3.6 Mass Transit

According to the FHWA Technical Advisory 6640.8A: Guidance for Preparing and Processing Environmental and Section 4(f) documents, a mass transit alternative should include those reasonable and feasible transit options (bus systems, rail, etc.) even though they may not be within the existing FHWA funding authority. Mass transit alternatives should be considered on all proposed major highway projects in urbanized areas with a population greater than 200,000.

The mass transit alternatives that will be evaluated in this analysis (fixed route bus transit and premium transit services) are based on a set of corridors, specifically a subset of the “corridors of concern” outlined in the Need and Purpose of this DEIS (see Figure 3-50). A corridor can be defined as an overall travel shed or travel demand market area that uses a common set of transportation facilities (freeway, arterials, transit lines, etc.) to reach a common general destination. For this study, the common general destination are the areas of dense employment directly adjacent to the study area, being the central business district of downtown Charleston, notably the hospital cluster of Medical University of South Carolina, Roper Hospital, and related businesses. These corridors include:

- Ashley River Road/St. Andrews Boulevard (8.75 miles);
- Glenn McConnell Parkway/Bees Ferry Road (8.25 miles);
- Savannah Highway (9 miles);
- Folly Road (3 miles); and
- Maybank Highway/Folly Road (5 miles).

3.6.1 What public interest is associated with mass transit?

During the scoping phase of the EIS, mass transit was quickly introduced as an alternative of interest for local citizens. Viewed as an alternative to new construction in terms of cost and impacts, mass transit was suggested in 35 comments (out of 588 comments) during the public comment period for the scoping phase in Spring 2008.

One purpose of the public information meetings held during late Fall 2008 was to present the broad range of alternatives under consideration for the proposed Mark Clark Expressway project as well as to receive additional ideas for alternatives from the public. During this public comment period following the public information meeting, seven comments suggested “mass transit” and 11 comments suggested “light rail” out of 460 comments.

During the series of public information meetings in Spring 2009 where “reasonable alternatives” were presented, the...
public had the opportunity to learn about the six build alternatives and the other alternatives to be considered in this DEIS, which included a non-specific mass transit alternative and TSM. During this public comment period, 42 comments (out of 548 comments) supported the “mass transit” alternative, although no specific transit mode was suggested.

3.6.2 What is the existing transit infrastructure?

The Charleston Area Regional Transit Authority (CARTA) provides the majority of existing transit service in the Charleston Metropolitan Area. Supplementing this service to the rural portions of the area, Tri County Link provides additional, less frequent transit service. In 2009, the study area is served by both traditional fixed route bus service and CARTA Express.

For the purpose of this analysis, assumptions were based upon CARTA ridership data (from June 2008 – May 2009) and current service coverage area. For forecasting purposes, an annual rate of increase of 3 percent was assumed and suggested by the CARTA Transit Action Plan 2007 – 2011. Also suggested by the funding priorities of the Transit Action Plan, no additional routes or frequencies were assumed. According to the Transit Action Plan, funding priorities included marketing programs, vehicle replacements, investing in CARTA Express and Tel-A-Ride [demand response], and financial support for major investment [e.g. on-going commuter rail planning in the I-26 corridor] opposed to increasing frequency or service area of existing routes.

3.6.3 What types of mass transit improvements were evaluated in this process for the proposed project?

The following data were used for this analysis:

- May 2008 – June 2009 CARTA ridership data;
- 2009 Charleston Area Regional Transit Authority (CARTA) route locations;
- CHATS Travel Demand Model: 2003 socioeconomic data (households, employment by place of employment);
- 2035 socioeconomic data, derived from 2030 forecasts from the Updated CHATS Travel Demand Model and expanded by EIS study team (households, employment by place of employment); and
- Updated CHATS Travel Demand Model, as expanded by EIS study team (congestion levels in study area and regional travel patterns).

Based predominantly on data from the 2003 CHATS Travel Demand Model and 2035 Updated CHATS Travel Demand Model, this spatial analysis was conducted to determine the viability of a mass transit alternative for the proposed Mark Clark Expressway project. The study team analyzed three modes of mass transit in this evaluation.

**Mode 1: Fixed route bus transit**

**Mode 2: Premium transit: expansion of CARTA Express**

**Mode 3: Premium transit: potential rail applications**

**Mode 1: Fixed Route Bus Transit**

Local bus service represents the most commonly provided form of transit service and is typically provided along fixed routes. For the purpose of this alternatives analysis, traditional bus transit is an attractive alternative for its minimal impacts to the physical environment, as it utilizes existing streets for service. It is also presumably more financially desirable than a “build” alternative, as the costs related to expanding bus service is in the form of additional transit vehicles and operations costs (salary for drivers, insurance, etc.). Other costs to consider include improvements needed to infrastructure to support efficiency of the transit service and safety for users of the system. These may include transit pull-outs for roadway efficiency, and potential upgrades to stops to support safety and convenience for users (lighting, bus shelters, benches, waste receptacles).

Following this tiered approach, the study team identified the existing route coverage to the study area and compared service areas with current ridership figures within study area corridors of concern.

As detailed in the ridership data found in Table 3.8 and Chart 3.10, the most heavily used route in the existing CARTA fixed bus route system is Route 10, serving the Rivers Avenue corridor with a frequency of 30 minute buses. This route averaged approximately 2,398 riders per day from June 2008 through May 2009. While outside of the defined corridors of concern, the Rivers Avenue route was included for reference as a higher performing route within the CARTA system. Routes currently serving the proposed Mark Clark Expressway project’s study area experience a much lower average daily ridership compared with other corridors served by CARTA. For the time period from June 2008 through May 2009, the routes in the study area include Route 30, serving Savannah Highway (connecting Citadel Mall with the City Hall in downtown Charleston) with an average of 572 riders per day at 45 minute intervals, Route 31, serving Folly Road (connecting suburban James Island with the Charleston Visitor’s Center) with an average of 276 riders per day at 90 minute intervals, and Route 301, serving the St. Andrews Boulevard corridor (connecting Citadel Mall, Ashley River Road, and the Charleston Visitor’s Center) with an average of 522 riders per day at 45-minute intervals.
Table 3.8
CARTA Average Daily Ridership (Weekday, June 2008 – May 2009)

<table>
<thead>
<tr>
<th>Route</th>
<th>Route Name</th>
<th>Frequency (Weekday)</th>
<th>Jun 08</th>
<th>Jul 08</th>
<th>Aug 08</th>
<th>Sept 08</th>
<th>Oct 08</th>
<th>Nov 08</th>
<th>Dec 08</th>
<th>Jan 09</th>
<th>Feb 09</th>
<th>Mar 09</th>
<th>Apr 09</th>
<th>May 09</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Rivers Avenue Limited</td>
<td>30 minutes</td>
<td>2,596</td>
<td>2,393</td>
<td>2,605</td>
<td>2,726</td>
<td>2,632</td>
<td>2,382</td>
<td>2,324</td>
<td>2,158</td>
<td>2,276</td>
<td>2,166</td>
<td>2,166</td>
<td>2,305</td>
</tr>
<tr>
<td>30</td>
<td>Savannah Highway</td>
<td>45 minutes</td>
<td>611</td>
<td>596</td>
<td>617</td>
<td>630</td>
<td>627</td>
<td>569</td>
<td>510</td>
<td>526</td>
<td>569</td>
<td>523</td>
<td>550</td>
<td>533</td>
</tr>
<tr>
<td>31</td>
<td>Folly Road</td>
<td>90 minutes</td>
<td>298</td>
<td>283</td>
<td>310</td>
<td>306</td>
<td>305</td>
<td>290</td>
<td>263</td>
<td>239</td>
<td>275</td>
<td>240</td>
<td>255</td>
<td>248</td>
</tr>
<tr>
<td>301</td>
<td>St. Andrews</td>
<td>45 minutes</td>
<td>586</td>
<td>590</td>
<td>608</td>
<td>584</td>
<td>607</td>
<td>512</td>
<td>487</td>
<td>446</td>
<td>456</td>
<td>406</td>
<td>501</td>
<td>484</td>
</tr>
</tbody>
</table>

In a mode share analysis, illustrated in Table 3.9, it is assumed that if current transit riders were to have the option to drive and drive a single occupancy vehicle, this would only represent a small fraction of the total vehicles traveling those corridors on a daily basis. For this analysis, this percent represents the share of total trips (average daily transit ridership plus average daily traffic counts) in the corridors taken by existing transit service. Assuming a three percent annual growth in transit ridership, the transit mode share in these corridors would account for less than two percent of all trips in the study area corridors of concern.
### Table 3.9

