CAMBRIDGE SYSTEMATICS

Northwest Toll Expressway Value Pricing Program Pilot Study

executive summary

prepared for

Georgia State Road and Tollway Authority

prepared by

Cambridge Systematics, Inc.

with

Jordan Jones & Goulding
GeoStats
Mercator Advisors
McMillan & Associates

March 2009

www.camsys.com

executive summary

Northwest Toll Expressway Value Pricing Program Pilot Study

prepared for

Georgia State Road and Tollway Authority

prepared by

Cambridge Systematics, Inc.
730 Peachtree Street NE, Suite 1050
Atlanta, Georgia 30308

with

Jordan Jones & Goulding
GeoStats
Mercator Advisors
McMillan & Associates

date

March 2009

Table of Contents

List of Tables

List of Figures

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:

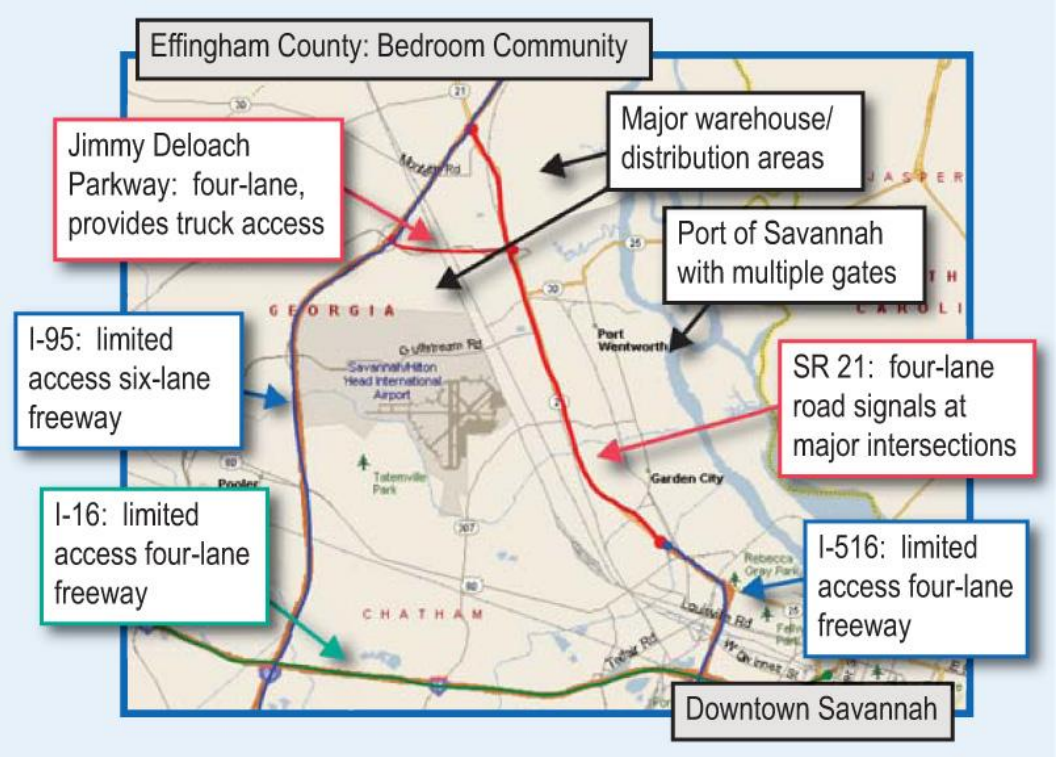
- Identify toll and alignment options for the Northwest Toll Expressway;
- Determine the traffic impacts of various toll and alignment alternatives; and
- Conduct financial analysis to determine the monetary impact of various toll and alignment alternatives.

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.

