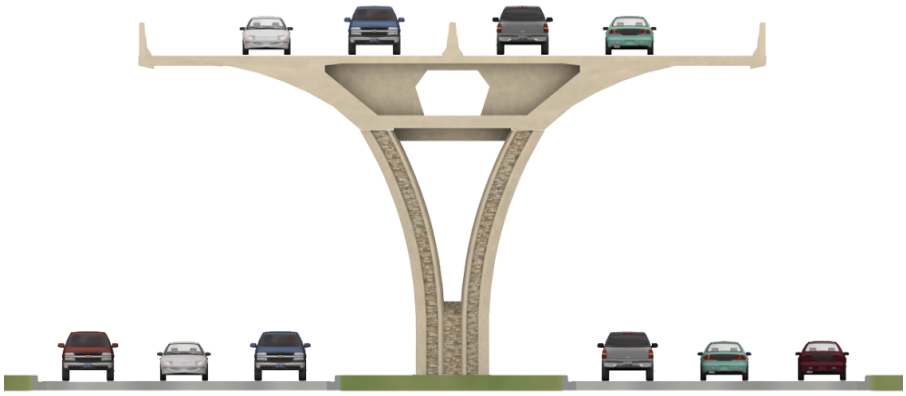
Constructing elevated lanes in the medians of existing roadways is an innovative approach increasingly being considered to address modern traffic problems. As

traffic growth and the resultant congestion in existing corridors increases, the traditional solution of adding capacity by constructing adjacent at-grade lanes has in many situations become increasingly difficult. The footprint of the expanded roadway can often be harmful to adjacent businesses, environmentally destructive, and prohibitively expensive. Acquiring needed right-of-way can be contentious and time consuming pitting transportation agencies against the communities that they are designed to serve. Additionally, nearby properties often experience negative noise and aesthetic impacts. All of these undesirable consequences can be reduced by constructing elevated lanes to provide the needed additional capacity. A schematic of an elevated roadway is shown in Figure 5.4 and an example elevated roadway in Tampa, Florida is shown in Figure 5.5.

An elevated alignment can also be built with segmented construction which allows for large segments of the roadway to be prefabricated off-site and assembled quickly at the construction site (shown in Figure 5.6). This, in turn, creates less traffic impacts during construction and less disruption to local businesses from construction as well. This is particularly important given the current levels of congestion at the I-95/SR 21 interchange.

An elevated scenario is particularly well-suited for the Northwest Toll Expressway because it allows for the separation of local traffic and through traffic for the study area. The Expressway would carry the through traffic, while the existing road network would service the local traffic. This has the benefit of separating through traffic from the port-related trucks in the study area which are primarily traveling locally between the port and local warehouses and distribution centers. It also has the benefit of not directing a "tax" on the port or shippers in the study area. This perceived tax could create negative competitive impacts for the Port of Savannah as marine companies decide to redirect their traffic to other ports.

Figure 5.4 Schematic of Elevated Alignment



Source: Project Feasibility Report SR 21 Elevated Roadway in the Median

Figure 5.5 Example of Operational Elevated Alignment – Lee Roy Selmon Highway in Tampa, Florida

Source: Project Feasibility Report SR 21 Elevated Roadway in the Median

Figure 5.6 Schematic of Segmental Construction of Elevated Roadway

Source: Project Feasibility Report SR 21 Elevated Roadway in the Median

5.3 COST ESTIMATE METHODOLOGIES

5.3.1 Construction Cost Estimation Methodology for At-Grade Alignment

A multi-step methodology was used to develop the construction cost estimates for the at-grade alignments. First, the interchanges along the project were compared with other similar interchanges across the state that have been constructed recently, as well as with interchange designs that have let to construction recently. This information provided a baseline range of costs that can be utilized for estimating costs for the Northwest Toll Expressway. For new location roadway cost estimates, historical data from GDOT was used to compare costs per mile on recent interstate projects. Significant construction cost data was available for recent projects along I-95 south of Chatham County. These costs were then adjusted to develop estimated construction costs per mile.

For conceptual interchange project estimates, a summary of assumptions for costs, materials, and bid items that would be used consistently for all of the interchanges was developed. This included assuming a standard pavement design for asphalt and concrete; estimating erosion control, traffic control, and signing / marking as a specific percent of the overall construction costs. A summary of these assumptions is listed below. Next, the scale conceptual layouts were used to calculate pavement areas, bridge areas, medians and curb locations. Since the terrain in the study area is relatively flat, it was assumed that vertical profiles for bridges and walls could be based off of a flat existing terrain. This allowed the calculation of bridge lengths and wall locations to be simplified and more consistent for all interchanges.

Once the areas and quantities were calculated for each conceptual project, the latest cost information data was researched. Consistent unit prices were assumed for asphalt, concrete, bridges, and walls based on GDOT Item Mean Estimates, the GDOT Detailed Estimate (DETEST) program, and the project team experience with recent designs that have been let to construction. Based on the total costs, items and costs specific to each interchange were added, such as the difficulty of construction staging and traffic control, drainage features, right of way constraints, interstate signing, etc.

Once the final costs were calculated, the data was entered into GDOT's DETEST program to provide more consistency in the presentation of the data. GDOT policy with regards to engineering and construction costs was followed. Reimbursable utility costs were not calculated due to the conceptual nature of this study. A ten percent contingency was added to the cost estimates to account for unknowns such as utility relocation.

The following assumptions were applied to all conceptual construction cost estimates:

1. Traffic control: 5 percent to 10 percent of overall project cost.

2. Pavement sections: 1.5", 4", 5", and 12" GAB for all roadway typical sections.
3. Bridges: $100/SF for regular bridges; $150/SF for flyovers and bridge widenings.
4. Use 6" median for islands with no c&g, use 4" median with TP7 c&g for actual medians between travel lanes.
5. Unless there is existing sidewalk, do not calculate sidewalk quantity.
6. Assume full depth shoulders for all roadways.
7. Erosion Control: 10 percent of project cost.
8. Signals: $125,000 each, includes poles, Advanced Traffic Management Systems, etc.
9. Signing and Marking: 2 percent of project cost. Cost out overhead sign bridges for interstates separately.
10. Drainage: Experience on other projects utilized to decide how many trunk lines are needed, how many outlets, side drains, flared end sections, etc. and structures will be needed. Foundation backfill quantity calculated also.
11. Other items added were:
    - Class A concrete for box culverts;
    - Guardrail and barrier near bridges, walls, steep slopes, etc.;
    - Approach slabs and grooved concrete for all bridge approaches.
    - Earthwork – tough quantity to come up with, we'll look at it case by case.
    - Leveling, Class B concrete widening, fabric strips for widening of existing roadways.
    - Tack coat between all asphalt layers, plus between 4" or more layers of pavement section (e.g. 12" 25mm pavement will need 2 additional layers of tack coat).
    - Add one field engineer's office.
    - Clearing and Grubbing. Guidelines developed by project team per other projects.

5.3.2 Conceptual Right-of-way Estimation Methodology for At-Grade Alignments

A right of way cost estimate was also developed for the at-grade alignment. This cost estimate includes the projected values of the land, improvements including buildings, parking areas, site improvements, and potential consequential damages. It is also an estimate of the amount of money spent on any relocation expenditures for residents displaced as a result of right-of-way acquisition. Preliminary right of way cost estimates are rough estimate, because it is only possible to prepare accurate cost estimates when each property has been fully

appraised within three to six months prior to beginning negotiations with the individual land owners.

Moving from the concept phase to the design phase and environmental approval is a lengthy process. The actual purchase of the required right of way typically does not take place until design plans, specifically right of way plans are approved as well as all environmental permitting is complete. During this time, the real estate market may change. New areas are developed or redeveloped. Property values may appreciate or depreciate.

Since real estate values are constantly changing, a projected of value for required right of way identified in a conceptual layout is a rough estimate. The project area is studied to determine the property types that will be impacted. Once the impacted areas are identified, sales and listings for each property type in the immediate area are gathered. Local tax assessor's value of the land and improvements are also studied to provide additional data.

These values along with estimated values of proximity damages, consequential damages, and cost to cures are tabulated. They are then applied to estimated percentage increases for market appreciation/depreciation, administrative and court costs (includes the cost to acquire the right way) and scheduling contingency (factor that builds in room for delays in design and environmental approval). These three factors have been determined by the Georgia Department of Transportation after reviewing cost estimates over the years to the actual acquisition costs at project completion.

5.3.3 Conceptual Construction Cost Estimation Methodology for Elevated Alignment

The methodology for developing construction cost estimates for the elevated alignment is taken directly from the 2008 FIGG Report "Project Feasibility Report SR 21 Elevated Roadway in the Median". To establish a base cost, historical data on a similar project was utilized. The 3-lane reversible elevated roadway constructed in the median of the Lee Roy Selmon Crosstown Expressway in Tampa, Florida was constructed in 2003 for $20 million per mile. This construction cost data was adjusted to account for inflation between 2003 and 2008. To estimate these inflationary increases, six construction market indices were examined. Two recognized industry references, the Engineering News Record Building Construction Index (ENR BCI) and the Federal Highway Administration Annual Structure Index (FHWA ASI) were used to estimate construction cost inflation during the 5-year period. The ENR BCI index showed a cumulative inflationary increase over the 5-year period of 24% (which was rounded up to 25 percent). The FHWA ASI index showed a cumulative inflationary increase of 48% (which was rounded up to 50 percent). Applying these increases to the 2003 cost of the Tampa project provides a range of high and low preliminary estimates of the 2008 equivalent cost of a comparable 3-lane structure. These costs were then adjusted to account for the 4-lane design of the

elevated alignment for this study along with interchanges and intersections that would be needed to connect the elevated alignment to the local road network.

5.4 CONSTRUCTION COST ESTIMATES

Using the methodology described in Section 5.3, the preliminary construction cost estimate for Alternative 1A and 1B (the Northern Alignment) is $32.8 million, and the preliminary cost estimate for Alternative 2A (the Full At-Grade Alignment) is $272.9 million. Using the methodology described in Section 5.4, the midpoint of the estimated costs using ENR BCI and FHWA ASI provides a preliminary estimate of $428 million for the Alternative 3A and 3B (Table 5.1). The cost for Alternative 3C is slightly lower due to the reduction of one interchange from the design, reduced total width, and design specifications needed for the beginning and end points of this alternative. The low cost of Alternatives 1A and 1B is primarily a function of the shorter length of the corridor. The high construction cost of the elevated alternatives is due to the increased cost for constructing a roadway on structures rather than on the ground.

There are additional costs which need to be incorporated to determine the total funding requirement for each alternative. These costs include engineering & contingency costs, right of way and utilities costs, preliminary engineering costs, owner's contingency costs, interest accrued over the construction period, debt service funding, and financing costs. Adding in these additional costs, the total funding requirements for the alternatives are: $76.5 million, $511.1 million and $586.2 million for Alternatives 1A, 2A, and 3A. The elevated alternatives are able to save a significant portion of right of way costs relative to the full at-grade alternative.

Table 5.2 Construction Cost Estimates
2007 Dollars

Item	Alternatives 1A, 1B	Alternative 2A	Alternatives 3A, 3B	Alternative 3C
Construction Cost	32,821,708	272,897,052	428,000,000	315,000,000
Engineering and Contingency	3,282,171	27,289,705	–	–
Right of Way and Utilities	15,491,000	80,000,000	15,491,000	15,491,000
Total Construction Cost[a]	**51,594,879**	**389,186,757**	**443,491,000**	**330,491,000**
Other Costs				
Preliminary Engineering	9,287,078	70,053,616	79,828,380	79,828,380
Owner's Contingency	2,579,744	19,459,338	22,174,550	22,174,550
Total Development Costs	**63,461,701**	**478,699,711**	**545,493,930**	**432,493,930**

[a]Does not include preliminary engineering, owner's contingency, or financing costs and reserves.

6.0 Traffic and Revenue Analysis

This chapter presents a summary of our traffic and revenue analysis for the four scenarios that were analyzed in detail for the Northwest Toll Expressway.

6.1 ALTERNATIVE 1A: NORTHERN ALIGNMENT – CARS AND TRUCKS

6.1.1 Estimated Average Weekday Traffic

A review of the project configuration and toll free estimates was conducted in determining the tolling concept shown in Figure 6.1. The traffic model was run for a range of toll rates to estimate the revenue maximizing toll rate for the facility. Analysis of the toll sensitivity showed that a passenger vehicle mainline toll rate of $1.00 or about $0.20 per mile for a full length trip was the near optimum toll rate and thus was chosen in developing the revenue forecast for this alternative. Figure 6.2 shows the 2030 estimated average weekday volumes for the facility at the chosen toll rate. At the mainline tolling location, 2030 average weekday traffic is estimated to be 16,800 vehicles. The Jimmy DeLoach Parkway ramp was the most often used ramp on the facility. A total of 7,600 vehicles entered and exited the toll facility at this location.

Figure 6.1 Alternative 1A – Toll Configuration and 2030 Estimated Average Weekday Traffic

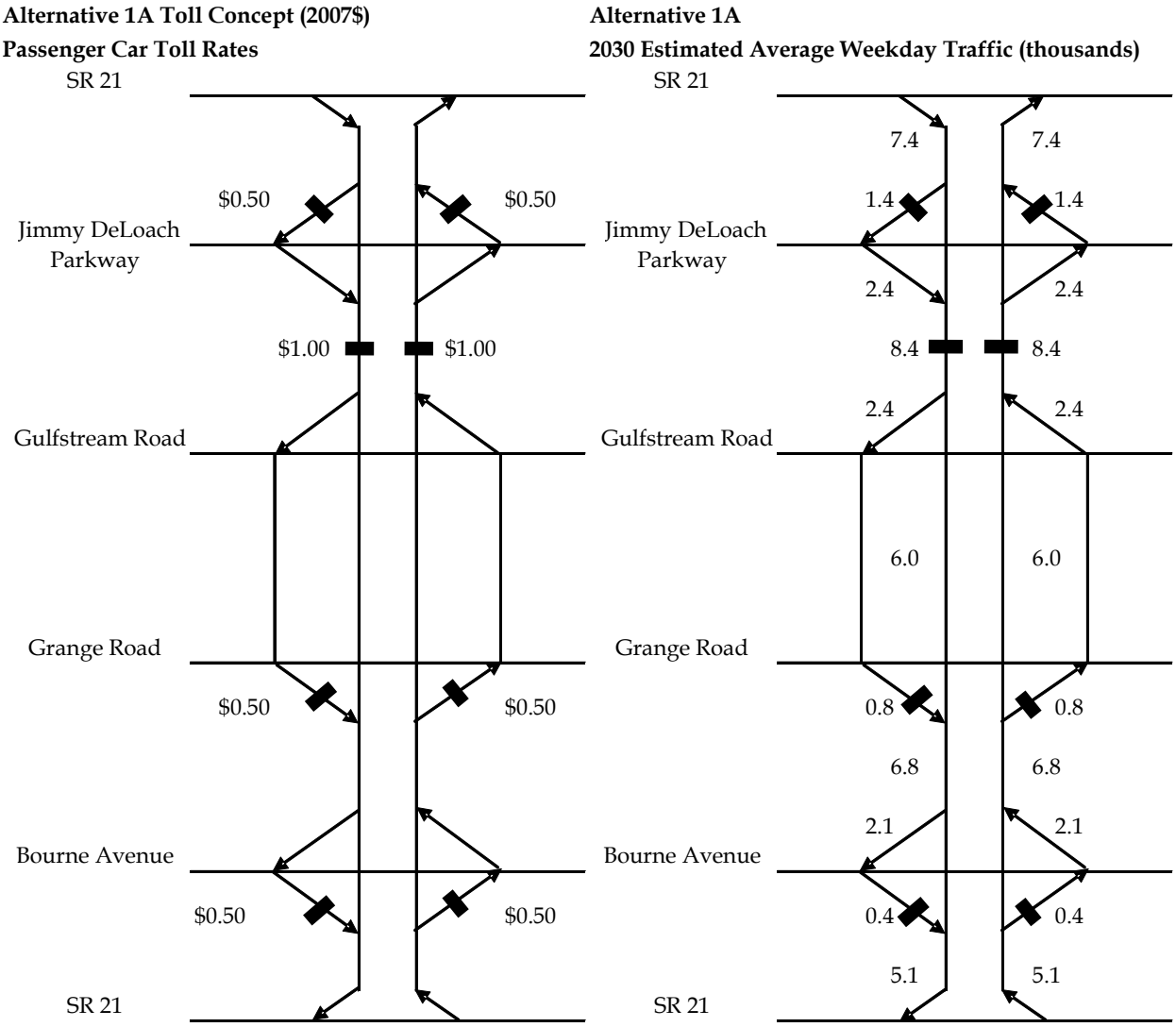


Table 6.1 shows the estimated average southbound speed in the morning peak period for different segments of the study area for Alternative 1A in year 2030. As expected, under the toll free scenario, the facility carries much more traffic compared to the toll scenario. As a result the facility experiences higher speeds in the toll scenario relative to the non-toll scenario. Similarly, SR 21 experiences lower speeds in the toll scenario, because some of the traffic shifts to SR 21.

Table 6.2 shows the estimated average 2030 southbound travel time in the morning peak period for different segments of the study area. As expected, the toll facility experiences lower travel time in the toll scenario relative to the non-toll scenario. Similarly, SR 21 shows higher travel times in the toll scenario compared to the non-toll scenario. The results in Table 6.1 and Table 6.2 indicate that the model is performed reasonably for the proposed facility.

Table 6.1 Alternative 1A – Average 2030 A.M. Peak Southbound Speeds (mph) for Toll Project and SR 21

	Toll-Free		Toll	
Segment	**Toll Project**	**SR 21**	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	22.7	15.6	38.8	11.2
Jimmy DeLoach Parkway to Gulfstream Road	31.7	19.0	54.3	6.1
Gulfstream Road to Grange Road	38.9	25.5	59.7	22.6
Grange Road to Bourne Avenue	34.8	26.7	59.8	21.7
Bourne Avenue to SR 21	34.4	40.9	47.5	39.1

Table 6.2 Alternative 1A – Average 2030 A.M. Peak Southbound Travel Time (Minutes) for Toll Project and SR 21

	Toll-Free		Toll	
Segment	**Toll Project**	**SR 21**	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	3.5	4.1	2.0	5.8
Jimmy DeLoach Parkway to Gulfstream Road	1.7	3.9	1.0	13.3
Gulfstream Road to Grange Road	1.6	1.9	1.0	2.2
Grange Road to Bourne Avenue	1.0	1.4	0.6	1.7
Bourne Avenue to SR 21	1.1	0.8	0.8	0.9
Total	**8.9**	**12.1**	**5.4**	**23.9**

6.1.2 Corridor Share Analysis

Traffic across a north-south screenline through the mainline plaza tolling location was assembled and is shown in Table 6.3. At the mainline tolling location, I-95 is about 3.5 miles to the west of the project, SR 21 is directly parallel to the project, and Coastal Highway is less than a mile east of the project. Under the toll-free scenario, it is estimated that the facility would carry a little more than a third of the total screenline demand. When the project is tolled, the overall share of traffic drops to roughly six percent of the overall screenline volume. This decline is likely due to the relatively small travel time savings the project would provide over the other toll free facilities coupled with the fairly low values-of-times that were estimated for the corridor study area.