<table>
<thead>
<tr>
<th>Route</th>
<th>Route Name</th>
<th>Corridor of Concern</th>
<th>Average Daily Ridership (2008)</th>
<th>2008 AADT</th>
<th>Mode Share Transit (2008)</th>
<th>Average Daily Ridership (2035)</th>
<th>2035 ADT</th>
<th>Mode Share Transit (2035)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Rivers Avenue Limited</td>
<td>N/A</td>
<td>2,596</td>
<td>30,400</td>
<td>7.31%</td>
<td>4,369</td>
<td>55,400</td>
<td>7.31%</td>
</tr>
<tr>
<td>30</td>
<td>Savannah Highway</td>
<td>Savannah Highway</td>
<td>572</td>
<td>39,400</td>
<td>1.43%</td>
<td>1,042</td>
<td>55,300</td>
<td>1.85%</td>
</tr>
<tr>
<td>31</td>
<td>Folly Road</td>
<td>Folly Road</td>
<td>276</td>
<td>41,100</td>
<td>0.67%</td>
<td>503</td>
<td>43,700</td>
<td>1.14%</td>
</tr>
<tr>
<td>301</td>
<td>St. Andrews</td>
<td>Ashley River Road / St. Andrews</td>
<td>522</td>
<td>44,000</td>
<td>1.17%</td>
<td>951</td>
<td>58,900</td>
<td>1.59%</td>
</tr>
</tbody>
</table>

*Assumes 3% annual growth, based on assumptions from 2007 - 2011 Transit Action Plan (CARTA)*

To evaluate the viability of fixed route bus transit to support the transportation need and purpose of the Mark Clark Expressway project, the threshold methodology was applied to the land use data in the study area. The threshold method, as detailed in the Transit Capacity and Quality of Service Manual, 2nd Edition (2008), suggests the minimum densities of three households per acre or four jobs per acre for hourly transit service to be feasible.

Applying the threshold methodology to the traffic analysis zones, Table 3.10 identifies the scale used to determine levels of transit propensity within the study area:

### Table 3.10

<table>
<thead>
<tr>
<th>Household Density (HH/acre)</th>
<th>Employment Density (Jobs/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0-3</td>
</tr>
<tr>
<td>Medium</td>
<td>3-10</td>
</tr>
<tr>
<td>High</td>
<td>Greater than 10</td>
</tr>
</tbody>
</table>

The transit propensity on a traffic analysis zone (TAZ) level is illustrated for 2035 socioeconomic conditions in the Mark Clark Expressway study area in Figure 3-51.

This spatial analysis compared the under served transit supportive areas within the Mark Clark Expressway study area with current transit service route coverage. This, as illustrated in Figure 3-51, suggests that the study area is currently served by fixed route bus service where land use densities are considered transit-supportive and can assume that the

F U.S. Census http://www.census.gov/geo/www/cob/tz_metadata.html last accessed 3/24.10
current ridership will remain an option for travelers but not a remedy for congestion within these defined corridors of concern. Based on this analysis, fixed route bus transit does not serve the need and purpose for the proposed project.

**Mode 2: Premium Transit Service: CARTA Express**

Much like fixed route transit service, express bus transit presents an attractive alternative to a “build” alternative in terms of impacts to the physical and social environment, as express bus service typically uses existing roadways. Express bus service operates within mixed traffic at governed speeds posted for all vehicles. However, express bus service is intended to operate on a faster schedule as the number of stops is limited and quicker routes, such as interstates without traffic signals, are often used. Infrastructure should be in place to support efficient transport of passengers.

CARTA offers CARTA Express service, picking up commuters in suburban, park and ride locations in James Island, West Ashley, North Charleston and Mount Pleasant. These routes are designed to pick up commuters and carry them to the Central Business District in downtown Charleston, or carry them through to the opposite end of the Charleston area. Limited stops along the routes provide faster transit service for riders.

Using 2009 CARTA Express ridership data and demographic data gathered from riders during a 2009 on-board survey collection, some observations can be made about current users of CARTA Express bus service. Ridership on the existing express routes between June 2008 and May 2009 averaged 835 riders per day on the route connecting North Charleston to James Island (total, two way riders) and 582 riders per day on Route 2, connecting Mt. Pleasant with West Ashley (total, two way riders). Ridership for the segments connecting James Island with downtown, in the Folly Road corridor are 176 daily, or 88 trips each way during peak hours. Route 2, serving the West Ashley community, carries 254 daily, or 127 riders each way during peak hours in the Savannah Highway corridor.

With these observations, it can be concluded that less than 225 vehicles per day, in each direction, are removed from these two corridors combined during peak hours due to the availability of CARTA Express service. In both corridors, these corridors have less than 1% transit mode share on this existing premium transit service (Table 3.11). Despite the assumed low impacts to the physical environment, this reduction is not large enough to be considered a mitigation of traffic congestion compared with the new location alternatives.
Table 3.11
CARTA Express Transit Mode Share in Corridors of Concern

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>James Island - N. Charleston Express</td>
<td>Folly Road</td>
<td>176</td>
<td>41,100</td>
<td>0.43%</td>
<td>321</td>
</tr>
<tr>
<td>2</td>
<td>Mt. Pleasant - W. Ashley Express</td>
<td>Savannah Highway</td>
<td>254</td>
<td>39,400</td>
<td>0.64%</td>
<td>463</td>
</tr>
</tbody>
</table>

*Assumes 3% annual growth, based on assumptions from 2007 - 2011 Transit Action Plan (CARTA)

While CARTA Express is an option for peak time commuters traveling these corridors, CARTA Express as it currently exists does not provide a viable option to address the need and purpose of the proposed Mark Clark Expressway project by improving regional mobility and adding adequate capacity to the transportation system.

### Mode 3: Premium Transit Service - Rail Applications

In order of magnitude of impacts, costs, ridership and traffic relief, rail transit is considered the premier transit mode. Beginning with streetcar and moving up through light rail technologies, rail transit systems are typically the result of other modes not sustaining demand. In other words, rail modes are typically planned, developed and constructed if and when the demand for transit of a metropolitan community cannot be accommodated by existing bus service. Using a range of 11 to 24 feet of street right of way, implementation of rail modes can range from costs of $5 million to $25 million per mile for streetcars. Using a range of up to 11 – 33 feet of either shared or exclusive rights of way, implementation of light rail modes can range from $40 million to $120 million per mile.

Due to the highly developed, urban land uses within these corridors, along with the existence of bridges in the roadway system, high-end cost estimates on a per-mile basis are used for roughly estimating the cost of implementation for streetcar and light rail applications. These estimates include planning, design, construction and acquisition of right of way. They are not inclusive of operating costs. The total miles of roadways having failing LOS within the corridors of concern is approximately 34 miles.

Recently, light rail has been designed, constructed and has initiated service in the Charlotte, N.C. metropolitan area. Comparatively, costs for that recently implemented system are at approximately $100 million per mile. Based on 34-miles of corridors in need of capacity, Table 3.12 presents what rail transit applications could cost by mode.

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9 CATS LYNX Blue Line Extension, Northeast Corridor, Fiscal Year 2011 New Starts Submittal Land Use (Quantitative) Template

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The application of these rail modes to the Mark Clark Expressway study area would depend upon the adjacent land uses and travel patterns within the corridors of concern and their ability to provide rail transit options to enough travelers to relieve congestion within corridors of concern during peak hours. While urban in land use, current densities can not support modern streetcars. Modern streetcars are designed to carry passengers short distances within an urban core as urban circulators. For peak time, when these corridors are above capacity, travelers are making work and school related trips with little flexibility in schedule and having less choice in mode. With a high end cost estimate at $850 million to implement, and in the absence of land use densities to support ridership for a successful ride share/ridership, modern street cars would not be considered practicable alternatives for the proposed Mark Clark Expressway project.

While light rail systems are designed for more regional and urban circulation and connections, fitting the description of the corridors of concern, the high end estimated cost of $2 billion to implement makes light rail an impracticable alternative for the proposed project.

<table>
<thead>
<tr>
<th>Rail Mode</th>
<th>Low Cost per Mile (millions)</th>
<th>High Cost per Mile (millions)</th>
<th>Total Low Cost Estimate (millions)</th>
<th>Total High Cost Estimate (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Car</td>
<td>$10</td>
<td>$25</td>
<td>$340</td>
<td>$850</td>
</tr>
<tr>
<td>Light Rail</td>
<td>$20</td>
<td>$60</td>
<td>$680</td>
<td>$2,040</td>
</tr>
<tr>
<td>Commuter Rail</td>
<td>$3</td>
<td>$25</td>
<td>$102</td>
<td>$850</td>
</tr>
</tbody>
</table>


Passenger rail service on Amtrak currently passes through the study area, as illustrated in Figure 3-52. While rail infrastructure exists in portions of the Mark Clark Expressway study area, the connection this could provide as local commuter rail service would only serve the portion of the regional traffic movements between portions of West Ashley and North Charleston.

The user benefit of such a system, when factoring in station time costs and feeder bus and walk time costs, the use of transit would take more time than using a personal vehicle or existing fixed route bus transit service. Using the existing Amtrak infrastructure would be a relatively low cost alternative but would only support regional travel patterns connecting West Ashley with the North Charleston station, limiting improvements to the regional capacity to routes connecting those flows for peak hours of travel. Having such limited benefit, commuter rail on existing Amtrak rail infrastructure would not meet the defined need and purpose of the proposed Mark Clark Expressway project.
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Development of Alternatives

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FIGURE 3-52
PASSENGER RAIL (AMTRAK)
3.6.4 Do the mass transit alternatives meet the needs for the project?

