



SR 21 CORRIDOR STUDY

Phase I Final Report



Prepared by:

Hussey, Gay, Bell & DeYoung

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EXECUTIVE SUMMARY

As part of the State Route 21 (SR 21) Corridor Study, Hussey, Gay, Bell & DeYoung, Inc. was retained by the Metropolitan Planning Commission (MPC) and has completed a corridor study for SR 21 from the Effingham County line to I-516 in Garden City. The purpose of this study is to investigate the existing and future transportation needs along the SR 21 corridor and recommend improvements to the mobility, connectivity and safety of this route.

SR 21 is the primary arterial providing access to Downtown Savannah from North Chatham and Effingham Counties. The corridor is also a designated an evacuation route for Savannah and the coastal region. SR 21 is a primary commuter route for Effingham County, providing access to Gulfstream, a major regional employer, and the municipalities of Port Wentworth and Garden City. As well, SR 21 serves the Savannah/Hilton Head Airport and the Port of Savannah. Natural obstacles in the area, like the Savannah River, have contributed to a lack of alternate routes, such that traffic converges upon SR 21, creating heavy congestion along the corridor. In general, there is a need for improved connectivity and mobility in the area.

Increasing congestion has deteriorated the ability of SR 21 to effectively serve as a commuter route and as a key distribution route for goods coming in and out of the Port of Savannah. As the Chatham County population grows, the limited capacity of SR 21 will also reduce its ability to function as an effective evacuation route. While historical traffic counts indicate a slight negative growth rate trend, this trend is not supported by the travel demand model results and is not expected to continue long term. The Chatham County Travel Demand Model projects growth over the next twenty years, which creates the need to expand capacity along the SR 21 corridor.

The project area extends along SR 21 through the cities of Port Wentworth and Garden City in Chatham County. The project area is characterized by a variety of land uses including residential, commercial, industrial, and institutional. As well, there are large areas of undeveloped land adjacent to the roadway.

Within the study area SR 21 is classified as an Urban Principal Arterial and carries significant traffic volumes through the corridor. As of 2010, the northern end of SR 21, near the I-95 interchange, sees average daily traffic (ADT) volumes of roughly 35,000 vehicles per day (vpd). Volumes drop to about 30,000 near Jimmy DeLoach Parkway, only to peak at approximately 40,000 vpd north of Gulfstream/Crossgate Road. Between 36,000 and 39,000 vpd pass through Garden City at the southern end of the corridor.

Existing and future traffic conditions in the corridor were analyzed, taking into consideration proposed projects along SR 21 and expected future growth in the area. Major planned projects include the Jimmy DeLoach Parkway Connector, the Brampton Road Connector, and improvements to Grange Road. Projected population and economic growth is expected to increase traffic congestion and delay for commuter, local, and distribution traffic on the corridor.



Today SR 21 can be characterized as a four-lane arterial, expanding to six lanes in Garden City, with a mix of developed and undeveloped areas. The proximity of the Port near the central portion of the corridor and the location of “bedroom communities” to the north of the corridor contribute to a mix of both commuter and heavy truck traffic on SR 21. Denser development, additional lanes, and more curb cuts along the southern end of the corridor restrict mobility and create safety concerns. To address these issues several roadway capacity improvement alternatives and the No Build condition were evaluated as part of the study. Based on the results of the traffic analysis performed for the study, the proposed concept would include the following:

- Widen the northern end of SR 21 to six lanes
- Construct elevated lanes above SR 21 from north of SR 30 to a connection with the Jimmy DeLoach Connector
- Provide flyover ramps at I-95
- Provide slip ramps at Pinderpoint Road
- Construct express lanes on the Jimmy DeLoach Connector
- Construct elevated lanes beginning at the terminus of the Jimmy DeLoach Connector, shifting to the SR 21 alignment, and connecting to I-516 just south of Minus Avenue
- Reconstruct SR 21 between Smith Avenue and Minus Avenue, narrowing the road from six to four lanes and adding a raised, landscaped median, bicycle lanes, and sidewalks.

The Preferred Alternative would provide additional capacity along SR 21 from the Effingham County line to I-516 and would provide limited access facilities while maintaining local access on the surface streets. The recommended improvements would also enhance traffic LOS operations along the length of the SR 21 corridor. The northern elevated lanes would improve peak hour operations at the I-95 interchange. The express lanes in the Central Section would likely reduce the chances of truck-passenger car conflicts and improve traffic operations on SR 21. The southern elevated lanes would significantly reduce traffic on the SR 21 surface street through Garden City, potentially reducing the crash rate and providing a more pedestrian and bicycle friendly environment. The recommended improvements are expected to substantially reduce travel time along SR 21 as compared with the No Build condition. The additional capacity provided by the ALT 10 alignment would accommodate anticipated future growth in the project area and improve north-south connectivity throughout the region while maintaining local access and viability as an evacuation route.



1 INTRODUCTION

The Savannah/Chatham County area is both a top tourist destination and a major business center for the region. The area has a strong business and employment base that includes manufacturing, distribution, tourism, military, education, healthcare, and port operations. SR 21 serves as a major thoroughfare through Chatham County and is one of the most heavily traveled roadways in the County. It provides a primary means of access to the Port of Savannah and serves commuter traffic between Effingham County and the Savannah area. The SR 21 corridor provides access to the Savannah/Hilton Head International Airport; major employers such as Gulfstream (a major aircraft manufacturer); and the municipalities of Port Wentworth and Garden City. It is also one of only four official hurricane evacuation routes established for Chatham County. A heavily used rail line parallels a majority of the corridor and crosses under the SR 21 corridor at one location. There are also two rail spur crossings, one which passes over SR 21 in Port Wentworth and another which crosses at-grade in the commercial district of Garden City.

Increasing congestion has deteriorated the ability of SR 21 to effectively serve as a commuter route and as a key distribution route for goods coming in and out of the Port of Savannah. As the Chatham County population grows, the limited capacity of SR 21 will also reduce its ability to function as an effective evacuation route. While historical traffic counts indicate a slight negative growth rate trend, this trend is not supported by the travel demand model results and is not expected to continue long term. The Chatham County Travel Demand Model projects growth over the next twenty years, which creates the need to expand capacity along the SR 21 corridor.

Due to the length, character, and variation in adjacent land uses, the corridor was divided into three logical roadway sections for which improvement strategies would be developed and analyzed, as defined below:

Northern Section – Effingham County Line to Jimmy DeLoach Parkway

Central Section – Jimmy DeLoach Parkway to Bourne Avenue (SR 307)

Southern Section – Bourne Avenue (SR 307) to Interstate 516

This report is part of a comprehensive study to develop and evaluate potential solutions to alleviate congestion, enhance safety and increase mobility along the corridor. This study evaluates the costs and benefits associated with each design alternative in light of environmental conditions, constructability, and impacts to residents and businesses. The study includes an examination of possible funding options as well as the potential for redevelopment and impacts to land use and community resources.



Recommendations were developed based on existing traffic conditions, operational analysis of the roadway and intersections, future traffic projections, and a review of historical crash data. The recommendations take into consideration safety, capacity needs, implementation feasibility, constructability, community support, right-of-way impacts, environmental impacts, connectivity, and complete streets concepts.

1.1 Study Area

SR 21 is an existing principal arterial that provides north-south connectivity between the City Savannah to the south and Garden City, Port Wentworth, I-95, and Effingham County to the north. The study area focuses on a ten-mile segment that extends from the Effingham County line to I-516 just south of Minus Avenue in Garden City. The Northern and Central Sections of the corridor, from the Effingham County line to Bourne Avenue (SR 307), are located within the city limits of Port Wentworth. The Southern Section, from just south of Bourne Avenue to I-516, lies within the jurisdiction of Garden City. Figure 1 shows the existing study area along the SR 21 corridor.

1.1.1 Existing Roadway Network

Improvements to this corridor must consider maintaining or enhancing connectivity with a number of significant existing roadways. Brief descriptions of major existing roadways that intersect SR 21 are as follows:

- **SR 30** intersects SR 21 just north of I-95, and then runs coincident with SR 21 until continuing east along Bonnybridge Road to its terminus at SR 25.
- **I-95** crosses the corridor near the northern end of the study segment.
- **Jimmy DeLoach Parkway (JDL Parkway)** links US 80 to SR 21 and includes an interchange with I-95 to the west of the study corridor.
- **Gulfstream/Crossgate Road** provides access to the Savannah/Hilton Head International Airport and Gulfstream just west of SR 21, and connects to SR 25 to the east.
- **Bourne Avenue (SR 307)/Dean Forest Road** links US Highway 17 in central Chatham County with SR 25 (at the main entrance to GPA's Garden City Terminal) and includes an interchange with I-16, as well as intersections with both US Highway 80 and SR 21.
- **SR 25** roughly parallels SR 21 to the east in Port Wentworth and Garden City, and connects to SR 21/I-516 with an interchange at Burnsed Boulevard just south of the study segment.
- **I-516** terminates just north of Burnsed Boulevard/SR 25 at the southern end of the study corridor just inside the Garden City Limits. I-516 runs along the east side of Savannah and connects to the Veterans Parkway and DeRenne Avenue to the south.

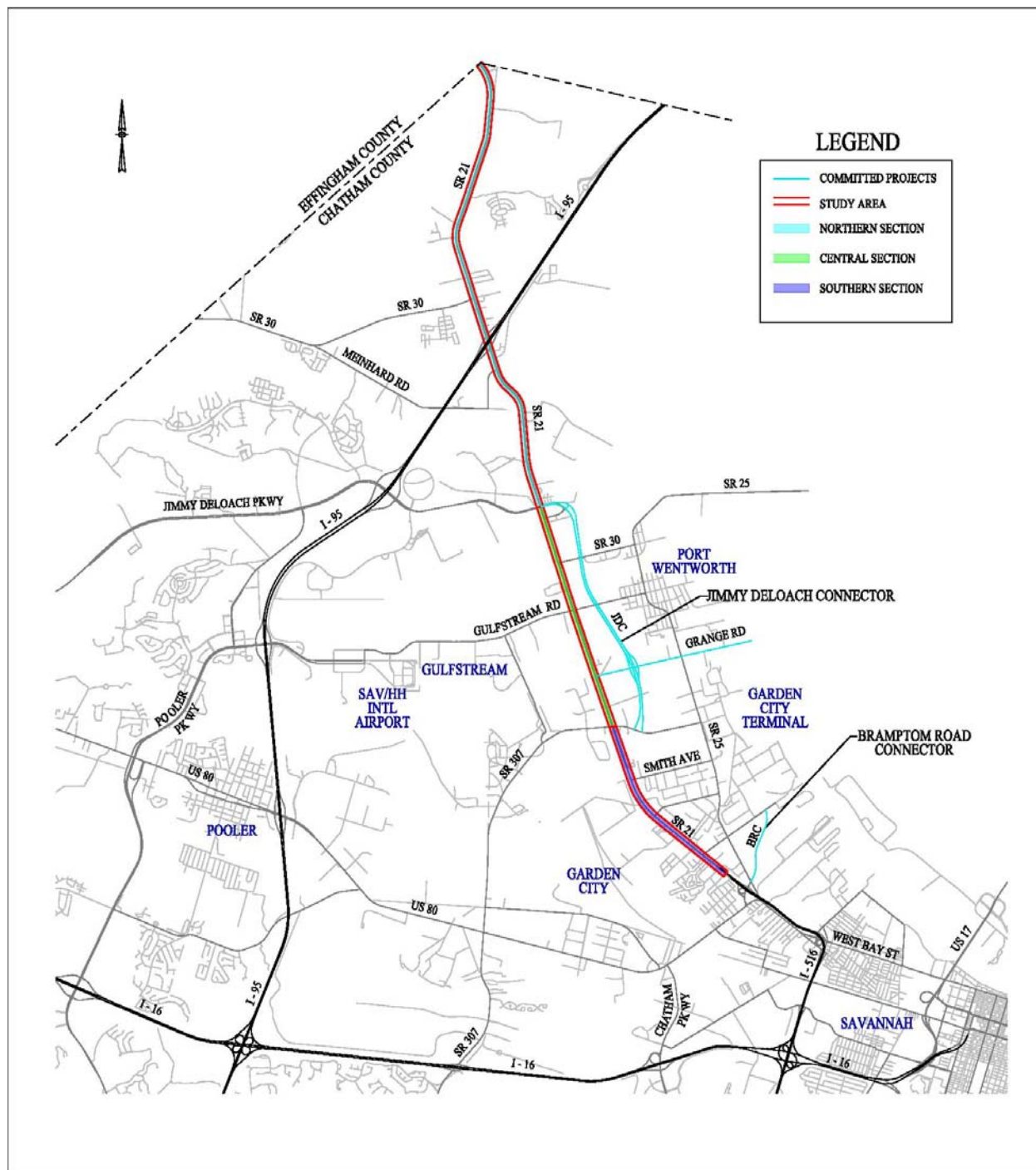


Figure 1 – Existing Study Area along SR 21 in Chatham County



1.2 Other Projects Planned in the Area

As potential solutions are developed and evaluated, several proposed roadways are also being considered, with special attention paid to maintaining or enhancing connectivity with these facilities. The “Last Mile” project will be evaluated as a certainty as it has been identified as a “committed” project with an anticipated construction completion date of 2014. The Brampton Road Connector and Grange Road Widening projects will also be considered; each of which will provide improved access to the Georgia Port Authority’s (GPA) Garden City Terminal. Additional current and planned projects in the area are discussed in Technical Memorandum 2. Following is a description of the key projects considered in this study. The location of each proposed project considered in this study is highlighted in the study area map in Figure 1.

- ***Proposed Jimmy DeLoach Parkway Connector (JDL Connector)***

PI#0008690: Jimmy DeLoach Parkway Connector (aka Last Mile)

The existing JDL Parkway links US 80 and SR 21 and provides access to I-95 just west of SR 21. The Parkway’s eastern terminus is an intersection with SR 21. The proposed connector would extend the JDL Parkway from its existing eastern terminus to an intersection with Bourne Avenue (SR 307), including a new interchange at Grange Road. The primary purpose of this project is to accommodate heavy truck traffic associated with the Port by providing more direct access between I-95 and the GPA terminals.

- ***Proposed Brampton Road Connector***

PI#0006328: Brampton Road Connector from Foundation Drive to SR 21/SR 25/US 80

The Brampton Road Connector project is located near the southern terminus of the study segment. This area involves an intricate conglomeration of major intersecting roads, including SR 25, US 80, I-516, SR 21 and a heavily used entrance to the Port’s Garden City Terminal. The proposed Brampton Road Connector will provide a four-lane, limited-access roadway between SR Spur 21 and Brampton Road. It will connect Brampton Road, GPA Gate 3, and Foundation Drive to SR 21, SR 25, and US 80, while providing direct access to the Interstate System for heavy commercial truck traffic. This project is programmed for long range.

- ***Grange Road Widening***

PI#0007885: CS 650/Grange Road from SR 21 to SR 25

Grange Road extends from a western terminus at SR 21 east across SR 25 and terminates shortly before the Savannah River. Funding has been authorized to reconstruct 1.5 miles of Grange Road from two existing lanes to three proposed lanes. It is in the Construction Work Program and the let date is 8/15/2013.



2 REVIEW OF PREVIOUS STUDIES

A review of previous studies along the corridor was incorporated into this study. The purpose of this review was to assess findings and recommendations developed in previous work to avoid reanalyzing what has already been done.

2.1 Overview of Previous Studies Review

Previous studies involving or affecting SR 21 have been performed by various public and private entities over the years. A review of these documents was undertaken to evaluate the existing information and data available for SR 21. The following list includes studies, documents, and websites examined as part of this review.

1. Northwest Toll Expressway Value Pricing Program Pilot Study, March 2009, Georgia State Road and Tollway Authority (SRTA)
2. Statewide Truck Lanes Needs Identification Study: SR 21 Corridor Needs Analysis, July 2007, Georgia Department of Transportation (GDOT)
3. Effingham Parkway Concept Report, November 2009, GDOT
4. Jimmy DeLoach Connector Concept Report, October 2009, GDOT
5. Brampton Road Connector Concept Report, March 2010, GDOT
6. Value Engineering Mod 1 Training Report: SR 307/Dean Forrest Road Widening and Reconstruction, March 2009, GDOT/MACTEC Engineering and Consulting, Inc.
7. Coastal Regional Metropolitan Planning Organization (CORE MPO) Transportation Improvement Program (Draft), To be adopted June 2010, CORE MPO
8. Research Forest Tracts Traffic Impact Study, August 2010, Effingham County Industrial Development Authority (ECIDA)
9. Multi-Modal Transportation Study for Effingham County, July 2008, GDOT
10. Community Assessment: Port Wentworth Comprehensive Plan, July 2007, Georgia Department of Community Affairs
11. Chatham County Bikeway Plan, October 2006 (amended), Chatham County – Savannah Metropolitan Planning Commission (MPC)
12. CORE Connections 2035: Volume 1-Framework Mobility Plan, September 2009, CORE MPO
13. Georgia Coast 2030: Population Projections for the 10-County Coastal Region, September 2006, for Coastal Georgia Regional Development Center
14. Georgia Ports Authority (GPA) Annual Report Fiscal Year 2009, June 2009, GPA
15. Georgia's State Traffic and Report Statistics (STARS), 2009, GDOT
16. Coastal Regional Commission website: thegeorgiacoast.crc.ga.gov
17. Chatham County — Savannah MPC website: www.thempc.org
18. Georgia Historical Society website: www.georgiahistory.com/historic_markers
19. United States Census Bureau website: www.census.gov



2.2 Findings from Previous Studies

Each of the above references was reviewed for relevant information regarding the SR 21 corridor. Technical Memorandum 2 details the relevant information obtained from other studies. Below is a brief summary of some key findings that impact the SR 21 Corridor.

Historical and Cultural Significance

Potential opportunities for incorporating and preserving local history exist. General William T. Sherman's March to the Sea was along what is now SR 21. Other nearby local heritage sites include the Swamp Fox Rural Neighborhood, Houston Baptist Church and Cemetery, and the Mulberry Grove Plantation. Two Historical Markers are located on or near SR 21: "Houston Baptist Church" north of Lakeside Boulevard and "Washington's Southern Tour II" north of International Trade Parkway.

Population and Employment

According to the US Census, the 2010 population of Chatham County was 265,128. The majority of Chatham County residents live in the City of Savannah, which boasted a 2010 population of 136,286. By the year 2030, the Georgia Office of Planning and Budget expects Chatham County to have a population of around 324,000. Just to the north, Effingham County reported a population of 52,250 in 2010. The Office of Planning and Budget expects Effingham County to grow to a population of 112,000 by 2030.

The City of Savannah is the largest city in the 10-county coastal Georgia region and a major employment center. Effingham County's explosive growth is largely due to its popularity as a bedroom community to Chatham County. SR 21 is a major commuting corridor for Effingham County residents, as is SR 30, which terminates into SR 21 and further contributes to commuting traffic congestion. Employment and commuting patterns indicate that over 60 percent of Effingham County workers are employed in a different county, and over 80 percent of Effingham workers drive alone to work.