Table 6.3 Alternative 1A – Corridor Share at Mainline Tolling Location Screenline

		Average Weekday Traffic			
Year	Facility	Toll-Free	Percent Share	Tolled	Percent Share
2015	I-95	65,500	48.0%	76,100	55.6%
	SR 21	16,500	12.1%	39,900	29.2%
	Project	47,400	34.8%	8,400	6.1%
	Coastal Highway	7,000	5.1%	12,400	9.1%
	Total	**136,400**	**100.0%**	**136,800**	**100.0%**
2030	I-95	98,600	52.7%	110,800	59.1%
	SR 21	24,500	13.1%	43,900	23.4%
	Project	55,400	29.6%	16,800	9.0%
	Coastal Highway	8,700	4.6%	16,000	8.5%
	Total	**187,200**	**100.0%**	**187,500**	**100.0%**

6.1.3 Estimated Transactions and Toll Revenue

Table 6.4 shows the estimated average weekday traffic for 2015 and 2030 at each of the tolling locations, the corresponding toll rate for passenger vehicles and trucks, and the resulting average weekday and annual toll revenue. Alternative 1A is estimated to generate $4.0 million and $8.8 million in year 2015 and 2030, respectively. Toll revenue is in year 2007 dollars. The mainline tolling location accounts for almost 90 percent of the overall toll revenue which indicates that the mainline tolling location is situated properly. An annual factor of 307.5 was used to convert average weekday traffic and revenue to annual estimates. This factor assumes 250 typical weekdays and 115 weekend/holidays which are assumed to have traffic levels that are 50 percent of the average weekday estimates.

Table 6.5 shows a 35-year annual transaction and revenue stream for the project. Annual operating costs were estimated by assuming a per transaction cost of $0.15. Annual net revenue was estimated by subtracting the resulting annual operating costs from the annual gross revenue estimates. Between 2015 and 2030, values were estimated through interpolation. Extrapolation was used to estimates values prior to 2015. Post-2030 values were estimated using a nominal growth rate of 3.0 percent.

Table 6.4 Alternative 1A – Estimated Transactions and Toll Revenue

		Average Weekday Traffic			Average Toll		Average Weekday Revenue			Annual	
Year	Tolling Location	Passenger Vehicles	Trucks	Total	Passenger Vehicles	Trucks	Passenger Vehicles	Trucks	Total	Transactions	Revenue
2015	Jimmy DeLoach	200	200	400	$0.50	$1.50	$100	$300	$400	123,000	$123,000
	Mainline	6,800	1,600	8,400	$1.00	$3.00	$6,800	$4,800	$11,600	2,583,000	$3,567,000
	Grange	400	200	600	$0.50	$1.50	$200	$300	$500	184,000	$153,750
	Bourne	200	200	400	$0.50	$1.50	$100	$300	$400	123,000	$123,000
	Total	**7,600**	**2,200**	**9,800**			**$7,200**	**$5,700**	**$12,900**	**3,013,500**	**$3,966,750**
2030	Jimmy DeLoach	2,400	400	2,800	$0.50	$1.50	$1,200	$600	$1,800	861,000	$553,500
	Mainline	12,800	4,000	16,800	$1.00	$3.00	$12,800	$12,000	$24,800	5,166,000	$7,626,000
	Grange	1,200	400	1,600	$0.50	$1.50	$600	$600	$1,200	492,000	$369,000
	Bourne	400	400	800	$0.50	$1.50	$200	$600	$800	246,000	$246,000
	Total	**16,800**	**5,200**	**22,000**			**$14,800**	**$13,800**	**$28,600**	**6,765,000**	**$8,794,500**

Table 6.5 Alternative 1A – Estimated Annual Transactions and Toll Revenue

		2007 Dollars			Nominal Dollars		
Year	Annual Transactions	Annual Gross Revenue	Operating Expenses	Net Revenue	Annual Gross Revenue	Operating Expenses	Net Revenue
2011	2,432,000	$3,209,000	$364,000	$2,844,200	$3,612,000	$411,000	$3,201,000
2012	2,566,000	$3,384,000	$384,900	$2,999,100	$3,923,000	$446,000	$3,477,000
2013	2,707,000	$3,568,000	$406,100	$3,161,900	$4,260,000	$485,000	$3,775,000
2014	2,856,000	$3,762,000	$428,400	$3,333,600	$4,627,000	$527,000	$4,100,000
2015	3,013,500	$3,966,750	$452,000	$3,514,750	$5,025,000	$573,000	$4,452,000
2016	3,180,000	$4,183,000	$477,000	$3,706,000	$5,458,000	$622,000	$4,836,000
2017	3,356,000	$4,411,000	$503,400	$3,907,600	$5,928,000	$677,000	$5,251,000
2018	3,542,000	$4,651,000	$531,300	$4,119,700	$6,438,000	$735,000	$5,703,000
2019	3,738,000	$4,905,000	$560,700	$4,344,300	$6,993,000	$799,000	$6,194,000
2020	3,945,000	$5,172,000	$591,800	$4,580,200	$7,595,000	$869,000	$6,726,000
2021	4,164,000	$5,454,000	$624,600	$4,829,400	$8,250,000	$945,000	$7,305,000
2022	4,395,000	$5,751,000	$659,300	$5,091,700	$8,960,000	$1,027,000	$7,933,000
2023	4,638,000	$6,065,000	$695,700	$5,369,300	$9,733,000	$1,116,000	$8,617,000
2024	4,895,000	$6,396,000	$764,300	$5,661,700	$10,572,000	$1,214,000	$9,358,000
2025	5,166,000	$6,745,000	$774,900	$5,970,100	$11,483,000	$1,319,000	$10,164,000
2026	5,452,000	$7,113,000	$817,800	$6,295,200	$12,473,000	$1,434,000	$11,039,000
2027	5,754,000	$7,501,000	$863,100	$6,637,900	$13,548,000	$1,559,000	$11,989,000
2028	6,073,000	$7,910,000	$911,000	$6,999,000	$14,715,000	$1,695,000	$13,020,000
2029	6,409,000	$8,341,000	$961,400	$7,379,600	$15,982,000	$1,842,000	$14,140,000
2030	6,765,000	$8,794,500	$1,014,800	$7,779,700	$17,357,000	$2,003,000	$15,354,000
2031	6,968,000	$9,058,000	$1,045,200	$8,012,800	$18,413,000	$2,125,000	$16,288,000
2032	7,177,000	$9,330,000	$1,076,600	$8,253,400	$19,535,000	$2,254,000	$17,281,000
2033	7,392,000	$9,610,000	$1,108,800	$8,501,200	$20,725,000	$2,391,000	$18,334,000
2034	7,614,000	$9,898,000	$1,142,100	$8,755,900	$21,986,000	$2,537,000	$19,449,000
2035	7,842,000	$10,195,000	$1,176,300	$9,018,700	$23,325,000	$2,691,000	$20,634,000
2036	8,077,000	$10,501,000	$1,211,600	$9,289,400	$24,746,000	$2,855,000	$21,891,000
2037	8,319,000	$10,816,000	$1,247,900	$9,568,100	$26,253,000	$3,029,000	$23,224,000
2038	8,569,000	$11,140,000	$1,285,400	$9,854,600	$27,851,000	$3,214,000	$24,637,000
2039	8,826,000	$11,474,000	$1,323,900	$10,150,100	$29,546,000	$3,409,000	$26,137,000
2040	9,091,000	$11,818,000	$1,363,700	$10,454,300	$31,345,000	$3,617,000	$27,728,000
2041	9,364,000	$12,173,000	$1,404,600	$10,768,400	$33,255,000	$3,837,000	$29,418,000
2042	9,645,000	$12,538,000	$1,446,800	$11,091,200	$35,280,000	$4,071,000	$31,209,000
2043	9,934,000	$12,914,000	$1,490,100	$11,423,900	$37,428,000	$4,319,000	$33,109,000
2044	10,232,000	$13,301,000	$1,534,800	$11,766,200	$39,707,000	$4,582,000	$35,125,000
2045	10,539,000	$13,700,000	$1,580,900	$12,119,100	$42,125,000	$4,861,000	$37,264,000

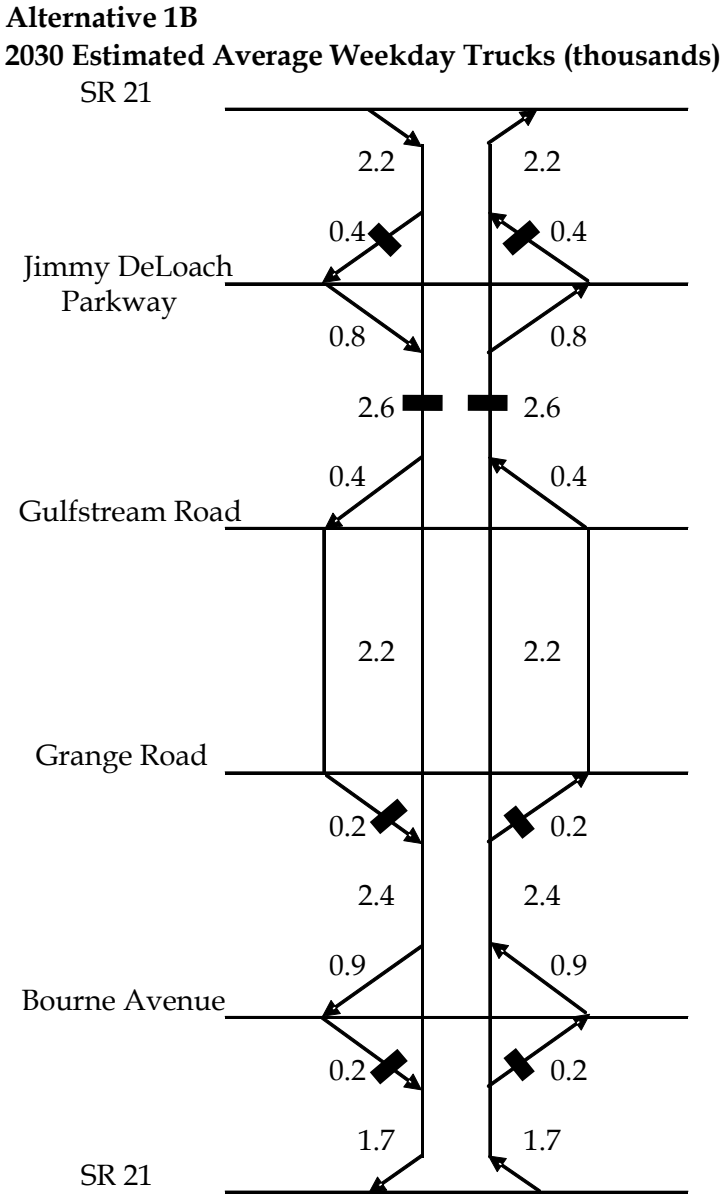
Notes: Revenue Inflation Rate: 3.0%
Cost Inflation Rate: 3.0%
Assumed Operating Expenses per Transaction: $0.15
Nominal Traffic Growth of 3.0 Percent per year Assumed for 2031-2045

6.2 ALTERNATIVE 1B: NORTHERN ALIGNMENT – TRUCKS ONLY

6.2.1 Estimated Average Weekday Trucks

Alternative 1B is identical to Alternative 1A in terms of alignment. However, Alternative 1B was run for a scenario in which only commercial vehicles would be allowed access. Figure 6.2 shows the 2030 estimated average weekday truck volumes for the facility at the chosen toll rate. At the mainline tolling location, 2030 average weekday traffic is estimated to be 5,200 commercial vehicles. This is much lower than the 16,800 vehicles that were captured utilizing the mixed flow traffic allowed on the Northwest Toll Expressway in Alternative 1A. The Jimmy DeLoach Parkway was once again the most frequently used ramp from the toll facility. A total of 2,400 vehicles utilized this ramp to exit or enter the facility.

Figure 6.2 Alternative 1B – Toll Configuration and 2030 Estimated Average Weekday Trucks



6.2.2 Estimated Average A.M. Speeds and Travel Times

The average 2030 A.M. peak-period speeds and travel times behave as expected in the truck-only scenario (Tables 6.6 and 6.7). The toll project has higher travel speeds and lower travel times than the mixed flow scenario analyzed in Alternative 1A.

Table 6.6 Alternative 1B – Average 2030 A.M. Peak-Period Southbound Speeds for Toll Project and SR 21

	Toll	
Segment	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	38.9	7.3
Jimmy DeLoach Parkway to Gulfstream Road	54.5	4.8
Gulfstream Road to Grange Road	59.8	21.6
Grange Road to Bourne Avenue	59.8	19.7
Bourne Avenue to SR 21	48.0	38.7

Table 6.7 Alternative 1B – Average 2030 A.M. Peak-Period Southbound Travel Time for Toll Project and SR 21

	Toll	
Segment	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	2.0	8.8
Jimmy DeLoach Parkway to Gulfstream Road	1.0	18.5
Gulfstream Road to Grange Road	1.0	2.3
Grange Road to Bourne Avenue	0.6	1.9
Bourne Avenue to SR 21	0.8	0.9
Total	**5.4**	**32.4**

6.2.3 Estimated Transactions and Toll Revenue

Table 6.8 shows the estimated average weekday traffic for 2015 and 2030 at each of the tolling locations, the corresponding average toll rate for trucks, and the resulting average weekday and annual toll revenue. Alternative 1B is estimated to generate $1.8 million and $5.5 million in year 2015 and 2030, respectively. Toll revenue is in year 2007 dollars. This equates to a little over half of the revenue compared to the mixed flow analysis in 2015 and a little over 60 percent of the revenue compared to the mixed flow analysis in 2030.

Table 6.8 Alternative 1B – Estimated Transactions and Toll Revenue

Year	Tolling Location	Average Weekday Traffic	Average Truck Toll	Average Weekday Revenue	Annual	
					Transactions	Revenue
2015	Jimmy DeLoach	200	$1.50	$300	61,500	$92,250
	Mainline	1,600	$3.00	$4,800	492,000	$1,476,000
	Grange	200	$1.50	$300	61,500	$92,250
	Bourne	200	$1.50	$300	61,500	$92,500
	Total	**2,200**		**$5,700**	**676,500**	**$1,752,750**
2030	Jimmy DeLoach	800	$1.50	$1,200	246,000	$369,000
	Mainline	5,200	$3.00	$15,600	1,599,000	$4,797,000
	Grange	400	$1.50	$600	123,000	$184,500
	Bourne	400	$1.50	$600	123,000	$184,500
	Total	**6,800**		**$18,000**	**2,091,000**	**$5,535,000**

Table 6.9 shows a 35-year annual transaction and revenue stream for the project. Annual operating costs were estimated by assuming a per transaction cost of $0.15. Annual net revenue was estimated by subtracting the resulting annual operating costs from the annual gross revenue estimates. Between 2015 and 2030, values were estimated through interpolation. Extrapolation was used to estimates values prior to 2015. Post-2030 values were estimated using a nominal growth rate of 5.0 percent to account for the freight growth at the port likely increasing more quickly than the passenger volume that dominates Alternative 1A.

Table 6.9 Alternative 1B – Estimated Annual Transactions and Toll Revenue

		2007 Dollars			Nominal Dollars		
Year	Annual Transactions	Annual Gross Revenue	Operating Expenses	Net Revenue	Annual Gross Revenue	Operating Expenses	Net Revenue
2011	502,000	$1,293,000	$75,300	$1,217,700	$1,455,000	$85,000	$1,370,000
2012	541,000	$1,395,000	$81,200	$1,313,800	$1,617,000	$94,000	$1,523,000
2013	583,000	$1,505,000	$87,500	$1,417,500	$1,797,000	$104,000	$1,693,000
2014	628,000	$1,624,000	$94,200	$1,529,800	$1,997,000	$116,000	$1,881,000
2015	676,500	$1,752,750	$101,500	$1,651,250	$2,220,000	$129,000	$2,091,000
2016	729,000	$1,892,000	$109,400	$1,782,600	$2,469,000	$143,000	$2,326,000
2017	786,000	$2,043,000	$117,900	$1,925,100	$2,746,000	$158,000	$2,588,000
2018	847,000	$2,206,000	$127,100	$2,078,900	$3,054,000	$176,000	$2,878,000
2019	913,000	$2,382,000	$137,000	$2,245,000	$3,396,000	$195,000	$3,201,000
2020	984,000	$2,572,000	$147,600	$2,424,400	$3,777,000	$217,000	$3,560,000
2021	1,061,000	$2,777,000	$159,200	$2,617,800	$4,200,000	$241,000	$3,959,000
2022	1,144,000	$2,998,000	$171,600	$2,826,400	$4,671,000	$267,000	$4,404,000
2023	1,233,000	$3,237,000	$185,000	$3,052,000	$5,194,000	$297,000	$4,897,000
2024	1,329,000	$3,495,000	$199,400	$3,295,600	$5,777,000	$330,000	$5,447,000
2025	1,433,000	$3,773,000	$215,000	$3,558,000	$6,423,000	$366,000	$6,057,000
2026	1,545,000	$4,074,000	$231,800	$3,842,200	$7,144,000	$406,000	$6,738,000
2027	1,666,000	$4,399,000	$249,900	$4,149,100	$7,945,000	$451,000	$7,494,000
2028	1,796,000	$4,749,000	$269,400	$4,479,600	$8,835,000	$501,000	$8,334,000
2029	1,936,000	$5,127,000	$290,400	$4,836,600	$9,824,000	$556,000	$9,268,000
2030	2,091,000	$5,535,000	$313,700	$5,221,300	$10,924,000	$619,000	$10,305,000
2031	2,196,000	$5,701,000	$329,400	$5,371,600	$11,589,000	$670,000	$10,919,000
2032	2,306,000	$5,986,000	$345,900	$5,640,100	$12,533,000	$724,000	$11,809,000
2033	2,421,000	$6,285,000	$363,200	$5,921,800	$13,554,000	$783,000	$12,771,000
2034	2,542,000	$6,599,000	$381,300	$6,217,700	$14,658,000	$847,000	$13,811,000
2035	2,669,000	$6,929,000	$400,400	$6,528,600	$15,853,000	$916,000	$14,937,000
2036	2,802,000	$7,275,000	$420,300	$6,854,700	$17,144,000	$990,000	$16,154,000
2037	2,942,000	$7,639,000	$441,300	$7,197,700	$18,542,000	$1,071,000	$17,471,000
2038	3,089,000	$8,021,000	$463,400	$7,557,600	$20,053,000	$1,159,000	$18,894,000
2039	3,243,000	$8,422,000	$486,500	$7,935,500	$21,687,000	$1,253,000	$20,434,000
2040	3,405,000	$8,843,000	$510,800	$8,332,200	$23,455,000	$1,355,000	$22,100,000
2041	3,575,000	$9,285,000	$536,300	$8,748,700	$25,366,000	$1,465,000	$23,901,000
2042	3,754,000	$9,749,000	$563,100	$9,185,900	$27,432,000	$1,584,000	$25,848,000
2043	3,942,000	$10,236,000	$591,300	$9,644,700	$29,667,000	$1,714,000	$27,953,000
2044	4,139,000	$10,749,000	$620,900	$10,127,100	$32,085,000	$1,854,000	$30,231,000
2045	4,346,000	$11,285,000	$651,900	$10,633,100	$34,699,000	$2,004,000	$32,695,000

Notes: Revenue Inflation Rate: 3.0%
Cost Inflation Rate: 3.0%
Assumed Operating Expenses per Transaction: $0.15
Nominal Traffic Growth of 3.0 Percent per year Assumed for 2031-2045

6.3 ALTERNATIVE 2A: FULL AT-GRADE ALIGNMENT

6.3.1 Estimated Average Weekday Traffic

Alternative 2A runs from north of SR 30 on the northern end of the alignment and connects with I-16 in the southern end of the alignment. The toll configuration for Alternative 2A is shown in Figure 6.3. Toll sensitivity analysis showed that a passenger vehicle mainline toll rate of $1.50 for a full length trip was the near optimum toll rate for revenue maximization and thus was chosen in developing the revenue forecast for this alternative. Tolls to and from the south at the Gulfstream Road and Bourne Avenue interchanges are shown in Figure 6.3. Figure 6.3 also shows the 2030 estimated average weekday volumes for the facility at the chosen toll rate. At the mainline tolling location, 2030 average weekday traffic is estimated to be 22,600 vehicles. This is about 33 percent higher than the mainline tolling volume for Alternative 1A.