With the above discussion of observed ridership figures for the existing fixed route bus service, which is well under capacity for ridership, the ability and relative impacts of a rail transit mode serving the need and purpose of congestion relief, the improvement to capacity and safety on the transportation system in the Mark Clark Expressway study area is negligible. The level of service of existing bus transit could be enhanced by increasing frequencies and improving user experience (signing park and ride locations, adding shelters and waiting facilities), but it is difficult to estimate the impact on ridership of improving that level of service. Land use densities would have to increase within these corridors of concern to provide a larger market for transit users within the study area.

In observing the Charlotte Area Transit System’s (CATS) recent change in frequencies, it can be seen how an increase in frequency and improvement in user experience can impact ridership. With an increase in frequencies, ridership for peak, midday and night on the express bus services rose 9.3 percent between 2007 and 2008 in Charlotte. When reviewing the fixed bus routes that had frequency changes, a majority of the routes were those in which surrounding land use densities and types supported transit, unlike the densities and types along the corridors of concern identified for this project. The current land use along the corridors of concern for the proposed project is not dense enough to support higher frequencies. Since a majority of the vehicular congestion is related to peak periods, increased ridership, as a result of increased frequencies, would not likely occur due to the existing travel patterns within the study area. Land use densities in the area would have to increase within these corridors of concern to provide a larger market for transit users within the study area. Other cities currently supporting higher levels of transit service have demonstrated land use development patterns supportive of higher transit service. Washington, DC, for example, has supported multiple levels of transit service with highly developed, concentrated employment centers around transit facilities. This study area does not expect to see similar levels of development according to available forecasts. Like employment densities, housing patterns in this region are also more suburban in nature compared with larger metropolitan areas with higher levels of transit service. Again, forecasts do not indicate an increase in housing densities within these corridors of concern to indicate a demand for supportive ridership necessary for additional transit services.

The need and purpose of the proposed Mark Clark Expressway project is to increase the capacity, and improve safety of the regional transportation system. The need and purpose also seeks to enhance mobility to and from West Ashley, Johns Island and James Island. Over 55 percent of the main thoroughfares in West Ashley, Johns Island and James Island exceed capacity during the peak hours, indicating that these are routes and trips made out of necessity (work, school trips). The mass transit alternatives (fixed bus routes and CARTA Express) address mobility concerns along
major corridors, connecting multiple short distance origins with destinations throughout the corridors of concern. Similarly, modern streetcar systems serve intra-corridor trips. The extent to which mass transit will reduce congestion levels does not add capacity to the regional transportation system along comparable orders of magnitude with the new location alternatives. The lack of reduction in congestion and VMT suggests a lack of improvement in regional mobility, as densities in land use do not support frequencies of service to serve regional mobility. Safety on the study area roads would be marginally improved by this minimal reduction in VMT. The impracticability of light rail on a cost per mile basis prevents the rail transit alternative from being a reasonable alternative for the proposed Mark Clark Expressway project.

The mass transit alternatives were eliminated from further analysis because they fail to meet the need and purpose of the proposed Mark Clark Expressway project and in addition were considered impracticable from a cost standpoint.

### 3.7 Transportation Systems Management

The Transportation Systems Management (TSM) Alternative seeks to improve the capacity, mobility, and safety of the existing roadway network with minimal capital expenditures. Examples of TSM improvements include the following operational and physical measures:

- vehicle speed management;
- traffic enforcement;
- speed limit adjustment;
- traffic calming;
- improved signage and striping;
- traffic signal optimization and coordination;
- access management;
- turn restrictions;
- median alternatives;
- pedestrian and bicycle facilities;
- addition of minor turn lanes;
- horizontal and vertical roadway realignments; and
- High Occupancy Vehicle (HOV) lanes.

### 3.7.1 Which existing roadways were evaluated for TSM applications?

The existing roadway network within the proposed project study area was analyzed to identify corridors potentially needing capacity, mobility or safety improvements. The level of service (LOS), level of mobility (LOM) and crash rate were determined for the existing roadways. Any roadway with a LOS E or F was identified as a corridor of concern, see Figure 3-50. For more information about the difference between LOM and LOS, see Chapter 2.

The safety of the study area roadways was measured using historical crash data. Roadways with a crash rate or fatality rate higher than the statewide average were identified as corridors of concern. Table 3.13 summarizes the concerns, if any, of each roadway.

---

**Average Daily Traffic (ADT)** is the number of vehicles that pass a given location during a 24-hour period.
<table>
<thead>
<tr>
<th>Corridor of Concern</th>
<th>From</th>
<th>To</th>
<th>Functional Class</th>
<th>2003 ADT</th>
<th>2035 ADT</th>
<th>Congestion and Mobility (LOS)</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashley River Rd.</td>
<td>Paul Cantrell Blvd.</td>
<td>Sam Rittenberg Blvd.</td>
<td>Minor Arterial</td>
<td>31,300</td>
<td>46,900</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Sam Rittenberg Blvd.</td>
<td>Saint Andrews Blvd.</td>
<td>Minor Arterial</td>
<td>27,000</td>
<td>33,900</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Bees Ferry Rd.</td>
<td>Paul Cantrell Blvd.</td>
<td>Minor Arterial</td>
<td>17,500</td>
<td>22,700</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bees Ferry Rd.</td>
<td>Glenn McConnell Pkwy.</td>
<td>Main Rd.</td>
<td>Minor Arterial</td>
<td>18,900</td>
<td>57,100</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ashley River Rd.</td>
<td>Glenn McConnell Pkwy.</td>
<td>Minor Arterial</td>
<td>7,100</td>
<td>40,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calhoun St.</td>
<td>Courtenay Dr.</td>
<td>Rutledge Ave.</td>
<td>Principal Arterial</td>
<td>18,600</td>
<td>18,900</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Camp Rd.</td>
<td>Folly Rd.</td>
<td>Riverland Dr.</td>
<td>Collector</td>
<td>6,000</td>
<td>8,500</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Folly Rd.</td>
<td>Fort Johnson Rd.</td>
<td>Collector</td>
<td>6,600</td>
<td>8,200</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Central Park Rd.</td>
<td>Folly Rd.</td>
<td>Riverland Dr.</td>
<td>Collector</td>
<td>5,600</td>
<td>8,400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folly Rd.</td>
<td>Savannah Hwy.</td>
<td>Maybank Hwy.</td>
<td>Principal Arterial</td>
<td>42,700</td>
<td>57,600</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maybank Hwy.</td>
<td>Harbor View Rd.</td>
<td>Minor Arterial</td>
<td>22,600</td>
<td>24,100</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>James Island Conn.</td>
<td>Camp Rd.</td>
<td>Minor Arterial</td>
<td>37,500</td>
<td>44,700</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harbor View Rd.</td>
<td>James Island Conn.</td>
<td>Minor Arterial</td>
<td>17,900</td>
<td>18,900</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camp Rd.</td>
<td>Ft. Johnson Rd.</td>
<td>Minor Arterial</td>
<td>23,800</td>
<td>29,400</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camp Rd.</td>
<td>Folly Beach</td>
<td>Principal Arterial</td>
<td>18,800</td>
<td>23,800</td>
<td>X</td>
<td></td>
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<td>Minor Arterial</td>
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<td>Brownwood Rd.</td>
<td>Minor Arterial</td>
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<td>Principal Arterial</td>
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<td>Over The Ashley River</td>
<td>Over The Ashley River</td>
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<td></td>
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<td>50,900</td>
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</tbody>
</table>
3.7.2 What types of TSM applications were evaluated?

TSM improvements can be helpful in addressing capacity, safety, and mobility issues, but the overall effect to traffic operations must be considered when implementing a specific TSM improvement. For example, vehicle speed management can improve the safety of residential streets by slowing traffic speeds but this also can reduce capacity within a given period of time.

**Vehicle Speed Management**

Vehicle speed management can improve safety. Drivers have less time to avoid accidents at higher speeds because stopping distances increase. Lowering or enforcing the existing speed limit on a stretch of roadway effectively increases the reaction time. Traffic calming strategies such as speed humps, roundabouts and neckdowns typically reduce speed, traffic volumes, and accidents.10

Vehicle speed management could be used to discourage cut-through traffic and to prevent speeding. Vehicle speed management was identified as a possible TSM application along roads near schools, in residential communities with low speed limits and in areas that are used as cut-throughs.

**Improved Signage and Striping**

Improved signage and striping help drivers navigate by providing important information. Easily readable street signs and guide signs can help drivers decide when to make lane changes or turn movements. Roadway striping delineates the edge of pavement and adjacent lanes. Retroreflective signs and striping are useful in areas that are not well lit. This type of signage/striping reflects the light originating from vehicle headlights back to the source, making them more visible in dark conditions. Improved signage and striping would have no affect on capacity or mobility but has the potential to improve safety in areas with poor lighting. Improved signage and striping was identified as a possible TSM application in areas with poor lighting or striping.