Future Development and Growth

Increases in development along the corridor will lead to both an increased opportunity for local employment and an increase in traffic volumes on SR 21. Additionally, the GPA and Gulfstream are expanding, which will lead to an increased volume of truck traffic, congestion, and safety issues. Incorporation of access management strategies will be vital to controlling congestion along the corridor as development and growth continue. The terminus of SR 21 with I-516 should be integrated into the urban environment while considering traffic calming and complete streets options. Enhanced land use and development opportunities should also be examined.

Tolling

Previous studies indicate the Port Connector Road should open to both trucks and passenger cars. Options such as high occupancy vehicle (HOV) lanes, high occupancy/toll (HOT) lanes, and express toll lanes (ETL) should be further investigated.



Long Range Transportation Plan (LRTP)

SR 21 is currently in the CORE MPO long range transportation plan and potential improvements to the corridor align with many of the goals outlined in the plan. Improvements to the roadway will reduce work trip congestion and vehicle hours of travel. Maximizing the efficiency of signalized intersections and expanding the use of Intelligent Transportation Systems (ITS) are possible ways to help minimize delay, which should improve local air quality. Shorter delays should also decrease the frequency of collisions due to frustrated drivers. While examining improvement options for SR 21, consideration for bicycle and pedestrian facilities and access to transit should be given. Additionally, SR 21 should be an efficient and reliable freight corridor to serve the truck traffic generated by the Port of Savannah.



3 PROJECT PURPOSE AND NEED

This study intends to develop a solution that would best enhance mobility and provide safer and more efficient travel along the SR 21 corridor between the Effingham County line and I-516. The project **purposes** are as follows:

- Provide congestion relief in order to improve operational levels during peak periods at major intersections
- Improve regional and local truck accessibility to the Port
- Minimize truck-car conflicts
- Minimize delay for commuter traffic
- Accommodate future travel demand while minimizing impacts to the community and the environment.
- Improve connectivity with interstates and major arterials in the area (I-516, SR 25, SR 307, Gulfstream Road, Jimmy DeLoach Parkway, I-95, SR 30, the proposed Jimmy DeLoach Parkway Connector, and the proposed Brampton Road Connector)
- Improve safety and viability for multi-modal access
- Preserve or enhance adjacent land uses

Based on extensive analysis described in detail in Technical Memorandum 3, two factors combine to produce flat growth along the corridor. First, based on a screenline analysis, it is evident that the corridor is saturated between O'Leary Road and Jimmy DeLoach Parkway, meaning that the capacity of the roadway has been reached and additional traffic cannot be accommodated during peak hours. Second, increasing use of the corridor by trucks seeking access to the Port of Savannah has exacerbated the problem by reducing the efficiency of the four-lane facility. According to findings stipulated in Technical Memorandum 3, roughly 5,000 vehicles per day are currently diverting to alternate routes.

Growth at the Port of Savannah remains positive, increasing total truck traffic in the area. Currently, trucks represent 16 to 28 percent of the traffic, which makes the corridor less attractive for passenger cars. If no major improvements are made to enhance mobility on SR 21, congestion will continue to increase and the overall growth rate will continue to stagnate. Meanwhile, anticipated growth rates in northern Port Wentworth, western Chatham County, and Effingham County suggest that commuter traffic will continue to increase, with the volume of diverted trips increasing at a similar rate.

The **need** for the project is based on existing congestion along the corridor. Analysis indicates a level of service (LOS) F – which means poor progression, long cycle lengths, and long delays – at three intersections (SR 30, Gulfstream/Crossgate Road, and SR 307) during the morning peak hour, and at three intersections (the I-95 northbound off-ramp, Gulfstream/Crossgate Road, and SR 307) during the afternoon peak hour.



3.1 Logical Termini

According to the Federal Highway Administration, “Logical Termini for project development are defined as (1) rational end points for a transportation improvement, and (2) rational end points for a review of the environmental impacts.” The termini of a proposed project will be of sufficient length to fully assess potential environmental impacts along the SR 21 corridor.

3.1.1 Proposed Termini

The proposed project would begin at the Effingham County line in Port Wentworth and end at the northern terminus of I-516 in Garden City. Measured along the existing SR 21 alignment, the project length is 10.0 miles.

Northern Terminus

Although the study area has been bounded on the northern end by the Effingham County line, the 2035 Chatham County Travel Demand Model indicates that 2035 average daily volumes on the northernmost segment of the corridor will be 53,000, far exceeding the capacity of the current four-lane facility. Major traffic generators and the facilities that serve the traffic within Effingham County must be identified and considered. The Multi-modal Transportation Study for Effingham County (completed by Carter-Burgess/Jacobs in July of 2008) identified the widening of SR 21 from 4 to 6 lanes between Old Augusta Road (at the County Line) and Fort Howard Road in Rincon as the number two priority project on a county-wide list of all recommended potential projects. This widening would accommodate future travel demand in Effingham County. Connection to this improved facility thereby establishes a logical terminus

Southern Terminus

The southern terminus of the project would be a connection to I-516. The Interstate currently ends at this point as a four-lane, limited access facility and SR 21 continues as a six-lane facility featuring, a flush-median, with curb and gutter and sidewalks. This is a logical point to begin the project as the Interstate is a major thoroughfare with a four-lane freeway section with a much greater capacity than its adjacent section to the north. I-516 provides direct access to Savannah’s midtown where its southern terminus feeds into DeRenne Avenue. DeRenne Avenue is a principal east-west arterial serving commuters and providing access to the Central Business District, major malls and commercial development, and two of Savannah’s three major hospitals. I-516 also provides an interchange connection with I-16 which provides access to downtown Savannah. Additional connectivity includes West Bay Street (and alternate means of access to the downtown area), US 80 and US 17, and the Southwest Bypass which provides access to Savannah’s Southside, Georgetown, and Richmond Hill via a limited access facility.

3.1.2 Independent Utility

Independent utility is defined as the ability of a transportation improvement to be usable and be a reasonable expenditure even if no additional transportation improvements are made in the area. The proposed project has independent utility because it will meet the defined need, be usable,



and can function on its own, without further construction of an adjoining project. The following general benefits would result from the proposed project:

- Improved connectivity with interstates and other major arterials in the area (I-95, SR 30, JDL Parkway/Connector, SR 307, US 80, SR 25, I-516)
- Improved mobility for both passenger cars and trucks
- Improved truck accessibility to the Port
- Minimization of truck-passenger car conflicts
- Improved operational levels during peak periods at major intersections
- Accommodation of future travel demand
- Enhanced opportunities for future multi-modal access

Safety should improve significantly as a result of improving truck access to the port, improving traffic operations, separating through traffic from local traffic, and reducing congestion.



4 PUBLIC INVOLVEMENT

Public involvement was an essential component of the SR 21 Corridor Study and occurred throughout the process. Public participation within the study sought to promote public awareness of the study and provide forums at which the public could participate actively with the study. The public involvement goals of the SR 21 Corridor Study were to:

- Inform the public and associated agencies of the purpose and progress of the SR 21 Corridor Study;
- Provide a forum for the public and partnering agencies to communicate their perceptions, opinions and ideas throughout the entire course of the planning process; and,
- Promote communication and integration of public input into the study, which is critical to building consensus for the conclusions and recommendations of the study.

4.1 Communications

At the onset of the study, a project logo was created in order to provide an identity for the SR 21 Corridor Study that would resonate with the public. This logo, shown in Figure 2, was used consistently on all presentations, documents, fact sheets, and other published information.



Figure 2 – SR 21 Corridor Study Logo

A project website was developed at the beginning of the project and maintained through project completion. The website provided updates on the status of the project, avenues for feedback from the public, and housed documents and plans related to the study.

In order to inform the public and relevant agencies of the purpose and progress of the SR 21 Corridor Study, project Fact Sheets were developed and maintained throughout the study. These Fact Sheets presented the project purpose, schedule and goals, as well as updates and findings. The most recent Fact Sheet is included in Appendix A.



4.2 Meetings

Over the life of the study, the MPO staff and consultant team met with the community, stakeholders, elected officials, and other interested parties on a regular basis as a primary means of public involvement and awareness. In addition to the regularly scheduled meetings determined at the beginning of the study – such as regular Stakeholder Committee meetings and Public Meetings – others were added on an as needed basis. Outreach was continual throughout the process, but was emphasized at three main points in the study:

- *Initiating the study* – To share the study goals and obtain initial input from the local community regarding traffic/transportation issues along the corridor.
- *Identification of three alternatives* – To share a minimum of three alternatives for improving conditions along the corridor that satisfy the need and purpose for the project and to receive public comment on those alternatives.
- *Preferred alternative* – To present a preferred alternative for community support and refinement.

For each of these three key milestones, meetings were held with the Stakeholder Committee, the public and key stakeholders.

- The first public meeting was held at Mercer Middle School, which is located on the SR 21 corridor. The other two public meetings were held at the Georgia Tech – Savannah Campus, located less than a mile from the corridor. All public meetings were advertised in the Savannah Morning News and posted on the project website. In addition, roadside signs were placed in multiple locations throughout the corridor at least two weeks prior to the meeting date.
- Stakeholder Committee meetings were typically held at the Metropolitan Planning Commission. The Stakeholder Committee was comprised of over 40 individuals, including local businesses, local government elected officials and staff, state agencies, Savannah Bicycle Campaign, Chambers of Commerce, and the Savannah Chatham County Public School System.

Because the input from these meetings was treated as cumulative and informed the process along the way, the following narrative is primarily structured chronologically, rather than by meeting type.



Initiating the Study

The initial stakeholder and public meetings were held to obtain input from the local community regarding traffic/transportation issues along the corridor. Both meetings provided an overview of the study need, goals, and process. The public meeting was held on September 9, 2010 and attended by approximately 37 people. Meeting participants were asked to provide feedback regarding their top issues and concerns. This was achieved through small group breakout sessions during the public meeting. Stakeholders and the public were also invited to complete comment cards and participate in a survey. The detailed comment forms and surveys are located in Appendix B. Many issues were raised including the at-grade railroad crossing in Garden City, safety matters related to the two-way-left-turn lane in Garden City, and concerns regarding heavy truck traffic.

Identification of Three Alternatives

As the study progressed, many alternatives were developed and analyzed. During the second round of public outreach, emphasis was placed on sharing the top three alternatives with the public for feedback and comment. The second public meeting was held on November 27, 2012. The public meeting was attended by 20 people. A comment form was developed to assess the community's response to each of these alternatives. In addition to asking about the preference for the alternatives presented, the comment form also asked questions regarding elements of context sensitive design, and provided substantial opportunity for written comments. Though only three surveys were returned (shown in Appendix B), overall feedback about the project was favorable. Highlights of the survey are shown below in Table 1. Note: At this point in the study, the elevated lanes strategy had already been selected for use in the Northern Section of the SR 21 corridor. Therefore, preference for the Northern Section alternatives was not included in the survey.



Table 1 – Summary of Public Participation Survey

Ranking of Importance for Selected Elements of Design <i>(1 - Not important; 6 - Very Important)</i>	
Northern Section	Average
Separate Trucks from Passenger Cars	5.33
Pedestrian and Bicycle Facilities	4.67
Trees and Landscaping	4.00
Central Section	
Separate Trucks from Passenger Cars	5.67
Pedestrian and Bicycle Facilities	4.00
Trees and Landscaping	3.33
Southern Section	
Separate Trucks from Passenger Cars	5.67
Pedestrian and Bicycle Facilities	3.67
Trees and Landscaping	3.67
Preferred Alternative	
Central Section	
Elevated Lanes	100%
Connect to 'Last Mile'	0%
Southern Section	
Elevated Lanes	67%
New Location	33%

Preferred Alternative

Based on technical analysis of the top three alternatives and input from the community, ALT 10 was identified as the preferred alternative for the SR 21 corridor. This alternative employs elevated lanes in both the Northern and Southern Sections of the corridor, connected by express lanes on the JDL Connector in the Central Section.

ALT 10 was presented as the preferred alternative for the corridor at a final public meeting held on August 15, 2013. The open house style meeting was attended by 25 people. As with other public meetings, attendees were invited to provide written comments, of which 5 were received. The comment forms are included in Appendix B. The overall response to the preferred alternative was positive.

4.3 Major Stakeholders

In addition to the large stakeholder meeting, smaller, more individualized meetings were held with major stakeholders, including the City of Garden City, the City of Port Wentworth, the Effingham County Transportation Advisory Board, the Georgia Ports Authority (GPA), the Savannah Economic Development Authority (SEDA), the Savannah-Hilton Head International Airport, and Gulfstream.



4.4 GDOT and MPO Coordination Meetings

The study team recognized that communication with agencies at the state and federal level is in the best interest of the project. Therefore, the study team, including the MPC Project Manager, attended a coordination meeting in Atlanta with Georgia Department of Transportation (GDOT) staff to discuss the project. This meeting aided the study team by providing a venue for guidance and comment by GDOT. GDOT was provided with copies of all deliverables throughout the study process and their review comments were appropriately incorporated.

Coordination with the sponsoring agency and its relevant committee members was also at the forefront of the SR 21 Corridor Study. Updates on the study were provided on a regular basis. It is anticipated that, at the conclusion of the study, the MPO Policy Committee will adopt a resolution in support of the preferred alternative.

5 EXISTING CONDITIONS

SR 21 is classified as an urban principal arterial for the entire 10-mile study segment; however, speed limits and adjacent land uses vary throughout the corridor. Following is a description of existing roadway conditions for each section of the study area.

Northern Section

The Northern Section, which falls within the Port Wentworth city limits, begins at the Effingham County line and continues south to the Jimmy DeLoach Parkway. North of SR 30, SR 21 is a four lane divided highway with a grass median, typical rural shoulders, and a posted speed limit of 55 mph. Around the I-95 interchange, from just north of SR 30 to just south of Hendley Road, the posted speed limit is 45 mph. Left and right turn lanes provide access to these adjacent businesses. Figure 3 provides a view of the existing roadway conditions on SR 21 near the I-95 interchange.



Figure 3 – Northern Section – SR 21 as seen from the I-95 overpass looking south

Central Section

The Central Section extends from the Jimmy DeLoach Parkway to Bourne Avenue (SR 307), and lies within the city of Port Wentworth. This portion of SR 21 is a four lane divided highway with a grass median. The posted speed limit is 55 mph between Jimmy DeLoach Parkway and Bonnybridge Road, and 50 mph from Bonnybridge Road to Bourne Avenue. Figure 4 shows a view of SR 21 looking south towards Bonnybridge Road from the Jimmy DeLoach Parkway overpass. Figure 5 shows existing SR 21 traffic at Bourne Avenue.



Figure 4 – Central Section – SR 21 as seen from JDL Parkway overpass looking south



Figure 5 – Central Section – SR 21 as seen looking north towards Bourne Avenue (SR 307)

Southern Section

The Southern Section is located within the jurisdiction of Garden City and stretches from Bourne Avenue (SR 307) to the I-516 terminus just south of Minus Avenue. From Bourne Avenue to Smith Avenue, SR 21 is a four lane divided highway with a grass median and paved shoulders. South of Smith Avenue, SR 21 is a seven lane facility with three travel lanes in each direction and a center two-way-left-turn lane, sidewalks and outside curb and gutter. The posted speed limit is 45 mph. This area features numerous commercial driveways and little access control. Two schools are located along the western side of SR 21, with one long 35 mph school zone. Just north of Brampton Road, there is an at-grade railroad crossing, shown in Figure 7. During the morning peak hour, two crossing guards, one adjacent to the middle school and one next to the high school, direct traffic on SR 21. Figure 6 provides a view of the Southern Section looking north along SR 21 towards the intersection at Brampton Road.



Figure 6 – Southern Section – SR 21 as seen looking north towards the Brampton Road intersection



Figure 7 – Southern Section – SR 21 as seen looking south towards railroad crossing



The following roadways have intersections with SR 21 and comprise the study intersections examined for this project:

1. SR 30
2. I-95 Southbound Ramps
3. I-95 Northbound Ramps
4. O'Leary Road/Pilot Truck Stop
5. Hendley Road
6. International Trade Parkway
7. Jimmy DeLoach Parkway (JDL Parkway)
8. Bonnybridge Road
9. Gulfstream/Crossgate Road
10. Grange Road
11. Bourne Avenue (SR 307)
12. Brampton Road
13. Minus Road

Additionally, several key intersections along the JDL Connector were considered:

14. Bourne Avenue and JDL Connector Southbound
15. Bourne Avenue and JDL Connector Northbound
16. Grange Road and JDL Connector Southbound
17. Grange Road and JDL Connector Northbound
18. Pierce Road and JDL Connector Southbound
19. Pierce Road and JDL Connector Northbound

In the No Build and ALT 3 conditions, study intersections 14 and 15 were analyzed as one intersection. A map indicating the locations of the study intersections along the corridor is presented in Figure 8.

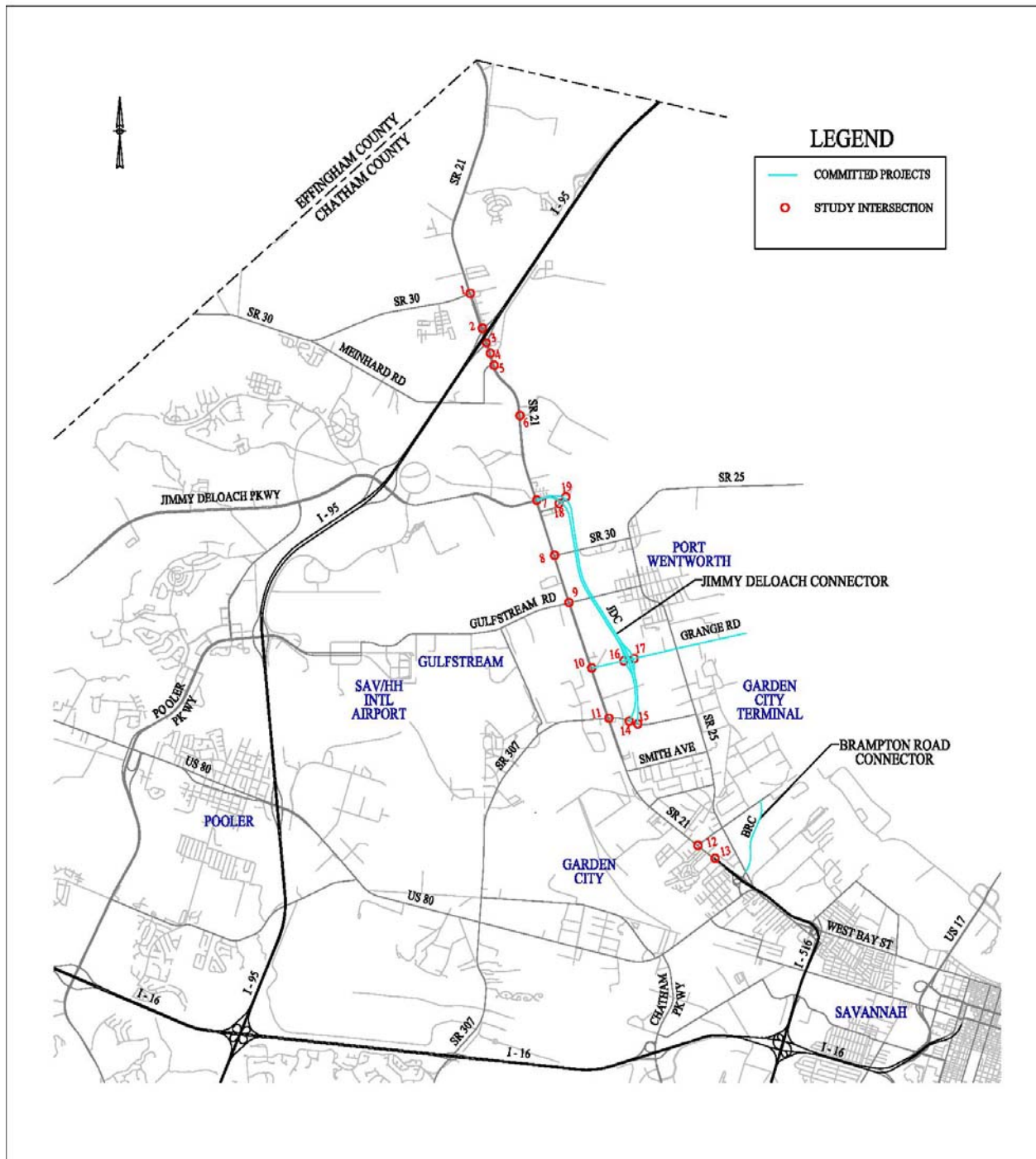


Figure 8 – Map of Study Intersections



5.1 Field Observations

Based on on-going field observations, traffic congestion exists along the SR 21 corridor during the weekday peak hours.