Tables 6.10 and 6.11 show the estimated average 2030 southbound speed and travel time in the morning peak period for different segments of the study area for Alternative 2A in year 2030. Under the toll-free scenario, the toll facility carries much more traffic compared to the toll scenario. As a result the toll facility experiences higher speed and lower travel time in the toll scenario relative to the non-toll scenario. The average A.M. peak-period southbound speeds for the toll scenario are between 49 mph and 65 mph depending on the segment. This is pretty close to free flow speeds. This compares to between 26 mph and 37 mph for the toll scenario. SR 21 experiences extremely low speeds under the toll scenario. All of the speeds on SR 21 range from 5 mph to 20 mph, except for one. This compares to speeds in between 15 mph and 26 mph in the toll-free scenario.

Under the toll scenario, the total travel time on SR 21 increases from 12.1 minutes to 27.9 minutes due to the large volumes of traffic which elect not to pay the toll. As discussed earlier, this significant amount of diversion is due in part to the low value-of-time that was captured as part of the stated-preference survey for autos. The travel time on the proposed corridor decreases from 7.4 minutes to 4.7 minutes as the toll is introduced.

Figure 6.3 Alternative 2A – Toll Configuration and 2030 Estimated Average Weekday Traffic

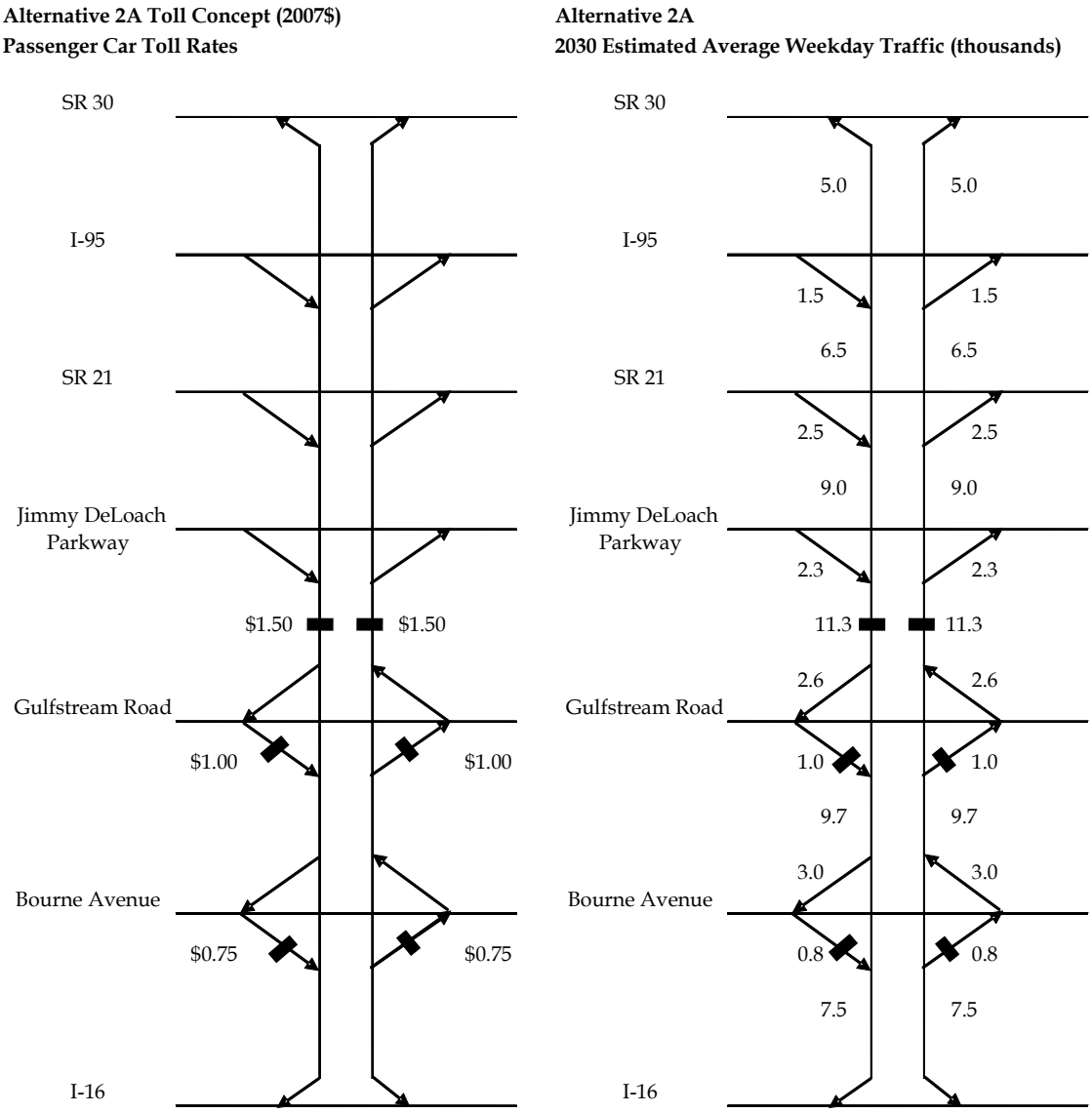


Table 6.10 Alternative 2A – Average A.M. Peak-Period Southbound Speeds for Toll Project and SR 21

	Toll-Free		Toll	
Segment	**Toll Project**	**SR 21**	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	33.2	15.9	48.8	12.7
Jimmy DeLoach Parkway to Gulfstream Road	26.1	15.7	49.3	4.8
Gulfstream Road to Grange Road	33.7	26.2	55.8	20.0
Grange Road to Bourne Avenue	37.1	25.8	49.6	17.8
Bourne Avenue to SR 21	59.4	35.1	64.9	33.2

Table 6.11 Alternative 2A – Average A.M. Peak-Period Southbound Travel Time for Toll Project and SR 21

	Toll-Free		Toll	
Segment	**Toll Project**	**SR 21**	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	1.6	3.0	1.1	3.7
Jimmy DeLoach Parkway to Gulfstream Road	2.6	4.7	1.4	18.4
Gulfstream Road to Grange Road	1.5	1.9	0.9	2.5
Grange Road to Bourne Avenue	1.0	1.4	0.7	2.1
Bourne Avenue to SR 21	0.7	1.1	0.6	1.2
Total	**7.4**	**12.1**	**4.7**	**27.9**

6.3.2 Corridor Share Analysis

Traffic across a north-south screenline through the mainline plaza tolling location was assembled and is shown in Table 6.12. Under the toll-free scenario, the facility would be expected to carry more than 40 percent of the total screenline demand. When the project is tolled, the overall share of traffic drops to 6.5 percent of the overall screenline in 2015 and to 11.3 percent in 2030. The higher retention of traffic in 2030 is due to increased congestion levels on the alternative routes. Even with the added congestion in 2030, a significant portion of the toll free traffic demand is diverted back to SR 21 and I-95.

Table 6.12 Alternative 2A – Corridor Share at Mainline Tolling Location Screenline

		Average Weekday Traffic			
Year	Facility	Toll-Free	Percent Share	Tolled	Percent Share
2015	I-95	61,800	42.7%	72,500	51.3%
	SR 21	10,700	7.4%	44,400	31.4%
	Project	64,800	44.8%	9,200	6.5%
	Coastal Highway	7,300	5.0%	15,300	10.8%
	Total	**144,600**	**100.0%**	**141,400**	**100.0%**
2030	I-95	88,600	43.8%	108,900	54.5%
	SR 21	20,500	10.1%	51,000	25.5%
	Project	84,000	41.6%	22,600	11.3%
	Coastal Highway	9,000	4.5%	17,500	8.8%
	Total	**202,100**	**100.0%**	**200,000**	**100.0%**

6.3.3 Estimated Transactions and Toll Revenue

Table 6.13 shows the estimated average weekday traffic for 2015 and 2030 at the tolling location and the resulting average weekday and annual toll revenue. Alternative 2A is estimated to generate $6.2 million and $15.5 million in year 2015 and 2030, respectively. Toll revenue is in year 2007 dollars. The 2015 toll revenue in Alternative 2A is roughly 50 percent higher than the toll revenue in Alternative 1A, while the 2030 toll revenue is just less than double the toll revenue in Alternative 1A.

Table 6.14 shows a 35-year annual transaction and revenue stream for the project. Annual operating costs were estimated by assuming a per transaction cost of $0.15. Annual net revenue was estimated by subtracting the resulting annual operating costs from the annual gross revenue estimates. Between 2015 and 2030, values were estimated through interpolation. Extrapolation was used to estimates values prior to 2015. Post-2030 values were estimated using a nominal growth rate of 3.0 percent. This table shows the maximum annual revenue of the facility being $68.6 million occurring in 2045.

Table 6.13 Alternative 2A – Estimated Transactions and Toll Revenue

		Average Weekday Traffic			Average Toll (2007 Dollars)		Average Weekday Revenue			Annual	
Year	Tolling Location	Passenger Vehicles	Trucks	Total	Passenger Vehicles	Trucks	Passenger Vehicles	Trucks	Total	Transactions	Revenue
2015	Mainline	8,000	1,200	9,200	$1.50	$4.50	$12,000	$5,400	$17,400	2,829,000	$5,350,500
	Gulfstream	1,000	200	1,200	$1.00	$3.00	$1,000	$600	$1,600	369,000	$492,000
	Bourne	800	200	1,000	$0.75	$2.25	$600	$450	$1,050	307,500	$322,875
	Total	**9,800**	**1,600**	**11,400**			**$13,600**	**$6,450**	**$20,050**	**3,505,500**	**$6,165,375**
2030	Mainline	18,600	4,000	22,600	$1.50	$4.50	$27,900	$18,000	$45,900	6,949,500	$14,114,250
	Gulfstream	1,600	400	2,000	$1.00	$3.00	$1,600	$1,200	$2,800	615,000	$861,000
	Bourne	1,200	400	1,600	$0.75	$2.25	$900	$900	$1,800	492,000	$553,500
	Total	**21,400**	**4,800**	**26,200**			**$30,400**	**$20,100**	**$50,500**	**8,056,500**	**$15,528,750**

Table 6.14 Alternative 2A – Estimated Annual Transactions and Toll Revenue

		2007 Dollars			Nominal Dollars		
Year	Annual Transactions	Annual Gross Revenue	Operating Expenses	Net Revenue	Annual Gross Revenue	Operating Expenses	Net Revenue
2011	2,812,000	$4,820,000	$421,800	$4,398,200	$5,425,000	$475,000	$4,950,000
2012	2,971,000	$5,126,000	$445,700	$4,680,300	$5,942,000	$517,000	$5,425,000
2013	3,139,000	$5,451,000	$470,900	$4,980,100	$6,509,000	$562,000	$5,947,000
2014	3,317,000	$5,797,000	$497,600	$5,299,400	$7,130,000	$612,000	$6,518,000
2015	3,505,500	$6,165,375	$525,800	$5,639,575	$7,810,000	$666,000	$7,144,000
2016	3,705,000	$6,557,000	$555,800	$6,001,200	$8,555,000	$725,000	$7,830,000
2017	3,916,000	$6,973,000	$587,400	$6,385,600	$9,371,000	$789,000	$8,582,000
2018	4,139,000	$7,416,000	$620,900	$6,795,100	$10,265,000	$859,000	$9,406,000
2019	4,375,000	$7,887,000	$656,300	$7,230,700	$11,245,000	$936,000	$10,309,000
2020	4,625,000	$8,388,000	$693,800	$7,694,200	$12,318,000	$1,019,000	$11,299,000
2021	4,889,000	$8,921,000	$733,400	$8,187,600	$13,494,000	$1,109,000	$12,385,000
2022	5,168,000	$9,488,000	$775,200	$8,712,800	$14,782,000	$1,208,000	$13,574,000
2023	5,463,000	$10,091,000	$819,500	$9,271,500	$16,193,000	$1,315,000	$14,878,000
2024	5,775,000	$10,732,000	$866,300	$9,865,700	$17,738,000	$1,432,000	$16,306,000
2025	6,104,000	$11,414,000	$915,600	$10,498,400	$19,432,000	$1,559,000	$17,873,000
2026	6,452,000	$12,139,000	$967,800	$11,171,200	$21,286,000	$1,697,000	$19,589,000
2027	6,820,000	$12,910,000	$1,023,000	$11,887,000	$23,317,000	$1,848,000	$21,469,000
2028	7,209,000	$13,730,000	$1,081,400	$12,648,600	$25,542,000	$2,012,000	$23,530,000
2029	7,620,000	$14,602,000	$1,143,000	$13,459,000	$27,979,000	$2,190,000	$25,789,000
2030	8,056,500	$15,528,750	$1,208,500	$14,320,250	$30,647,000	$2,385,000	$28,262,000
2031	8,298,000	$15,995,000	$1,244,700	$14,750,300	$32,515,000	$2,530,000	$29,985,000
2032	8,547,000	$16,475,000	$1,282,100	$15,192,900	$34,495,000	$2,684,000	$31,811,000
2033	8,803,000	$16,969,000	$1,320,500	$15,648,500	$36,595,000	$2,848,000	$33,747,000
2034	9,067,000	$17,478,000	$1,360,100	$16,117,900	$38,824,000	$3,021,000	$35,803,000
2035	9,339,000	$18,002,000	$1,400,900	$16,601,100	$41,187,000	$3,205,000	$37,982,000
2036	9,619,000	$18,542,000	$1,442,900	$17,099,100	$43,695,000	$3,400,000	$40,295,000
2037	9,908,000	$19,098,000	$1,486,200	$17,611,800	$46,356,000	$3,607,000	$42,749,000
2038	10,205,000	$19,671,000	$1,530,800	$18,140,200	$49,179,000	$3,827,000	$45,352,000
2039	10,511,000	$20,261,000	$1,576,700	$18,684,300	$52,174,000	$4,060,000	$48,114,000
2040	10,826,000	$20,869,000	$1,623,900	$19,245,100	$55,352,000	$4,307,000	$51,045,000
2041	11,151,000	$21,495,000	$1,672,700	$19,822,300	$58,722,000	$4,570,000	$54,152,000
2042	11,486,000	$22,140,000	$1,722,900	$20,417,100	$62,299,000	$4,848,000	$57,451,000
2043	11,831,000	$22,804,000	$1,774,700	$21,029,300	$66,092,000	$5,144,000	$60,948,000
2044	12,186,000	$23,488,000	$1,827,900	$21,660,100	$70,117,000	$5,457,000	$64,660,000
2045	12,552,000	$24,193,000	$1,882,800	$22,310,200	$74,388,000	$5,789,000	$68,599,000

Notes: Revenue Inflation Rate: 3.0%
Cost Inflation Rate: 3.0%
Assumed Operating Expenses per Transaction: $0.15
Nominal Traffic Growth of 3.0 Percent per year Assumed for 2031-2045

6.4 ALTERNATIVE 3A: FULL ELEVATED ALIGNMENT – ACCESS AT GULFSTREAM ROAD

6.4.1 Estimated Average Weekday Traffic

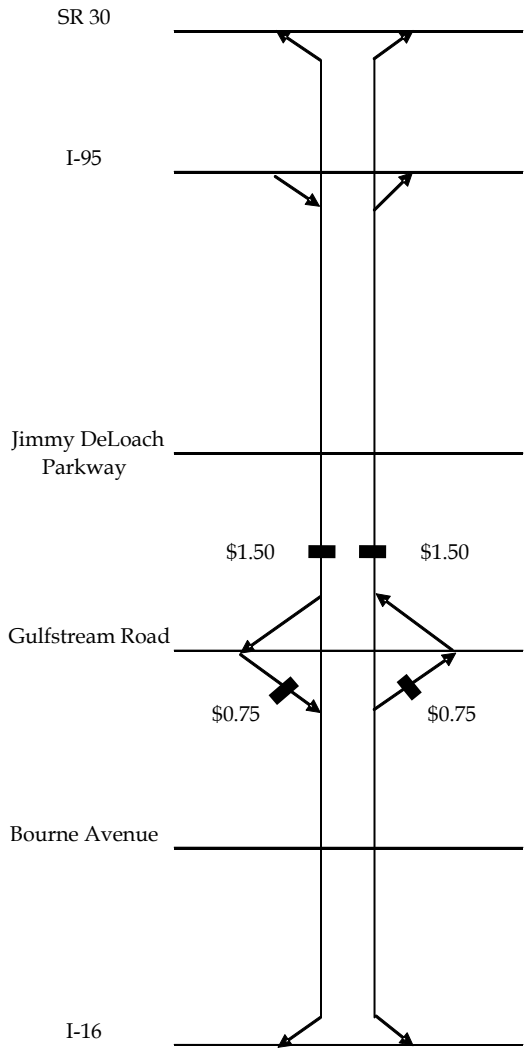
The tolling concept for Alternative 3A (the 2-direction, mixed-flow elevated alignment with connection at Gulfstream Road and I-95) is shown in Figure 6.4. A passenger vehicle toll rate of $1.50 or about $0.20 per mile for a full length trip was chosen for the analysis based upon prior toll sensitivity analysis in Alternative 3A. The truck toll rate for a full length trip was set to $4.50. Both autos and commercial vehicles were allowed to access the elevated facility. Figure 6.4 also shows the 2030 estimated average weekday volumes for the facility at the chosen toll rate. At the mainline tolling location, 2030 average weekday traffic is estimated to be 23,200 vehicles.