**Traffic Signal Optimization and Coordination**

Traffic signal optimization and coordination is a common way to increase efficiency along a roadway. Adjustments to the timing of a signal such as increasing green times or providing protected phases for left turn movements can help with congestion and safety concerns. The coordination of adjacent signals can help vehicle platoons progress through a series of signals without being stopped at each one along the way. Travel times through the section of roadway would therefore be reduced. Optimization and coordination of traffic signals typically reduce delay by less than 5 percent.11

Traffic signal optimization/coordination was identified as a possible TSM application for any roadway with a signal one mile apart or closer.

**Access Management**

Driveways and intersections create conflict points where accidents are likely to happen. Managing the density and

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location of access points can improve safety. In Oregon, a study was conducted in which accidents on 240 roadway segments were analyzed.\textsuperscript{12} The study in Oregon showed that for every access point per mile the accident rate increases by approximately 4 percent.\textsuperscript{13} Limiting the number of driveways or restricting turn movements at driveways can improve safety. Urban roadways with closely-spaced driveways and intersections could benefit from access management. Eliminating or combining driveways along these roadways would most likely decrease the crash rate but would not have a significant affect on capacity or mobility. Access management was identified as a possible TSM application on roadway segments with safety concerns and with closely-spaced access points.

Median construction can be used to limit access along a section of roadway. Medians restrict turn movements at driveways and reduce the number of conflict points. Pedestrians can use medians as refuges when crossing roadways. Special attention should be given to ensure left turn and U-turn movements are provided for efficiency. Midblock breaks in the median should be considered to avoid high U-turn traffic volumes at intersections. Medians restrict driveways to right-in/right-out access only but left-over turn lanes can be constructed within the median to allow left turns into the driveway. Left-overs are constructed in a manner that does not allow left turns or through movements from the side street. Medians were identified as a possible TSM application in locations that could benefit from access management. Medians were not identified in locations that would require widening as this would likely result in more than minimal capital expenditures.

Two-way center left turn lanes can be effective in reducing accidents while maintaining access to driveways. Medians are typically more effective than two-way center left turn lanes in reducing accidents. Table 3.14, summarizes the expected reduction in accidents per mile based on seven accident prediction models.\textsuperscript{14} Some roadways within the study area have two-way center left turn lanes. Access along a three-lane or five-lane roadway can be managed by constructing medians along portions of the two-way center left turn lane.

**Pedestrian and Bicycle Facilities**

Roadways in areas with pedestrian or bicycle traffic should be able to accommodate these movements safely. Sidewalks, crosswalks and pedestrian signals help to separate pedestrian traffic from vehicles. Signs and crosswalks alert drivers that pedestrians are likely to be present. It can be difficult for vehicles to pass bicyclists on heavily traveled two lane roads. Providing wide vehicle lanes or bicycle lanes prevent drivers from having to pass in the opposing travel lane.

Within the Charleston region, there are approximately 24-miles of bikeway facilities, as identified on fourteen different

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\textsuperscript{13} Ibid

\textsuperscript{14} Ibid
bike or shared use path systems and lanes have been identified in the City of Charleston's 2012 BIKE Plan.\textsuperscript{15} Three of these facilities are located within the study area, these facilities include:

- West Ashley Park/Carolina Bay Path - approximately 3.5 miles
- West Ashley Greenway - 8.25 miles
- West Ashley Bikeway - 2.65 miles

In addition to the crash data collected for the road segments in the project level traffic analysis network (these road segments are listed in Table 3.5 on page 3-39), pedestrian and bicycle fatality data was also collected for the same road segments for a 3.25 year period. Within the 3.25 year period from January 1, 2005 – April 19, 2008, there were seven fatalities on the road segments in the project level traffic analysis network.

“According to the Benchmarking Report analysis, South Carolina is the second most dangerous state in the nation for bicycling with 20.2 deaths per 10,000 bicyclists. Bicyclists account for 1.6% of all traffic fatalities in the state making it one of the most riskiest state for bicycling, along with Alabama, Louisiana and North Carolina.”\textsuperscript{16}

<table>
<thead>
<tr>
<th>ADT</th>
<th>Undivided Highway</th>
<th>Two-Way Center Left Turn Lane</th>
<th>Non-Traversable Median</th>
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</thead>
<tbody>
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<td>39</td>
<td>32</td>
</tr>
<tr>
<td>20,000</td>
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<td>55</td>
</tr>
<tr>
<td>30,000</td>
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</tr>
<tr>
<td>40,000</td>
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<td>112</td>
<td>85</td>
</tr>
</tbody>
</table>


Improvements to bicycle and pedestrian facilities have the potential to increase safety along a roadway; however, these improvements are not capable of improving regional mobility and capacity. Bicycle and pedestrian safety improvements were considered as plausible TSM applications, but given the length of the existing roads and the high level of congestion in the study area, the improvements would not help achieve the overall purpose and need of the project.

**Addition of Minor Turn Lanes**

The construction of left-turn lanes on two lane roadways can improve the operations and safety of a roadway. Left turn lanes have been shown to reduce accident rates.\textsuperscript{17} Left-turn movements affect the capacity of through volume when a separate left turn lane is not provided. The capacity of a shared left/through lane is typically 30 to 40 percent less than a through only lane.\textsuperscript{18} The decrease in capacity of a shared left/through lane results from vehicles queuing to turn left and/or through vehicles being forced to wait in the queue before they can proceed through the intersec-

\textsuperscript{15} City of Charleston’s Draft 2012 BIKE Plan pg 86
\textsuperscript{16} http://archive.constantcontact.com/fs004/1102329574334/archive/1102968704126.html
\textsuperscript{17} Ibid
\textsuperscript{18} Ibid
tion. Therefore, left turn lanes were identified as a possible TSM application to improve capacity at various signalized intersections.

**Horizontal and Vertical Roadway Realignments**

In some cases roadway alignments can cause safety and/or capacity issues. For example, skewed intersections and sharp curves often impact turn movements due to poor sight distance. Realigning these sections of roadway can increase sight distances resulting in safer turn movements. Vertical alignments can cause problems with safety and capacity. Steep downgrades approaching a signalized intersection can lead to collisions due to the increased distance needed for stopping. Conversely, steep upgrades approaching a signalized intersection can decrease the capacity of the approach. Heavy vehicles experience increased acceleration times when starting on a steep upgrade. This can cause fewer vehicles to get through a signal phase. Possible horizontal realignments were identified as potential TSM applications at skewed intersections. However, horizontal realignments are geometric changes that would not necessarily affect the overall network. For example, while realignment of the intersection of Maybank Highway and Folly Road may improve safety at that specific intersection, it would not improve the safety of other intersections along either roadway network. This horizontal realignment would have little to no effect on capacity at the intersection.

**High Occupancy Vehicle Lanes**

High Occupancy Vehicle (HOV) lanes are typically used to encourage drivers to carpool, and to separate transit vehicles from congested roadways. HOV lanes are usually restricted to vehicles with two or more persons but motorcyclists are also typically allowed. HOV lanes are generally incorporated into an existing roadway either by constructing new lanes or converting existing lanes. In the context of TSM improvements HOV lanes would be incorporated by converting existing lanes since constructing new HOV lanes would be too costly to be considered a TSM improvement. HOV lanes were not considered since converting existing lanes would not increase capacity. As reported on page 27 of the I-26 Corridor HOV/HOT Lanes Analysis conducted by SCDOT:

> Because of existing capacity and design constraints in the corridor and lack of sufficient modal options necessary to facilitate a change in travel behavior, conversion of an existing general purpose lane for either HOV or HOT lane use is not supported by the analysis at this time. This finding is supported by analyzing the potential impact on traffic conditions in the remaining general purpose lanes, and the lack of sufficient transit service and ridesharing infrastructure needed to minimize that impact.

> Based on the assumptions and analyses outlined in this report, construction of a new HOV/HOT lane fully funded through variable tolling does not appear to be viable at this time due to the level of HOT lane usage necessary to satisfy annualized debt service. However, additional independent financial analyses and modeling are currently underway to determine whether a HOT lane facility on I-26, along with other corridors statewide, would provide a sufficient return on investment and potentially serve as appropriate candidates for public-private partnerships in addressing congestion. Upon completion (estimated mid-2009), that information will be made available as an addendum to this report.

> While no alternative presented in this report would singularly eliminate congestion along I-26, a number of less costly, short-term initiatives are already underway or planned in the region that col-
lectively would help to mitigate congestion within the corridor. These initiatives include enhanced express bus service, mobility management, ridesharing, and employer-sponsored flexible work scheduling.

The I-26 Corridor HOV/HOT Lanes Analysis conducted by SCDOT is included in Appendix S.

### 3.7.3 Which corridors have capacity, mobility and safety concerns?

The Updated CHATS Travel Demand Model estimates that several study area roadways currently operate at or near capacity due to traffic demand. The resulting congestion causes the roadways to operate at unacceptable LOS and LOM. Due to the unique geography of the study area several congested roadways are the primary connection between distinct regions (i.e. Johns Island, James Island, West Ashley and downtown Charleston). Safety is also a concern as congestion increases on these roadways. The corridors of concern have been identified based on capacity, safety and mobility. Table 3.15 summarizes the concerns of these corridors and the possible TSM applications. For an in depth discussion of each roadway and their possible TSM application, see Appendix K: Alternative Development and Analysis Technical Memorandum.