Northern Section

During the weekday morning peak hour, significant queuing has been observed on southbound SR 21 at SR 30, at times backing up all the way to the Rice Hope development. Similarly, extreme queuing has been observed during the weekday evening peak hour on northbound SR 21 at the I-95 northbound ramps. In general, traffic north of I-95 appears to be primarily commuters, while a large number of heavy trucks are seen south of I-95, in the vicinity of the Pilot truck stop.

Central Section

During weekday morning peak hours, congestion has been observed on southbound SR 21 at Bonnybridge Road, where left-turning trucks sometimes cause the left-turn queue to back up beyond the available left-turn storage. Significant congestion and high volumes of truck traffic have also been observed at the intersection of SR 21 and Bourne Avenue (SR 307) for both the morning and evening peak hours. In general, traffic in the Central Section appears to be a mix of heavy trucks and passenger cars, with the heavy trucks creating increased delay at intersections.

Southern Section

During the morning peak hour, the school zones and crossing guards create some added delay. The at-grade railroad crossing has been observed to create queuing and added delay during off-peak hours. Greater pedestrian activity has also been observed, particularly near the schools on weekdays. Traffic in Garden City appears to be a mix of both through and local trips.



5.2 Land Use

The SR 21 corridor includes many diverse land uses between the Effingham County line and I-516. It is primarily located in two municipalities, Garden City and Port Wentworth. Each of the three sections comprising the corridor exhibits different land use patterns and demands, as detailed below. Land use maps of the corridor are provided in Appendix C.

Northern Section

The Northern Section of SR 21 lies within the city of Port Wentworth. Rice Hope, a 1,300 acre master-planned community is located along the eastern side of SR 21, near the county line. Though still under development, Rice Hope currently includes single-family residences townhomes, and apartments. Commercial development is also slated, primarily along the SR 21 frontage. Rice Creek, another residential development, lies on the west side of SR 21 across from Rice Hope and features apartments as well as single-family detached homes. A significant amount of land on the west side of SR 21, north of SR 30, remains as yet undeveloped. Two additional areas of residential development lie just north of SR 30 and are made up primarily of single-family homes.

The area between SR 30 and O'Leary Road is heavily commercial, featuring Interstate-oriented uses such as hotels, restaurants, and gas stations. A large shopping center, anchored by a grocery store, is located at the intersection of SR 21 and SR 30/Black Creek Drive, serving both residents and commuters. The area on the west side of SR 21 between SR 30 and I-95 includes a large area of commercially zoned land which is still in the early stages of development. A large truck stop is also located in this area at the intersection of SR 21 and O'Leary Road.

From O'Leary Road to the JDL Parkway, much of the SR 21 corridor remains undeveloped. The predominant land use pattern in this area includes a mix of some small scale businesses, a mobile home park, and a few, scattered single-family homes. International Trade Parkway provides access to major distribution centers, with space for future development. Between International Trade Parkway and JDL Parkway, St. Augustine Creek creates a major obstacle for potential developments. Development activity directly adjacent to SR 21 is also constrained by the CRX railroad line which runs along the western edge of the SR 21 alignment, beginning just south of Hendley Road and continuing south just past the Pipemakers Canal.

Central Section

The Central Section is located within the City of Port Wentworth. As SR 21 continues from JDL Parkway to Gulfstream/Crossgate Road, land use continues to be a mix of small scale businesses and scattered residences, with large areas of undeveloped land. The City of Savannah's Industrial & Domestic Water Plant just north of Gulfstream/Crossgate Road is accessed directly from SR 21.



Between Gulfstream/Crossgate Road and Bourne Avenue (SR 307) the primary land use is industrial; however, there are a few remaining single-family residences in this area. Both the Savannah/Hilton Head International Airport and Gulfstream are located to the west of SR 21 and can be accessed via Gulfstream Road. The Georgia Ports Authority Terminals lie to the east of the corridor with direct access to the main gate via Bourne Avenue. There is a large, undeveloped area just south of Gulfstream/Crossgate Road, on the east side of SR 21 that, if developed, would most likely be for industrial use.

The CRX railroad line continues parallel along the west side of SR 21, restricting the amount of development that can occur on this edge of the corridor.

Southern Section

Just south of Bourne Avenue (SR 307), SR 21 enters into the jurisdiction of Garden City. Development on the east side of SR 21 is primarily commercial and includes a church. South of Pipemakers Canal, the CRX railroad breaks away from the western side of SR 21. The Southern Section of the corridor in Garden City is highly commercialized with primarily service-oriented businesses, including fast-food restaurants, banks, and fueling stations. Residential uses in the area include an apartment complex right on SR 21 along with neighborhoods just off the corridor. In addition, there are two schools in Garden City, a middle school and a high school, both located on the west side of SR 21.

5.2.1 Economic Development

Northern Section

The commercial area surrounding the I-95 interchange is currently stable and continues to experience growth. This area has the highest concentration of commercial development on SR 21 within Port Wentworth, and maintaining the success of this commercial area is a high priority for the City. The aforementioned areas of undeveloped land north of this interchange also have significant economic development potential for Port Wentworth.

Central Section

As the Port continues to grow, there is significant economic development potential for industrial-related land uses. Such development would be most likely to occur in the areas between Bourne Avenue (SR 307) and the JDL Parkway. At present Gulfstream, which currently employs 5,500 people, is planning an expansion that would create 1,000 new jobs.

Southern Section

The commercial development in Garden City along SR 21 helps to meet the needs of local residents. In general, however, this area is fairly unattractive, as all of the properties are not maintained to the highest standards and there is a severe lack of shade trees along the street and in parking areas. At present, there are several vacant businesses in this area as well. Significant redevelopment opportunities exist in this section of the corridor.



5.2.2 Local and Regional Planning

Chatham County is a major regional economic and employment hub, and commuting activity from adjacent counties is one of the primary regional transportation issues. As mentioned in Section 2.2, a significant number of Effingham County residents commute to Chatham County for work. The large commuter population poses capacity challenges for the regional roadway system, including interstates, US highways, and other major roads such as SR 21.

With the help of local stakeholders and members of the general public, the Coastal Region Metropolitan Planning Organization (CORE MPO) developed a list of transportation issues for the area. The CORE MPO conducted a 2030 needs assessment which modeled the travel demand for the entire metropolitan area as a system rather than on individual projects or corridors. Under a No Build scenario, the model predicted that several roads would experience severe congestion in 2030, including portions of the SR 21 Corridor. SR 21 was identified as one of the corridors with safety and congestion issues. As a result of the 2030 needs assessment, CORE MPO developed a constrained long-range plan to address major deficiencies in the regional transportation system and identify funding sources to implement the various recommended projects. The long-range plan establishes priorities for roadway projects based on the current funding status of all projects included in the plan. In its recently adopted FY 2013-2016 TIP, CORE MPO identifies the SR 21 Corridor Improvements project as a 2nd Priority Project that has significant regional impacts.

5.3 Multimodal Facilities

5.3.1 Pedestrian Facilities

At present, the Northern and Central Sections of SR 21 are not conducive to pedestrian traffic. There are no existing sidewalks; however, crosswalks and pedestrian signals are currently employed at major intersections along SR 21 including:

- SR 30/Black Creek Drive
- O'Leary/Pilot Truck Stop
- International Trade Parkway
- JDL Parkway
- Bonnybridge Road
- Gulfstream/Crossgate Road
- Bourne Avenue (SR 307)

Pedestrian activity in the Southern Section of the corridor is fairly common, supported by the mix of commercial, residential, and institutional land uses in this area; however, the blocks are very long, the right-of-way is extremely wide, and pedestrian crosswalks are limited. Although sidewalks are generally present, there are few pedestrian amenities such as shade trees, benches, or pedestrian-scaled lighting. A pedestrian bridge over the SR 21 corridor, shown in Figure 9, provides a safe crossing to the middle school, but is not always used by pedestrians. Traffic calming measures, creation of blocks, and narrowing the street could greatly enhance not only pedestrian safety but also aesthetics and redevelopment opportunities in this area as well.



Figure 9 – Pedestrian Bridge over SR 21 in Garden City, looking north towards Rommel Avenue

5.3.2 Bicycle Facilities

There are no existing bicycle facilities within the SR 21 corridor, but the Chatham County Bikeway Plan identifies two locations as suitable for on-road bicycle facilities, shown below in Figure 10. Bicycle Route 9 which shares the JDL Parkway alignment is rated as “most suitable” and would include a paved shoulder as part of the 2035 LRTP. Bicycle Route 22 would run along SR 21 between Bonnybridge Road and US 25/Burnsed Boulevard, providing continuity to the planned bicycle network by connecting with the JDL Parkway Bikeway and other planned bicycle routes.

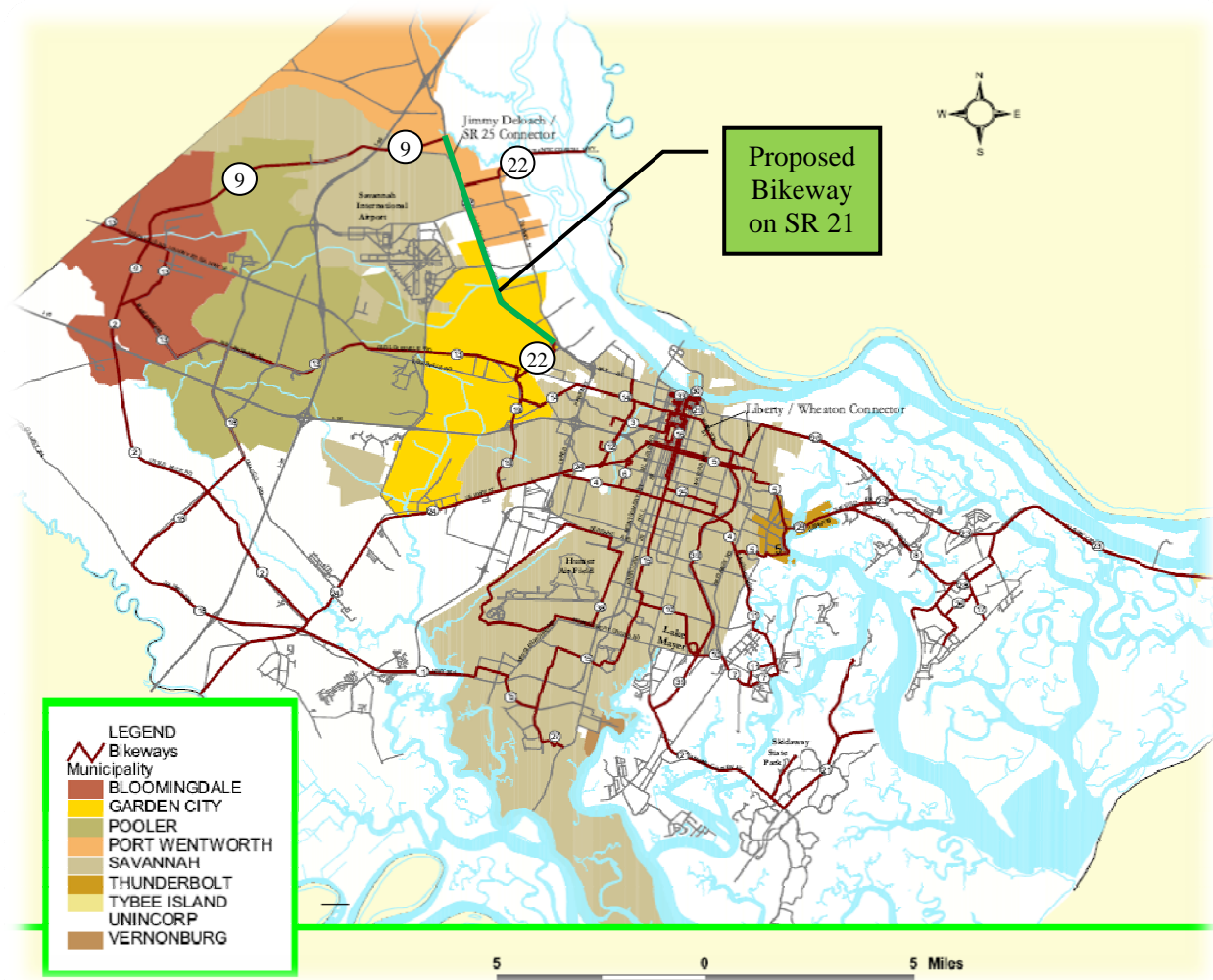


Figure 10 – Existing and Planned Bikeways in Chatham County (Chatham County Bikeway Plan, 2000)



5.3.3 Transit Facilities

At present there are no transit routes operating in the Northern Section of the corridor. Chatham Area Transit (CAT) Route 2 operates buses that travel from downtown Savannah up SR 21 through Garden City, with service on JDL Parkway, Gulfstream Road, and Bourne Avenue (SR 307). CAT maps showing Routes 2, 3A, and 3B are provided in Figure 11.

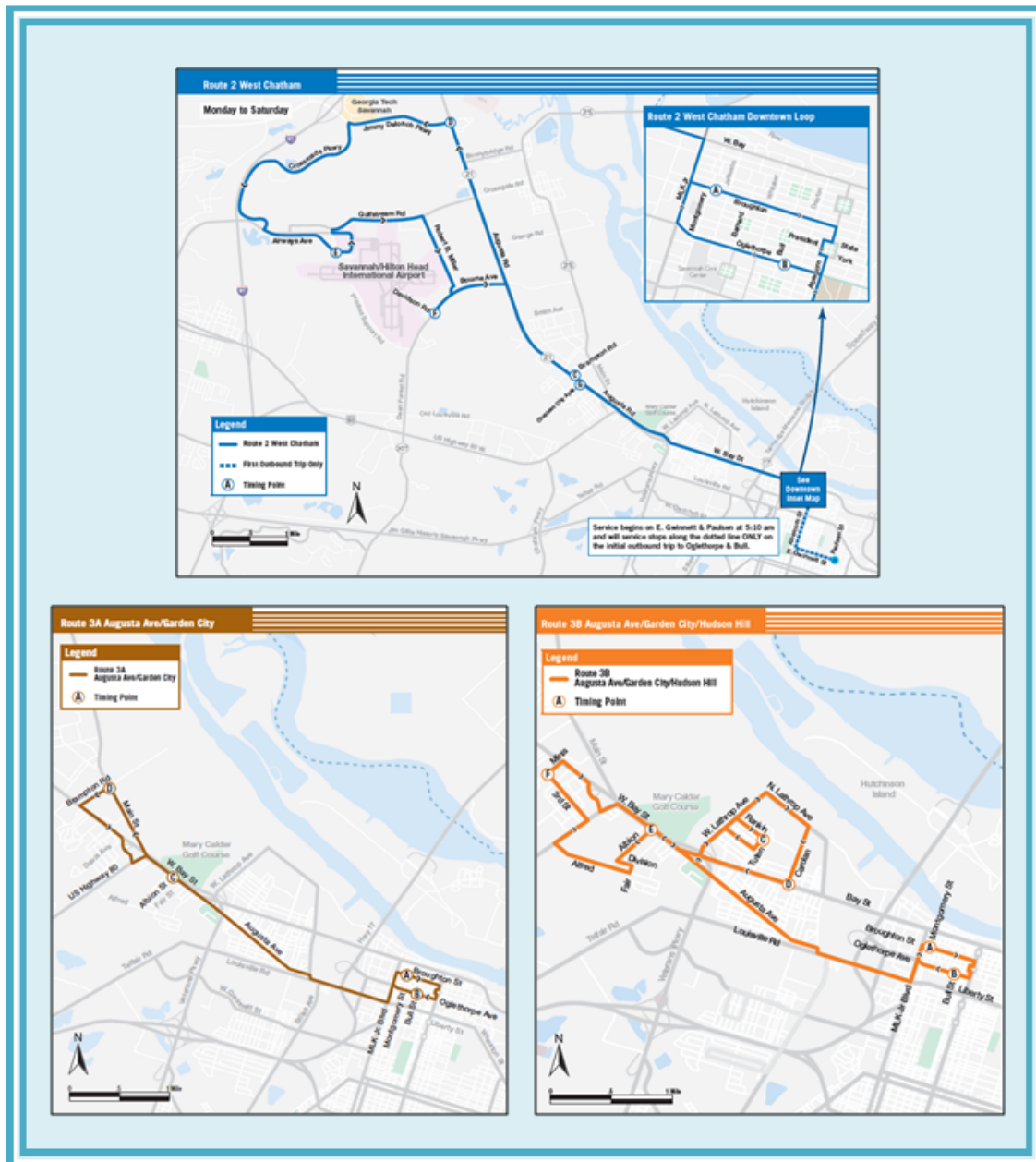


Figure 11 – CAT Maps for Routes 2, 3A, and 3B, as of August 2013



5.4 Hurricane Evacuation Route

SR 21 is designated as an Atlantic coast hurricane evacuation route. Traffic leaving the Savannah and Chatham County area is directed to travel north across I-95 toward Sylvania. Future improvements to the SR 21 Corridor should make efforts to maintain or enhance the abilities of the corridor to facilitate timely and safe evacuations of the Savannah-Chatham County area.