As shown in Figure 6.4, a significant percentage of the traffic either enter or exit at this alternative's single ramp location at Gulfstream Road. The total number of vehicles using this ramp is 8,000 per day. Tables 6.15 and 6.16 show the estimated average 2030 southbound speeds and travel times in the morning peak period for different segments of the study area for Alternative 3A. The proposed facility has speeds that are much lower when it is not tolled relative to when it is tolled. This indicates that the traffic diverting away from the proposed facility is utilizing SR 21 to cross the corridor.

The travel times in the corridor indicate that even under toll-free scenarios the travel time for Alternative 3A is significantly lower than the travel time for SR 21. This indicates that there are a large number of vehicles that travel in the corridor that can not make use of the alignment under any conditions. This must be due to the origins and destinations of these trips not being well-served by the entrance and egress points of Alternative 3A Under the toll-free scenario, the travel time of SR 21 is 27.1 minutes, while the travel time of Alternative 3A is only 16.9. This difference is even more pronounced in the toll scenario, where the travel time of SR 21 is 40.7 minutes, while the travel time of Alternative 3A is 9.9 minutes.

Figure 6.4 Alternative 3A – Toll Configuration and 2030 Estimated Average Weekday Traffic

Alternative 3A Toll Concept (2007$)
Passenger Car Toll Rates



Alternative 3A
2030 Estimated Average Weekday Traffic (Thousands)

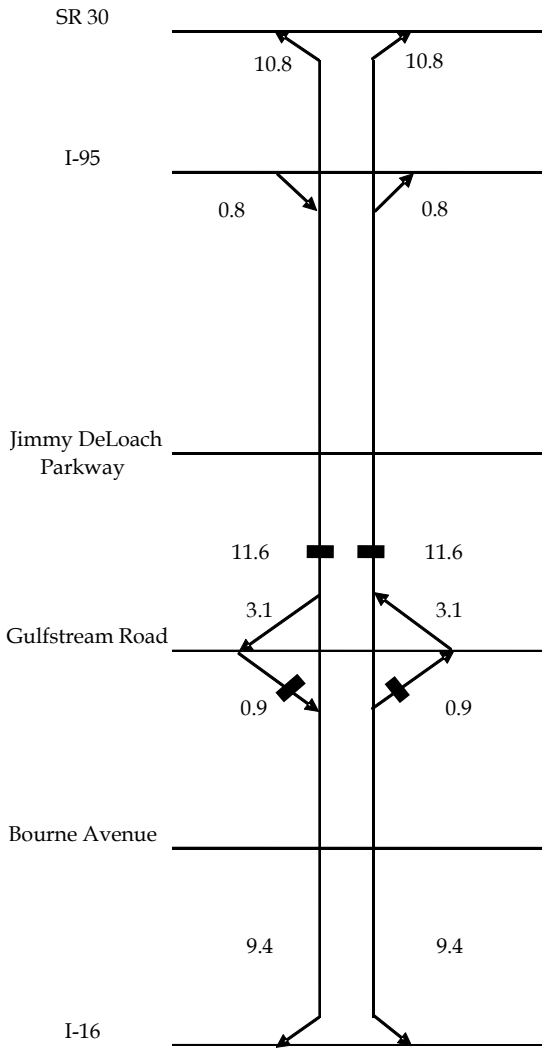


Table 6.15 Alternative 3A – Average 2030 A.M. Peak Southbound Speeds (mph) for Toll Project and SR 21

	Toll-Free			Toll	
Segment	No Build	Toll Project	SR 21	Toll Project	SR 21
SR 21 to Jimmy DeLoach Parkway	7.3	18.9	10.1	47.0	6.9
Jimmy DeLoach Parkway to Gulfstream Road	5.2	35.7	12.3	48.2	6.5
Gulfstream Road to Grange Road	21.5	35.7	24.4	48.2	20.7
Grange Road to Bourne Avenue	20.9	35.7	24.7	48.2	20.1
Bourne Avenue to SR 21	38.6	50.0	40.1	64.0	35.5

Table 6.16 Alternative 3A – Average 2030 A.M. Peak Southbound Travel Time (Minutes) for Toll Project and SR 21

	Toll-Free			Toll	
Segment	No Build	Toll Project	SR 21	Toll Project	SR 21
SR 21 to Jimmy DeLoach Parkway	8.9	8.8	14.7	3.7	20.8
Jimmy DeLoach Parkway to Gulfstream Road	14.0	2.3	5.9	1.7	11.8
Gulfstream Road to Grange Road	2.3	1.7	2.0	1.3	2.4
Grange Road to Bourne Avenue	1.8	1.2	1.3	1.1	1.8
Bourne Avenue to SR 21	3.5	2.9	3.2	2.1	3.9
Total	**30.5**	**16.9**	**27.1**	**9.9**	**40.7**

6.4.2 Corridor Share Analysis

Traffic across a north-south screenline through the mainline plaza tolling location was assembled and is shown in Table 6.17. Under the toll-free scenario, Alternative 3A would be expected to carry about 32 percent of the total screenline demand in year 2030. When Alternative 3A is tolled, the overall share of traffic drops to around 8.4 percent of the overall screenline, with a majority of the traffic diverting back to I-95.

Table 6.17 Alternative 3A – Corridor Share at Mainline Tolling Location Screenline

		Average Weekday Traffic					
Year	Facility	No Build	Percent Share	Toll-Free	Percent Share	Tolled	Percent Share
2015	I-95	74,430	57.0%	62,600	44.1%	75,800	53.2%
	SR 21	43,130	33.0%	25,100	17.7%	43,400	30.5%
	Project	0	0.0%	45,100	31.8%	11,900	8.4%
	Coastal Highway	12,950	9.9%	9,200	6.5%	11,300	7.9%
	Total	**130,510**	**100.0%**	**142,000**	**100.0%**	**141,500**	**100.0%**
2030	I-95	115,730	65.2%	95,100	47.5%	112,600	56.2%
	SR 21	44,000	24.8%	34,200	17.1%	48,100	24.0%
	Project	0	0.0%	58,500	29.2%	23,200	11.6%
	Coastal Highway	17,700	10.0%	12,500	6.2%	16,500	8.2%
	Total	**177,430**	**100.0%**	**200,300**	**100.0%**	**199,800**	**100.0%**

6.4.3 Estimated Transactions and Toll Revenue

Table 6.18 shows the estimated average weekday traffic for 2015 and 2030 at the tolling location and the resulting average weekday and annual toll revenue. Alternative 3A is estimated to generate $5.8 million and $12.5 million in year 2015 and 2030, respectively. Toll revenue is in year 2007 dollars.

Table 6.19 shows a 35-year annual transaction and revenue stream for the project. Annual operating costs were estimated by assuming a per transaction cost of $0.15. Annual net revenue was estimated by subtracting the resulting annual operating costs from the annual gross revenue estimates. Between 2015 and 2030, values were estimated through interpolation. Extrapolation was used to estimates values prior to 2015. Post-2030 values were estimated using a nominal growth rate of 3.0 percent. Future revenue analyses will compare the net present value of these annual revenue streams to the projected costs for each alignment.

Table 6.18 Alternative 3A – Estimated Transactions and Toll Revenue

	Daily		Annual	
Year	Total	Total	Transactions	Revenue
2015	11,900	$18,900	3,659,250	$5,811,750
2030	23,200	$40,500	7,134,000	$12,453,750

Table 6.19 Alternative 3A – Estimated Annual Transactions and Toll Revenue

		2007 Dollars			Nominal Dollars		
Year	Annual Transactions	Annual Gross Revenue	Operating Expenses	Net Revenue	Annual Gross Revenue	Operating Expenses	Net Revenue
2011	3,064,000	$4,743,000	$459,600	$4,283,400	$5,338,000	$517,000	$4,821,000
2012	3,203,000	$4,990,000	$480,500	$4,509,500	$5,785,000	$557,000	$5,228,000
2013	3,348,000	$5,250,000	$502,200	$4,747,800	$6,269,000	$600,000	$5,669,000
2014	3,500,000	$5,524,000	$525,000	$4,999,000	$6,794,000	$646,000	$6,148,000
2015	3,659,250	$5,811,750	$548,900	$5,262,850	$7,362,000	$695,000	$6,667,000
2016	3,826,000	$6,115,000	$573,900	$5,541,100	$7,979,000	$749,000	$7,230,000
2017	4,000,000	$6,434,000	$600,000	$5,834,000	$8,647,000	$806,000	$7,841,000
2018	4,182,000	$6,769,000	$627,300	$6,141,700	$9,370,000	$868,000	$8,502,000
2019	4,372,000	$7,122,000	$655,800	$6,466,200	$10,154,000	$935,000	$9,219,000
2020	4,571,000	$7,493,000	$685,700	$6,807,300	$11,004,000	$1,007,000	$9,997,000
2021	4,779,000	$7,884,000	$716,900	$7,167,100	$11,925,000	$1,084,000	$10,841,000
2022	4,997,000	$8,295,000	$749,600	$7,545,400	$12,923,000	$1,168,000	$11,755,000
2023	5,224,000	$8,727,000	$783,600	$7,943,400	$14,004,000	$1,257,000	$12,747,000
2024	5,462,000	$9,182,000	$819,300	$8,362,700	$15,176,000	$1,354,000	$13,822,000
2025	5,711,000	$9,661,000	$856,700	$8,804,300	$16,447,000	$1,458,000	$14,989,000
2026	5,971,000	$10,165,000	$895,700	$9,269,300	$17,824,000	$1,571,000	$16,253,000
2027	6,243,000	$10,695,000	$936,500	$9,758,500	$19,316,000	$1,691,000	$17,625,000
2028	6,527,000	$11,252,000	$979,100	$10,272,900	$20,932,000	$1,821,000	$19,111,000
2029	6,824,000	$11,838,000	$1,023,600	$10,814,400	$22,683,000	$1,961,000	$20,722,000
2030	7,134,000	$12,453,750	$1,070,100	$11,383,650	$24,579,000	$2,112,000	$22,467,000
2031	7,348,000	$12,827,000	$1,102,200	$11,724,800	$26,075,000	$2,241,000	$23,834,000
2032	7,568,000	$13,212,000	$1,135,200	$12,076,800	$27,663,000	$2,377,000	$25,286,000
2033	7,795,000	$13,608,000	$1,169,300	$12,438,700	$29,347,000	$2,522,000	$26,825,000
2034	8,029,000	$14,016,000	$1,204,400	$12,811,600	$31,134,000	$2,675,000	$28,459,000
2035	8,270,000	$14,436,000	$1,240,500	$13,195,300	$33,029,000	$2,838,000	$30,191,000
2036	8,518,000	$14,869,000	$1,277,700	$13,591,300	$35,040,000	$3,011,000	$32,029,000
2037	8,774,000	$15,315,000	$1,316,100	$13,998,900	$37,174,000	$3,195,000	$33,979,000
2038	9,037,000	$15,774,000	$1,355,600	$14,418,400	$39,436,000	$3,389,000	$36,047,000
2039	9,308,000	$16,247,000	$1,396,200	$14,850,800	$41,837,000	$3,595,000	$38,242,000
2040	9,587,000	$16,734,000	$1,438,100	$15,295,900	$44,384,000	$3,814,000	$40,570,000
2041	9,875,000	$17,236,000	$1,481,300	$15,754,700	$47,087,000	$4,047,000	$43,040,000
2042	10,171,000	$17,753,000	$1,525,700	$16,227,300	$49,955,000	$4,293,000	$45,662,000
2043	10,476,000	$18,286,000	$1,571,400	$16,714,600	$52,998,000	$4,554,000	$48,444,000
2044	10,790,000	$18,835,000	$1,618,500	$17,216,500	$56,227,000	$4,832,000	$51,395,000
2045	11,114,000	$19,400,000	$1,667,100	$17,732,900	$59,651,000	$5,126,000	$54,525,000

Notes: Revenue Inflation Rate: 3.0%
Cost Inflation Rate: 3.0%
Assumed Operating Expenses per Transaction: $0.15
Nominal Traffic Growth of 3.0 Percent per year Assumed for 2031-2045

6.5 ALTERNATIVE 3B: FULL ELEVATED ALIGNMENT – ACCESS AT BOURNE AVENUE

6.5.1 Estimated Average Weekday Traffic

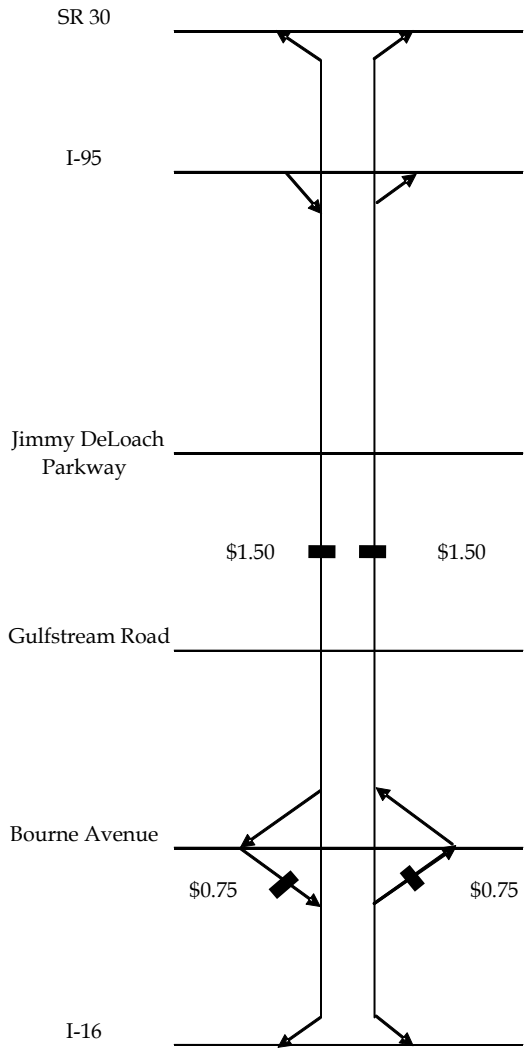
The tolling concept for Alternative 3B is shown in Figure 6.5. A passenger vehicle toll rate of $1.50 or about $0.20 per mile for a full length trip was chosen for the analysis based upon prior toll sensitivity analysis in Alternative 3B. Both autos and commercial vehicles were allowed to access the elevated facility. Figure 6.5 also shows the 2030 estimated average weekday volumes for the facility at the chosen toll rate. At the mainline tolling location, 2030 average weekday traffic is estimated to be 18,800 passenger vehicles.

As shown in Figure 6.5, approximately 7,400 vehicles per day utilize the ramp at Bourne Avenue. This is slightly less than the number of vehicles that accessed Gulfstream Road in Alternative 3A. Tables 6.20 and 6.21 show the estimated average 2030 southbound speeds and travel times in the morning peak period for different segments of the study area for Alternative 3B. Under the toll-free scenario, the proposed facility has speeds around 30 mph. Under the toll scenario, the facility has speeds around 51 mph due to the diversion of traffic away from the proposed facility and on to SR 21. SR 21 corridor has an average speed of 11 mph for toll scenario and 17 mph for toll-free scenario. This indicates that the traffic diverting away from the proposed facility is utilizing SR 21 to cross the corridor.

The travel times in the corridor indicate that even under toll-free scenarios the travel time for Alternative 3B is significantly lower than the travel time for SR 21. This indicates that there are a large number of vehicles that travel in the corridor that can not make use of the alignment under any conditions. This must be due to the origins and destinations of these trips not being well-served by the entrance and egress points of Alternative 3B. Under the toll-free scenario, the travel time of SR 21 is 28.0 minutes, while the travel time of Alternative 3B is only 15.9. This difference is even more pronounced in the toll scenario, where the travel time of SR 21 is 41.3 minutes, while the travel time of Alternative 3B is 9.0 minutes.

Figure 6.5 Alternative 3B – Toll Configuration and 2030 Estimated Average Weekday Traffic

Alternative 3B Toll Concept (2007$)
Passenger Car Toll Rates



Alternative 3B
2030 Estimated Average Weekday Traffic (Thousands)

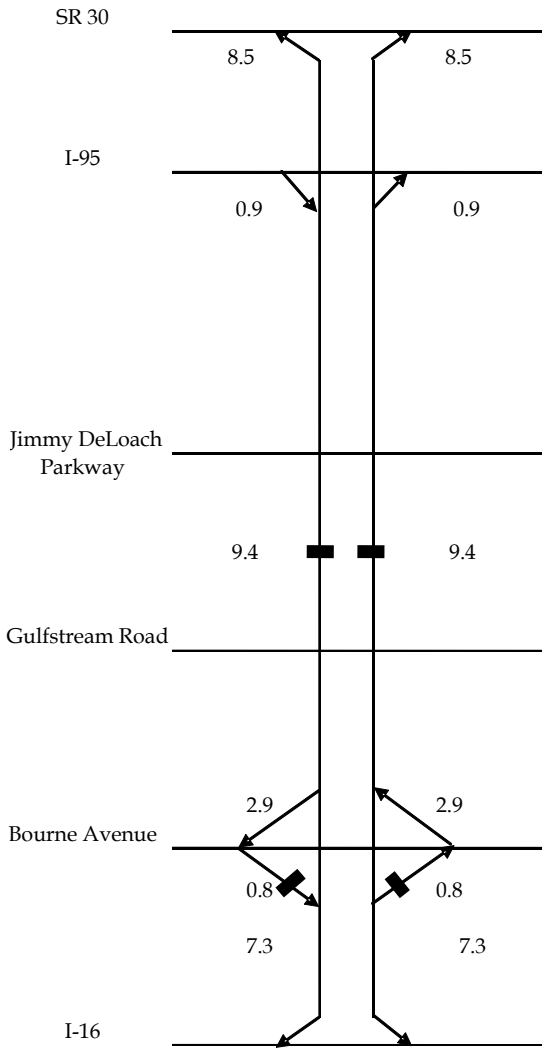


Table 6.20 Alternative 3B – Average 2030 A.M. Peak Southbound Speeds (mph) for Toll Project and SR 21

	Toll-Free			Toll	
Segment	No Build	Toll Project	SR 21	Toll Project	SR 21
SR 21 to Jimmy DeLoach Parkway	7.3	19.1	9.8	47.3	6.9
Jimmy DeLoach Parkway to Gulfstream Road	5.2	36.1	12.2	48.8	6.1
Gulfstream Road to Grange Road	21.5	36.1	24.4	48.8	20.4
Grange Road to Bourne Avenue	20.9	36.1	24.3	48.8	19.8
Bourne Avenue to SR 21	38.6	50.0	40.0	64.2	35.2

Table 6.21 Alternative 3B – Average 2030 A.M. Peak Southbound Travel Time (Minutes) for Toll Project and SR 21

	Toll-Free			Toll	
Segment	No Build	Toll Project	SR 21	Toll Project	SR 21
SR 21 to Jimmy DeLoach Parkway	8.9	8.7	15.1	3.5	21.1
Jimmy DeLoach Parkway to Gulfstream Road	14.0	2.1	6.0	1.5	12.0
Gulfstream Road to Grange Road	2.3	1.4	2.0	1.1	2.4
Grange Road to Bourne Avenue	1.8	1.0	1.5	0.8	1.9
Bourne Avenue to SR 21	3.5	2.7	3.4	2.1	3.9
Total	**30.5**	**15.9**	**28.0**	**9.0**	**41.3**

6.5.2 Corridor Share Analysis

Traffic across a north-south screenline through the mainline plaza tolling location was assembled and is shown in Table 6.22. Under the toll-free scenario, Alternative 3B would be expected to carry about 29 percent of the total screenline demand in year 2030. When the project is tolled, the overall share of traffic drops to around 9.4 percent of the overall screenline volume, with a majority of the traffic diverting back to I-95. This is a similar scenario to Alternative 3A.