### 3.7.4 Does the TSM Alternative meet the needs for the project?

The need and purpose of the proposed Mark Clark Expressway project is to improve the capacity, and safety of the regional transportation system. The need and purpose also seeks to enhance mobility to and from West Ashley, Johns Island, and James Island. Under the base year (2003) conditions, over 55 percent of the main thoroughfares in West Ashley, Johns Island and James Island exceed capacity during the peak hours. Primary links between distinct regions are expected to be burdened as future travel demand causes an increase in congestion and crashes. The TSM strategies are aimed at making the most efficient use of the existing transportation infrastructure by increasing the efficiency, safety, capacity and mobility of a corridor without increasing the size of the existing facilities. Many of the proposed TSM improvements restrict turn movements and/or separate opposing traffic movements. These improvements have the potential to enhance safety, capacity and mobility in localized areas where mitigation is provided; however, the benefits would not be provided throughout the entire study area, which is what the need and purpose of the project require.

Constructing left turn lanes at traffic signals, optimizing signal phases, and coordinating adjacent signals would result in more capacity but would not have a significant affect on mobility for the study area. As stated earlier, optimization and coordination of traffic signals can reduce delay by 5 percent or less. Specific areas could experience slightly less delay as a result of signal improvements but much of the study area would remain congested. As a result, the TSM Alternative was eliminated from further analysis because it fails to meet the need and purpose of the proposed Mark Clark Expressway project. On a case by case basis, SCDOT and Charleston County continue to assess trouble spots within the road network and use TSM improvements where they can be applied.
<table>
<thead>
<tr>
<th>Corridor of Concern</th>
<th>From</th>
<th>To</th>
<th>Improvement</th>
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<td>Fishbourne St.</td>
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<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
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<tr>
<td>River Rd.</td>
<td>Savannah Hwy.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Maybank Hwy.</td>
<td>River Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Access Management, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Riverland Dr.</td>
<td>Folly Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Turn Restrictions, Median Alternatives, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Stono River</td>
<td>Riverland Dr.</td>
<td></td>
<td>No TSM Improvements Apply</td>
</tr>
<tr>
<td>River Rd.</td>
<td>Stono River</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Sailfish Rd.</td>
<td>River Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Main Rd.</td>
<td>Sailfish Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Edge</td>
<td>Main Rd.</td>
<td></td>
<td>Signal Optimization/Coordination</td>
</tr>
<tr>
<td>Brownswood Rd.</td>
<td>Main Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Plow Ground Rd.</td>
<td>Maybank Hwy.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Maybank Hwy.</td>
<td>Brownswood Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Maybank Hwy.</td>
<td>Edenvale Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Edenvale Rd.</td>
<td>Betsy Kerrison Pkwy.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Wappoo Hall Rd.</td>
<td>Maybank Hwy.</td>
<td></td>
<td>Speed Management, Striping, Lighting</td>
</tr>
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<td>Maybank Hwy.</td>
<td>Central Park Rd.</td>
<td></td>
<td>Vehicle Speed Management, Addition of Minor Turn Lanes, Striping</td>
</tr>
<tr>
<td>Central Park Rd.</td>
<td>Camp Rd.</td>
<td></td>
<td>Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Camp Rd.</td>
<td>Grimball Rd.</td>
<td></td>
<td>Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>SC 162</td>
<td>Bees Ferry Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
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<tr>
<td>Magnolia Rd.</td>
<td>Wesley Dr.</td>
<td></td>
<td>Signal Optimization/Coordination, Turn Restrictions, Median Alternatives</td>
</tr>
<tr>
<td>Main Rd.</td>
<td>Savage Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Addition of Minor Turn Lanes</td>
</tr>
<tr>
<td>Savage Rd.</td>
<td>Sam Rittenberg Blvd.</td>
<td></td>
<td>Signal Optimization/Coordination</td>
</tr>
<tr>
<td>I-526</td>
<td>Magnolia Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Turn Restrictions, Median Alternatives</td>
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<td>Over The Ashley River</td>
<td>Over The Ashley River</td>
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<td>No Congestion, Safety, or Mobility Concerns</td>
</tr>
<tr>
<td>Saint Andrews Blvd.</td>
<td>Folly Rd.</td>
<td>Ravenel Bridge</td>
<td>Signal Optimization/Coordination</td>
</tr>
<tr>
<td>Wesley Dr.</td>
<td>Wesley Dr.</td>
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<td>Signal Optimization/Coordination</td>
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<td>Savannah Hwy.</td>
<td>Folly Rd.</td>
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<td>Signal Optimization/Coordination, Turn Restrictions, Median Alternatives, Horizontal Realignment</td>
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<tr>
<td>Saint Andrews Blvd.</td>
<td>Savannah Hwy.</td>
<td></td>
<td>No Congestion, Safety, or Mobility Concerns</td>
</tr>
<tr>
<td>Wesley Dr.</td>
<td>Wesley Dr.</td>
<td></td>
<td>Signal Optimization/Coordination</td>
</tr>
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<td>Savannah Hwy.</td>
<td>Folly Rd.</td>
<td></td>
<td>Signal Optimization/Coordination, Turn Restrictions, Median Alternatives, Horizontal Realignment</td>
</tr>
<tr>
<td>Saint Andrews Blvd.</td>
<td>Savannah Hwy.</td>
<td></td>
<td>No Congestion, Safety, or Mobility Concerns</td>
</tr>
</tbody>
</table>
3.8 Reasonable Alternatives

Based on the preliminary alternatives analysis, six new location alternatives evaluated from the range of alternatives were found to meet the need and purpose for the project and determined to be “Reasonable Alternatives.” Because mass transit and TSM did not meet the need and purpose of the proposed project, they will not be considered one of the “Reasonable Alternatives.”

- No-build Alternative assumes 2035 conditions. It is always included in the DEIS as a benchmark against which the impacts of other alternatives can be compared. The E+C network is included as part of the No-build. As part of the No-build Alternative, short-term minor reconstruction, such as safety upgrading and maintenance, can be considered.

- Alternative 1 extends from the existing interchange at Mark Clark Expressway/U.S. 17, across the Stono River, to intersect Maybank Highway on Johns Island. The alignment then traverses James Island south of James Island County Park to end at the existing James Island Connector/Folly Road interchange. This is a fully controlled access facility. See Figure 3-53.

- Alternative 8 extends from the existing interchange at Mark Clark Expressway/U.S. 17, across the Stono River. On Johns Island, this alignment avoids the intersection of Maybank Highway and River Road by providing an interchange on Maybank Highway west of this intersection. The alignment traverses the Stono River and James Island, south of the James Island County Park, to end at the existing James Island Connector/Folly Road interchange. This is a fully controlled access facility. See Figure 3-53.

- Alternative 10 extends from the existing interchange at Mark Clark Expressway/U.S. 17, across the Stono River, to intersect Maybank Highway on Johns Island. It then crosses James Island, north of James Island County Park near Ferris and Cyrus Road and connects to the existing James Island Connector/Folly Road interchange. This is a fully controlled access facility. See Figure 3-53.

- Alternative 11 extends from the existing interchange at Mark Clark Expressway/U.S. 17 to Johns Island where two spur interchanges are located. These spurs would be partial interchanges at Maybank Highway and River Road north of Maybank Highway (Spur A) and River Road south of Maybank Highway (Spur B). The alignment then traverses James Island ending at the existing James Island Connector/Folly Road interchange. This is a fully controlled access facility. See Figure 3-53.

- Alternative 11A extends from the existing interchange at Mark Clark Expressway/U.S. 17 to Johns Island and provides one spur interchange, Spur 11A. (This alternative is the same as Alternative 11, but Spur B has been removed.) This spur would be a partial interchange at River Road, north of Maybank Highway and would provide a connection to Maybank Highway near Sailfish Drive. The alignment then traverses James Island ending at the existing James Island Connector/Folly Road interchange. This is a fully controlled access facility. See Figure 3-53.

- Alternative 36 extends from U.S. 17 across the Stono River to Johns Island but it is proposed as a four-lane
Chapter 3.
Development of Alternatives

FIGURE 3-53
THE REASONABLE ALTERNATIVES

NOTE: To see individual maps of each alternative, please see section 3.2
parkway with low speeds. On Johns Island, this alternative provides two connector roads onto Johns Island. These access points would be located at Maybank Highway and River Road north of Maybank Highway and River Road south of Maybank Highway. On James Island, the parkway would utilize Central Park Road, which would be widened to four lanes with a raised median to the James Island Connector. Access to the parkway would be provided at intersections with Maybank Highway, Folly Road, and other future connections. This alternative provides bicycle and pedestrian facilities. See Figure 3-53.

### 3.9 What was the public’s response to the Reasonable Alternatives?

Once the Reasonable Alternatives were selected based on the preliminary alternatives analysis, the study team presented these six alternatives to the agencies and the public for their input and review.