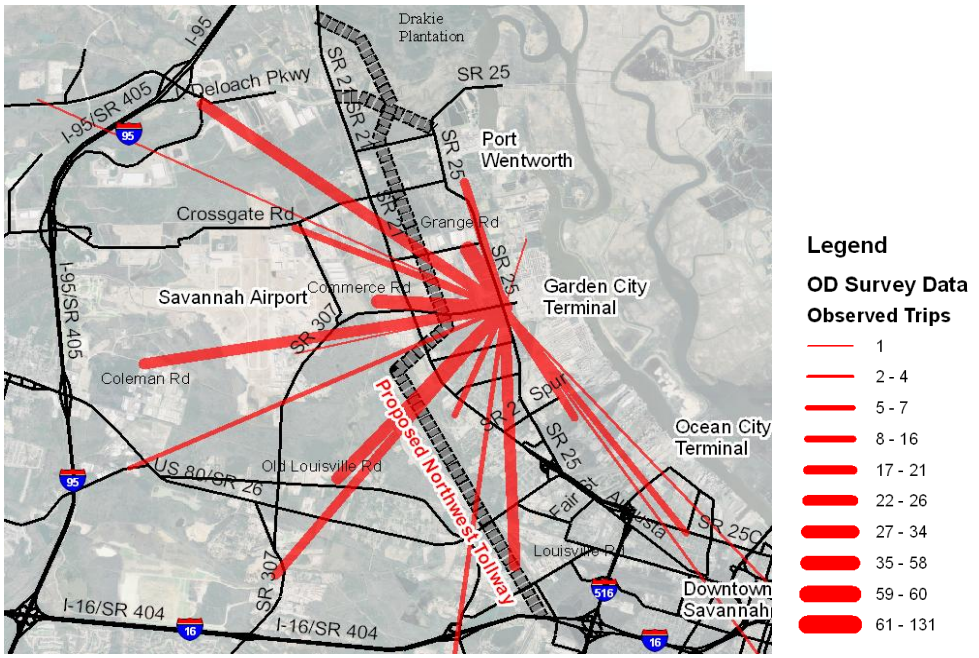
Table ES.2 SR 21 Statistics by Time Period and Direction

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.

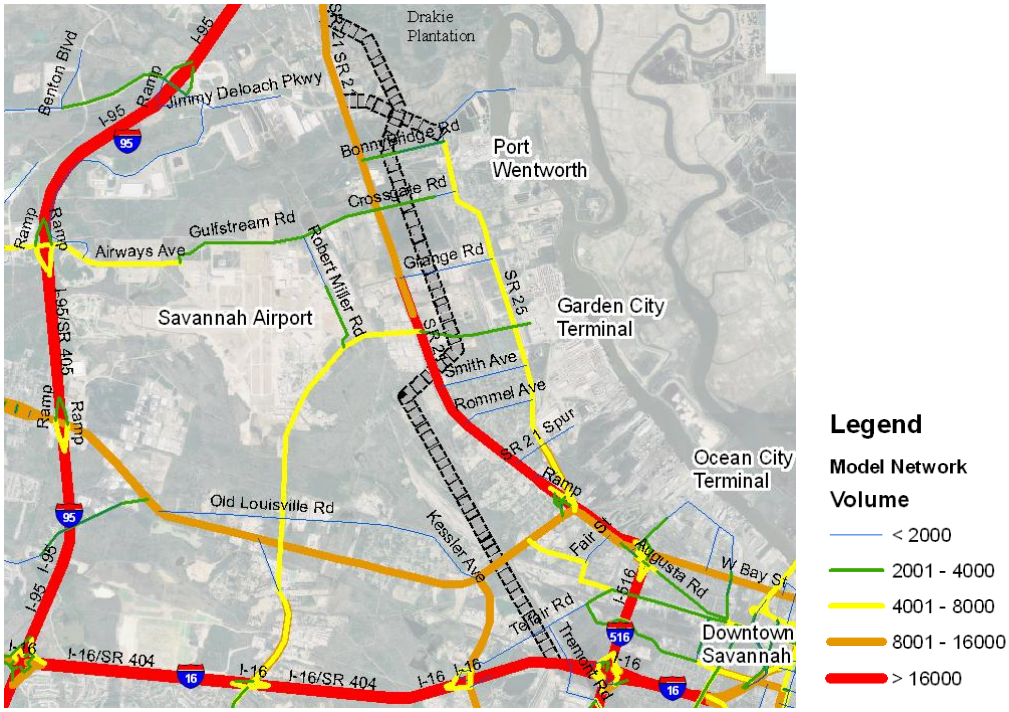
The travel demand model runs for the 2030 forecast year indicate that there are several areas of high volume expected to occur in the study area (Figure ES.3). I-95 and I-16 are projected to carry more than 16,000 vehicles per day in 2030. SR 21 is expected to have a portion of its roadway carry more 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)