Table 6.22 Alternative 3B – Corridor Share at Mainline Tolling Location Screenline

		Average Weekday Traffic					
Year	Facility	No Build	Percent Share	Toll-Free	Percent Share	Tolled	Percent Share
2015	I-95	74,430	57.0%	63,000	44.2%	76,800	54.1%
	SR 21	43,130	33.0%	25,400	17.8%	44,000	31.0%
	Project	0	0.0%	44,800	31.4%	9,200	6.5%
	Coastal Highway	12,950	9.9%	9,400	6.6%	12,000	8.5%
	Total	**130,510**	**100.0%**	**142,600**	**100.0%**	**142,000**	**100.0%**
2030	I-95	115,730	65.2%	95,300	47.7%	113,500	56.8%
	SR 21	44,000	24.8%	34,400	17.2%	49,600	24.8%
	Project	0	0.0%	57,500	28.8%	18,800	9.4%
	Coastal Highway	17,700	10.0%	12,600	6.3%	18,100	9.1%
	Total	**177,430**	**100.0%**	**199,800**	**100.0%**	**199,950**	**100.0%**

6.5.3 Estimated Transactions and Toll Revenue

Table 6.23 shows the estimated average weekday traffic for 2015 and 2030 at the tolling location and the resulting average weekday and annual toll revenue. Alternative 3B is estimated to generate $5.4 million and $11.3 million in year 2015 and 2030, respectively. Toll revenue is in year 2007 dollars.

Table 6.24 shows a 35-year annual transaction and revenue stream for the project. Annual operating costs were estimated by assuming a per transaction cost of $0.15. Annual net revenue was estimated by subtracting the resulting annual operating costs from the annual gross revenue estimates. Between 2015 and 2030, values were estimated through interpolation. Extrapolation was used to estimates values prior to 2015. Post-2030 values were estimated using a nominal growth rate of 3.0 percent. Future revenue analyses will compare the net present value of these annual revenue streams to the projected costs for each alignment.

Table 6.23 Alternative 3B – Estimated Transactions and Toll Revenue

		Average Weekday Traffic			Average Toll (2007 Dollars)		Average Weekday Revenue			Annual	
Year	Tolling Location	Passenger Vehicles	Trucks	Total	Passenger Vehicles	Trucks	Passenger Vehicles	Trucks	Total	Transactions	Revenue
2015	Mainline	8,300	900	9,200	$1.50	$4.50	$12,450	$4,052	$16,500	2,829,000	$5,073,750
	Bourne	1,100	100	1,200	$0.75	$2.25	$825	$225	$1,050	369,000	$322,875
	Total	**9,400**	**1,000**	**10,400**			**$13,275**	**$4,275**	**$17,550**	**3,198,000**	**$5,396,625**
2030	Mainline	16,400	2,400	18,800	$1.50	$4.50	$24,600	$10,800	$35,400	5,781,000	$10,885,500
	Bourne	1,400	200	1,600	$0.75	$2.25	$1,050	$450	$1,500	492,000	$461,250
	Total	**17,800**	**2,600**	**20,400**			**$25,650**	**$11,250**	**$36,900**	**6,273,000**	**$11,346,750**

Table 6.24 Alternative 3B – Estimated Annual Transactions and Toll Revenue

		2007 Dollars			Nominal Dollars		
Year	Annual Transactions	Annual Gross Revenue	Operating Expenses	Net Revenue	Annual Gross Revenue	Operating Expenses	Net Revenue
2011	2,670,000	$4,427,000	$400,500	$4,026,500	$4,983,000	$451,000	$4,523,000
2012	2,793,000	$4,652,000	$419,000	$4,233,000	$5,393,000	$486,000	$4,907,000
2013	2,922,000	$4,888,000	$438,300	$4,449,700	$5,837,000	$523,000	$5,314,000
2014	3,057,000	$5,136,000	$458,600	$4,677,400	$6,317,000	$564,000	$5,753,000
2015	3,198,000	$5,396,625	$479,700	$4,916,925	$6,836,000	$608,000	$6,228,000
2016	3,345,000	$5,671,000	$501,800	$5,169,200	$7,399,000	$655,000	$6,744,000
2017	3,499,000	$5,959,000	$524,900	$5,434,100	$8,008,000	$705,000	$7,303,000
2018	3,660,000	$6,262,000	$549,000	$5,713,000	$8,668,000	$760,000	$7,908,000
2019	3,828,000	$6,580,000	$574,200	$6,005,800	$9,382,000	$819,000	$8,563,000
2020	4,004,000	$6,914,000	$600,600	$6,313,400	$10,153,000	$882,000	$9,271,000
2021	4,188,000	$7,265,000	$628,200	$6,636,800	$10,989,000	$950,000	$10,039,000
2022	4,380,000	$7,634,000	$657,000	$6,977,000	$11,894,000	$1,024,000	$10,870,000
2023	4,581,000	$8,022,000	$687,200	$7,334,800	$12,873,000	$1,103,000	$11,771,000
2024	4,791,000	$8,429,000	$718,700	$7,710,300	$13,932,000	$1,188,000	$12,744,000
2025	5,011,000	$8,857,000	$751,700	$8,105,300	$15,078,000	$1,280,000	$13,798,000
2026	5,241,000	$9,307,000	$786,200	$8,520,800	$16,320,000	$1,379,000	$14,941,000
2027	5,482,000	$9,780,000	$822,300	$8,957,700	$17,664,000	$1,485,000	$16,179,000
2028	5,734,000	$10,277,000	$860,100	$9,416,900	$19,118,000	$1,600,000	$17,518,000
2029	5,997,000	$10,799,000	$899,600	$9,899,400	$20,692,000	$1,724,000	$18,968,000
2030	6,273,000	$11,346,750	$941,000	$10,405,750	$22,394,000	$1,857,000	$20,537,000
2031	6,461,000	$11,687,000	$969,200	$10,717,800	$23,757,000	$1,970,000	$21,787,000
2032	6,655,000	$12,038,000	$998,300	$11,039,700	$25,205,000	$2,090,000	$23,115,000
2033	6,855,000	$12,399,000	$1,028,300	$11,370,700	$26,740,000	$2,218,000	$24,522,000
2034	7,061,000	$12,771,000	$1,059,200	$11,711,800	$28,368,000	$2,353,000	$26,015,000
2035	7,273,000	$13,154,000	$1,091,000	$12,063,000	$30,095,000	$2,496,000	$27,599,000
2036	7,491,000	$13,549,000	$1,123,700	$12,425,300	$31,929,000	$2,648,000	$29,281,000
2037	7,716,000	$13,955,000	$1,157,400	$12,797,600	$33,872,000	$2,809,000	$31,063,000
2038	7,947,000	$14,374,000	$1,192,100	$13,181,900	$35,936,000	$2,980,000	$32,956,000
2039	8,185,000	$14,805,000	$1,227,800	$13,577,200	$38,124,000	$3,162,000	$34,962,000
2040	8,431,000	$15,249,000	$1,264,700	$13,984,300	$40,445,000	$3,354,000	$37,091,000
2041	8,684,000	$15,706,000	$1,302,600	$14,403,400	$42,907,000	$3,559,000	$39,348,000
2042	8,945,000	$16,177,000	$1,341,800	$14,835,200	$45,520,000	$3,776,000	$41,744,000
2043	9,213,000	$16,662,000	$1,382,000	$15,280,000	$48,291,000	$4,005,000	$44,286,000
2044	9,489,000	$17,162,000	$1,423,400	$15,738,600	$51,232,000	$4,249,000	$46,983,000
2045	9,774,000	$17,677,000	$1,466,100	$16,210,900	$54,353,000	$4,508,000	$49,845,000

Notes: Revenue Inflation Rate: 3.0%
Cost Inflation Rate: 3.0%
Assumed Operating Expenses per Transaction: $0.15
Nominal Traffic Growth of 3.0 Percent per year Assumed for 2031-2045

6.6 ALTERNATIVE 3C – FULL ELEVATED ALIGNMENT – REVERSIBLE LANES

6.6.1 Estimated Average Weekday Traffic

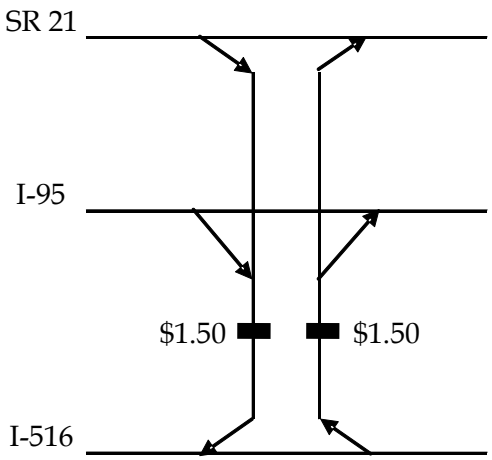
The tolling concept for Alternative 3C is shown in Figure 6.6. There is only need for one tolling point as all traffic that would use the facility would pass through this location. A passenger vehicle toll rate of $1.50 or about $0.20 per mile for a full length trip was chosen for the analysis based upon prior toll sensitivity analysis. Commercial vehicles were not allowed access to the elevated facility and the facility would operate in the southbound direction only during the A.M. and midday time periods and in the northbound direction only during the P.M. and night time periods. Figure 6.6 also shows the 2030 estimated average weekday volumes for the facility at the chosen toll rate. At the mainline tolling location, 2030 average weekday traffic is estimated to be 11,600 passenger vehicles. This is roughly half of the volume captured through Alternative 2A (22,600 vehicles) and 30 percent less than the vehicles captured in Alternative 1A (16,800 vehicles). It is also significantly less than the number of vehicles captured in Alternatives 3A and 3B.

As shown in Figure 6.6, the vast majority of the traffic (nearly 90 percent) travel the entire length of the corridor. Approximately, 1,200 vehicles per day utilize the interchange at I-95. Tables 6.25 and 6.26 show the estimated average 2030 southbound speeds and travel times in the morning peak period for different segments of the study area for Alternative 3C. Under the toll-free scenario, the proposed facility has speeds around 55 mph which is very close to free-flow speeds. Under the toll scenario, free flow speeds are achieved through the diversion of traffic away from the proposed facility and on to SR 21. SR 21 has a wide range of speeds for both the toll scenario and the toll-free scenario with slower speeds in the northern end of the facility and faster speeds in the southern end of the facility. This indicates that the traffic diverting away from the proposed facility is utilizing SR 21 to cross the corridor.

Under the toll-free scenario, the travel time of SR 21 is 32.1 minutes, while the travel time of the Elevated Alignment is only 13.8. This difference is even more pronounced in the toll scenario, where the travel time of SR 21 is 43.9 minutes, while the travel time of Alternative 3C is 7.8 minutes, which as mentioned before is very close to the free flow conditions of the corridor. This even wider discrepancy further indicates the high level of sensitivity of auto traffic to the toll rates in the study area.

Figure 6.6 Alternative 3C – Toll Configuration and 2030 Estimated Average Weekday Traffic

Alternative 3C Toll Concept (2007$)
Passenger Car Toll Rates



Alternative 3C
2030 Estimated Average Weekday Traffic (thousands)

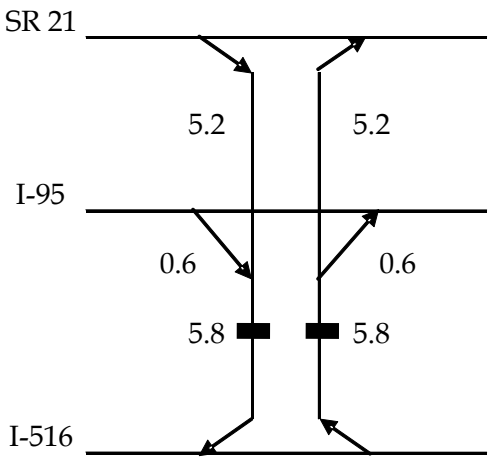


Table 6.25 Alternative 3C – Average A.M. Peak-Period Southbound Speeds for Toll Project and SR 21

	Toll-Free		Toll	
Segment	**Toll Project**	**SR 21**	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	20.1	9.8	52.5	7.1
Jimmy DeLoach Parkway to Gulfstream Road	54.4	7.5	59.5	5.1
Gulfstream Road to Grange Road	54.4	24.2	59.5	20.5
Grange Road to Bourne Avenue	54.4	24.1	59.5	19.4
Bourne Avenue to SR 21	58.8	39.0	64.0	35.8

Table 6.26 Alternative 3C – Average A.M. Peak-Period Southbound Travel Time for Toll Project and SR 21

	Toll-Free		Toll	
Segment	**Toll Project**	**SR 21**	**Toll Project**	**SR 21**
SR 21 to Jimmy DeLoach Parkway	8.2	15.0	3.2	21.0
Jimmy DeLoach Parkway to Gulfstream Road	1.4	9.8	1.2	14.5
Gulfstream Road to Grange Road	1.0	2.1	0.9	2.4
Grange Road to Bourne Avenue	0.8	1.6	0.8	2.1
Bourne Avenue to SR 21	2.4	3.6	1.7	3.9
Total	**13.8**	**32.1**	**7.8**	**43.9**

6.6.2 Corridor Share Analysis

Traffic across a north-south screenline through the mainline plaza tolling location was assembled and is shown in Table 6.27. Under the toll-free scenario, Alternative 3C would be expected to carry about 13 percent of the total screenline demand. The lower corridor share for this alternative as compared to other alternatives is a result of the project serving only the passenger vehicle segment of traffic and lack of intermediate access and egress. When the project is tolled, the overall share of traffic drops to around five percent of the overall screenline volume with a majority of the traffic diverting back to I-95. This illustrates that the traffic captured by Alternative 3C is actually being diverted from both SR 21 and from I-95.

Table 6.27 Alternative 3C – Corridor Share at Mainline Tolling Location Screenline

		Average Weekday Traffic			
Year	Facility	Toll-Free	Percent Share	Tolled	Percent Share
2015	I-95	70,400	49.9%	76,500	54.1%
	SR 21	40,000	28.4%	44,800	31.7%
	Project	17,800	12.6%	5,600	4.0%
	Coastal Highway	12,800	9.1%	14,500	10.3%
	Total	**141,000**	**100.0%**	**141,400**	**100.0%**
2030	I-95	112,900	54.9%	122,200	59.6%
	SR 21	49,600	24.1%	52,100	25.4%
	Project	26,400	12.8%	11,600	5.7%
	Coastal Highway	16,600	8.1%	19,100	9.3%
	Total	**205,500**	**100.0%**	**205,000**	**100.0%**

6.6.3 Estimated Transactions and Toll Revenue

Table 6.28 shows the estimated average weekday traffic for 2015 and 2030 at the tolling location and the resulting average weekday and annual toll revenue. Alternative 3C is estimated to generate $2.6 million and $5.3 million in year 2015 and 2030, respectively. Toll revenue is in year 2007 dollars.

Table 6.28 Alternative 3C – Estimated Transactions and Toll Revenue

	2015	2030
Average Weekday		
Transactions	5,600	11,600
Toll Rate (2007 Dollars)	$1.50	$1.50
Revenue	$8,400	$17,400
Annual		
Transactions	1,722,000	3,567,000
Revenue	$2,583,000	$5,350,500

Table 6.29 shows a 35-year annual transaction and revenue stream for the project. Annual operating costs were estimated by assuming a per transaction cost of $0.15. Annual net revenue was estimated by subtracting the resulting annual operating costs from the annual gross revenue estimates. Between 2015 and 2030, values were estimated through interpolation. Extrapolation was used to estimates values prior to 2015. Post-2030 values were estimated using a nominal growth rate of 3.0 percent. Future revenue analyses will compare the net present value of these annual revenue streams to the projected costs for each alignment.