A second series (three meetings) of Public Information Meetings was held in April and May of 2009 and one project stakeholders’ meeting in May of 2009. The goals of these meetings were to:

- present the range of alternatives that were considered for the proposed project;
- present the preliminary alternatives analysis; and
- present the Reasonable Alternatives.

At these meetings, frequently expressed comments included:

- support of “New Way to Work” as an alternative;
- improving existing roads instead of completing the Mark Clark Expressway;
- including mass transit either as an alternative or in combination with one of the build alternatives;
- protecting the James Island County Park and Dill Sanctuary;
- concern over impacts to marshes/wetlands;
- keeping Johns Island rural; and
- the need for bicycle/pedestrian facilities in the study area.

### 3.9.1 How was public input incorporated into the Reasonable Alternatives?

As a result of the input from the agencies, stakeholders and the public, various adjustments were suggested to be made to the alignments. The following is a list of considerations and/or modifications that were made to the alignments before they were finalized for evaluation in the DEIS process:

- One mile south of U.S. 17, all six new location Reasonable Alternatives (Alternatives 1, 8, 10, 11, 11A and 36) were shifted 235 feet east of their original position after passing over South Shore Drive in the Oakland neighborhood to avoid impacting the community dock that serves the Battery Haig subdivision.

- Alternative 36 was shifted 110 feet north of its original position on James Island, west of Riverland Drive to avoid impacting Murray-LaSaine Elementary School, which is eligible for the National Register of Historic Places.
• Due to public support for a parkway concept, the study team considered the potential of converting the five interstate alternatives to a parkway design. Based on previous results from the Updated CHATS Travel Demand Model, the study team assessed whether these parkway alignments would function adequately from a traffic perspective. From this analysis, the study team determined that in order for the parkway concept to operate at an acceptable LOS, it would need to have more than one access point on Johns Island. The dispersion of traffic across a network of potential travel routes enables the parkway configurations to adequately handle traffic. Four of the Reasonable Alternatives (Alternatives 1, 8, 10 and 11A) only provide a single interchange location on Johns Island and therefore, these alternatives would not provide sufficient traffic operations as parkway facilities. The alternatives which would provide two intersections on Johns Island, dispersing the traffic from Maybank Highway, could function as either an interstate or as a parkway facility. Alternative 11 provides these two access points on Johns Island; however, this alternative follows basically the same alignment across Johns Island as the existing parkway alternative (Alternative 36).

• In October 2009, the study team received a proposal from SCCCL entitled A New Way to Work: Implementation Analysis - October 2009, which revised the original proposal received in January 2009. This proposal was evaluated by the study team and is referred to as the Grid Network Alternative.

The revised proposal includes the same publicly-funded network of local streets that was included in the original January 2009 proposal (see Appendix K: Alternative Development and Analysis Technical Memorandum). The publicly-funded network of local streets are proposed in the following areas: Harborview Road and Folly Road while allowing additional access to the James Island Connector on James Island; River Road and Maybank Highway on Johns Island; along U.S. 17 and at the I-526/U.S. 17 interchange in West Ashley.

In the October 2009 proposal, the SCCCL requested that in addition to the publicly-funded roads, the privately-funded roads be included in their alternative to be evaluated for the proposed Mark Clark Expressway project. Page 8 of the proposal states “the NEPA alternatives analysis must include not only the publicly-funded components of the plan, but must also include consideration of the reasonably foreseeable private redevelopment that will occur as a result of the publicly-funded portion of the project.” Despite this suggestion, both versions of the proposal acknowledge on page 12 that “All of the concepts for connections and redevelopment on private property are, of course, conceptual.” Because SCDOT cannot oversee or ensure the construction of the conceptual, privately-funded roads as a result of redevelopment, the privately-funded roads were not “reasonably foreseeable” and not included as part of the alternative to be evaluated. As a result, these roads were not included in the analysis of the Grid Network Alternative.

To properly compare and to ensure consistency in the evaluation of all the alternatives for the proposed Mark Clark Expressway project, a single, consistent land use scenario has been applied to the traffic analyses. The 2035 land use data used in the Updated CHATS Travel Demand Model was developed in consultation with planning departments to estimate land use forecasts, which reduced the amount of subjectivity on the travel demand estimation. To ensure the consistency in the evaluation of all alternatives, including the Grid Network Alternative, the original land use scenario that was used in the analysis and land use information provided in Chapter 4 of A New Way to Work: Implementation Analysis - October 2009 was not included. For further information on the land use scenario used for the Updated CHATS Travel Demand Model, see

One modification was made in the traffic analysis for the Grid Network Alternative as a result of the October 2009 submittal. Modifications to median types, a type of access management, were included along some of the network roadways in the model run of the Grid Network Alternative.

As a result of the evaluation of the Grid Network Alternative proposal, it was determined that funding type, location and typical sections remain consistent with the January 2009 “New Way to Work” proposal, resulting in the same roads and defined right of way used to evaluate the Grid Network - Alternative 19.

For more information regarding the revised Grid Network Alternative, please see of Appendix K, Alternative Development and Analysis Technical Memorandum, Part 1 Addendum B.

### 3.9.2 Did any new alternatives result from public input?

Many of the public comments expressed support for the parkway concept but voiced issues and concerns about the location of Alternative 36. Specifically comments expressed concern about the potential impacts to the community along Central Park Road and impacts to Murray-LaSaine Elementary School. Comments supported the inclusion of bicycle/pedestrian facilities in this alternative.

As a result of the comments concerning the impacts along Central Park Road with Alternative 36, the study team looked at the possibility of alternate routes for a parkway facility on James Island. The study team used the design criteria detailed in Section 3.1.3 to develop an additional parkway alternative. As stated previously, an alignment with only one intersection or interchange at Maybank Highway will not function as a parkway. This resulted in merging features of Alternative 11 and Alternative 36 to create a hybrid alternative, Alternative G, see Figure 3-54. This created an additional new location Reasonable Alternative, referred to as Alternative G for the remainder of this DEIS. Alternative G is close to the same alignment as Alternative 11, but has been modified from an interstate facility to a parkway facility. Instead of having two spur interchanges on Johns Island, Alternative G has two at-grade connector roads. These two connector roads are in the same location for both Alternative 36 and Alternative G. After crossing the Stono River onto James Island, Alternative G was shifted north along the northern boundary of the James Island County Park to minimize impacts.

- Alternative G extends from U.S. 17 across the Stono River to Johns Island as a four-lane parkway with low speeds of 35-45 mph. This alternative provides two connector roads onto Johns Island. These connector roads would tie into River Road north of Maybank Highway and River Road south of Maybank Highway. On James Island, the parkway would pass through the northern edge of the James Island County Park. After passing Riverland Drive, Alternative G continues northeast, south of The Regatta, Carmike James Island Cinema and the U.S. Post Office, tying into the existing James Island Connector/Folly Road interchange. Alternative G provides access to Central Park Road via Riley Road and Up on the Hill Road. The study team has done this based on input from the City of Charleston and public comments, see Chapter 7. This alternative provides a multi-use path to accommodate bicycles and pedestrians.
Legend

- Freeway/Expressway
- Primary Highway
- State/County Road
- Citadel Mall
- Greenway
- Dill Sanctuary
- James Island County Park
- Refined Study Area
- Alternative G

Figure 3-54
ALTERNATIVE G

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Development of Alternatives

Draft Environmental Impact Statement
Page 3-78
3.9.3 How were the Reasonable Alternatives moved forward?

After the public information meetings, the study team refined the level of detail for each of the seven Reasonable Alternatives. For simplicity, the new location alternatives were also renamed for the DEIS studies:

- Alternative 1 – Alternative A
- Alternative 8 – Alternative B
- Alternative 10 – Alternative C
- Alternative 11 – Alternative D
- Alternative 11A – Alternative E
- Alternative 36 – Alternative F
- Alternative G – Alternative G (hybrid of Alternatives 11 and 36)

3.10 What are the alternatives that will be rigorously explored?

Because the mass transit and TSM were not found to meet the need and purpose for the project, seven new location alternatives were designed and studied for the potential impacts and benefits to the human and natural environment. The Reasonable Alternatives are: Alternative A, Alternative B, Alternative C, Alternative D, Alternative E, Alternative F and Alternative G.

3.10.1 What criteria were used to design the new location Reasonable Alternatives?

The full-control of access interstate design criteria which was assumed for the purpose of the preliminary alternatives analysis (see Appendix K: Alternative Development and Analysis Technical Memorandum) was further refined for the development of the Reasonable Alternatives. In response to public comment, design criteria for a low-speed parkway facility was developed and added for engineering consideration. As with the interstate facility, the parkway concept provides four-lanes, but is divided by a 15-foot center median: it provides limited access on James Island, where access to existing development needed to be addressed. Rather than interchanges, the parkway facility provides two at-grade, T-intersections on Johns Island with two connector roads that each connect to River Road. The parkway also provides a multi-use path for its entire length, this addition to the facility was in response to public comment. The design speed for the parkway facility and connector roads (for both Alternatives F and G) was 35-45 miles per hour.