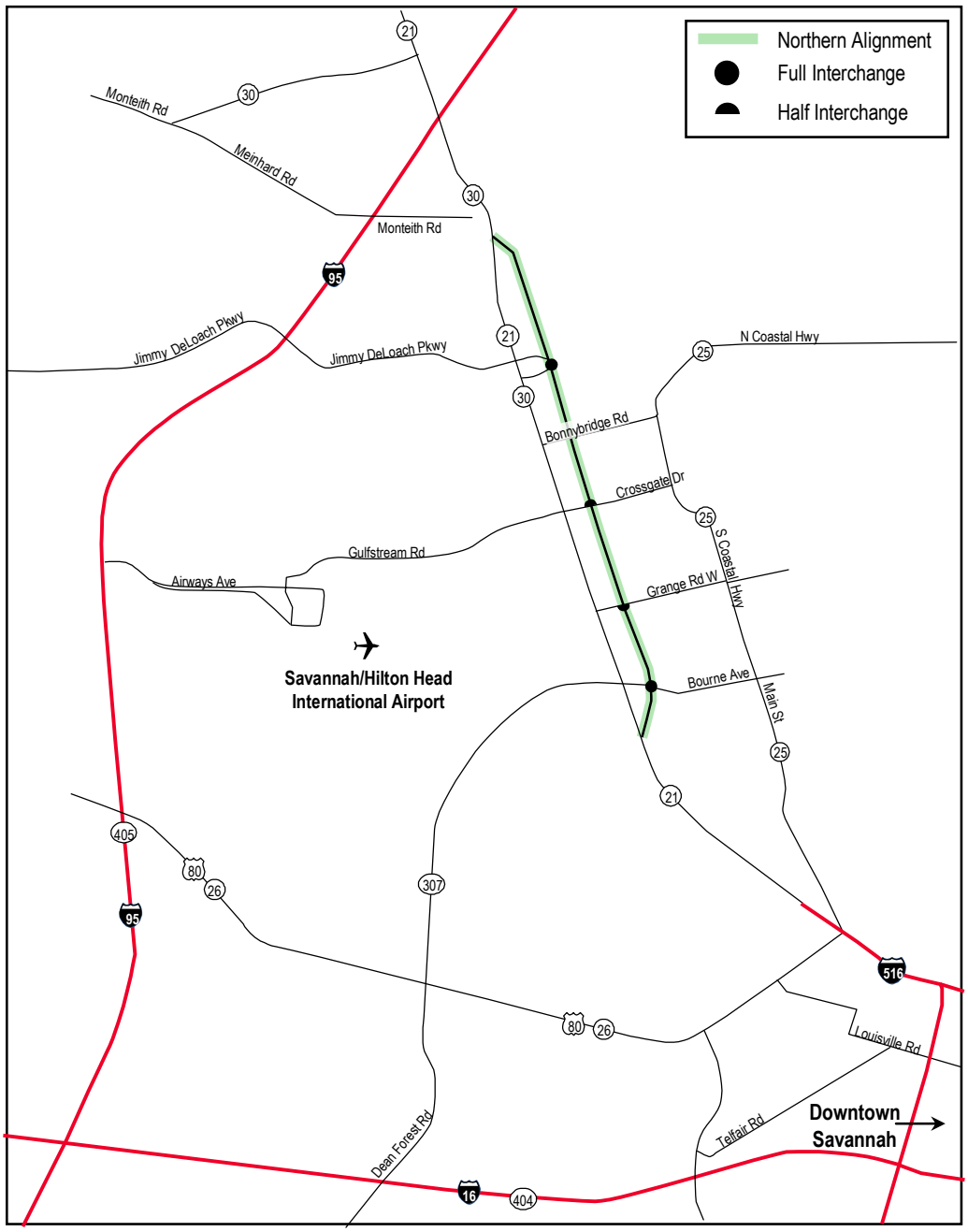


Figure ES.5 Location of Alternative 2A (Full At-Grade Alignment)