Table 6.29 Alternative 3C – Estimated Annual Transactions and Toll Revenue

		2007 Dollars			Nominal Dollars		
Year	Annual Transactions	Annual Gross Revenue	Operating Expenses	Net Revenue	Annual Gross Revenue	Operating Expenses	Net Revenue
2011	1,418,000	$2,127,000	$212,700	$1,914,300	$2,394,000	$239,000	$2,155,000
2012	1,488,000	$2,232,000	$223,200	$2,008,800	$2,587,000	$259,000	$2,328,000
2013	1,562,000	$2,343,000	$234,300	$2,108,700	$2,798,000	$280,000	$2,518,000
2014	1,640,000	$2,460,000	$246,000	$2,214,000	$3,025,000	$303,000	$2,722,000
2015	1,722,000	$2,583,000	$258,300	$2,324,700	$3,272,000	$327,000	$2,945,000
2016	1,808,000	$2,711,000	$271,200	$2,439,800	$3,537,000	$354,000	$3,183,000
2017	1,898,000	$2,846,000	$284,700	$2,561,300	$3,825,000	$383,000	$3,442,000
2018	1,992,000	$2,988,000	$298,800	$2,689,200	$4,136,000	$414,000	$3,722,000
2019	2,091,000	$3,137,000	$313,700	$2,823,300	$4,473,000	$447,000	$4,026,000
2020	2,195,000	$3,293,000	$329,300	$2,963,700	$4,836,000	$484,000	$4,352,000
2021	2,304,000	$3,457,000	$345,600	$3,111,400	$5,229,000	$523,000	$4,706,000
2022	2,419,000	$3,629,000	$362,900	$3,266,100	$5,654,000	$565,000	$5,029,000
2023	2,539,000	$3,810,000	$380,900	$3,429,100	$6,114,000	$611,000	$5,503,000
2024	2,665,000	$4,000,000	$399,800	$3,600,200	$6,611,000	$661,000	$5,950,000
2025	2,798,000	$4,199,000	$419,700	$3,779,300	$7,149,000	$715,000	$6,434,000
2026	2,937,000	$4,408,000	$440,600	$3,967,400	$7,729,000	$773,000	$6,956,000
2027	3,083,000	$4,627,000	$462,500	$4,164,500	$8,357,000	$835,000	$7,522,000
2028	3,236,000	$4,857,000	$485,400	$4,371,600	$9,035,000	$903,000	$8,132,000
2029	3,397,000	$5,099,000	$509,600	$4,589,400	$9,770,000	$976,000	$8,794,000
2030	3,567,000	$5,350,500	$535,100	$4,815,400	$10,560,000	$1,056,000	$9,504,000
2031	3,674,000	$5,511,000	$551,100	$4,959,900	$11,203,000	$1,120,000	$10,083,000
2032	3,784,000	$5,676,000	$567,600	$5,108,400	$11,884,000	$1,188,000	$10,696,000
2033	3,898,000	$5,847,000	$584,700	$5,262,300	$12,610,000	$1,261,000	$11,349,000
2034	4,015,000	$6,023,000	$602,300	$5,420,700	$13,379,000	$1,338,000	$12,041,000
2035	4,135,000	$6,203,000	$620,300	$5,582,700	$14,192,000	$1,419,000	$12,773,000
2036	4,259,000	$6,389,000	$638,900	$5,750,100	$15,056,000	$1,506,000	$13,550,000
2037	4,387,000	$6,581,000	$658,100	$5,922,900	$15,974,000	$1,597,000	$14,377,000
2038	4,519,000	$6,779,000	$677,900	$6,101,100	$16,948,000	$1,695,000	$15,253,000
2039	4,655,000	$6,983,000	$698,300	$6,284,700	$17,982,000	$1,798,000	$16,184,000
2040	4,795,000	$7,193,000	$719,300	$6,473,700	$19,078,000	$1,908,000	$17,170,000
2041	4,939,000	$7,409,000	$740,900	$6,668,100	$20,241,000	$2,024,000	$18,217,000
2042	5,087,000	$7,631,000	$763,100	$6,867,900	$21,473,000	$2,147,000	$19,326,000
2043	5,240,000	$7,860,000	$786,000	$7,074,000	$22,780,000	$2,278,000	$20,502,000
2044	5,397,000	$8,096,000	$809,600	$7,286,400	$24,198,000	$2,417,000	$21,751,000
2045	5,559,000	$8,339,000	$833,900	$7,505,100	$25,641,000	$2,564,000	$23,077,000

Notes: Revenue Inflation Rate: 3.0%
Cost Inflation Rate: 3.0%
Assumed Operating Expenses per Transaction: $0.15
Nominal Traffic Growth of 3.0 Percent per year Assumed for 2031-2045

6.7 SUMMARY FINDINGS ON TRAFFIC AND REVENUE ANALYSIS

Table 6.30 summarizes traffic, revenue and transaction volumes for each of the alternatives in this chapter. Based on this table and information described earlier in this chapter and in Chapter 2 of the report, the characteristics of the alternatives are as follows:

- Alternative 1A – Given that this alternative is less than five miles in length, it generates a relatively high level of transactions and revenues. This alternative actually has the highest revenue per mile ratio of all of the alternatives. This alternative also diverts the most traffic away from SR 21 than any of the alternatives. The 2030 volume of SR 21 at the mainline toll location screenline is smaller for this alternative at 43,900 vehicles per day than it is for any other alternative.
- Alternative 1B – This alternative captures the least amount of traffic and revenue of all of the alternatives. This is due to its exclusive service for trucks. Its 5,200 vehicle volume per day is less than one-third of the similar alternative that serves both trucks and autos.
- Alternative 2A – This alternative has the highest level of revenue in 2030 at $14.3 million. It also has the highest volume of transactions at 8.0 million in 2030. Alternative 2A also has the highest number of vehicles that enter and exit the toll road. Summing the ramp volumes shown in Figure 6.3, there are a total of 27,400 vehicles that enter and exit the toll road on a daily basis. Operationally, this would generate a significant amount of weaving and require significant allowances be made for merging and diverting vehicles from the roadway.
- Alternative 3A – This alternative has the highest volume of traffic at the mainline tolling location at 23,200 vehicles per day. This alternative has the second highest net revenue and number of transactions of all of the alternatives. Additionally, this alternative incorporates a small amount of exit and entrance ramp traffic at its primary interchange at Gulfstream Road. This ramp is responsible for a total of 8,000 vehicles per day. Combined with the interchange at I-95, there are a total of 9,600 vehicles per day accessing Alternative 3A at intermediate points. This is nearly one-third of the 27,400 vehicles that enter and exit Alternative 2A at intermediate locations.
- Alternative 3B – While this alternative is similar to Alternative 3A, its performance is not quite as good. It attracts less revenue than Alternative 3A in 2030 ($11.1 million compared to $14.3 million). Correspondingly, it also attracts less traffic (18,800 vehicles per day compared to 23,200 vehicles per day). At first glance this lower performance is surprising given that Bourne Avenue provides the closest access to the Port of Savannah terminal gates. However, as shown from the port gate truck

surveys in Chapter 2, there are very few trucks that leave the port and are destined for the interstate system in Savannah. The vast majority of these trucks are actually bound for warehouses and distribution centers located in the Northwest Toll Expressway study area. These trucks can not make use of a limited access toll road in the region. The access provided at Gulfstream Road by Alternative 3A is actually much better aligned with the projections for future economic activity in the study area. It provides better access to the interstate for trucks at the warehouses and distribution centers in the study area. The warehouse survey discussed in Chapter 2 described how the majority of the trucks accessing the warehouses are destined for either the port or the interstate system. Alternative 3A provides better access to the interstate system for these trucks than Alternative 3B. Similarly, Alternative 3A provides better access to the employees in the warehouses and distribution centers to I-95, Effingham County, downtown Savannah, and other points further south in Chatham County. The warehouses and distribution centers will be the focal point of employment growth in the study area and therefore they should also be the focal point for access to the Northwest Toll Expressway.

- Alternative 3C – This alternative generates the smallest amount of revenue of all of the alternatives. It also has the second lowest volumes in terms of both mainline tolling volumes and number of transactions. While Alternative 3C services the Effingham County to downtown traffic very well, its exclusion of truck traffic means that all of this traffic will be of the lower toll paying automobile type. Additionally, the absence of any access to the projected large volumes of passenger cars and trucks that will be accessing the study area's warehouses and distribution centers limits the usefulness of this alternative.

Based on these results, there is a clear preferred alternative from each of the three families of alternatives. For the northern alignments, Alternative 1A is the best performing alternative. For the full at-grade alignment, there is only one alternative (Alternative 2A). For the elevated alignments, Alternative 3A is the best performing alternative. It is also the best performing alignment of all of the families of alternatives in terms of its ability to generate traffic. The system performance and financial analyses conducted in subsequent chapters will focus on these three highest performing alternatives (Alternatives 1A, 2A, and 3A) to further describe options to be considered for the Northwest Toll Expressway.

Table 6.30 Summary Comparison of Traffic and Revenue for Each Alternative

Alternative	Volume at Mainline Toll Location	2030 Net Revenue (in millions of 2007 dollars)	Total Annual Transactions (millions)
1A	16,800	7.8	6.8
1B	5,200	5.2	2.1
2A	22,600	14.3	8.0
3A	23,200	11.1	7.1
3B	18,800	10.4	6.3
3C	11,600	4.8	3.6

7.0 System Performance

This chapter examines the system performance benefits of the three primary alignments relative to a No Build Scenario through an analysis of vehicle miles traveled (VMT) and vehicle hours traveled (VHT) for all of Chatham County along with an analysis of east-west screenline volumes through major corridors in the study area.

Figure 7.1 shows that each of the three alignments performs roughly equivalent in terms of countywide VMT relative to the No Build Scenario. This indicates that the Elevated Alignment does not cause the types of routing diversions that generate additional VMT. There is the potential for new roadways to cause some drivers to divert their trip routing to access the new roadway such that there is a significant increase to regional VMT. This is not the case for the alternatives analyzed in this study. This further indicates that the alignment of the alternatives is consistent with the desired and current trip routing activities that occur in the region.

All three of the alignments reduce travel delay for autos and trucks in the county. This is evidenced by the decreases in VHT for each of the Build Scenarios relative to the No Build Scenarios and is shown in Figure 7.2. Since vehicles are traveling roughly the same or slightly more VMT for the build scenarios, the decrease in VHT is a direct result of reductions in travel delay for the county. This is critical, because it shows that the benefits of the build scenarios are significant for the entire region not just the immediate area surrounding the corridor. The Northern Alignment decreases VHT by 5 percent relative to the No Build Scenario. The Full At-Grade Alignment has 21 percent less VHT relative to the No Build Scenario. The Full Elevated Alignment has 40 percent less VHT relative to the No Build Scenario. The Full Elevated Alignment has twice as much impact on reducing travel delays as the Full At-Grade Alignment. This is likely a result of the higher design speed of 60 mph allowed on the Elevated Alignment relative to the 45 mph design speed of the Full At-Grade Alignment. The Full At-Grade Alignment has several intersections in its design which forces a lower design speed for the entire facility. The Full Elevated Alignment has only one intermediate access point.

All three of the alignments increase average travel speeds in the county with the Full Elevated Alignment increasing travel speeds much more significantly than the other two alignments (Figure 7.3). The Full Elevated Alignment increases speeds by 71 percent compared to increases of 31 percent and 3 percent for the Full At-Grade Alignment and Northern Alignment respectively. Similar to the reduction in travel delay in the corridor, the performance benefits of the Full Elevated Alignment are in large part a result of the reduced access points which enable it to achieve a design speed of 60 mph compared to the design speed of 45 mph achieved for the other two alignments. This analysis indicates that the Full

Elevated Alignment has significant system performance benefits relative to the Full At-Grade Alignment and the Northern Alignment.

Figure 7.1 Total Chatham County Million Vehicle Miles Traveled (MVMT) by Alternative (2030)

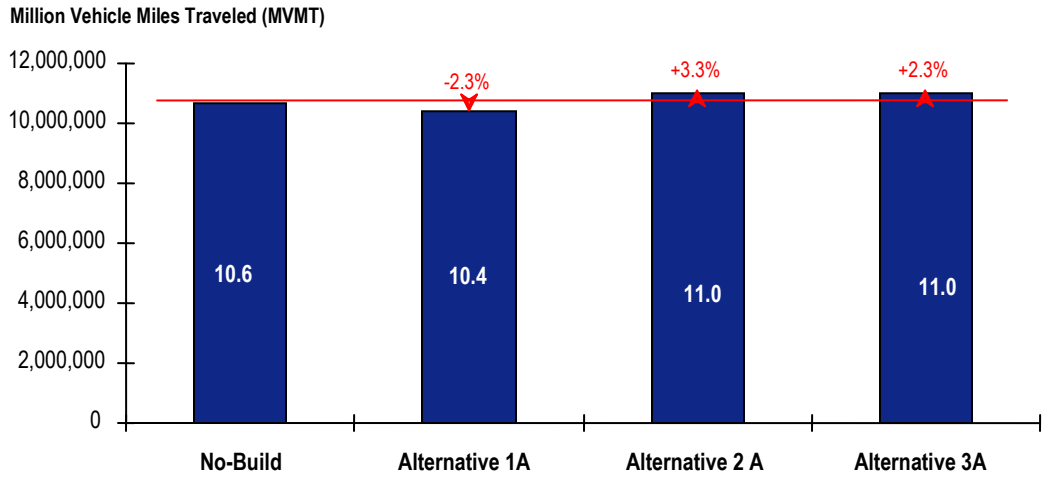


Figure 7.2 Total Chatham County Vehicle Hours Traveled (VHT) by Alternative (2030)

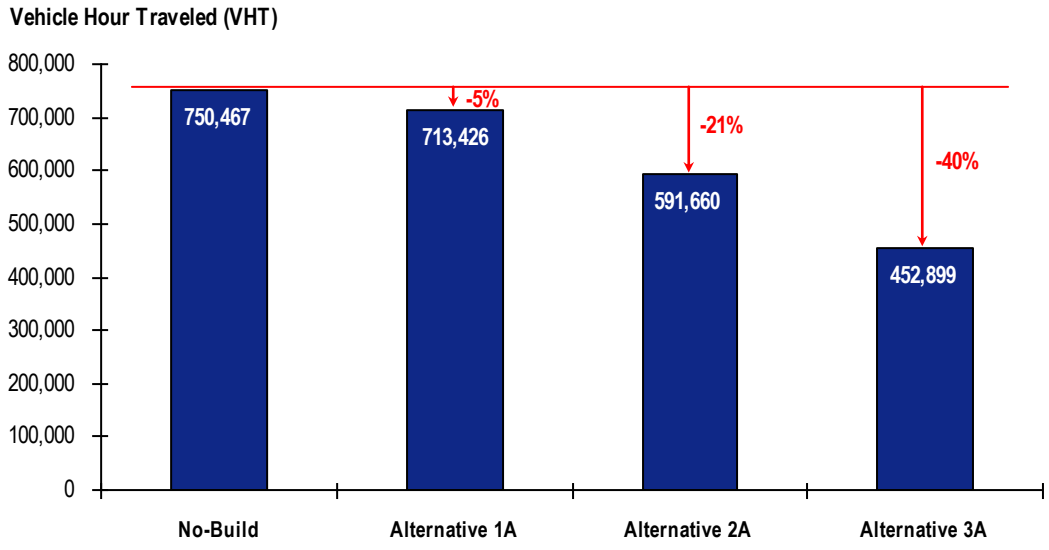
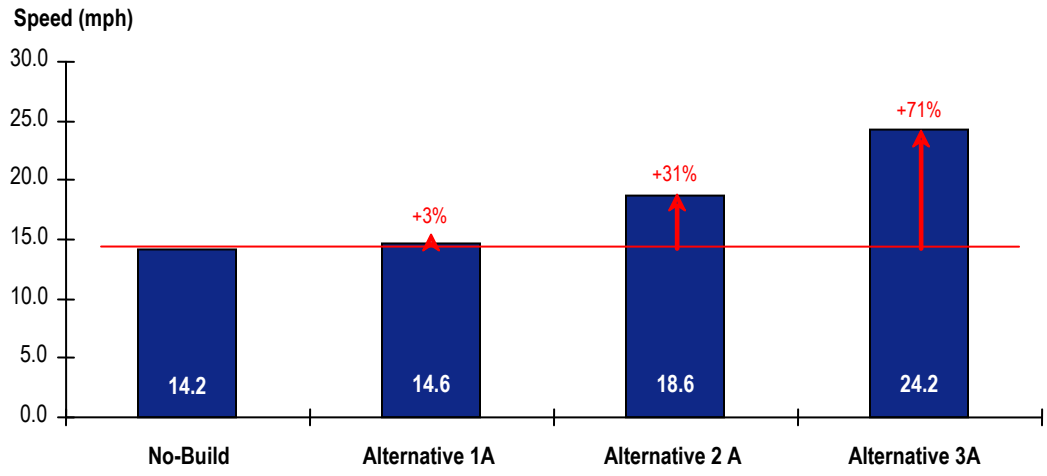


Figure 7.3 Total Chatham County Vehicle Speed by Alternative (2030)



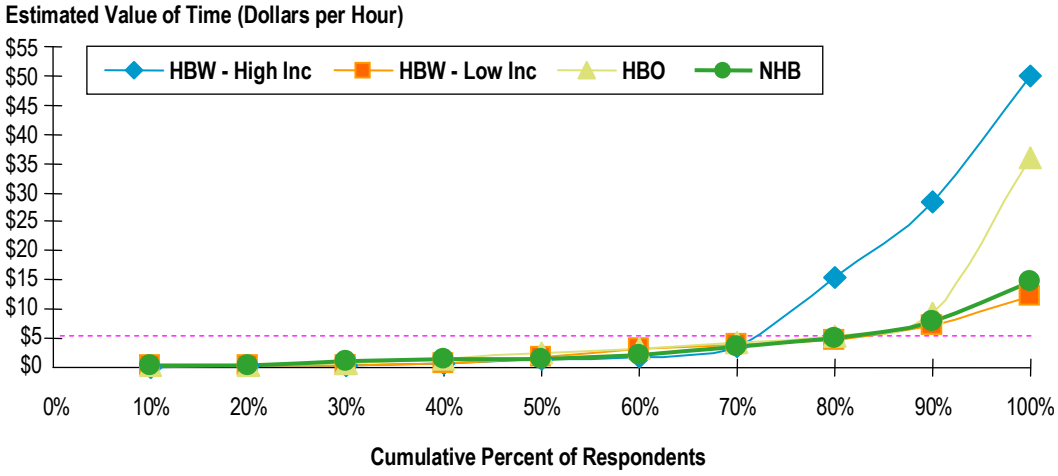
7.1 IMPLICATIONS OF SYSTEM PERFORMANCE AND TRAFFIC AND REVENUE ANALYSIS

When combining the results of the system performance exhibited in Figures 7.1 and 7.3 with the summary findings on the traffic and revenue analysis discussed in Section 6.7, it becomes apparent that all of these three alternatives have positive characteristics. Alternative 1A (the Northern Alignment) has the best performance on a per-mile basis. It captures a relatively high amount of traffic and generates a fair amount of revenue given that it is less than five miles in length. Alternative 2A captures the highest volume of total traffic of all of the alternatives and it also generates the highest level of total revenue in 2030. captured and total revenue generated. It also has significant system performance benefits relative to Alternative 1A. Alternative 3A has the best system performance of all of the alternatives. It reduces VHT in all of Chatham County by more than twice the amount of Alternative 2A and reduces VHT by more than ten times the amount of Alternative 1A. Similarly, it achieves much higher average countywide speeds relative to Alternatives 1A and 2A. Additionally, Alternative 3A has a simpler alignment with limited access points that avoids the weaving and merging that would occur with Alternatives 1A and 2A. The positive characteristics of these three alternatives will also be revisited in consideration of the financial analysis conducted in Chapter 9.