The South Carolina Highway Design Manual (2003) and the AASHTO “Green Book” (2001) were utilized to establish engineering control of access, which is the regulated limitation of public access rights to and from properties abutting state owned right of way. Full control of access for the freeway alternatives defines strict access to the facility only by means of defined interchanges. Limited control of access for the parkway alternative defines a limited number of access points beyond interchanges to enter or exit the facility by providing connectors or streets to the mainline parkway for local public access.
design criteria that comply with state and federal guidelines for vehicular safety, comfort and mobility. See Appendix K, Alternative Development and Analysis Technical Memorandum for preliminary design criteria developed for the following facilities shown in Table 3.16.

**Typical Sections**
Typical sections for the interstate mainline and interstate ramps were re-evaluated and revised to ensure adherence to the design criteria and adherence to the facility’s intended use.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Facility</th>
<th>Applicable Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Principal Arterial (Freeway)</td>
<td>Interstate</td>
<td>Mainline Alternatives: A, B, C, D, E</td>
</tr>
<tr>
<td>Urban Principal Arterial</td>
<td>Parkway</td>
<td>Mainline Alternatives F, G</td>
</tr>
<tr>
<td>Interchange Ramps (Directional / Semi-directional)</td>
<td>Interstate</td>
<td>All interchanges, Spurs A &amp; B of Alternatives D &amp; E.</td>
</tr>
<tr>
<td>Interchange Ramps (Loops)</td>
<td>Interstate</td>
<td>All interchanges, Spur B of Alternative D</td>
</tr>
<tr>
<td>Urban Collector</td>
<td>New connector roads</td>
<td>Alternatives F, G</td>
</tr>
</tbody>
</table>

**Horizontal Alignment**
The horizontal alignments developed under the preliminary alternatives analysis were re-evaluated and refined to:

- Address comments received from the public information meetings;
- Reduce potential impacts to adjacent structures/property (avoid docks or properties);
- Tighten horizontal curvature/alignment to minimize footprints and cost where possible;
- Coincide with adjacent utility easements or property lines to eliminate partial property takes more efficiently; and
- Avoid key areas defined on the features map to limit impacts to historical properties, schools, etc.

**Vertical Alignment**
For the Alternative Development and Analysis Technical Memorandum-Part I (see Appendix K), vertical alignments of each alternative were developed conceptually at critical areas, such as proposed interchanges or flyovers to determine if appropriate clearances or grades could be obtained. The vertical alignments for the reasonable alternatives, in the form of detailed profiles, were developed to refine typical sections and determine construction limits and right of way. See Figure 3-55 and Figure 3-56.
FIGURE 3-55
TYPICAL SECTION PARKWAY

TYPICAL SECTION

MAIN LINE – PARKWAY ALTERNATIVE

TYPICAL SECTION

MAIN LINE – PARKWAY ALTERNATIVE ON STRUCTURE
Several factors were considered to set minimum elevations along the alignment and to develop the profiles:

1. Bridge deepwater and saltwater marsh;
2. Bridge navigable streams, creeks or channels;
3. Required vertical clearances over roadways; and
4. Provide minimum roadway grade to avoid flooding of mainline in new location areas.

Utility Identification and Prior Rights Relocation Estimating

Utilities were investigated and identified in the refined study area to determine if any of the Reasonable Alternatives would require extensive relocations to a major or critical existing utility, require moving the alternative itself to avoid a utility, or cause such impacts that an alternative would not be considered feasible.

Each of the Reasonable Alternatives will impact an existing utility in some manner and require necessary relocations, although the magnitude of impacts have not been detailed at this time. However, a preliminary assessment of utility impacts does not appear to be so extensive that they would render an alternative as not feasible. None of the new location Reasonable Alternatives were revised or moved to accommodate an existing utility at this time, but this may be considered for the SCDOT recommended preferred alternative.

3.10.2 How were the interchange locations designated?

The preliminary interchange locations evaluated for the Reasonable Alternatives were taken from the original proposal in the SIB Application. The SIB Application states “It begins from its present terminus at SC 7/US 17, connecting to SC 700 (Maybank Highway), SC 171 (Folly Road), and SC 30 (James Island Expressway). The proposed project crosses the Stono River at two locations.”19 Alternatives A, B and C would include an interchange at U.S. 17, Maybank Highway and Folly Road. Alternatives D and E would include directional spurs (instead of full interchanges) on Johns Island. As parkways, Alternatives F and G include intersections with two connector roads (instead of interchanges) on Johns Island and at-grade intersections on James Island.

3.10.2.1 How were the interchange designs chosen?

A detailed analysis was completed for each of the three interchange locations for the Reasonable Alternatives, see Appendix K: Alternative Development and Analysis Technical Memorandum. It was determined that the interchange at U.S. 17/proposed Mark Clark Expressway would operate effectively through design year 2035 as a Single Point Urban Interchange (SPUI) for all of the new location Reasonable Alternatives, see Figure 3-58.

The interchange at Maybank Highway has four different options, depending on the alternative, type of facility and the location of the crossing of Maybank Highway. The following summarizes these interchange types:

- A proposed partial clover leaf interchange (Alternatives A and C), see Figure 3-57.
- A Single Point Urban Interchange (SPUI) (Alternative B), see Figure 3-58.
- Two spur intersections on Johns Island. The first (Spur A) is a partial interchange with River Road 1 mile

19  Charleston County Application to the South Carolina State Transportation Infrastructure Bank, page 1
northeast of Maybank Highway which continues to a T-intersection at Maybank Highway 0.5 mile west of the Maybank Highway/River Road intersection. The second spur interchange (Spur B) is a partial interchange to River Road which terminates as a T-intersection with River Road 0.7 mile south of the Maybank Highway/River Road intersection (Alternatives D and E).

- Two connector roads on Johns Island. Connector A and Connector B on Johns Island are low-speed, collector facilities with limited control of access (Alternatives F and G).

Depending on the type of facility, two options for the interchange at the proposed Mark Clark Expressway project and Folly Road are included as part of a Reasonable Alternative:

- For an interstate, Alternatives A, B, C, D and E: a Single Point Urban Interchange (SPUI) which connects to the James Island Connector (SC Route 30).
- For the parkway, Alternatives F and G: an at-grade intersection with the James Island Connector at Folly Road.
3.10.3 What other modifications were made to the Reasonable Alternatives to avoid relocations?

All seven of the Reasonable Alternatives were modified along Folly Road to avoid impacting the Colonial Grand at Quarterdeck Apartments. The right of way along Folly Road just north of the James Island Connector was reduced to avoid the relocation of three buildings that housed 44 apartments.

3.11 How were the Reasonable Alternatives evaluated?

A detailed analysis comparing the benefits and environmental impacts associated with each of the seven Reasonable Alternatives is documented in Chapter 5: Existing Conditions and Environmental Consequences. This analysis considered impacts to: cultural resources, community impacts, threatened and endangered species, noise, air quality, wetlands, water quality, floodplains, land use, environmental justice and Section 4(f) resources. The Reasonable Alternatives were reviewed to ensure they still met the needs for the project. In this regard, all of the seven Reasonable Alternatives provided similar traffic benefits including: the ability to reduce congestion on existing roads; the ability to increase safety on existing roads; and the ability to improve regional mobility and system linkage. Next, the Reasonable Alternatives were evaluated based on public input, impacts and benefits that would result from the construction of each of them. These analyses are the basis for SCDOT’s recommendation of a preferred alternative. A complete list of the impacts analyzed and a summary of the results are shown in the Reasonable Alternatives Matrix in Chapter 5.

3.11.1 How would the Reasonable Alternatives meet the needs for the project?

How well do the Reasonable Alternatives meet the need to reduce congestion on existing roads?

The Reasonable Alternatives were evaluated on their “ability to reduce congestion on existing roads” in the study area and in the region. Change in the VMT, VHT and delay within the study area and in the region were used to compare the performance of the Reasonable Alternatives to the No-build Alternative. Table 3.17 summarizes the results of these comparisons based on the projected 2035 traffic volumes. The Updated CHATS Travel Demand Model was employed to determine these user benefits for each alternative.
### Table 3.17

**Ability to reduce congestion on existing roads on a daily basis**
as compared to the No-build Alternative based on 2035 project traffic volumes