5.5 Existing Traffic Conditions

A capacity analysis of existing peak hour traffic conditions was performed to determine the operational level of service (LOS) at the study intersections identified for the SR 21 corridor. Intersection LOS is based on average vehicular delay experienced at the intersection and is a typical measure of effectiveness used to evaluate intersection operations. The Highway Capacity Manual (HCM) provides ranges of delay for each LOS definition, spanning from very minimal delays (LOS A) to long delays (LOS F). LOS E or F are considered unacceptable for most drivers.

Table 2 below summarizes the results of a capacity analysis for existing conditions at significant intersections. Intersections operating at LOS E or F are emphasized in red. Synchro reports from the analysis are available in Appendix D.

Table 2 – Existing 2010 LOS and Control Delay

Intersection	AM		PM	
	Delay (s)	LOS	Delay (s)	LOS
SR 21 @				
SR 30	470	F	45	D
I-95 Southbound Ramps	71	E	27	C
I-95 Northbound Ramps	26	C	100	F
O'Leary Road	21	C	32	C
<i>Hendley Road (Eastbound Approach)</i>	36	E	70	F
International Trade Parkway	7	A	38	D
Jimmy DeLoach Parkway	15	B	15	B
Bonnybridge Road	14	B	18	B
Gulfstream Road/Crossgate Drive	45	D	105	F
<i>Grange Road (Westbound Approach)</i>	1174	F	error	F
Bourne Avenue (SR 307)	60	E	71	E
Brampton Road	19	B	15	B
Minus Avenue	20	B	24	C



As shown in Table 2, five intersections have failing operations in the morning peak hour, and five intersections are failing in the evening peak hour. The results of the existing capacity analysis are consistent with observations made in the field. Existing conditions show multiple intersections with delays that are unacceptable to most drivers.

The majority of the congestion on the SR 21 corridor can be found between SR 30 and O’Leary Road in the Northern Section, and between Gulfstream/Crossgate Road and Bourne Avenue (SR 307) in the Central Section. Under existing conditions, southbound traffic exhibits an overall corridor LOS E in the morning peak hour, with northbound traffic operating at LOS B. For the evening peak hour, both directions of travel operate at LOS C overall.

5.6 Truck Traffic in the Corridor

The proximity of the Port of Savannah and the high concentration of industrial uses along SR 21 contribute to high volumes of truck traffic in the corridor, particularly in the Northern and Central Sections. The majority of truck traffic is traveling locally, moving freight between local distribution warehouses and rail lines or the Port. The mixture of trucks with commuters and other users of the corridor exacerbate the congestion problems at intersections between Bourne Avenue (SR 307) and I-95, as the comparatively slower acceleration capacity of the trucks impedes the efficiency of signalized intersections for all vehicles. As well, high percentages of heavy trucks can increase the chances for truck-passenger car conflicts.

The SR 21 Corridor carries a higher percentage of truck traffic than the average state highway. Other state facilities have a truck percentage of approximately 7 percent, whereas the portion of heavy trucks on SR 21 ranges from 2 to 8 percent at the corridor termini and from 18 to 28 percent at key points along the route. As a comparison, the average truck percentage for an Interstate highway is 15 percent. Observed truck percentages for SR 21 are shown in Table 3 below.

Table 3 – Percentage of Heavy Trucks on SR 21

SR 21 Corridor Segment	2010 AADT	Truck Percentage
South of SR 30	33,170	18
North of I-95	35,060	24
South of I-95	22,340	16
North of Jimmy DeLoach Parkway	28,160	27
South of Gulfstream Road/ Crossgate Drive	27,530	28



5.7 Crash History

The most up-to-date crash data was obtained from the GDOT Office of Traffic Safety and Design for the years 2010 through 2012. The crash data were examined for each of the three study sections along the corridor. Crash data is summarized in Table 4 for the Northern Section, Table 5 for the Central Section, and Table 6 for the Southern Section. The most recent (2009) statewide crash rate for an urban, non-freeway, principal arterial is 536 crashes per 100 MVMT.

Table 4 – Crash History for the Northern Section of State Route 21

Effingham County Line to Jimmy DeLoach Parkway						
Year	Crashes	Crash Rate*	Injuries	Injury Rate*	Fatalities	Fatality Rate*
2010	121	198	64	105	1	1.6
2011	75	123	16	26	0	0
2012	88	144	34	56	0	0

*Rate is per 100 million vehicle miles traveled

As shown in Table 4, crash rates along the Northern Section of the SR 21 corridor are well below the 2009 statewide crash rate. For this section, one fatality was recorded in 2010.

Table 5 – Crash History for the Central Section of State Route 21

Jimmy DeLoach Parkway to Bourne Avenue (SR 307)						
Year	Crashes	Crash Rate*	Injuries	Injury Rate*	Fatalities	Fatality Rate*
2010	89	269	36	109	0	0
2011	58	175	20	60	0	0
2012	50	151	15	45	0	0

*Rate is per 100 million vehicle miles traveled

Table 5 indicates that crash rates along the Central Section of SR 21 are well below the 2009 statewide crash rate. No fatalities were recorded for this segment from 2010 through 2012.

Table 6 – Crash History for the Southern Section of State Route 21

Bourne Avenue (SR 307) to I-516						
Year	Crashes	Crash Rate*	Injuries	Injury Rate*	Fatalities	Fatality Rate*
2010	123	438	63	225	0	0
2011	98	349	48	171	0	0
2012	126	449	41	146	0	0

*Rate is per 100 million vehicle miles traveled

Table 6 reveals that crash rates in the Southern Section are less than the most recent statewide crash rate. No fatalities were recorded for this segment from 2010 through 2012.



5.8 Summary of Existing Conditions

The Northern Section has primarily residential uses north of SR 30, commercial uses, with potential for further growth, focused around the I-95 interchange, and largely undeveloped areas between Hendley Road and JDL Parkway. During peak hours, heavy commuter traffic is observed around the I-95 interchange, with high truck volumes observed south of I-95. The intersections at SR 30 and the interstate ramps exhibit failing operations during peak hours of travel. High volumes of both commuter and truck traffic increase the potential for truck-passenger car conflicts. The lack of multi-modal facilities creates safety concerns as well.

The Central Section is largely undeveloped with pockets of residential and commercial uses and significant potential for future industrial developments. Peak hour traffic in this section is a mix of commuters and heavy trucks, which increases the likelihood of truck-passenger car conflicts. There are limited transit services in the area and no pedestrian or bicycle facilities. Future Port expansion is expected to generate more truck traffic, while the growth at Gulfstream will attract more commuter traffic. High levels of congestion are experienced near Bourne Avenue (SR 307) and heavy truck traffic contributes to delays at all the intersections in this section.

The Southern Section features primarily commercial land uses, with some residential and industrial uses. This section has the greatest redevelopment potential. As well, this section has sidewalks and public transit services. The Southern Section exhibits the highest crash rates, and typically sees a mix of both through and local trips along SR 21. Reducing traffic volumes on SR 21 in the Southern Section could improve safety issues and spur economic redevelopment.

In general, congestion and safety issues are present throughout the length of the corridor, while existing land use and traffic characteristics vary from section to section. SR 21 is encountering high levels of congestion during peak hours, and frustrated drivers are beginning to avoid SR 21, seeking out alternative routes that are longer distances but have shorter travel times. Key concerns for the existing corridor include both the truck/passenger car and through/local traffic mixes, high levels of congestion and delay, and safety issues for motorized and non-motorized traffic.



6 DEFINITION OF ALTERNATIVES

6.1 Tier I Alternatives Description

For each of the three corridor sections, several strategies for improvement were explored. Eleven corridor improvement alternatives were formulated by combining a set of basic strategies (such as widening, new location, elevated lanes, etc.) into assorted permutations. Each alternative represents a unique combination of these strategies. Table 7 provides brief descriptions of the Tier I Alternatives based on strategy combinations employed in each section. Detailed descriptions of the Tier I Alternatives are provided in Appendix E, with concept schematics shown in Appendix F.

Table 7 – Conceptual Alternative Summary based on Strategies Employed

ALT	NORTHERN SECTION	CENTRAL SECTION	SOUTHERN SECTION
1	Widening	Widening	Widening
2	Widening/Flyovers at I-95	Widening/Grade Separation	Widening
3	Elevated Lanes on 21	Elevated Lanes on SR 21	Elevated Lanes on SR 21
4	West Loop Highway w/ New Interchange at I-95	Elevated Lanes on SR 21	Elevated Lanes on SR 21
5	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	Elevated Lanes on SR 21
6	East Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	Elevated Lanes on SR 21
7	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	New Highway to I-16 near I-516
8	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	New Highway to I-16 near SR 307
9	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	Elevated Lanes on SR 25
10	Elevated Lanes on 21	Connect to JDL Connector	Elevated Lanes on SR 21
11	Elevated Lanes on 21	Connect to JDL Connector	New Highway to I-16 near I-516



6.2 Tier I Analysis

The process by which design alternatives for the corridor were developed and evaluated involved a series of steps. First, community input was sought by conducting stakeholder and public information meetings. Community feedback was combined with information obtained through research and data collection to develop strategies for addressing the needs and constraints of the SR 21 corridor. Based on information gathered at stakeholder and public meetings rating criteria were established to reflect community values. Next conceptual design alternative schematics were developed based on a set of basic improvement strategies. Finally, the design alternatives were evaluated and many eliminated in three rounds of evaluation as follows:

Round 1: Quantitative Assessment of Congestion Relief Potential

Round 2: Preliminary Qualitative “Fatal Flaw” Assessment by Section

Round 3: Detailed Qualitative and Quantitative Comparison

In addition to the project purposes, defined in Section 1 of this report, the following constraints were considered throughout the alternative refinement process:

- Minimizing impacts to existing residential, commercial, industrial or other development
- Minimizing environmental impacts
- Maintaining or improving access to existing business and industry
- Minimizing adverse impacts to Port Wentworth and Garden City
- Accommodating future development/redevelopment by carefully considering land use impacts
- Constructability/Maintenance of traffic during construction

The Tier I Analysis methods are detailed in Technical Memorandum 4A. This section provides a summary of the analysis rounds and the corresponding outcomes.



6.2.1 Round 1: Quantitative Assessment of Congestion Relief Potential

Each of the Tier I Alternatives was modeled through successive augmentation of the 2035 version of the Chatham County Travel Demand Model. Model outputs for each alternative were examined and an evaluation matrix prepared to allow for quantitative comparison of measures of effectiveness for each of the eleven alternatives. This matrix is included in the report as Appendix G. The matrix was used to evaluate each alternative to determine if it would effectively address the purpose of providing congestion relief along the corridor. The analysis revealed that both ALT 1 and ALT 2 fail to provide adequate congestion relief along SR 21. The two failing alternatives were subsequently removed from further consideration.

6.2.2 Round 2: Preliminary Qualitative “Fatal Flaw” Analysis by Section

A preliminary “fatal flaw” analysis, which is largely qualitative in nature, was employed to examine the remaining nine Tier I Alternatives. The evaluation criteria examined in the “fatal flaw” analysis included:

- Traffic Flow
- Corridor Capacity
- Land Use
- Environmental Impacts
- Comparative Costs
- Potential for Economic Development
- Impacts to Local Communities

Rather than examine each concept alternative individually, the “fatal flaw” analysis considered the individual design strategies for each section of the corridor. Based on the “fatal flaw” analysis, the *East Loop Highway* strategy for the Northern Section was eliminated due to significant right-of-way requirements, potential environmental impacts, and inadequate congestion relief. In the Southern Section, the *Elevated Lanes on SR 25* strategy was eliminated because of right-of-way requirements and significant residential impacts and displacements as well as the higher cost of the facility when compared to *Elevated Lanes on SR 21*. As a result, ALT 6 and ALT 9, which employed these strategies, were removed from further consideration.

Table 8 summarizes the eliminations made as a result of the first two rounds of Tier I analysis.



Table 8 – Alternatives Eliminated in First Two Rounds of Assessment

ALT	NORTHERN	CENTRAL	SOUTHERN	REASON FOR ELIMINATION
1	Widening	Widening	Widening	<u>Round 1: Inadequate congestion relief on SR 21</u>
2	Widening w/ Flyovers at I-95	Widening w/ Grade Separation	Widening	<u>Round 1: Inadequate congestion relief on SR 21</u>
3	Elevated Lanes on SR 21	Elevated Lanes on SR 21	Elevated Lanes on SR 21	
4	West Loop Highway w/ New Interchange at I-95	Elevated Lanes on SR 21	Elevated Lanes on SR 21	
5	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	Elevated Lanes on SR 21	
6	East Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	Elevated Lanes on SR 21	<u>Round 2: Significant ROW requirements, especially to high-value potential commercial and industrial land uses. Inadequate congestion relief on SR 21 near I-95</u>
7	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	New Highway to I-16 near I-516	
8	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	New Highway to I-16 near SR 307	
9	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	Elevated Lanes on SR 25	<u>Round 2: More disruptive and expensive than elevated lanes on SR 21</u>
10	Elevated Lanes on SR 21	Connect to JDL Connector	Elevated Lanes on SR 21	
11	Elevated Lanes on SR 21	Connect to JDL Connector	New Highway to I-16 near I-516	



6.2.3 Round 3: Detailed Qualitative and Quantitative Comparison

Each remaining alternative was examined in more detail, including assessment and comparison of the following:

- Estimated construction costs
- Congestion reduction
- Right-of-way requirements and potential displacements
- Potential impacts to natural and cultural resources
- Utilization of new facilities

Based on these assessment objectives, the remaining strategies were compared by section. Within the Northern Section, the *West Loop Highway* strategy was eliminated because of the greater potential wetland impacts, greater negative land use implications, and higher construction cost versus the *Elevated Lanes on SR 21* strategy. In the Central Section, both the *Elevated Lanes on SR 21* and the *Connect to Jimmy DeLoach Connector* strategies were retained for further evaluation. In the Southern Section, the *New Highway to I-16 near SR 307* strategy required more right-of-way, had greater wetland impacts, and was considered the least effective strategy of the three proposed for that section. It was therefore eliminated.

Round 3 analysis resulted in the elimination of four more alternatives as summarized in Table 9.



Table 9 – Alternatives Eliminated by Detailed Qualitative Analysis

ALT	NORTHERN	CENTRAL	SOUTHERN	REASON FOR ELIMINATION
3	Elevated Lanes on SR 21	Elevated Lanes on SR 21	Elevated Lanes on SR 21	
4	West Loop Highway w/ New Interchange at I-95	Elevated Lanes on SR 21	Elevated Lanes on SR 21	<ul style="list-style-type: none"> • Comparatively greater potential wetland impacts, greater negative land use implications, and greater total cost.
5	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	Elevated Lanes on SR 21	<ul style="list-style-type: none"> • Comparatively greater potential wetland impacts, greater negative land use implications, and greater total cost.
7	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	New Highway to I-16 near I-516	<ul style="list-style-type: none"> • Comparatively greater potential wetland impacts, greater negative land use implications, and greater total cost.
8	West Loop Highway w/ New Interchange at I-95	Connect to JDL Connector	New Highway to I-16 near SR-307	<ul style="list-style-type: none"> • Comparatively greater potential wetland impacts, greater negative land use implications, and greater total cost. • Significantly greater ROW and potential wetland impacts • Inadequate congestion relief on SR 21 in Garden City's commercial district
10	Elevated Lanes on SR 21	Connect to JDL Connector	Elevated Lanes on SR 21	
11	Elevated Lanes on SR 21	Connect to JDL Connector	New Highway to I-16 near I-516	

6.2.4 Summary of Tier I Analysis

Based on the three rounds of qualitative and quantitative analysis, ALT 3, ALT 10, and ALT 11 were determined to have the greatest potential for meeting the project need and purpose. These three alternatives were advanced to the next study phase – Tier II Analysis.



6.3 Public Involvement in Refining Alternatives

The ultimate purpose of public involvement is to incorporate input received from stakeholders and the community into the project. Both the Savannah Bicycle Campaign and local members of the community expressed the desire for pedestrian and bicycle facilities throughout the corridor. Feedback from both the local community and major stakeholders indicated strong support for separating truck and passenger car traffic. Some key stakeholders made a point to voice concerns over mixing passenger car traffic with truck traffic on the JDL Connector.

In order to address public and stakeholder feedback, the following actions were taken:

- A multi-use path was added along the both shoulders throughout the Northern Section from the Effingham County line to JDL Parkway. The path on the western edge ends at International Trade Parkway, before the rail line comes alongside the roadway.
- A multi-use path was added along the eastern side of SR 21 through the Central Section from JDL Parkway to Smith Avenue.
- Sidewalks and multi-use paths were added along both sides of SR 21 in the Southern Section south of Smith Avenue.
- ALT 10 was modified to provide express lanes along the JDL Connector with concrete barriers separating the express lane traffic (primarily commuters) from the JDL Connector traffic (high percentages of heavy trucks).



6.4 Tier II Alternative Definitions

The three Tier II Alternatives are described below. Concept layouts and typical sections for each of the alternatives are provided in Appendix H and Appendix I, respectively.

6.4.1 Alternative 3 (ALT 3)

Northern Section

Elevated Lanes:

- Construct two elevated lanes above SR 21, beginning north of SR 30 and continuing to the south over I-95.
- Construct flyover ramps connecting:
 - Northbound I-95 to southbound elevated lanes
 - Southbound I-95 to southbound elevated lanes
 - Northbound elevated lanes to southbound I-95
 - Northbound elevated lanes to northbound I-95
- Construct four elevated lanes above SR 21, beginning at the flyover ramp connections and continuing to the south.

At-Grade:

- Widen SR 21 to six lanes between the northern most end of the project (near the Effingham County Line) and the existing ramps at I-95.
- Realign O'Leary Road, Hendley Road and reconfigure access to the Pilot truck stop, including relocation of the existing O'Leary Road signal



Central Section – Elevated Lanes on SR 21

Elevated Lanes:

- Construct four elevated lanes above SR 21, continuing from the Northern Section.
- Construct an on-ramp from northbound SR 21 to northbound elevated lanes north of Bonnybridge Road.
- Construct an off-ramp from southbound elevated lanes to southbound SR 21 north of Bonnybridge Road. The ramp will continue past the intersection at Bonnybridge Road before allowing exiting ramp vehicles to merge with SR 21 traffic.
- Construct a looping off-ramp from northbound elevated lanes just north of Bourne Avenue (SR 307). The off-ramp will fork so that one branch gives direct access to northbound SR 21 while the other branch provides direct access to Bourne Avenue at a signalized intersection.
- Construct an on-ramp from southbound SR 21 to southbound elevated lanes just south of Bourne Avenue (SR 307).

At-Grade:

- Reconstruct portions of SR 21 by widening the median to accommodate piers supporting the elevated lanes.

Southern Section – Elevated Lanes on SR 21

Elevated Lanes:

- Construct four elevated lanes above SR 21, continuing from the Central Section.
- The elevated lanes will end, merging onto I-516 south of Minus Avenue between the SR 25 and West Bay Street interchanges.