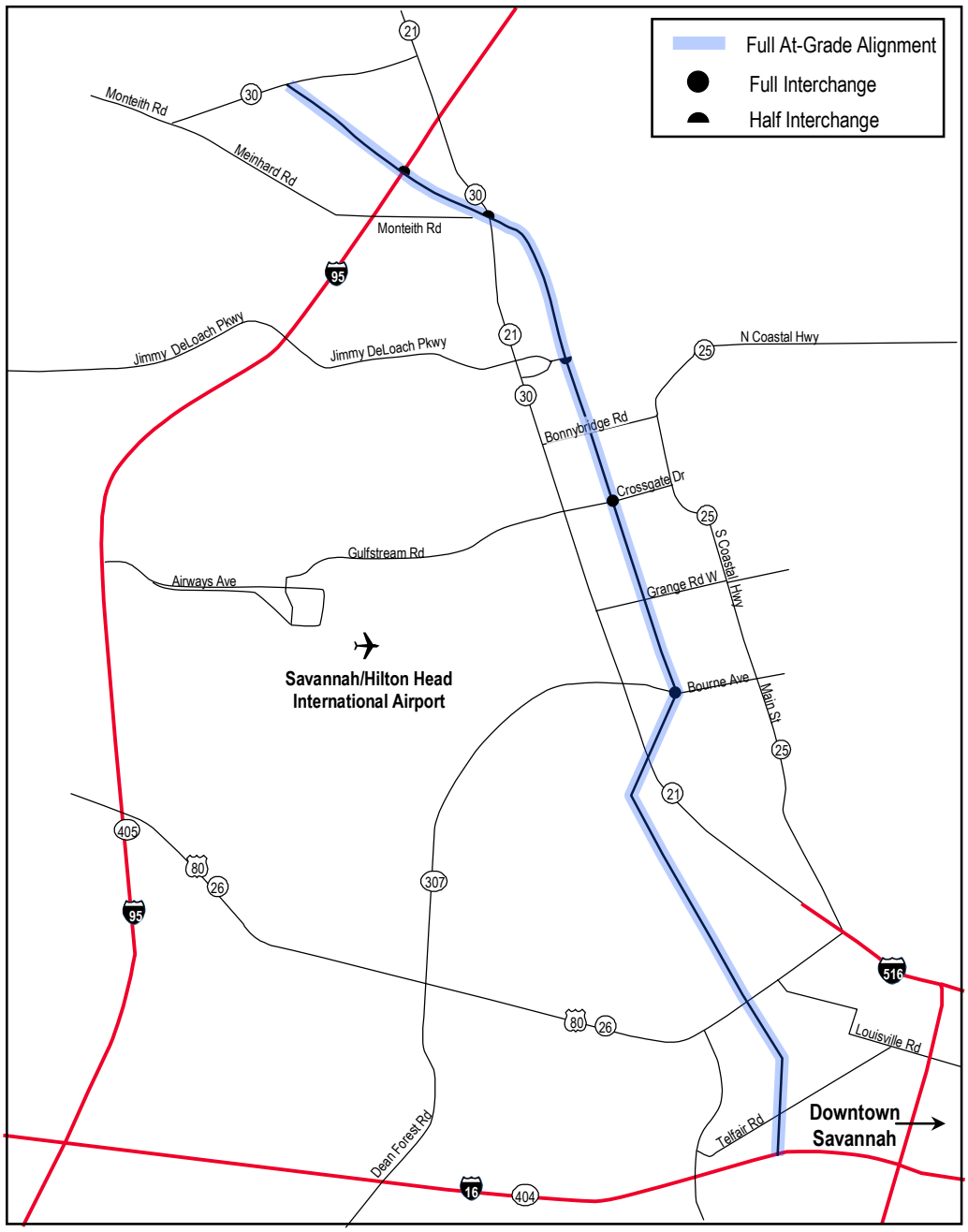