8.0 Sensitivity Analysis

This chapter describes the sensitivity of the traffic and revenue estimates of the Northwest Toll Expressway due to the value-of-time (VOT) of automobiles and the location of access points in the corridor. Previous analyses estimated traffic and revenue for the proposed road based on the value-of-time calculated from the results of stated-preference surveys. The auto component of the surveys was conducted on residents of Chatham and Effingham Counties and the truck component was conducted on a sample of trucks that had used the Port of Savannah in the recent past. Figure 8.1 shows the distribution of the value-of-time for each of the trip purposes based on the auto surveys. As shown in the figure, the median value-of-time is roughly $2.00 per hour and over 80 percent of the survey participants had a value-of-time less than $5.00 per hour. This is considerably lower than the value-of-time that has been calculated in other locations and it is also much lower than the value-of-time based on actual usage of toll roads around the country.

Figure 8.1 Value-of-Time Curves from Savannah Stated-Preference Survey for Autos



Our research and experience has found that a low value of $5.00 is a more acceptable bottom value for a value-of-time. The literature on VOT suggests that it does vary greatly by trip purpose, as well as by personal income and age. In a scan of the literature, conducted in 2005,[2] nine studies were considered where trip segmentation was purpose-specific. The lowest reported VOT was $5.53 and

[2] Cambridge Systematics, Inc., *Assessment of Southeast Florida Road User Costs, Task 1 Technical Memorandum, Travel-Time Values,* prepared for the Florida Department of Transportation for the Southeast Florida Road User Costs Study, 2005.

the highest VOT was $23.76. Research performed during our Washington State Comprehensive Toll Study on values-of-time for market segments are presented in Table 8.1.

Table 8.1 Summary of Values-of-Time by Market Segment

Trip Purpose	Low Range	High Range – A.M. and P.M.	High Range – Midday, Evening, and Night
Home-Based Work Single-Occupant Vehicles			
Low Income	$6.38/hour	$10.64/hour	$8.91/hour
Low-Medium Income	$11.76/hour	$19.61/hour	$16.42/hour
Medium-High Income	$17.14/hour	$28.57/hour	$23.92/hour
High Income	$22.22/hour	$37.04/hour	$31.01/hour
All Nonwork and High-Occupant Vehicles			
Drive Alone	$10.00/hour	$16.67/hour	$13.95/hour
Carpool and Vanpool	$10.00/hour	$24.09/hour	$20.17/hour
Trucks			
Light Trucks	$20.98/hour	$34.97/hour	$29.27/hour
Medium Trucks	$21.28/hour	$35.46/hour	$29.69/hour
Heavy Trucks	$24.59/hour	$40.99/hour	$34.31/hour

These values-of-time were estimated from several data sources:

- Federal Transit Administration (FTA) guidelines,[3] which states that the home-based work model should have a value of in-vehicle time equal to about 40 percent of the traveler's wage rate. We extrapolated values-of-time for different income groups and trip purposes using this calculation to set a minimum level of about $4.00 per hour and a maximum for higher-income traveler values-of-time of about $14.00 per hour for work trips and $6.20 per hour and $6.50 per hour for home-based nonwork and nonhome-based trips are, respectively.
- In other research from Southern California,[4] there is evidence that most values-of-time derived from stated-preference survey are about half of the values-of-time from revealed-preference surveys, based primarily on the

[3] Jim Ryan, J., 2004, *Travel Forecasting for New Starts, the FTA Perspective,* prepared for the Federal Transit Administration, April 7, 2004.

[4] David Brownstone and Kenneth Small, *Valuing Time and Reliability: Assessing the Evidence from Road Pricing Demonstrations,* University of California at Irvine, June 18, 2003.

values-of-time reported from observed data of the SR 91 and I-15 corridors in Southern California.

- The SR 520 stated-preference survey[5] in Washington State was reviewed to compare values-of-time to local area surveys. These data, which were used to estimate values-of-time for peak ($14.43 per hour) and off-peak ($12.08 per hour) time periods in the SR 520 corridor, were used to differentiate our values-of-time by market segment for the peak and off-peak time periods.
- A stated-preference survey for the Alaska Way Viaduct in Seattle, Washington produced values-of-times by trip purpose and trip type (downtown versus through movements).[6] The AWV SP survey showed a range of $5.34 per hour to $14.05 per hour for work trips by frequency, time period, and trip type compared to a range of $6.38 per hour to $22.22 per hour for work trips by income group. The wider range by income group indicates that income is a stronger indicator of value-of-time than either trip type or frequency. The AWV SP survey showed a range of $6.28 per hour to $10.26 per hour for nonwork trips by frequency, time period, and trip.

Table 8.2 shows the revised value-of-times for different trip purposes based on making adjustments inferred from the research of auto value-of-time. The value-of-times for trucks remain unchanged. The average value-of-time based on the revised table is $9.03 per hour for all trip purposes with a minimum value-of-time of $4.40 for select trip purposes. The value-of-time calculated based on the surveys can be considered the lower bounds estimate on the actual value-of-time, while the revised values-of-time represent an upper bound for consideration in this study. The actual value-of-time of auto drivers using the corridor is likely somewhere within these upper and lower bounds.

An additional aspect of this sensitivity analysis was the addition of an access point between the Northwest Toll Expressway and a traffic analysis zone (TAZ) near to the Jimmy DeLoach Parkway. This access was added based on the previous analysis showing heavy usage of this access point.

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[5] Washington State Department of Transportation, *SR 520 Toll Feasibility Study Final Report*, prepared by Parsons Brinckerhoff, PB Consult, and Resource Systems Group, April 2004.

[6] Washington State Department of Transportation, SR 99: Alaskan Way Viaduct & Seawall Replacement Project, SR 99/AWV Stated Preference Survey and Value-of-Time Study: Executive Summary, prepared by Parsons Brinckerhoff Quade & Douglas with Resource Systems Group, October 2005.

Table 8.2 Revised Value-of-Time Quartiles for the Modified Savannah-Chatham County Travel Demand Model

Purpose	Quartile Values-of-Time			
Home-Based Work – Low	$4.665	$4.89	$6.69	$9.75
Home-Based Work – High	$4.665	$4.89	$7.32	$39.45
Home-Based Shopping	$4.555	$5.615	$7.125	$15.525
Home-Based Other	$4.555	$5.615	$7.125	$15.525
Nonhome-Based	$4.40	$5.075	$6.425	$12.45
Internal – External	$4.555	$5.615	$7.125	$15.525
External – External	$4.40	$5.075	$6.425	$12.45
Truck Trips – Internal/External	$4.67	$7.55	$8.93	$28.93
Other Truck Trips	$4.67	$7.55	$8.93	$28.93

Using these revised values-of-time and the additional access point, the consultant team calculated new traffic and revenue estimates for each of the alternatives. Section 8.1 describes the traffic and revenue analysis for Alternative 3B assuming the higher value-of-time. The sensitivity analysis for each alternative is provided in Appendix J.

8.1 SENSITIVITY ANALYSIS FOR ALTERNATIVE 3B WITH INCREASED VALUE-OF-TIME

8.1.1 Estimated Average Weekday Traffic

The tolling concept for Alternative 3B with increased value-of-time (the elevated alignment with an interchange at Bourne Avenue) is shown in Figure 8.2. A passenger vehicle mainline toll rate of $1.50 or about $0.20 per mile for a full length trip was chosen for this analysis. The truck mainline toll rate is $4.50. Both autos and trucks were allowed to access the elevated facility.

Figure 8.2 also shows the 2030 estimated average weekday volumes for the facility at the chosen toll rate. At the mainline tolling location, 2030 average weekday traffic is estimated to be 26,800. This is a 42 percent increase above the average weekday traffic of 18,800 for Alternative 3B with the value-of-time based on the Savannah stated preference surveys and discussed in Section 6.5. Similarly the increase of average weekday traffic on the toll road between Bourne Avenue and I-16 is 49 percent higher using the higher value-of-time. This contrasts to the increase in volumes at the ramps at Bourne Avenue being less than 18 percent higher for the increased value-of-time scenario. This large differential in increased volume indicates that there is a much greater potential to

divert additional through trips along the corridor than there is to divert traffic that has a trip end within the corridor.

The additional traffic attracted to Alternative 3B with a higher value-of-time would decrease equilibrium speeds on the toll road and increase average travel times on the road. This is shown in Tables 8.3 and 8.4 for Alternative 3B with a higher value of time. These tables can be compared to Alternative 3B with the value-of-time based on the Savannah stated preference surveys.

Figure 8.2 Alternative 3B with Increased Value-of-Time – Toll Configuration and 2030 Estimated Average Weekday Traffic

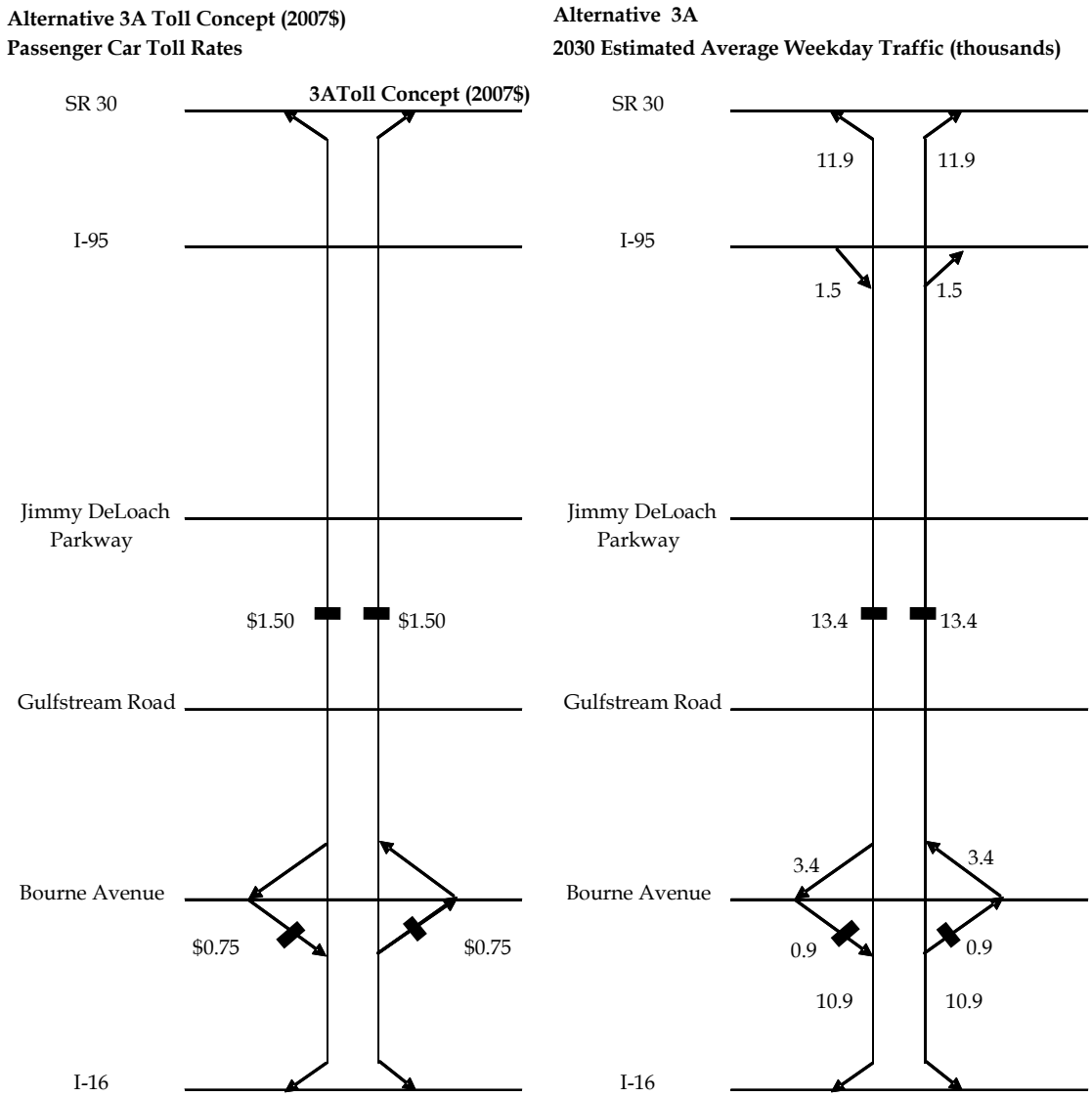

Table 8.3 Alternative 3B with Increased Value-of-Time – Average 2030 A.M. Peak Southbound Speeds (mph) for Toll Project and SR 21

	Toll-Free			Toll	
Segment	No Build	Toll Project	SR 21	Toll Project	SR 21
SR 21 to Jimmy DeLoach Parkway	7.3	18.5	9.1	26.8	8.8
Jimmy DeLoach Parkway to Gulfstream Road	5.2	36.0	19.2	44.6	17.1
Gulfstream Road to Grange Road	21.5	36.0	24.1	44.6	22.1
Grange Road to Bourne Avenue	20.9	36.0	23.7	44.6	21.6
Bourne Avenue to SR 21	38.6	51.3	39.8	62.1	35.6

Table 8.4 Alterative 3B with Increased Value-of-Time – Average 2030 A.M. Peak Southbound Travel Time (Minutes) for Toll Project and SR 21

	Toll-Free			Toll	
Segment	No Build (SR 21)	Toll Project	SR 21	Toll Project	SR 21
SR 21 to Jimmy DeLoach Parkway	8.9	8.7	16.6	5.6	16.9
Jimmy DeLoach Parkway to Gulfstream Road	14.0	2.1	3.8	1.6	4.2
Gulfstream Road to Grange Road	2.3	1.4	2.1	1.1	2.2
Grange Road to Bourne Avenue	1.8	1.0	1.6	0.8	1.7
Bourne Avenue to SR 21	3.5	2.7	3.5	2.2	3.9
Total	**30.5**	**15.9**	**27.6**	**11.3**	**28.9**

8.1.2 Corridor Share Analysis

The vast majority of additional traffic that is diverted to Alternative 3B with the higher value-of-time comes from I-95. Table 8.5 shows that the average weekday traffic at I-95 at the mainline tolling location screenline is 107,600 for Alternative 3B with the higher value-of-time. This compares to 113,500 for Alternative 3B with the value-of-time based on the Savannah stated preference survey (Table 6.22). The volume for SR 21 decreased by 1,100 and the volume for the Coastal Highway increased by 200 for Alternative 3B with the higher value-of-time. This reinforces the notion that the diverted traffic is coming from long distance, through trips rather than local trips.

Table 8.5 Alternative 3B with Increased Value-of-Time – Corridor Share at Mainline Tolling Location Screenline

		Average Weekday Traffic			
Year	Facility	Toll-Free	Percent Share	Tolled	Percent Share
2015	I-95	63,200	44.4%	74,600	52.4%
	SR 21	25,100	17.7%	42,600	29.9%
	Project	44,800	31.5%	13,000	9.1%
	Coastal Highway	9,100	6.4%	12,100	8.5%
	Total	**142,200**	**100.0%**	**142,300**	**100.0%**
2030	I-95	95,700	47.5%	107,600	53.5%
	SR 21	34,800	17.3%	48,500	24.1%
	Project	58,150	28.9%	26,700	13.3%
	Coastal Highway	12,900	6.4%	18,300	9.1%
	Total	**201,550**	**100.0%**	**201,100**	**100.0%**

8.1.3 Estimated Transactions and Toll Revenue

Table 8.6 shows the estimated average weekday traffic for 2015 and 2030 at the tolling location and the resulting average weekday and annual toll revenue for Alternative 3B with the higher value-of-time. It shows that this alternative is forecast to generate 30 percent more revenue is 2030 than Alternative 3B with the value-of-time based on the Savannah stated preference surveys.

Table 8.7 shows a 35-year annual transaction and revenue stream for Alternative 3B with the higher-value-of-time. Annual operating costs were estimated by assuming a per transaction cost of $0.15. Annual net revenue was estimated by subtracting the resulting annual operating costs from the annual gross revenue estimates. Between 2015 and 2030, values were estimated through interpolation. Extrapolation was used to estimates values prior to 2015. Post-2030 values were estimated using a nominal growth rate of 3.0 percent.