At-Grade:

- Reconstruct SR 21 between Smith Avenue and Minus Avenue, narrowing the road from six lanes to four lanes and adding a raised, landscaped median, bicycle lanes, and sidewalks.

6.4.2 Alternative 10 (ALT 10)

Northern Section – Elevated Lanes on SR 21

Both the *Elevated Lanes* and *At-Grade* Components are identical to those described in Section 0 for the Northern Section.



Central Section – Connect to Jimmy DeLoach (JDL) Connector

Elevated Lanes:

- Construct an off-ramp from southbound elevated lanes to southbound SR 21, beginning just north of Pinderpoint Road and merging with the outside southbound lane just north of the JDL Parkway overpass.
- Construct an on-ramp from northbound SR 21 to northbound elevated lanes beginning just north of the JDL Parkway overpass.
- Continue construction of four elevated lanes on SR 21, then curving east beginning at St. Augustine Creek and connecting to the JDL Connector within the median gore just south of the Connector's Pierce Avenue interchange.
- Construct four elevated lanes beginning within the JDL Connector median gore north of Bourne Avenue (SR 307) and continuing south over Bourne Avenue, curving back towards the SR 21 alignment. The southbound elevated lanes will separate from the northbound lanes as the elevated lanes curve back to towards the SR 21 alignment. The southbound lanes will rejoin the northbound lanes just south of Pipemakers Canal.
- Construct an off-ramp from the northbound elevated lanes to northbound SR 21 just at Pipemakers Canal, where the southbound and northbound elevated lanes are separated from each other. The off-ramp will descend into the median of SR 21, creating a left exit from the elevated lanes.
- Construct an on-ramp from southbound SR 21 to southbound elevated lanes at the Pipemakers Canal, just south of Bourne Avenue (SR 307).

At-Grade:

- Widen the JDL Connector from four to eight lanes. Construct concrete barriers to separate the two outside southbound lanes from the two inside southbound lanes, and to separate the two outside northbound lanes from the two inside northbound lanes, such that the existing capacity of the JDL Connector will be maintained.
- The four barrier-separated inside lanes, hereafter referred to as express lanes, will share the JDL Connector alignment but will not have access to the JDL Connector ramps or interchanges.
- Maintain the existing connectivity of the JDL Connector at Pierce Avenue, Grange Road, and Bourne Avenue (SR 307).

Southern Section – Elevated Lanes on SR 21

Both the Elevated Lanes and At-Grade Components are identical to those described for the Southern Section in Section 0.



6.4.3 Alternative 11 (ALT 11)

Northern Section – Elevated Lanes on SR 21

Both the *Elevated Lanes* and *At-Grade* Components are identical to those described in Section 0 for the Northern Section.

Central Section – Connect to Jimmy DeLoach (JDL) Connector

Elevated Lanes:

- Construct an off-ramp from southbound elevated lanes to southbound SR 21, beginning just north of Pinderpoint Road and merging with the outside southbound lane just north of the JDL Parkway overpass.
- Construct an on-ramp from northbound SR 21 to northbound elevated lanes beginning just north of the JDL Parkway overpass.
- Continue construction of four elevated lanes on SR 21, then curving east beginning at St. Augustine Creek and connecting to the JDL Connector within the median gore just south of the Connector's Pierce Avenue interchange.
- Construct four elevated lanes beginning within the JDL Connector median gore north of Bourne Avenue (SR 307) and continuing south over Bourne Avenue, curving back towards and over the SR 21 alignment just south of Pipemakers Canal.
- Construct an off-ramp from the northbound elevated lanes to a signalized intersection with Bourne Avenue (SR 307). The ramp will be aligned with an on-ramp to northbound JDL Connector at the intersection.
- Construct an on-ramp from a signalized intersection at Bourne Avenue (SR 307) to southbound elevated lanes. The ramp will be aligned with an off-ramp from southbound JDL Connector at the intersection.

At-Grade:

- Widen the JDL Connector from four to six lanes, including a truck-only lane in each direction.



New Highway:

- Construct a new four lane highway beginning at the terminus of the JDL Connector, at Bourne Avenue (SR 307).
- Construct an off-ramp from the northbound New Highway to a signalized intersection with Bourne Avenue (SR 307). The ramp will be aligned with an on-ramp to northbound JDL Connector at the intersection.
- Construct an on-ramp from a signalized intersection at Bourne Avenue (SR 307) to southbound New Highway. The ramp will be aligned with an off-ramp from southbound JDL Connector at the intersection.

Southern Section – New Highway between JDL Connector and I-16

New Highway:

- Construct a four lane facility along a new alignment between the southern terminus of the JDL Connector and I-16. The new facility will run roughly parallel to the CSX track.
- Construct a bridge on the New Highway where it crosses SR 21.
- Construct bridges over minor roadways between SR 21 and US 80.
- Construct a bridge over US 80.
- Construct ramps from northbound New Highway to an intersection with US 80 and from the intersection with US 80 to northbound New Highway. The ramps will form a tee intersection with US 80, to the east of the New Highway. The ramps will form the north leg of the intersection and will include bridges over the railroad tracks.
- Construct ramps from southbound New Highway to an intersection with US 80 and from the intersection with US 80 to southbound New Highway. The ramps will form a tee intersection with US 80, to the west of the New Highway. The ramps will form the south leg of the intersection.

Interchange with I-16:

- Construct a collector-distributor road system adjacent to I-16 between Chatham Parkway and I-516, adding new through lanes for I-16 within the I-516 interchange and converting the existing through lanes on I-16 into components of the collector-distributor road system.
- Construct a new, full-movement interchange, connecting the new location facility with the new I-16 collector-distributor road system between Chatham Parkway and I-516



7 TIER II ALTERNATIVE ANALYSIS

The three alternatives that were selected out of the Tier I Analysis were further evaluated in a Tier II screening process as detailed in Technical Memorandum 5. Based on this analysis a Preferred Alternative was selected. As part of the Tier II Analysis, the following criteria were considered:

- Geometric Feasibility
- Congestion Impacts
- Truck-Passenger Car Conflicts
- Connectivity
- Development of At-Grade Commercial Segments and Land Use Impacts
- Traffic Analysis
- Environmental Screening
- Benefit-Cost Evaluation

Following is a summary of the Tier II Analysis for each criterion.

7.1 Geometric Feasibility

Geometric Feasibility refers to compliance with geometric criteria based on GDOT design standards and physical aspects of each alternative. Geometric feasibility was verified for all three Tier II Alternatives throughout the length of the corridor. In addition, other physical aspects related to building the project were reviewed for comparison purposes.

7.2 Congestion Impacts

In order to examine the effectiveness of each Tier II Alternative in relieving congestion, a screenline assessment was performed at four locations along the SR 21 corridor. At each location, identified below in Figure 12, the total average daily traffic (ADT) and volume to capacity (v/c) ratio were measured on SR 21, the JDL Parkway/Connector, and any proposed new facility for the given alternative. Although this study primarily focuses on the SR 21 corridor, the JDL Parkway/Connector is included because of its parallel alignment with SR 21 and its role in accommodating travel demand in the corridor.

Figure 13 through Figure 16, shown following, present stacked bar graphs displaying the 2035 ADT counts on each roadway for each build condition at the given screenline location. The total volume traveling through the corridor is listed above each stack, while the v/c ratio for each facility is listed on the corresponding bar. Based on the data presented in these figures, SR 21 is highly congested at each location for the No Build Scenario, whereas the build alternatives are able to attract more vehicles to the corridor while simultaneously reducing the level of congestion on SR 21. Overall, ALT 10 appears to provide the greatest congestion relief on SR 21.