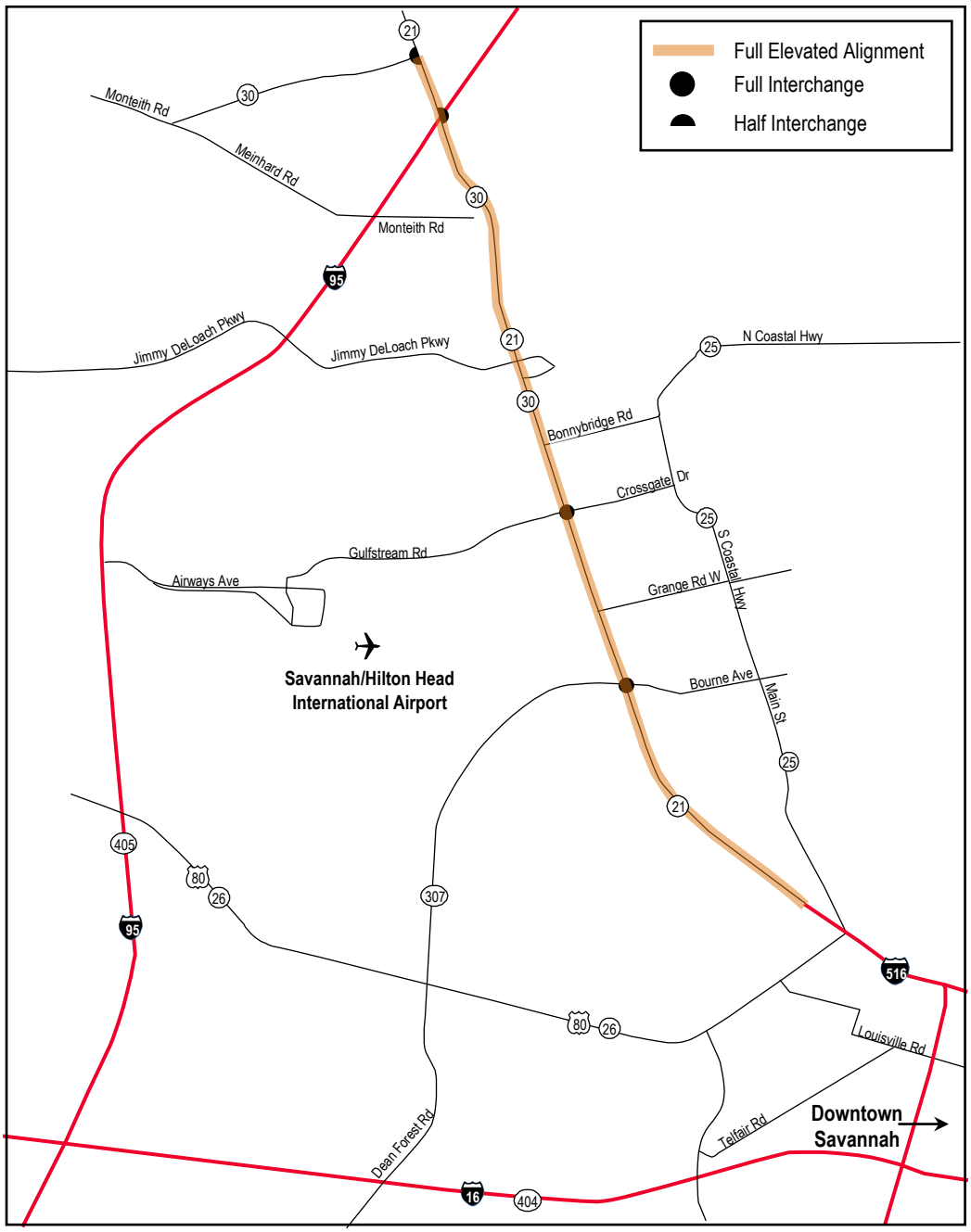