Table 8.6 Alternative 3B with Increased Value of Time – Estimated Transactions and Toll Revenue

		Average Weekday Traffic			Average Toll (2007 Dollars)		Average Weekday Revenue			Annual	
Year	Tolling Location	Passenger Vehicles	Trucks	Total	Passenger Vehicles	Trucks	Passenger Vehicles	Trucks	Total	Transactions	Revenue
2015	Mainline	12,200	900	13,100	$1.50	$4.50	$18,300	$4,050	$22,350	4,028,250	$6,872,625
	Bourne	1,000	80	1,080	$0.75	$2.25	$750	$180	$930	332,100	$285,975
	Total	**13,200**	**980**	**14,180**			**$19,050**	**$4,230**	**$23,280**	**4,360,350**	**$7,158,600**
2030	Mainline	24,800	2,000	26,800	$1.50	$4.50	$37,200	$9,000	$46,200	8,241,000	$14,206,500
	Bourne	1,600	200	1,800	$0.75	$2.25	$1,200	$450	$1,650	553,500	$507,375
	Total	**26,400**	**2,200**	**28,600**			**$38,400**	**$9,450**	**$47,850**	**8,794,500**	**$14,713,875**

Table 8.7 Alternative 3B with Increased Value-of-Time – Estimated Annual Transactions and Toll Revenue

		2007 Dollars			Nominal Dollars		
Year	Annual Transactions	Annual Gross Revenue	Operating Expenses	Net Revenue	Annual Gross Revenue	Operating Expenses	Net Revenue
2011	3,617,000	$5,907,000	$542,600	$5,364,400	$6,648,000	$611,000	$6,037,000
2012	3,790,000	$6,198,000	$568,500	$5,629,500	$7,185,000	$659,000	$6,526,000
2013	3,971,000	$6,503,000	$595,700	$5,907,300	$7,765,000	$711,000	$7,024,000
2014	4,161,000	$6,823,000	$624,200	$6,198,800	$8,391,000	$768,000	$7,623,000
2015	4,360,350	$7,158,600	$654,100	$6,504,500	$9,068,000	$829,000	$8,239,000
2016	4,569,000	$7,511,000	$685,400	$6,825,600	$9,800,000	$894,000	$8,906,000
2017	4,788,000	$7,881,000	$718,200	$7,162,800	$10,591,000	$965,000	$9,626,000
2018	5,017,000	$8,269,000	$752,600	$7,516,400	$11,446,000	$1,042,000	$10,404,000
2019	5,257,000	$8,676,000	$788,600	$7,887,400	$12,370,000	$1,124,000	$11,246,000
2020	5,509,000	$9,103,000	$826,400	$8,276,600	$13,368,000	$1,214,000	$12,154,000
2021	5,773,000	$9,551,000	$866,000	$8,685,000	$14,447,000	$1,310,000	$13,137,000
2022	6,049,000	$10,021,000	$907,400	$9,113,600	$15,612,000	$1,414,000	$14,198,000
2023	6,339,000	$10,514,000	$950,900	$9,563,100	$16,872,000	$1,526,000	$15,346,000
2024	6,643,000	$11,031,000	$996,500	$10,034,500	$18,233,000	$1,647,000	$16,586,000
2025	6,961,000	$11,574,000	$1,044,200	$10,529,800	$19,704,000	$1,778,000	$17,926,000
2026	7,294,000	$12,143,000	$1,094,100	$11,048,900	$21,293,000	$1,919,000	$19,374,000
2027	7,643,000	$12,740,000	$1,146,500	$11,593,500	$23,010,000	$2,071,000	$20,939,000
2028	8,009,000	$13,367,000	$1,201,400	$12,165,600	$24,867,000	$2,235,000	$22,632,000
2029	8,392,000	$14,025,000	$1,258,800	$12,766,200	$26,873,000	$2,412,000	$24,461,000
2030	8,794,500	$14,713,875	$1,319,200	$13,394,675	$29,039,000	$2,604,000	$26,435,000
2031	9,058,000	$15,155,000	$1,358,700	$13,796,300	$30,807,000	$2,762,000	$28,045,000
2032	9,330,000	$15,610,000	$1,399,500	$14,210,500	$32,684,000	$2,930,000	$29,754,000
2033	9,610,000	$16,078,000	$1,441,500	$14,636,500	$34,674,000	$3,109,000	$31,565,000
2034	9,898,000	$16,560,000	$1,484,700	$15,075,300	$36,785,000	$3,298,000	$33,487,000
2035	10,195,000	$17,057,000	$1,529,300	$15,527,700	$39,025,000	$3,499,000	$35,526,000
2036	10,501,000	$17,569,000	$1,575,200	$15,993,800	$41,402,000	$3,712,000	$37,690,000
2037	10,816,000	$18,096,000	$1,622,400	$16,473,600	$43,924,000	$3,938,000	$39,986,000
2038	11,140,000	$18,639,000	$1,671,000	$16,968,000	$46,599,000	$4,178,000	$42,421,000
2039	11,474,000	$19,198,000	$1,721,100	$17,476,900	$49,436,000	$4,432,000	$45,004,000
2040	11,818,000	$19,774,000	$1,772,700	$18,001,300	$52,447,000	$4,702,000	$47,745,000
2041	12,173,000	$20,367,000	$1,826,000	$18,541,000	$55,641,000	$4,988,000	$50,653,000
2042	12,538,000	$20,978,000	$1,880,700	$19,097,300	$59,029,000	$5,292,000	$53,737,000
2043	12,914,000	$21,607,000	$1,937,100	$19,669,900	$62,623,000	$5,614,000	$57,009,000
2044	13,301,000	$22,255,000	$1,995,200	$20,259,800	$66,436,000	$5,956,000	$60,480,000
2045	13,700,000	$22,923,000	$2,055,000	$20,868,000	$70,483,000	$6,319,000	$64,164,000

Notes: Revenue Inflation Rate: 3.0%
Cost Inflation Rate: 3.0%
Assumed Operating Expenses per Transaction: $0.15
Nominal Traffic Growth of 3.0 Percent per year Assumed for 2031-2045

8.1.4 Summary Conclusions Regarding Sensitivity Analysis

As mentioned earlier, the detailed sensitivity results which describe the impact of a higher value-of-time on all of the alternatives is provided in Appendix J.

The results of this chapter indicate that the value-of-time estimate for cars and trucks in the corridor is critical to accurately estimating traffic volumes and revenue generation for the toll road. The stated preference surveys conducted in this study represent the standard practice for estimating value-of-time for proposed toll roads. However, given the sensitivity of the results to this variable, it will be worthwhile to further investigate revealed preference values-of-time that auto and truck drivers actually demonstrate for existing toll roads, particularly toll roads that incorporate variable pricing. This investigation should be conducted along with other future studies of this corridor. Additionally, the travel demand model that was customized for analyzing the Northwest Toll Expressway will likely need to be run at several values-of-time for a narrower range of alternatives to provide information on how assumptions of value-of-time impact the revenues that are generated by the toll road and the local and systemwide traffic impacts of the toll road as well.

9.0 Summary of Financial Analysis

This chapter summarizes the financial assessment of various options considered for enhancing mobility in the Northwest Toll Expressway study area. The financial analysis for each alternative provides an indication of the potential amount of funding that might be secured by leveraging the estimated net toll revenue. For some of the alternatives, the potential impacts of changes to key assumptions regarding the amount of project debt issued and the value of assumed travel time savings are also examined. The detailed spreadsheet analysis is provided in Appendix G.

9.1 METHODOLOGY AND KEY INPUTS

A financial model was created to facilitate the analysis of the various alternatives. The model is used to calculate the potential amount of project debt that can be issued to fund construction based on various inputs and assumptions described below.

- **Preliminary Construction Cost Estimate –** The cost estimates are based on conceptual alignments with typical cross sections and materials. This is described in Chapter 5.
- **Traffic and Revenue Estimates –** The estimates were done for toll-free traffic in the corridor and made various assumptions regarding optimal toll rates and the potential traffic diversion associated with each alternative. This is described in Chapter 6. The value-of-time for this analysis is consistent with what is described in Chapter 8 and Appendix J which discusses the impacts of higher values-of-time such as that noted in other corridor locations around the country.
- **Annual Operation and Maintenance Expenses –** The cost of operating the toll facilities was assumed to equal $0.15 per transaction (in 2007 dollars) with three percent annual escalation. The routine roadway maintenance expense in initial year of operation was estimated at $1 million per mile with three percent annual escalation thereafter. The operating costs are summarized in Chapter 5.
- **Project Financing –** Each financing scenario assumes the issuance of 40-year tax-exempt toll revenue bonds issued by a public toll authority or nonprofit organization. The debt has a senior claim on net toll revenue after payment of operating expenses and is structured to achieve minimum annual debt service coverage of 1.50x. The assumed interest rate for current interest bonds is 4.5 percent and the yield on capital appreciation bonds – securities that pay compounded interest at maturity – is 5.0 percent. The financing scenarios include Federal credit assistance in the form of a low-cost

subordinate loan provided under the Federal Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA). The TIFIA loan has an assumed interest rate of 3.25 percent and the loan is structured to maintain a minimum of 1.10x annual debt service coverage.

9.2 SUMMARY OF PRELIMINARY FINANCIAL ASSESSMENT

Alternatives 1A and 1B: Northern Alignment

Two scenarios were examined for the Northern Alignment: one with an initial mainline toll of $1.00 for cars and $3.00 for trucks and another with the truck tolls only.[7] Projected toll revenues are sufficient to cover anticipated capital and operating costs in each case, but the toll facility would not serve all of the travel needs in the study area, particularly the need to access the downtown Savannah area by residents in Effingham County (Table 9.1).

Table 9.1 Alternatives 1A and 1B (Northern Alignments)

	Alternative 1A – Cars and Trucks	Alternative 1B – Trucks Only
Gross Toll Revenue 2015	$5,025,000	$2,220,000
Gross Toll Revenue 2030	$17,357,000	$10,924,000
Estimated Project Cost	$63,461,701	$63,461,701
Financing Costs and Reserves	$13,058,105	$11,192,397
Total Funding Requirement	**$76,519,806**	**$74,654,098**
Toll Revenue Bond Proceeds	$76,522,473	$74,657,866
Subordinated TIFIA Loan	–	-
Total Proceeds	**$76,522,473**	**$74,657,866**
Percent of Total Funding Requirement	**100.0%**	**100.0%**

[7] Initial toll rates are in 2007 dollars and are escalated at 3.0% annually. Ramp tolls for cars and trucks are $0.50 and $1.50, respectively.

Alternative 2A: Full At-Grade Alignment

The financing scenarios for Alternative 2A assume an initial mainline toll of $1.50 for cars and $4.50 for trucks.[8] The first scenario shows that conventional toll financing with 1.50x debt service coverage would generate sufficient funds to cover approximately 31 percent of the total costs (Table 9.2). The additional leverage provided by a TIFIA loan with 1.10x debt service coverage would increase the total funding potential to over 45 percent of the total cost.

Table 9.2 Alternative 2A – Full At-Grade Alignment

	Alternative 2A – Senior Debt Only	Alternative 2A – Senior Debt and TIFIA
Gross Toll Revenue 2015	$7,810,000	$7,810,000
Gross Toll Revenue 2030	$30,647,000	$30,647,000
Estimated Project Cost	$478,699,711	$478,699,711
Financing Costs and Reserves	$32,430,238	$47,394,886
Total Funding Requirement	**$511,129,949**	**$526,094,596**
Toll Revenue Bond Proceeds	$206,336,448	$211,603,679
Subordinated TIFIA Loan	$0	$104,176,210
Total Proceeds	**$206,336,448**	**$315,779,890**
Percent of Total Funding Requirement	**40.4%**	**60.0%**

[8] Initial toll rates are in 2007 dollars and are escalated at 3.0 percent annually. Ramp tolls for cars and trucks are $0.75 and $2.25 to $3.00, respectively.

Alternatives 3A, 3B, and 3C: Elevated Toll Lanes

Several financing scenarios with elevated toll lanes were examined (Table 9.3). Each assumed the facility would be open to passenger cars with an initial mainline toll amount of $1.50.[9] Alternatives 3A and 3B are 2-way, 4-lane alternatives that also allows for trucks. Alternative 3C is an elevated roadway with three reversible lanes that is exclusively for cars. Alternatives 3A and 3B are also analyzed with a higher value-of-time based on information collected at other corridor locations. These are shown in the third and fifth column of Table 9.3.

Table 9.3 Alternatives 3A, 3B, and 3C - Elevated Toll Lanes

	Alternative 3A	Alternative 3A - with Increased VOT	Alternative 3B	Alternative 3B – with Increased VOT	Alternative 3C
Gross Toll Revenue 2015	$7,362,000	$9,431,000	$6,836,000	$9,068,000	$3,272,000
Gross Toll Revenue 2030	$24,579,000	$28,925,000	$22,394,000	$29,039,000	$10,560,000
Estimated Project Cost	$545,493,930	$545,493,930	$545,493,930	$545,493,930	$432,333,930
Financing Costs and Reserves	$40,717,314	$50,108,447	$36,494,392	$49,706,153	$15,903,154
Total Funding Requirement	**$586,211,244**	**$595,602,377**	**$581,988,322**	**$595,200,083**	**$448,237,084**
Toll Revenue Bond Proceeds	$176,077,990	$214,101,217	$160,234,315	$213,401,138	$69,295,905
Subordinated TIFIA Loan	86,692,249	105,442,826	78,922,549	105,084,817	34,129,311
Total Proceeds	**$262,770,239**	**$319,544,042**	**$239,156,864**	**$318,485,955**	**$103,425,216**
Percent of Total Funding Requirement	**44.8%**	**53.7%**	**41.1%**	**53.5%**	**23.1%**

9.3 FINDINGS BASED ON PRELIMINARY FINANCIAL ASSESSMENT

The preliminary financial assessment shows that the Northern Alignment is close to self-financing for the alternative that includes both trucks and autos. Additionally, it shows that for the Full At-Grade Alignment, that there is a significant increase in the revenues that are accrued under the high VOT

[9] Initial toll rates are in 2007 dollars and are escalated at 3.0 percent annually.

alternative relative to the VOT distribution developed based on the stated preference surveys conducted in other locations. Under the high VOT alternative, 60 percent of the total funding requirement for the project was covered by toll revenue for Alternative 2A.

Similarly for Alternative 3A, the toll revenue covered 54 percent of the total funding requirement for the Elevated Alignment with the high VOT compared to less than 45 percent with the VOT developed from the local stated preference surveys. Additionally, the financial analysis indicates that the elevated roadway with the reversible lanes (Alternative 3C) can only cover 23 percent of its total funding requirement. This indicates that the reversible lane scenario is not a viable alternative for this study. The reason for this low coverage is likely due to the presence of a fair amount of reverse traffic in the study area throughout the day and also the lack of access to locations interior to the study area. There is forecast to be a large amount of growth to the warehouses and distribution centers in the interior portion of the study area and much of the auto and truck traffic generated by these activities would benefit from access to the Northwest Toll Expressway as well. The reversible alignment does not provide this access. For the Full Elevated Alignment with two-way flows, the financial analysis does indicate that there is slightly more revenue generated from the alternative with Gulfstream Road access relative to the alternative with access at Bourne Avenue. Therefore, the Gulfstream Road access point will be considered the most viable alternative for the Full Elevated Alignment.

It should be noted that the gross revenues used for this financial analysis are considered to be very preliminary and an investment grade traffic and revenue study would need to be conducted in order to determine actual bonding capacity. Beyond tolling, innovative financing options should be considered as options for funding for each of the alignments.

10.0 Conclusions and Next Steps

This study has demonstrated that there is a need for transportation improvements in the Northwest Toll Expressway study area. There is currently a significant amount of congestion on SR 21 during the commute hours. Based on the projected growth of the Port of Savannah, the warehouses and distribution centers in the study area, and Effingham County, there will be severe congestion in the study area over the long term, if there are no improvements made to the local transportation network. We have analyzed three families of alignments in depth to determine their ability to improve travel conditions in the study area and their ability to generate toll revenues that can assist in offsetting the construction and operating costs of the roadway. The three families of alignments are:

- Alignments 1A, 1B – Northern Alignment
- Alignment 2A – Full At-Grade Alignment
- Alignments 3A, 3B, 3C – Full Elevated Alignment

The traffic and revenue results indicated that the most effective alternatives within each family of alignments are: Alternative 1A, Alternative 2A, and Alternative 3A. A summary review of the traffic and financial impacts for these three alternatives provide insight on potential next steps to consider for moving forward with transportation solutions in the study area.

10.1 SUMMARY OF TRAFFIC IMPACTS

As discussed in Chapter 8, there is little difference between the countywide VMT generated from each of the three alternatives relative to the No Build Scenario. However, Alternative 3A has a significant travel time savings relative to the other alternatives. Alternative 3A reduces delay by twice the amount of Alternative 2A and it reduces delay by eight times the amount of Alternative 1A. Therefore, the system performance benefits for Alternative 3A are far greater than those of the other alternatives. These performance benefits are in large part a result of the reduced access points which enable it to achieve a design speed of 60 mph for the entire stretch of the alignment compared to the other alignments which include design speeds of 45 mph due to the large number of intersections.

10.2 SUMMARY OF FINANCIAL IMPACTS

Alternative 1A is preliminarily estimated to cost $63 million. Its low cost is primarily attributable to its short length. The full alignments (Alternatives 2A and 3A) are roughly similar in terms of preliminary cost estimates. The Full At-Grade Alignment (Alternative 2A) is estimated to cost $479 million, while the Full Elevated Alignment (Alternative 3A) with one interchange is projected to cost $545 million (Table 10.1). Under a 40-year revenue stream, the gross revenues collected are highest for Alternative 3A followed by Alternative 2A and then Alternative 1A. The gross toll revenues collected are $400 million, $257 million, and $228 million respectively for the three alternatives. As mentioned previously, these revenue estimates are very preliminary and an investment grade traffic and revenue study would need to be conducted to refine the estimate of bonding capacity. Additionally, innovative finance options need to be considered as an option for funding for each of the alignments.

The amount of the total development costs that are covered by toll revenues are impacted by the need to include costs for toll operations of the facility, maintenance of the road, and interest payments on bonds used to raise the funds to construct the facility. For Alternative 1, 100 percent of the capital and operating costs can be covered by toll revenues. For Alternative 2, 60 percent of these costs can be covered by toll revenues. For Alternative 3, 54 percent of these costs can be covered by toll revenues.

Table 10.1 Preliminary Financial Analysis Summary

	Alternative 1A – Cars and Trucks	Alternative 2A – Senior Debt and TIFIA	Alternative 3A – Elevated Lanes Each Direction with Gulfstream Rd. Access	Alternative 3A - WITH High VOT
Gross Toll Revenue 2015	$5,025,000	$7,810,000	$7,362,000	$9,431,000
Gross Toll Revenue 2030	$17,357,000	$30,647,000	$24,579,000	$28,925,000
Estimated Project Cost	$63,461,701	$478,699,711	$545,493,930	$545,493,930
Financing Costs and Reserves	$13,058,105	$47,394,886	$40,717,314	$50,108,447
Total Funding Requirement	**$76,519,806**	**$526,094,596**	**$586,211,244**	**$595,602,377**
Toll Revenue Bond Proceeds	$76,522,473	$211,603,679	$176,077,990	$214,101,217
Subordinated TIFIA Loan	–	$104,176,210	86,692,249	105,442,826
Total Proceeds	**$76,522,473**	**$315,779,890**	**$262,770,239**	**$319,544,042**
Percent of Total Funding Requirement	**100.0%**	**60.0%**	**44.8%**	**53.7%**

10.3 RECOMMENDATIONS AND POTENTIAL NEXT STEPS

The purpose of this study was to determine the feasibility of tolling to assist in the development of a roadway proposed in the Savannah region's long-range transportation plan. Based on a preliminary analysis of long-term traffic patterns, design options, and financial analysis, three alternative alignments were found to have the greatest promise for addressing the region's travel needs. These alignments are Alternative 1A (A Northern Alignment), Alternative 2A (A Full At-Grade Alignment), and Alternative 3A (A Full Elevated Alignment). Alternative 1A is focused on near-term truck traffic needs, but does not address long-term auto traffic needs. This alignment is the least expensive option, but does not provide regional traffic relief. Additionally, the freight community has reservations regarding the tolling of a roadway that is aligned with the port. Alternative 2A addresses both truck and auto traffic needs. It will require significant right-of-way acquisitions in the region and it provides significantly less regional traffic relief relative to Alternative 3A.

Alternative 3A also addresses both truck and auto traffic needs in the region. It provides improved system connectivity to I-95, I-516, and the proposed

Effingham Parkway. This alignment also provides the best system benefits in terms of congestion, VMT, and average speed for the region. These benefits are primarily the result of increased design speeds that can be achieved using an elevated alignment with one access point in the middle of the corridor.

If a decision is made to proceed with the implementation of the Northwest Toll Expressway, the following steps should occur:

- Investment-grade traffic and revenue study including in-depth national research into truck and auto value-of-time distributions;
- Detailed financial analysis, including consideration of alternative and innovative finance techniques;
- Detailed engineering design, including the need for environmental permitting and documentation;
- Coordination of efforts between SRTA, GDOT, the Savannah Metropolitan Planning Commission, and the Federal Highway Administration regarding roadway planning in and around the study area; and
- Education and outreach to the general public in the Savannah region regarding the use of tolls in roadway development.