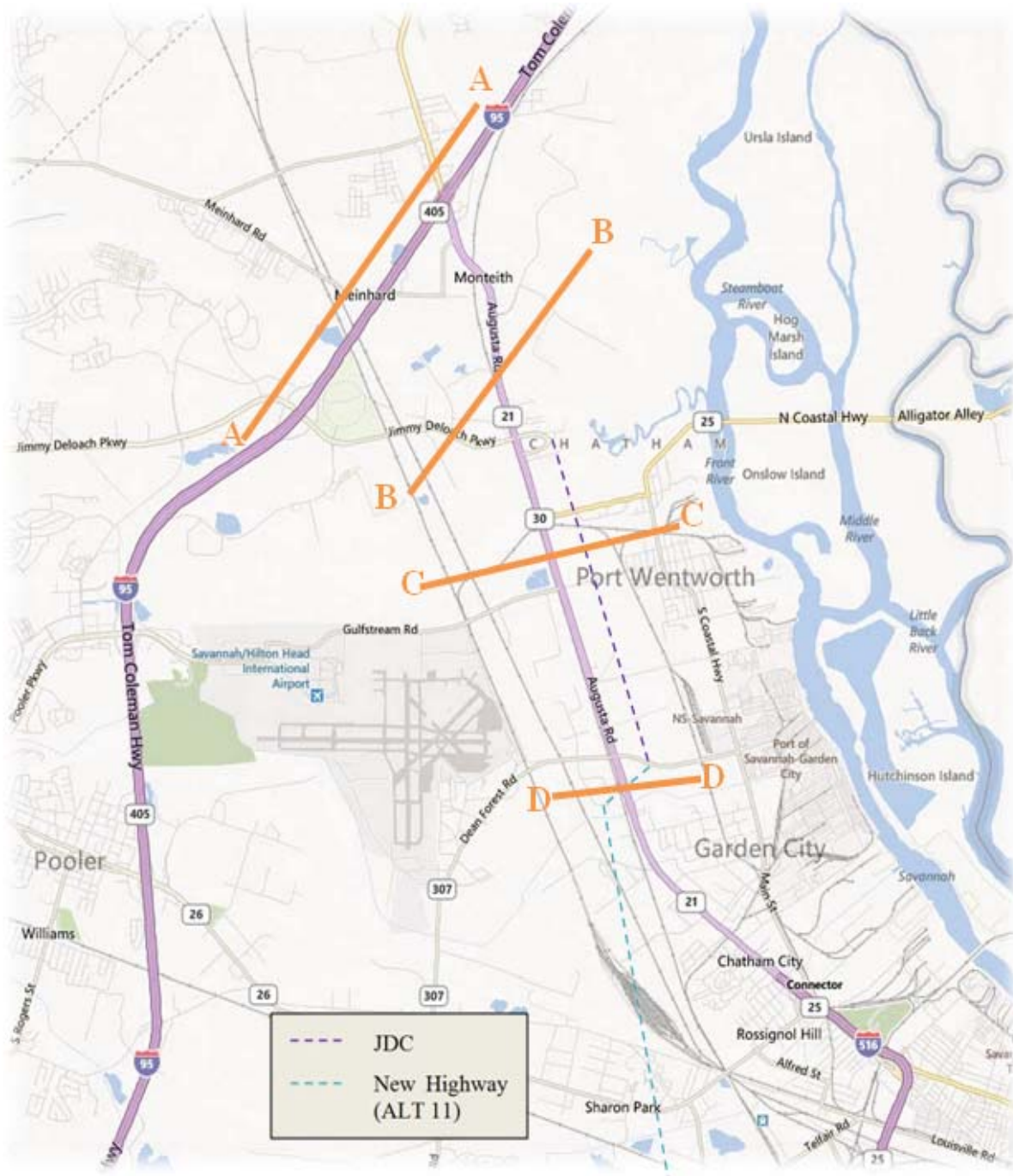


Figure 12 – Congestion Impact Screenline Locations

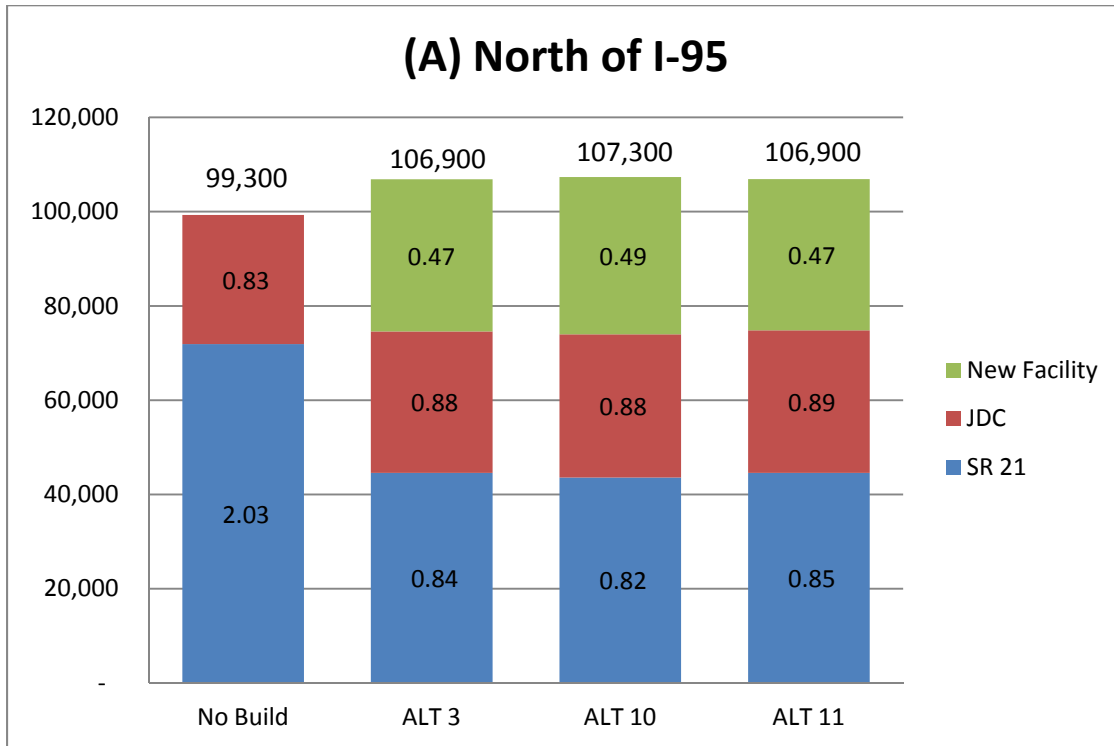


Figure 13 - 2035 ADT, Total Volumes, and v/c Ratios North of I-95

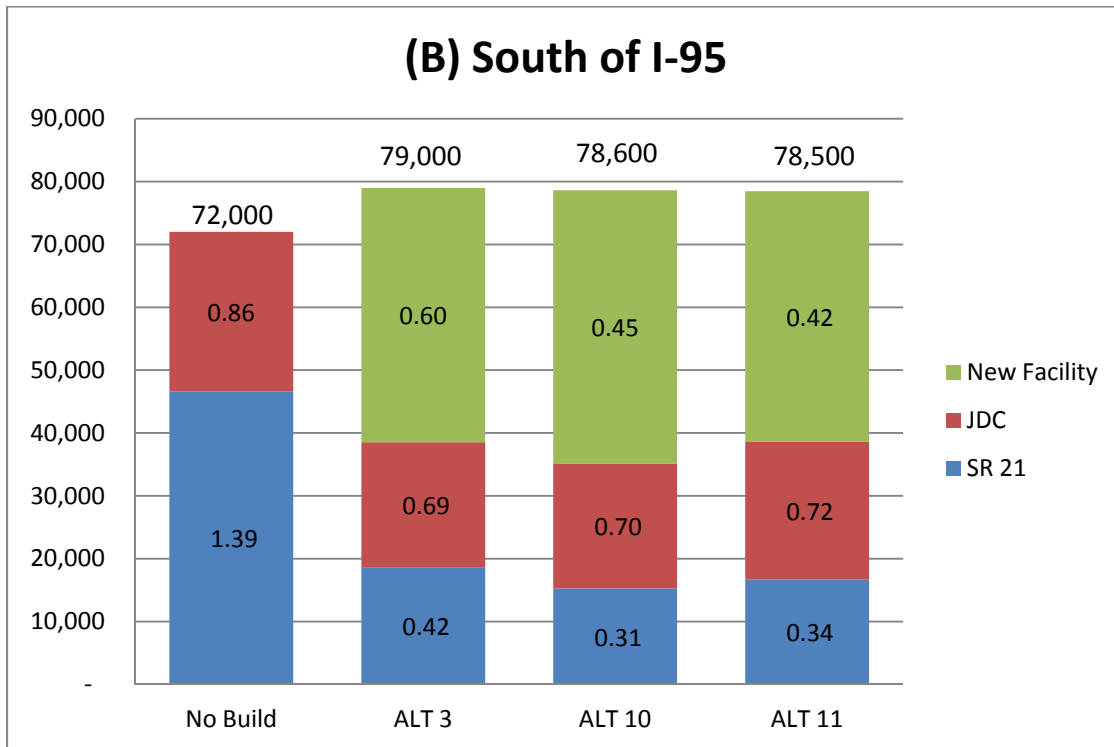


Figure 14 - 2035 ADT, Total Volumes, and v/c Ratios South of I-95

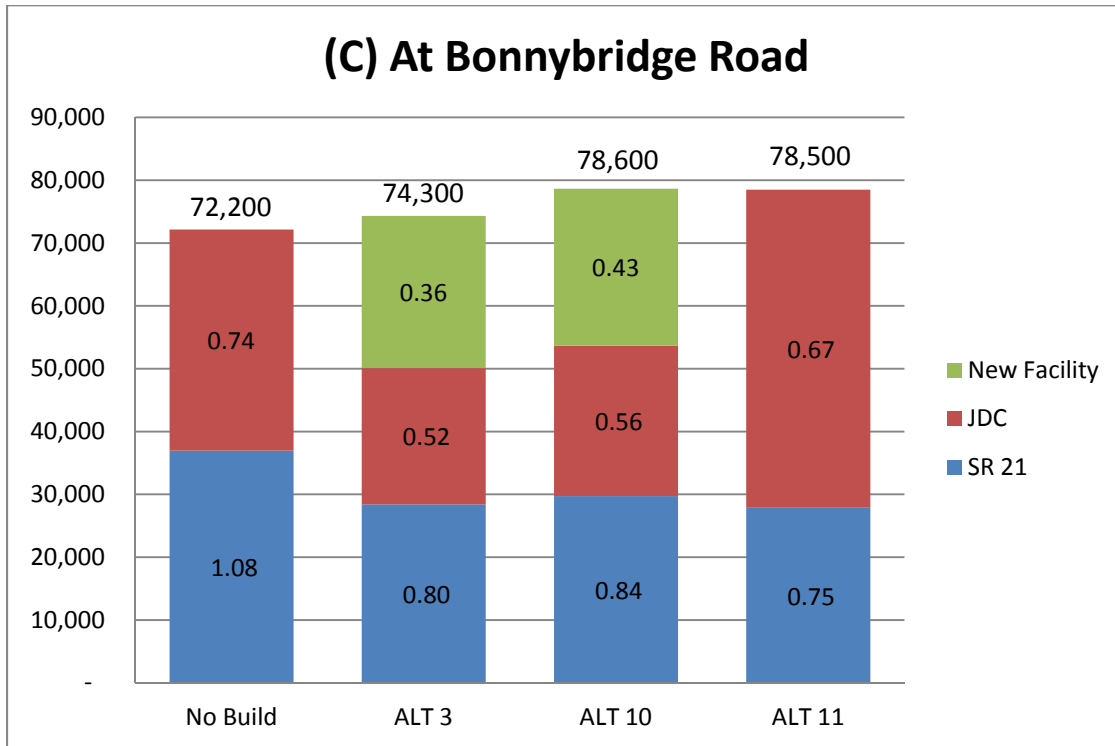


Figure 15 – 2035 ADT, Total Volumes, and v/c Ratios at Bonnybridge Road

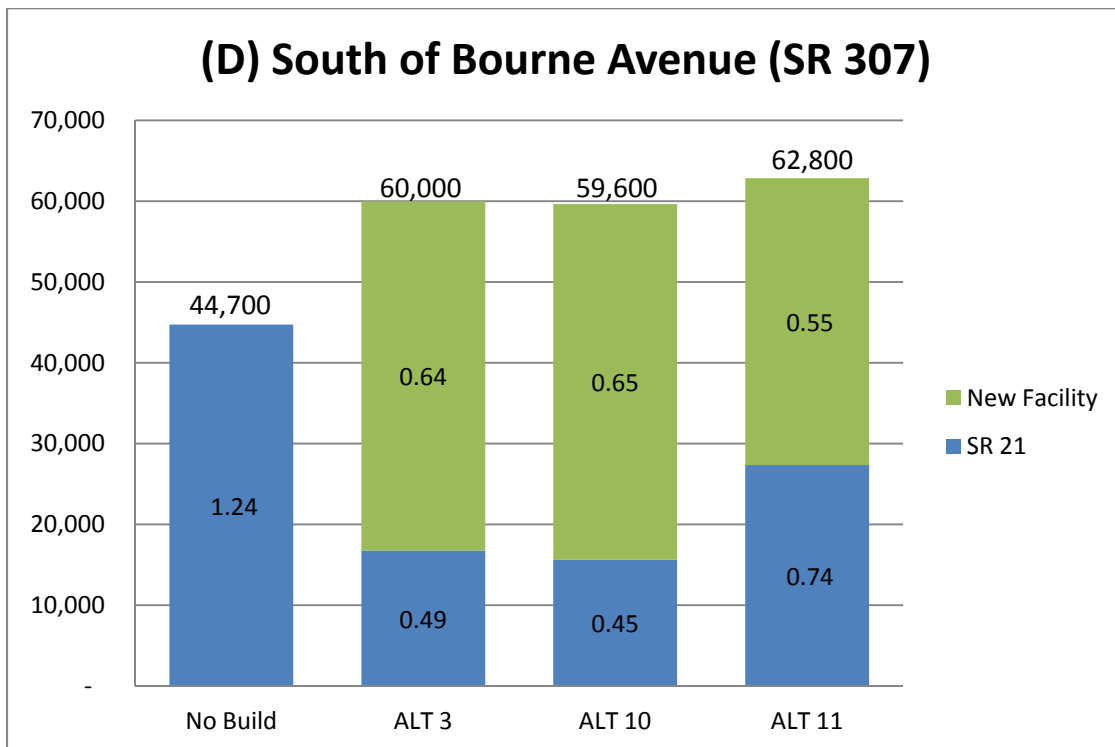


Figure 16 – 2035 ADT, Total Volumes, and v/c Ratios South of Bourne Avenue (SR 307)



7.3 Truck-Passenger Car Conflicts

The high volume of trucks along the SR 21 corridor, particularly in the Northern and Central Sections, is a major concern. As part of the Tier II Analysis, the number of trucks and passenger cars using key facilities was examined in each section of the corridor, as follows:

- Northern Section
 - SR 21
 - Elevated Lanes
- Central Section
 - SR 21
 - Elevated Lanes (ALT 3) or Express Lanes (ALT 10)
 - Jimmy DeLoach Connector
- Southern Section
 - SR 21
 - Elevated Lanes (ALTs 3 & 10)
 - New Highway (ALT 11)

The truck and passenger car counts for SR 21, the JDL Connector, and the new facilities are presented in stacked bar graphs to show the mix of passenger cars and trucks on each facility within each section of the corridor. On the following pages, Figure 17 compares the traffic mix for the Northern Section, Figure 18 the Central Section, and Figure 19 the Southern Section.



Figure 17 illustrates how traffic is distributed between SR 21 and the elevated lanes just south of I-95 in the Northern Section of the corridor. In the Northern Section, ALT 3 provides the greatest separation of truck and passenger car traffic.

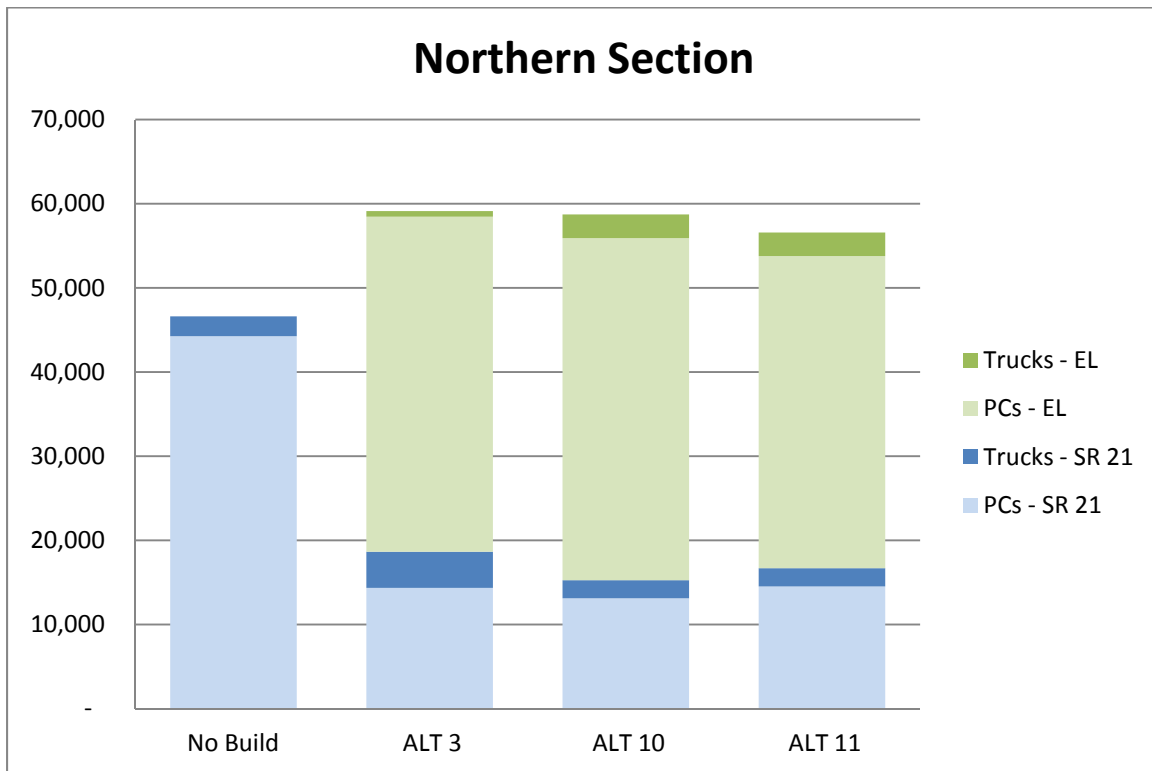


Figure 17 –2035 Passenger Car (PC) and Truck ADT Counts on SR 21 and Elevated Lanes (EL) South of I-95



Figure 18 illustrates how traffic is distributed between SR 21, the JDL Connector, and new facilities, just south of Gulfstream/Crossgate Road in the Central Section. ALT 3 and ALT 10 provide the greatest separation of truck and passenger car traffic by shifting a significant portion of passenger car traffic to new facilities. Meanwhile, ALT 11 increases the potential for truck-passenger car conflicts by adding passenger car traffic to the JDL Connector versus the No Build condition. As indicated in the figure, ALT 10 provides the greatest increase in capacity versus the No Build scenario.

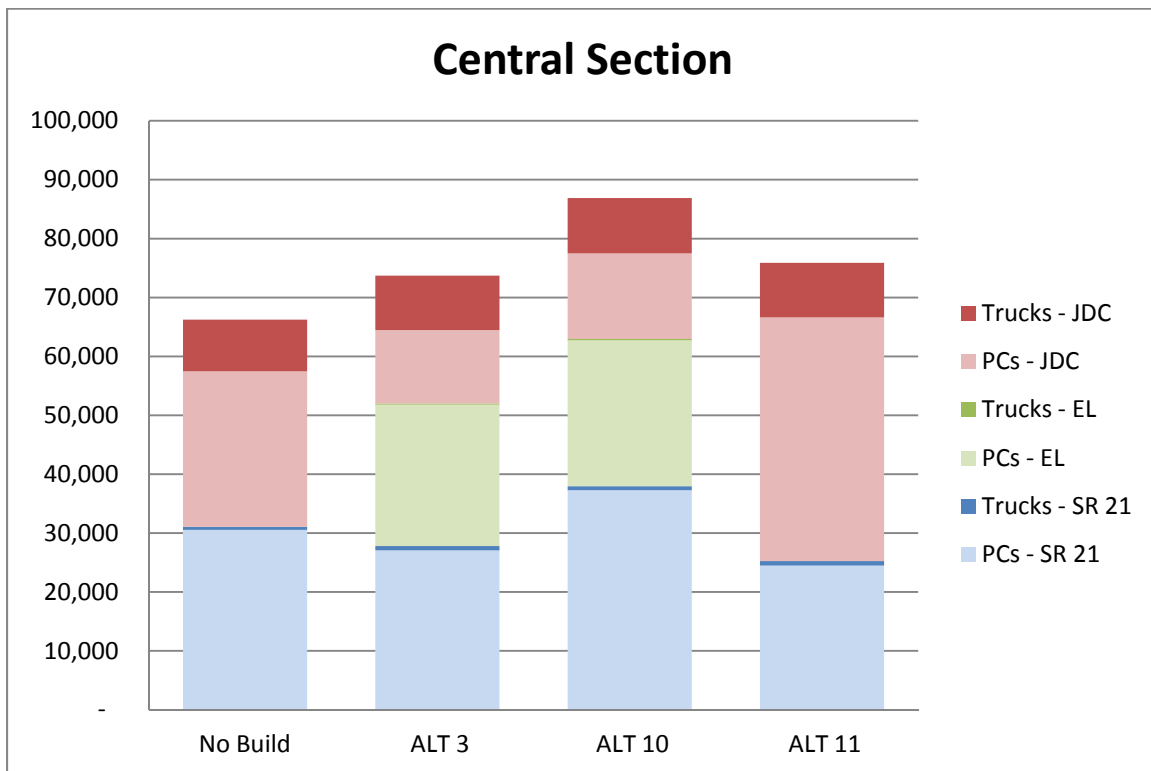


Figure 18 – 2035 Passenger Car (PC) and Truck ADT Counts on SR 21, JDL Connector, and Elevated/Express Lanes (EL), South of Crossgate Road



Figure 19 illustrates how traffic is distributed between roadway facilities just south of Bourne Avenue (SR 307) in the Southern Section of the corridor. ALT 3 and ALT 10 increase the capacity of the SR 21 corridor without any significant increase in the potential for truck-passenger car conflicts. As well, ALT 3 and ALT 10 provide the greatest reduction in the amount of traffic on the SR 21 surface street in Garden City which would potentially help create a more pedestrian and bicycle friendly environment.

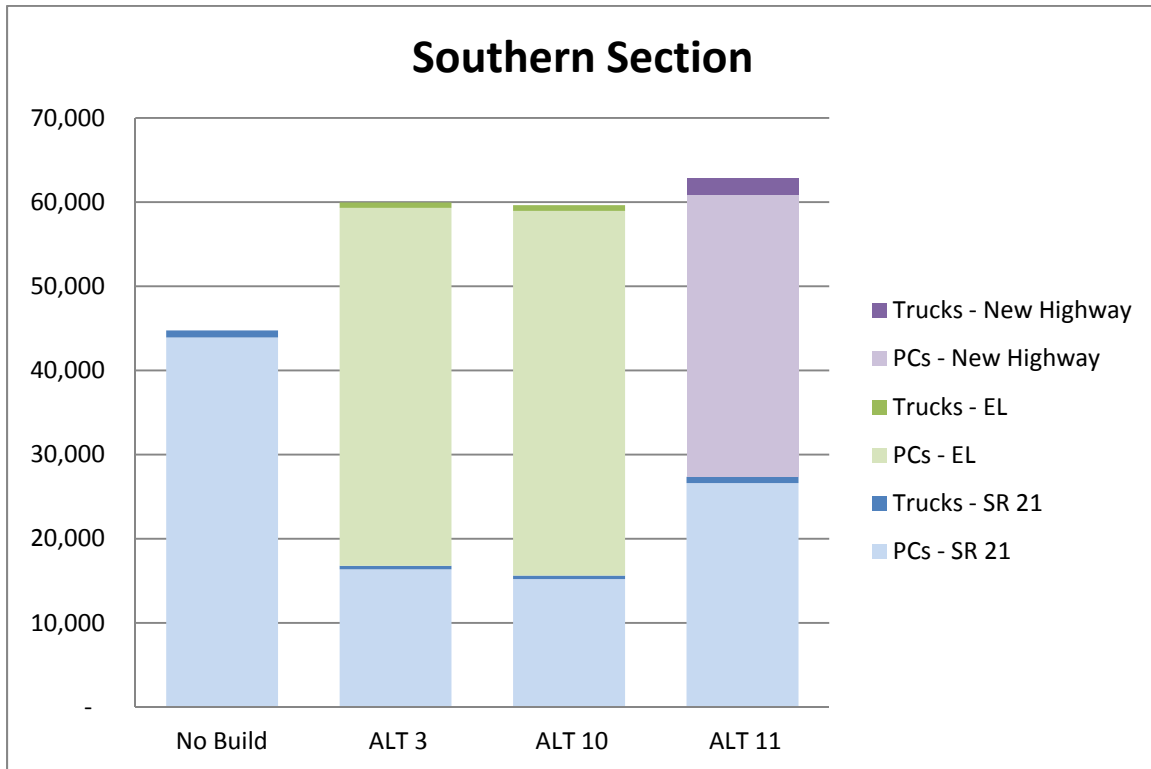


Figure 19 – 2035 Passenger Car (PC) and Truck ADT Counts on SR 21, Elevated Lanes (EL), and New Highway Alignment, South of Bourne Ave (SR 307)



Figure 20 presents the total number of passenger cars travelling through the Central Section for each scenario under consideration. For each condition, the passenger car count is further broken down into two categories – cars traveling on a roadway with a high truck volume, and cars traveling on a roadway with a low truck volume. Facilities with a truck percentage greater than 5 percent are considered to have a high truck volume. The “high truck volume” facilities considered in the figure had truck percentages ranging from 18.3 to 42.6 percent. Facilities considered to have low truck volumes exhibited truck percentages ranging from 0.8 to 2.9 percent. It is assumed that passenger cars traveling on a roadway with a high truck volume are more likely to be involved in a truck-car conflict, versus passenger cars traveling on a roadway with a low truck volume. Figure 20 indicates that ALT 3 and ALT 10 provide the best solutions for minimizing truck and passenger car conflicts. In addition to separating truck and passenger car traffic, ALT 10 also serves more total passenger cars than the other Tier II Alternatives.

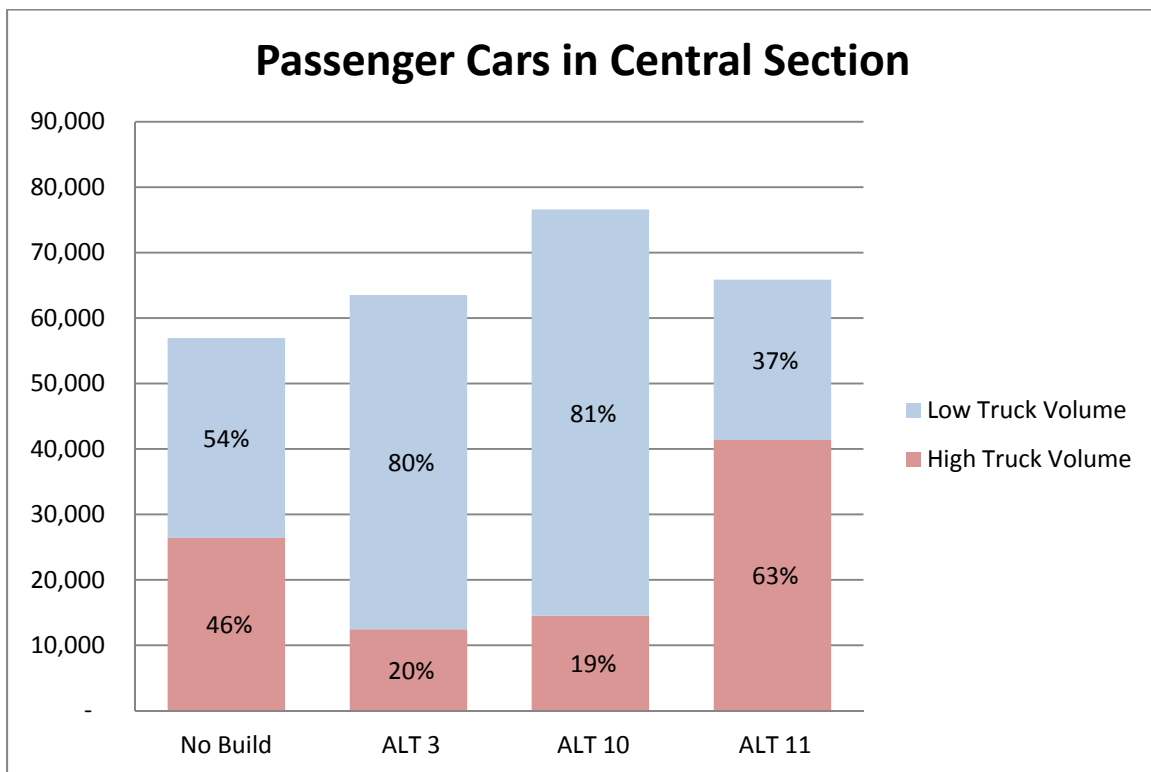


Figure 20 – Number of Passenger Cars on Facilities with High Truck Volumes versus Low Truck Volumes in the Central Section of the SR 21 Corridor



7.4 Connectivity

Connectivity refers to the density of connections in a roadway network and the directness of links. Each Tier II Alternative was evaluated based on added connectivity between major arterials in both the northbound and southbound directions. All three Tier II Alternatives maintain existing connectivity. ALT 11 does the best job of improving connectivity by providing 28 (directionally-calculated) additional connections within the study area, which is nearly triple that of either ALT 3 or ALT 10.