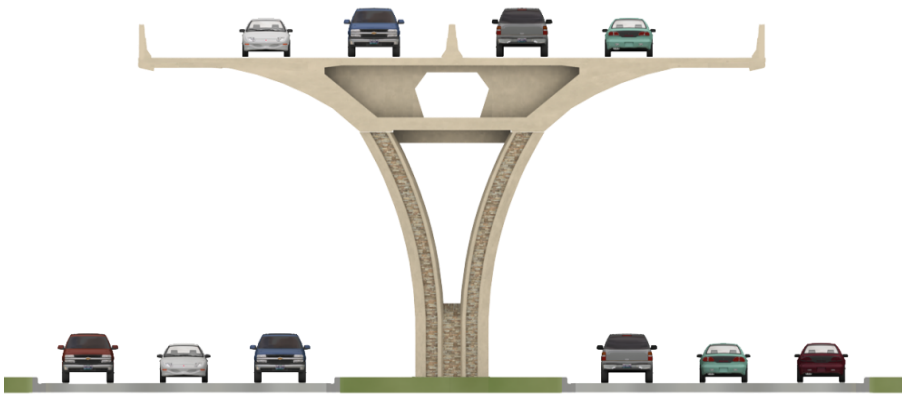
Figure ES.6 Location of Alternative 3A, 3B, and 3C (Full Elevated Alignment)



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

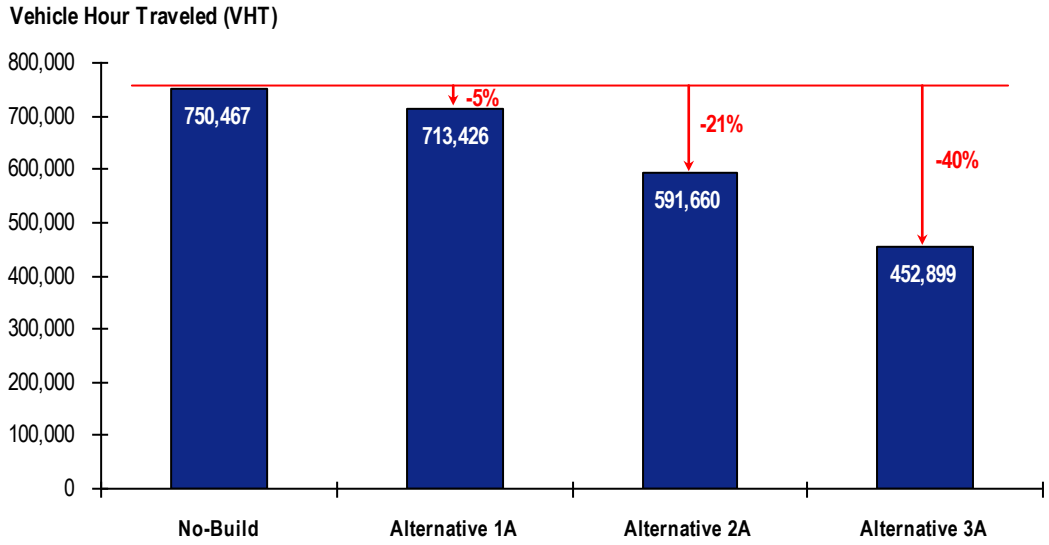
The traffic impact analysis identified the most effective alternative within each of the three families of alignments. The most effective alternatives were: Alternative 1A (Northern Alignment – Cars and Trucks), Alternative 2A (Full, At-Grade Alignment, and Alternative 3A (Full Elevated Alignment with 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.