7.5 Development of At-Grade Commercial Segment and Land Use Impacts

Each Tier II Alternative was examined for its impacts on surrounding land uses and its abilities to facilitate multi-modal design. Particular attention was paid to how well each alternative would be able to improve pedestrian and bicycle safety and accessibility within the corridor. All three alternatives create opportunities to enhance pedestrian and bicycle facilities. The use of elevated lanes (ALTs 3 and 10) in the Southern Section proved to be especially promising for creating a pedestrian and bicycle friendly environment.

7.6 Traffic Analysis

7.6.1 Future Traffic Volume Projections

Future traffic volumes were developed for the Design Year 2035 in order to evaluate future operating characteristics along the study corridor. These projections were used to determine expected future traffic operations and to evaluate transportation improvement alternatives that will be required to support future traffic demand. The traffic forecasting methodology was detailed in Technical Memorandum 3, submitted to GDOT Office of Planning on March 15, 2013. The traffic flow diagrams are included in Appendix J. The methodology used to develop the future volumes is summarized below.

Traffic Forecasting Methodology

Daily and peak hour traffic projections were prepared for Design Year 2035 for the No Build alternative and the Tier II Alternatives. Guidance on the preparation of traffic volume forecasts provided in the GDOT Design Manual, Chapter 13, Traffic Forecasting Process, by GDOT (May 2009) was used as a basis in preparing traffic volume forecasts. To estimate future traffic conditions, the existing traffic volumes were factored up to account for future increases in background traffic and growth along the corridor.

The future traffic projections were determined based on the CORE MPO 2035 travel demand model (E+C network) and the 2006 base year model, historical growth trends, and existing traffic volumes and travel patterns. The future traffic projections took into consideration prior studies on SR 21 as well. For the alternatives considered, the CORE MPO 2035 travel demand model was modified to reflect the proposed roadway improvements. This modification allowed the model to predict changes in travel patterns that occurred as a result of the improvement. A comparison of the weekday ADT volumes projected for the year 2035 is summarized in Figure 21 for the alternatives considered.

Under the No Build condition, the daily traffic estimated for SR 21 just north of I-95 is approximately 72,000 vehicles per day (vpd) for the year 2035. Traffic will increase to just over 50,000 vpd just north of the JDL Parkway, with roughly 32,000 vehicles on SR 21 north of Gulfstream/Crossgate Road in the Central Section of the corridor. Approximately 45,000 to 50,000 vpd are estimated on SR 21 in the Southern Section through Garden City. These daily traffic volumes represent the approximate capacity of the E+C roadway configuration. Based on a review of the model, actual vehicle demand is greater but the demand is constrained by the network laneage and the model assigns trips to alternate routes. The model has increased volume on the roadway to maximum capacity which creates congested conditions throughout the corridor.

The different Tier II Alternatives are expected to generate an increase in overall traffic volumes on the SR 21 corridor (SR 21, JDL Connector, and new facilities combined) versus the No Build condition because the proposed network eases capacity constraint. Each build concept generates different traffic projections based on the capacity for that concept.

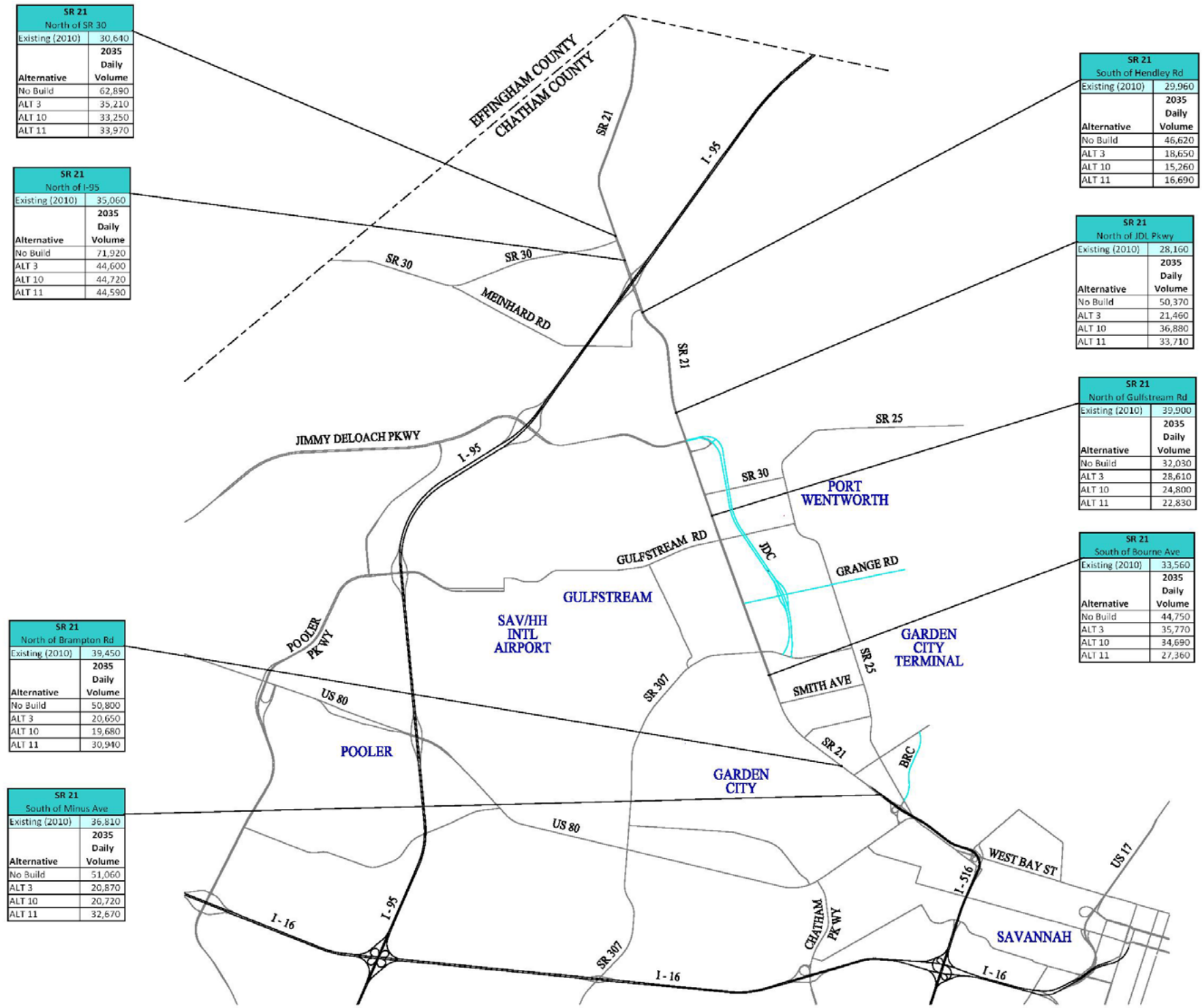


Figure 21 – ADT Volumes for Existing, No Build, and Tier II Alternatives



7.6.2 Future Capacity Analysis

Capacity Analysis Methodology

The SR 21 corridor was analyzed using future traffic projections developed for the year 2035. For the No Build scenario the analysis was based on the existing lane geometry and traffic control. Committed improvements were included in both the No Build and Tier II Alternative conditions. Committed projects included in the model are the JDL Connector, the Brampton Road Connector, and the widening of Grange Road. For the Tier II Alternatives, analysis was performed using future traffic volumes and proposed geometry. Procedures and methodologies outlined in the Transportation Research Board's (TRB) 2009 Edition of the Highway Capacity Manual (HCM 2009) were employed. The analyses for this study were completed using McTrans Highway Capacity Software (HCS+) and Trafficware Ltd. Synchro Studio 7, both of which automate many of HCM 2009's methodologies.

Design Year (2035) Intersection Capacity Analysis

Intersection analyses were performed for the 2035 design year morning and evening peak hours for critical intersections, both signalized and unsignalized, in the study area for the No Build scenario and each of the three Tier II Alternatives. Input volumes were based on 2035 Chatham County Travel Demand Models. For the No Build scenario, the model assumes only the existing system plus committed projects (E+C) including the JDL Connector, the Brampton Road Connector, and the widening of I-95 (from six to eight lanes) in Chatham County by 2035. Although the existing intersection of SR 21 and Grange Road is unsignalized, this intersection is expected to be signalized in 2035. The Synchro HCM reports for each analysis are provided in Appendix K and include the LOS and average control delay per vehicle for each critical movement. Table 10 presents intersection LOS and average delay results for the No Build and build alternatives 2035 morning peak hour, while Table 11 presents the same results for the 2035 evening peak hour. Delays considered LOS E or worse are emphasized in red. LOS results for unsignalized intersections are italicized.



Table 10 - Intersection LOS Results for 2035 Morning Peak Hour

2035 AM Intersection	No Build		ALT 3		ALT 10		ALT 11	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
SR 21 @:								
SR 30/Black Creek Dr.	480	F	39	D	51	D	51	D
I-95 SB Ramps	315	F	29	C	11	B	9	A
I-95 NB Ramps	25	C	21	C	15	B	22	C
O'Leary Rd-Pilot Truck Stop*	18	B	n/a		n/a		n/a	
Hendley Road-O'Leary Ext.†	>> 50	F	19	B	5	A	5	A
International Trade Pkwy	19	B	15	B	11	B	11	B
Jimmy DeLoach Pkwy	59	E	28	C	21	C	23	C
Bonnybridge Road	4	A	7	A	5	A	4	A
Gulfstream/Crossgate	56	E	26	C	25	C	21	C
Grange Road	3	A	4	A	3	A	8	A
Bourne Ave (SR 307)	59	E	41	D	39	D	53	D
Brampton Road	5	A	9	A	7	A	8	A
Minus Avenue	25	C	21	C	19	B	19	B
JDC Ramps:								
SB @ Bourne Ave. (SR 307)	18	B	11	B	13	B	16	B
NB @ Bourne Ave. (SR 307)	n/a		n/a		1	A	14	B
SB @ Grange Road	19	B	13	B	11	B	8	A
NB @ Grange Road	18	B	13	B	17	B	13	B
SB @ Pierce	12	B	11	B	5	A	13	B
NB @ Pierce	12	B	9	A	7	A	9	A

* In build alternatives, O'Leary Rd/Pilot Truck Stop is Right-In/Right-Out, LOS is not calculated.

† For No Build Scenario, Hendley Road is a TWSC intersection



Table 11 - Intersection LOS Results for 2035 Evening Peak Hour

2035 PM	No Build		ALT 3		ALT 10		ALT 11	
Intersection	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
SR 21 @:								
SR 30/Black Creek Dr.	333	F	33	C	54	D	51	D
I-95 SB Ramps	240	F	6	A	11	B	9	A
I-95 NB Ramps	411	F	41	D	37	D	34	C
O'Leary Rd-Pilot Truck Stop*	36	D	n/a		n/a		n/a	
Hendley Road-O'Leary Ext.†	>> 50	F	21	C	9	A	15	B
International Trade Pkwy	26	C	9	A	6	A	6	A
Jimmy DeLoach Pkwy	36	D	12	B	19	B	16	B
Bonnybridge Road	9	A	7	A	9	A	7	A
Gulfstream/Crossgate	37	D	27	C	45	D	42	D
Grange Road	7	A	5	A	4	A	6	A
Bourne Ave (SR 307)	103	F	39	D	51	D	54	D
Brampton Road	4	A	6	A	6	A	7	A
Minus Avenue	63	E	21	C	21	C	23	C
JDC Ramps:								
SB @ Bourne Ave. (SR 307)	72	E	19	B	12	B	18	B
NB @ Bourne Ave. (SR 307)	n/a		n/a		2	A	12	B
SB @ Grange Road	17	B	12	B	12	B	7	A
NB @ Grange Road	21	C	9	A	16	B	16	B
SB @ Pierce	210	F	17	C	13	B	12	B
NB @ Pierce	65	F	13	B	11	B	21	C

* In build alternatives, O'Leary Rd/Pilot Truck Stop is Right-In/Right-Out, LOS is not calculated.

† For No Build Scenario, Hendley Road is a TWSC intersection



For the No Build scenario several key intersections are expected to operate at unacceptable LOS E or F conditions during at least one peak period in 2035. These intersections include:

- SR 21 at SR 30/Black Creek Drive
- SR 21 at I-95 Southbound Ramps
- SR 21 at I-95 Northbound Ramps
- SR 21 at Hendley Road
- SR 21 at Jimmy DeLoach Parkway
- SR 21 at Gulfstream/Crossgate Road
- SR 21 at Bourne Avenue (SR 307)
- SR 21 at Minus Avenue
- Southbound JDL Connector Ramps at Bourne Avenue (SR 307)
- Southbound JDL Connector Ramps at Pierce Avenue
- Northbound JDL Connector Ramps at Pierce Avenue

For each of the Tier II Alternatives, all intersections operate at LOS D or better in both morning and evening peak hours. The Tier II Alternatives offer significant reductions in overall intersection delay when compared with the No Build scenario. ALT 3 offers the greatest reduction in delay at the intersection of SR 21 and SR 30; however, it also requires additional improvements to the SR 30 approaches, whereas ALT 10 and ALT 11 can operate at an acceptable LOS while maintaining existing geometries on SR 30.

7.6.3 Design Year (2035) HCS Roadway Analysis

For the purpose of determining roadway LOS, the SR 21 corridor was divided into five segments based on roadway characteristics. Each segment was analyzed using HCS software for both the No Build and Tier II Alternative conditions for the 2035 peak hours. Table 12 defines the roadway segments used for the analysis. Table 13 presents the LOS results by segment for the No Build and Tier II Alternative scenarios for the 2035 peak hours. The HCS reports are provided in Appendix L.

Table 12 – SR 21 Roadway Analysis Segments

Segment	From	To
Multilane 1	County Line	Berrien Rd
Arterial 1	Berrien Rd	O'Leary Rd
Multilane 2	O'Leary Rd	Pierce Avenue
Arterial 2	Pierce Avenue	Bourne Ave (SR 307)
Arterial 3	Bourne Ave (SR 307)	I-516



Table 13 – SR 21 2035 Roadway LOS by Segment

Analysis Scenario	Multilane 1		Arterial 1		Multilane 2		Arterial 2		Arterial 3	
	Flow Rate	LOS	Travel Speed	LOS	Flow Rate	LOS	Travel Speed	LOS	Travel Speed	LOS
Morning Peak Hour										
No Build	2450	F	25.9	C	1233	C	33.7	C	32.4	B
ALT 3	1027	D	30.2	B	507	A	30.0	C	30.8	B
ALT 10	1148	D	30.1	B	573	B	36.5	B	31.9	B
ALT 11	1100	D	29.2	B	565	B	32.4	C	30.1	B
Evening Peak Hour										
No Build	2037	F	17.5	D	1167	C	35.3	B	26.2	C
ALT 3	998	D	29.7	B	448	A	29.0	C	30.2	B
ALT 10	1033	D	32.5	B	528	A	36.8	B	31.9	B
ALT 11	941	C	31.0	B	542	A	31.3	C	31.3	B

For the No Build scenario, the segment of SR 21 north of SR 30 is expected to operate at LOS F for both morning and evening peak hours in 2035. Each of the Tier II Alternatives was able to provide an acceptable LOS for the entire SR 21 corridor.

A freeway analysis of the JDL Connector was also performed for the 2035 peak hours. The JDL Connector is expected to operate at LOS A for the No Build and all of the Tier II Alternative conditions.



7.6.4 Summary of Future Traffic Conditions

In order to examine overall improvements to SR 21 offered by the design alternatives, a Synchro Arterial LOS report was created for each scenario, with the reports provided in Appendix M. Table 14 presents the Arterial LOS for SR 21 between SR 30 and Minus Avenue for the primary direction of travel during the morning and evening peak hours. The table also includes total signal delay, total travel time (in minutes), and arterial speed for the corridor. Results with LOS E or F are emphasized in red.

Table 14 - SR 21 Arterial Performance Summary (between SR 30 and I-516)

	2035 AM - Southbound				2035 PM - Northbound			
	No Build	ALT 3	ALT 10	ALT 11	No Build	ALT 3	ALT 10	ALT 11
Signal Delay (minutes)	16.8	4.1	3.8	3.9	29.0	3.6	6.0	3.9
Travel Time (minutes)	26.7	14.1	14.0	13.9	40.0	14.7	17.3	15.0
Arterial Speed (mph)	17.3	32.8	33.0	33.3	13.0	35.3	29.9	34.6
Arterial LOS	E	C	C	C	F	B	C	B

The overall arterial LOS results show that the southbound direction of travel is operating at LOS E with a travel time of 26.7 minutes in the morning peak hour, while the northbound direction of travel is operating at LOS F with a total travel time of 40.0 minutes in the evening peak hour. The results indicate that morning peak hour signal delay and travel time for the southbound direction of travel are reduced by over 12 minutes in each of the Tier II Alternatives. Signal delay and travel time are reduced by at least 23 minutes for the northbound direction of travel in the evening peak hour. Of the three Tier II Alternatives, ALT 10 experiences greater signal delay in the evening peak hour. The delay experienced in ALT 10 likely reflects the higher evening peak hour volumes along SR 21 versus the traffic volumes experienced along SR 21 in ALT 3 and ALT 11. Despite the increase in delay, ALT 10 still reduces travel time along SR 21 by about 23 minutes when compared to the No Build scenario.

Congestion relief and delay reduction are comparable for all three Tier II Alternatives.



7.7 Environmental Screening

A summary of the environmental resources located along each alternative is provided below in Table 15. The table includes the number of historic resources located adjacent to the alignment alternative, the number of archaeological sites located within the Area of Potential Effect (APE) of the alignment alternative, and the number of wetlands and open waters located near the alignment alternative. Resources located along the committed project section are not included.

Table 15 – Summary of Resources Located Along Each Alternative

	ALT 3	ALT 10	ALT 11
Historic Resources	92	78	22
Archaeological Sites	2	2	2
Waters of the US	10 wetlands	10 wetlands	22 wetlands, 1 lake, 2 ponds

7.8 Benefit-Cost Analysis

The benefit-to-cost evaluation for each Tier II Alternative was calculated based on current GDOT methodology, as detailed in Technical Memorandum 5. Project benefits were calculated with no adjustment for *Gross State Product*. Table 16 presents a summary of the benefit-cost calculations, including the estimated B/C ratios.

Table 16 – Benefit-Cost Comparison Summary

	ALT 3	ALT 10	ALT 11
Daily Network Change, Compared to No-Build			
Vehicle Hours Travelled	-66,100	-65,300	-65,900
Vehicle Miles Travelled	-48,000	-46,000	-47,000
Network Benefit, Compared to No-Build			
Daily Vehicle Hours Travelled	\$ 1,103,600	\$ 1,090,500	\$ 1,099,600
Daily Vehicle Miles Travelled	\$ 8,600	\$ 8,300	\$ 8,400
Total Daily Benefit	\$ 1,112,200	\$ 1,098,800	\$ 1,108,000
Total Annual Benefit	\$ 278,050,000	\$ 274,710,000	\$ 276,980,000
Total Project Cost	\$ 511,414,000	\$ 420,430,000	\$ 505,722,000
25-Year Annualized Project Cost	\$ 29,370,000	\$ 24,140,000	\$ 29,040,000
Benefit-Cost Ratio	9.5	11.4	9.5



7.9 Tier II Evaluation Summary

Table 17 provides a summary comparison of all three Tier II Alternatives. All results presented in the table are based on 2035 traffic conditions. Benefits and costs are based on current dollar values.

Table 17 – Summary Comparison of the Tier II Alternatives

	No-Build	ALT 3	ALT 10	ALT 11
Alternative Description				
Northern Section	-	Elevated Lanes on SR 21	Elevated Lanes on SR 21	Elevated Lanes on SR 21
Central Section	-	Elevated Lanes on SR 21	Express Lanes Along JDC	Connect to and Widen JDC
Southern Section	-	Elevated Lanes on SR 21	Elevated Lanes on SR 21	New Highway to I-16
Congestion Impacts				
Rush Hour Travel Time, Effingham to Downtown	81 minutes	27 minutes	27 minutes	28 minutes
2035 Average Volume-to-Capacity Ratios along SR 21	1.28	0.70	0.69	0.71
Volume Returning to the SR 21 Corridor south of I-95	-	7,000 vehicles	6,600 vehicles	6,500 vehicles
Average Daily Traffic				
on SR 21 in Port Wentworth	72,000	41,000	44,000	43,000
on SR 21 in Garden City	51,000	21,000	19,000	31,000
peak using New Facility	-	44,000	43,000	42,000
Truck-Car Conflict Impacts				
Percentage of Passenger Cars on High Truck Volume Roads	46%	20%	19%	63%
Truck Percentages				
on SR 21	5%	23%	14%	13%
on JDC	25%	43%	39%	18%
on New Facility (at Crossgate)	-	1%	1%	-
Connectivity				
Added Connections (NB/SB)	-	6/5	5/5	14/14



Table 17 continued – Summary Comparison of the Tier II Alternatives

	No-Build	ALT 3	ALT 10	ALT 11
Alternative Description				
Northern Section	-	Elevated Lanes on SR 21	Elevated Lanes on SR 21	Elevated Lanes on SR 21
Central Section	-	Elevated Lanes on SR 21	Express Lanes Along JDC	Connect to and Widen JDC
Southern Section	-	Elevated Lanes on SR 21	Elevated Lanes on SR 21	New Highway to I-16
Traffic Analysis				
Rush Hour Signal Delay, SR 30 to I-516	23 minutes	4 minutes	5 minutes	4 minutes
Rush Hour Travel Time, SR 30 to I-516	33 minutes	14.5 minutes	15.5 minutes	14.5 minutes
Arterial LOS, Morning Peak Hour	E	C	C	C
Arterial LOS, Evening Peak Hour	F	B	C	B
Environmental Impacts				
Potential Wetland Impacts	-	3 acres	18 acres	42 acres
Required Right-of-Way	-	20 acres	35 acres	40 acres
Potential Displacements				
Residential	-	5	35	40
Commercial	-	0	6	7
Institutional	-	1	1	1
Project Benefits				
Network Vehicle Hours Travelled	463,200	397,100	397,900	397,300
VHT Savings	-	66,100	65,300	65,900
Network Vehicle Miles Travelled	11,865,000	11,807,000	11,809,000	11,809,000
VMT Savings	-	49,000	46,000	47,000
Annualized Benefit		\$278 million	\$275 million	\$277 million
Estimated Costs				
Construction	-	\$ 507 million	\$ 404 million	\$ 483 million
Right-of-Way	-	\$ 5 million	\$ 16 million	\$ 23 million
Total	-	\$ 512 million	\$ 420 million	\$ 506 million
25-year Annualized Benefit-Cost Ratio	-	9.5	11.4	9.5



8 RECOMMENDED ALTERNATIVE

Alternative 10 has been selected as the Preferred Alternative. Its selection is based on evaluation with respect to the following guiding criteria:

- A. Purpose and Need Fulfillment
- B. Overall Project Cost
- C. Public and Stakeholder Input

8.1 Purpose and Need Fulfillment

Table 18 summarizes the evaluation of all Tier II Alternatives with respect to their effectiveness at fulfilling the project purpose. Note that with respect to each purpose, numerous evaluation criteria were examined, but only the single, most significant criterion is cited in the table.

Table 18 – Project Purpose Fulfillment Summary

	ALT 3	ALT 10	ALT 11
Provide Congestion Relief	Adequate (Avg. SR 21 v/c Ratio reduced to 0.70)	Adequate (Avg. SR 21 v/c Ratio reduced to 0.69)	Adequate (Avg. SR 21 v/c Ratio reduced to 0.71)
Improve Accessibility to Port	Adequate (JDC ADT reduced by 38%)	Adequate (JDC ADT reduced by 32%)	Inadequate (JDC ADT increased by 44%)
Minimize Truck-Car Conflicts	Adequate (Conflicts reduced by 27%)	Adequate (Conflicts reduced by 27%)	Inadequate (Conflicts increased by 16%)
Minimize Commuter Delay	Adequate (Commute times reduced by 66%)	Adequate (Commute times reduced by 66%)	Adequate (Commute times reduced by 65%)
Accommodate Future Travel Demand	Adequate (2035 Latent Capacity: 30%)	Adequate (2035 Latent Capacity: 31%)	Adequate (2035 Latent Capacity: 29%)
Maintain or Improve Connectivity	Adequate (All Existing Maintained; 11 Connections added)	Adequate (All Existing Maintained; 10 Connections added)	Adequate (All Existing Maintained; 28 Connections added)
Improve Safety and Viability for Multi-modal Access and Mobility	Adequate (Avg. SR 21 ADT reduced by 44%)	Adequate (Avg. SR 21 ADT reduced by 42%)	Adequate (Avg. SR 21 ADT reduced by 36%)
Preserve or Enhance Adjacent Land Uses	Adequate (ADT in GCCD* reduced to 21,000)	Adequate (ADT in GCCD* reduced to 19,000)	Marginal (ADT in GCCD* reduced to 31,000)

* GCCD = Garden City Commercial District (between Smith Avenue and I-516)

Provide Congestion Relief

All three Tier II Alternatives adequately address congestion relief. ALT 10 is the most effective of the three.

Improve Accessibility to the Port

The Jimmy DeLoach Connector is intended to serve as a primary freight access facility for GPA's Garden City Terminal. ALT 11 increases congestion on this facility while both ALT 3 and ALT 10 reduce congestion.

Minimize Truck-car Conflicts

In the No Build condition, 46 percent of passenger car trips in the central portion of the corridor involve a portion of their travel time on facilities with truck percentages in excess of 18 percent. Both ALT 3 and ALT 10 reduce this percentage to roughly 20 percent while ALT 11 increases this ratio to 63 percent.

Accommodate Future Travel Demand

All three Tier II Alternatives adequately address future travel demand, providing latent capacity margins of roughly 30 percent.

Maintain or Improve Connectivity

All three Tier II Alternatives maintain existing connectivity. ALT 11 does the best job of improving connectivity by providing 28 (directionally-calculated) additional connections within the study area, which is nearly triple that of either ALT 3 or ALT 10.

Improve Safety and Viability for Multi-modal Access and Mobility

Opportunities for improvement as it relates to safety and viability for multi-modal access and mobility are positively associated with the reduction of vehicular traffic on highway facilities where pedestrian and bicycle usage is viable. ALT 3 and ALT 10 provide the greatest opportunity for improvement, with ADT reductions greater than 40 percent compared to the No Build.

Preserve or Enhance Adjacent Land Uses

Both ALT 3 and ALT 10 include new pedestrian and bike facilities, along with landscaping and a reduction in the number of lanes in the Garden City commercial district. These improvements greatly enhance the accessibility of the commercial uses along the corridor for all users. All three alternatives reduce the through traffic in the Garden City area, thus enhancing access for local trips.



8.2 Project Cost

Overall project cost was estimated for each of the Tier II Alternatives and included both right-of-way and construction costs. ALT 3 has an estimated cost of nearly \$513 million, ALT 10 has an estimated cost of about \$421 million, and ALT 11 is estimated to cost close to \$507 million. ALT 10 is the least expensive of the three alternatives. Detailed cost estimates are provided in Appendix N.

8.2.1 Public Involvement

Throughout the study, the public has expressed strong agreement with the need to address congestion and safety issues along the corridor. Both Garden City and Port Wentworth, as the two local governments with jurisdiction in the corridor, expressed the importance of maintaining commercial activity in their respective jurisdictions. Garden City is very supportive of the elevated lanes in the southern section of the corridor due to the separation of local and through trips, improvements to multi-modal access, and increased redevelopment potential. Port Wentworth is also supportive of the congestion relief at the I-95 interchange, which is the most heavily developed area in the city.

Prior to the Tier II Alternative evaluation, concerns were expressed regarding potential conflicts between truck and passenger car traffic on the JDL Connector. This issue was addressed by modifying the original ALT 10 design. Instead of creating a six-lane mixed use facility, an eight lane facility with four barrier separated express lanes in the center is proposed. The express lanes would tie in directly to the elevated lanes on either end of the JDL Connector. The proposed modification provides better separation of passenger cars from trucks and is less expensive to construct than elevated lanes on SR 21 through the Central Section.

8.3 Recommended Improvements

The recommended improvements will do the following:

Northern Section

- Widen SR 21 from four lanes to six lanes from the Effingham County line to the I-95 interchange.
- Install a continuous elevated four lane freeway above SR 21 from just north of SR 30 to the proposed JDL Connector express lanes.
- O'Leary Road/Hendley Road improvements

Central Section

- Express lanes on JDL Connector
- Intersection improvements at SR 21 and Bourne Avenue (SR 307)

Southern Section

- Elevated lanes

The recommended project would provide additional capacity along SR 21 from SR 30 to I-516 to accommodate the existing and projected traffic volumes. The recommended improvement would also enhance the traffic LOS operations along SR 21. The express lanes along the JDL Connector would separate passenger cars from heavy truck traffic, thereby reducing the potential for truck-car conflicts. In addition, the recommended improvements are expected to substantially reduce travel time along SR 21 from the No Build condition. The additional capacity provided by the recommended Build alignment would accommodate anticipated future growth in the project area and improve north-south connectivity throughout the region while maintaining local access and minimizing right-of-way impacts.

8.3.1 Potential At-Grade Lane Reductions

As the most heavily developed and populated section of the corridor, the Southern Section shows significant promise to support context sensitive design and spur potential redevelopment opportunities. The surface roads should include both bike lanes and sidewalks to provide the appropriate facilities for various users. The opportunity to reduce the number of lanes on the at-grade section of SR 21 from six to four lanes offers potential benefits to the surrounding community. The lane reduction will allow multi-modal improvements to be made primarily within the existing right-of-way. In addition, the reduction of traffic on the local streets will enhance safety and usability for all users. Replacing the current, continuous center turn lane with a vegetated median will create a much more pleasant environment capable of supporting landscaping. Although there will still be a large right-of-way, design of safer pedestrian crossings will be more feasible.

As ALT 10 moves forward for further analysis, consideration should be given to six foot sidewalks and perhaps even a multi-use path on the west side of SR 21 to accommodate pedestrian activity associated with the two schools located adjacent to the highway. With pedestrian improvements at Rommel Avenue, the pedestrian walkway over SR 21 should be analyzed for possible removal.

8.3.2 Potential for Tolling

A toll analysis was performed for each of the Tier II Alternatives. The proposed SR 21 toll lanes are approximately 8.9 to 11.6 miles long, depending on the Alternative analyzed, with its northern terminus at the Chatham/ Effingham County line, and its southern terminus at the I-516 in Savannah Parkway. The project, for the purposes of this investigation, was assumed to be two lanes per direction for most of its length. Toll collection would be limited to all electronic tolling (AET) with payment of tolls accomplished through the placement of toll gantries with electronic equipment designed to collect motorist payment information from in-car transponders, or through identification of the motorist through their vehicle's license plate. No cash would be accepted and no toll collectors would be present.

The base case assumes a toll rate of \$0.10 to \$0.30 per mile based on the hour of the day. This means a full-length trip toll ranging between \$0.89 and \$3.48 for passenger cars, depending upon the alignment alternative and the time of day, as shown in Table 19.



Table 19: Full-Length Passenger Car Trip Toll by Alignment Alternative and Time of Day

Time of Day	Alternative 3	Alternative 10	Alternative 11
Off Peak	\$1.16	\$0.89	\$0.97
Shoulder	\$2.32	\$1.78	\$1.94
Peak	\$3.48	\$2.67	\$2.91

For the base case traffic and toll revenue forecasts indicate that, by 2035, ALT 3 is expected to generate annual gross toll revenue of \$5.8 million; ALT 10 could produce \$5.2 million in annual gross toll revenue; and ALT 11 would create about \$5.0 million annually. The base case plus toll inflation of 2.5 percent was shown to produce revenues that were some 65 percent higher versus the base case.

Net revenues were calculated by subtracting operations and maintenance (O&M) costs from total gross toll revenues. Alternative 3 produces higher net revenue than the other two alternatives. This is because it is one continuous toll facility, while the other two alternatives each have a free central portion. While for each alternative, customers pay a similar cost per mile, the length of roadway assigned a toll cost-per-mile is longer in Alternative 3 than in Alternatives 10 and 11.

Based on a number of assumptions outlined in the Toll and Revenue Report, it is estimated that the project could support approximately \$14.0 million to \$18.0 million in debt financing. *Notwithstanding, this estimate is provided at a very preliminary level and should be considered indicative only. Additional financial structuring that introduces items such as capital appreciation bonds, subordinate debt, TIFIA loans, etc. could provide for additional proceeds. Prior to seeking financing, a more detailed investment-grade analysis of revenues, roadway and toll collection expenses, and financial structuring will be required by lending institutions.*



9 CONCLUSION

Analysis of the existing and future No Build scenarios shows that conditions are expected to worsen over time as traffic volumes grow. The anticipated traffic growth in the project area will increase congestion and create lengthy delays for commuter, local, and Port-related traffic traveling along the corridor. Existing congestion along SR 21 already causes excessive delays for commuters during both the weekday morning and evening peak hours. The mixing of truck and passenger car traffic and the lack of multi-modal facilities throughout much of the corridor create safety concerns. These elements demonstrate the need to reduce travel time along SR 21, reduce potential truck-passenger car conflicts, and improve connectivity in the region. Failure to address these needs will result in a decline in mobility and access along the corridor. In addition, travel time reliability is important for users of the corridor, especially if tolling alternatives are considered for future improvements.

Existing and future traffic conditions were analyzed for the corridor. These analyses took into consideration the proposed projects along SR 21 as well as anticipated growth in the region. Major planned projects include the Jimmy DeLoach Parkway Connector, the Brampton Road Connector, and the widening of Grange Road. Regional population, major employers, and the Port of Savannah are all expected to grow in coming years, which will further exacerbate existing congestion on the corridor. Currently, traffic experiences significant delay and congestion, with long queues, during both the morning and evening peak periods in the peak direction of travel.

To address key issues identified in the corridor, eleven design alternatives were considered as part of the study. Based on evaluations of these alternatives and the No Build scenario, a Preferred Alternative was selected for the corridor. The Preferred Alternative would include the following improvements:

Northern Section

- Widen SR 21 to six lanes between the northern most end of the project (near the Effingham County Line) and the existing ramps at I-95.
- Construct two elevated lanes above SR 21, beginning north of SR 30 and continuing to the south over I-95.
- Construct flyover ramps connecting:
 - Northbound I-95 to southbound elevated lanes
 - Southbound I-95 to southbound elevated lanes
 - Northbound elevated lanes to southbound I-95
 - Northbound elevated lanes to northbound I-95
- Construct four elevated lanes above SR 21, beginning at the flyover ramp connections and continuing to the south.
- Realign O'Leary Road, Hendley Road and reconfigure access to the Pilot truck stop, including relocation of the existing O'Leary Road signal



Central Section – Connect to Jimmy DeLoach (JDL) Connector

- Continue construction of four elevated lanes on SR 21, then curving east beginning at St. Augustine Creek and connecting to the JDL Connector within the median gore just south of the Connector's Pierce Avenue interchange.
- Construct slip ramps at Pinderpoint Road from southbound elevated lanes to southbound SR 21 and from northbound SR 21 to northbound elevated lanes
- Construct four barrier separated express lanes in the center of the JDL Connector, maintaining the existing capacity and connectivity of the JDL Connector.
- Construct four elevated lanes beginning within the JDL Connector median gore north of Bourne Avenue (SR 307) and continuing south over Bourne Avenue, curving back towards the SR 21 alignment.
- Construct slip ramps south of Bourne Avenue (SR 307) from southbound SR 21 to southbound elevated lanes and from northbound elevated lanes to northbound SR 21. The northbound ramp will connect to the surface lanes in the median.

Southern Section – Elevated Lanes on SR 21

- Construct four elevated lanes above SR 21, continuing from the Central Section.
- The elevated lanes will end, merging onto I-516 south of Minus Avenue between the SR 25 and West Bay Street interchanges.
- Reconstruct SR 21 between Smith Avenue and Minus Avenue, narrowing the road from six lanes to four lanes and adding a raised, landscaped median, bicycle lanes, and sidewalks.

The Preferred Alternative would provide additional capacity along SR 21 from the Effingham County line to I-516 and would provide limited access facilities while maintaining local access on the surface streets. The recommended improvements would also enhance traffic LOS operations along the length of the SR 21 corridor. The northern elevated lanes would improve peak hour operations at the I-95 interchange. The express lanes in the Central Section would likely reduce the chances of truck-passenger car conflicts and improve traffic operations on SR 21. The southern elevated lanes would significantly reduce traffic on the SR 21 surface street through Garden City, potentially reducing the crash rate and providing a more pedestrian and bicycle friendly environment. The recommended improvements are expected to substantially reduce travel time along SR 21 as compared with the No Build condition. The additional capacity provided by the ALT 10 alignment would accommodate anticipated future growth in the project area and improve north-south connectivity throughout the region while maintaining local access and viability as an evacuation route.



9.1 Next Steps

Completion of the SR 21 Corridor Study should be followed by the development of a stakeholder-driven vision for the northwest region of Chatham County. Some key stakeholders that should be included in the process early on are the Savannah/Hilton Head Airport, Gulfstream, Georgia Port Authority, and the Savannah Bicycle Coalition. A corridor vision plan should be created to document the feasibility of the project as well as investigate potential land use development and devise a community plan to coincide with the upgraded corridor. The community and stakeholders should be actively involved in design charettes to shape the future of the corridor. Coordination with the proper agencies will be crucial to complete the project in a timely manner. GDOT, the State Road and Tollway Authority (SRTA), FHWA, the Cities of Port Wentworth, Garden City, and Savannah, as well as Chatham County should be involved in further development of this project.

One possible funding source for this project is tolling. An initial tolling and revenue study was performed; however a broader scope should be considered to achieve more comprehensive results. A financing and implementation plan should be laid out to move the project forward.