<table>
<thead>
<tr>
<th>Criteria</th>
<th>No-build</th>
<th>Alt-A</th>
<th>Alt-B</th>
<th>Alt-C</th>
<th>Alt-D</th>
<th>Alt-E</th>
<th>Alt-F</th>
<th>Alt-G</th>
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<tbody>
<tr>
<td>Project level traffic analysis</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>network VMT (miles less than the No-build)</td>
<td>5,025,367</td>
<td>25,271</td>
<td>163,878</td>
<td>28,912</td>
<td>55,673</td>
<td>55,401</td>
<td>100,887</td>
<td>98,797</td>
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<td>Project level traffic analysis</td>
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<td></td>
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<td></td>
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<tr>
<td>network VHT (hours less than the No-build)</td>
<td>127,420</td>
<td>6,284</td>
<td>9,314</td>
<td>6,976</td>
<td>8,176</td>
<td>7,372</td>
<td>8,866</td>
<td>6,946</td>
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<tr>
<td>Project level traffic analysis</td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>network delay (hours less than the No-build)</td>
<td>23,024</td>
<td>4,294</td>
<td>4,627</td>
<td>4,580</td>
<td>5,550</td>
<td>5,085</td>
<td>5,433</td>
<td>5,020</td>
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<td>Regional VMT (miles less than the No-build)</td>
<td>19,926,162</td>
<td>44,997</td>
<td>53,267</td>
<td>53,743</td>
<td>76,374</td>
<td>76,068</td>
<td>120,820</td>
<td>113,583</td>
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<tr>
<td>Regional VHT (hours less than the No-build)</td>
<td>485,940</td>
<td>6,771</td>
<td>7,396</td>
<td>7,603</td>
<td>8,588</td>
<td>7,842</td>
<td>9,234</td>
<td>8,185</td>
</tr>
<tr>
<td>Regional delay (hours less than the No-build)</td>
<td>63,301</td>
<td>4,387</td>
<td>4,700</td>
<td>4,706</td>
<td>5,562</td>
<td>5,135</td>
<td>5,427</td>
<td>5,795</td>
</tr>
</tbody>
</table>

*Source: Updated CHATS (2003 - 2035) Travel Demand Model*

All of the Reasonable Alternatives reduce the number of miles traveled in the region. However, Alternatives F and G reduce miles traveled by substantially more than the other alternatives. This difference results from the enhancement in regional connectivity. These parkway alternatives have additional access points which provide multiple options for shorter distance trips compared to the other alternatives, which provide access at fewer locations (interchanges/intersections).

**How well do the Reasonable Alternatives meet the need to increase safety on existing roads?**

The Reasonable Alternatives were evaluated on their “ability to increase safety on existing roads.” The study team assessed improvements in segments of roads within the project level traffic analysis network that were identified as having crash rates and/or fatality rates over the statewide average. To evaluate improvements in safety, the study team compared V/C ratios for the road segments in the No-build Alternative with the V/C ratios from the Reasonable Alternatives. Each alternative was given a total score based on the number of segments with improved V/C ratios. The Reasonable Alternatives ranged from 17 to 20 road segments within the project level traffic analysis network with improved V/C ratios, see Table 3.18.
How well do the Reasonable Alternatives meet the need to improve regional mobility?

The Reasonable Alternatives were evaluated on their “ability to improve regional mobility” between the West Ashley, Johns Island and James Island areas of the Charleston region. Average regional trip length was used to compare the performance of the Reasonable Alternatives to the No-build Alternative, see Table 3.19. This considered travel times (minutes) for trips between regions (i.e. trips from West Ashley to James Island), but not trips within each area (i.e. trips within West Ashley).

<table>
<thead>
<tr>
<th>Number of Road Segments Improved</th>
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<tr>
<td>No-build</td>
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<tr>
<td>Alternative</td>
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<tr>
<td>A</td>
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<tr>
<td>---</td>
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<tr>
<td>0</td>
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</table>

Source: Updated CHATS (2003 - 2035) Travel Demand Model

The number of minutes per trip a vehicle can save between the West Ashley area of the Charleston region with any of the Reasonable Alternatives is a forecasted reduction of between 0.6 and 0.7 minutes per trip. This equates to an overall savings of 1,916 to 2,236 hours per day for West Ashley based on year 2035 projections.

The number of minutes per trip a vehicle can save between the Johns Island area of the Charleston region with any of the Reasonable Alternatives is a forecasted reduction of between 4.1 and 5.6 minutes per trip. This equates to an overall savings of 3,156 to 4,310 hours per day for Johns Island based on year 2035 projections.

The number of minutes per trip a vehicle can save between the James Island area of the Charleston region with any of the Reasonable Alternatives is a forecasted reduction of between 0.5 and 1.1 minutes per trip. This equates to an overall savings of 580 to 1,276 hours per day for James Island based on year 2035 projections.
3.12 Descriptions of the Reasonable Alternatives

Each of the Reasonable Alternatives would have different benefits and impacts as a result of construction of the proposed project, which were compared in order for SCDOT to recommend a Preferred Alternative. For detailed information about the potential benefits and impacts of each of the Reasonable Alternatives see Chapter 5.

The No-build Alternative

The No-build Alternative was included in the DEIS as a benchmark against which the impacts of other alternatives can be compared. For information about how the No-build Alternative was used as a baseline for evaluation of the preliminary alternatives analysis, see Section 3.1.1.

Alternative A (formerly Alternative 1)

Alternative A is a total of 8.5 miles in length, with 5.2 miles of bridges including one crossing of the Atlantic Intracoastal Waterway (AIWW).

In West Ashley, Alternative A extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. The proposed interchange at the proposed Mark Clark Expressway and U.S. 17 is a Single Point Urban Interchange (SPUI).

After crossing the Stono River, Alternative A continues south passing between Rushland Plantation and Headquarters Island to a proposed interchange at Maybank Highway on Johns Island, 0.8 mile east of River Road. The proposed interchange at Maybank Highway is a partial clover leaf interchange.

Alternative A then continues south from the Maybank Highway interchange along the eastern edge of the power line easement, crosses the power line easement approximately 0.2 mile from Johnson Scott Road and then continues south for approximately 0.2 mile, where it turns east to cross the Stono River approximately 0.17 mile south of the power line easement.

Once across the Stono River, Alternative A continues south for approximately 0.4 mile then turns to the east traveling 0.07 mile south of the James Island County Park passing through the northern edge of the Dill Sanctuary. Alternative A then follows the James Island Creek north across James Island and continues northeast traveling behind the Regatta Apartments, Carmike James Island Cinema and the U.S. Post Office, where it ties into the existing James Island Connector/Folly Road interchange.

The proposed interchange with the proposed Mark Clark Expressway and Folly Road is a Single Point Urban Interchange (SPUI). The new interchange will carry the new roadway over Folly Road to connect to the existing James Island Connector, which currently terminates at Folly Road. See Figure 3-59.
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**Alternative B (formerly Alternative 8)**

Alternative B is a total of 9.9 miles in length, with 4.8 miles of bridging, including one over the AIWW.

In West Ashley, Alternative B extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. The proposed interchange at the proposed Mark Clark Expressway and U.S. 17 is a Single Point Urban Interchange (SPUI).

Alternative B continues southwest from the Stono River intersecting River Road approximately 0.8 mile north of the River Road/Maybank Highway intersection. Approximately 0.2 mile west of River Road, Alternative B turns south to intersect with Maybank Highway approximately 0.5 mile west of River Road. Alternative B then extends 0.25 mile south of Maybank Highway before curving northeast to cross River Road again approximately 0.7 mile south of the River Road/Maybank Highway intersection. Alternative B then curves east 0.4 mile east of River Road and crosses the Stono River, approximately 0.17 mile south of the power line easement.

The proposed interchange proposed Mark Clark Expressway and Maybank Highway west of River Road for Alternative B is a Single Point Urban Interchange (SPUI) located 0.5 mile west of the Maybank Highway and River Road intersection. The new road would bridge over Maybank Highway and four ramps would connect the interstate to Maybank Highway beneath the mainline.

Once across the Stono River, Alternative B continues south for approximately 0.4 mile then turns to the east traveling 0.07 mile south of the James Island County Park passing through the northern edge of the Dill Sanctuary. Alternative B then follows the James Island Creek north across James Island and continues northeast traveling behind the Regatta Apartments, Carmike James Island Cinema and the U.S. Post Office, where it ties into the existing James Island Connector/Folly Road interchange.

The proposed interchange with I-526 and Folly Road is a Single Point Urban Interchange (SPUI). The new interchange will carry the new roadway over Folly Road to connect to the existing James Island Connector, which currently terminates at Folly Road. See Figure 3-60.
Alternative C (formerly Alternative 10)
Alternative C is a total of 7.4 miles in length, with 4.4 miles on structure, including one crossing of the AIWW.

In West Ashley, Alternative C extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. The proposed interchange at the proposed Mark Clark Expressway and U.S. 17 is a Single Point Urban Interchange (SPUI).

After crossing the Stono River, Alternative C continues south passing between Rushland Plantation and Headquarters Island to a proposed interchange at Maybank Highway on Johns Island, 0.8 mile east of River Road. The interchange at Maybank Highway is a proposed partial clover leaf interchange.

Alternative C continues south from the interchange at Maybank Highway and then turns east to cross the Stono River again about 0.5 mile north of the existing power line easement. Alternative C then passes south of Woodland Shores, Stone Edge and Stono Shores neighborhoods near Ferris and Cyrus Road, approximately 0.09 mile north of the Murray-LaSaine Elementary School and 0.3 mile north of the James Island County Park. After crossing over Riverland Drive and Central Park Road, Alternative C curves to the southeast behind the EME Apartments and continues northeast south of the Regatta Apartments, Carmike James Island Cinema and the U.S. Post Office, tying into the existing James Island Connector/Folly Road interchange.

The proposed interchange with the proposed Mark Clark Expressway and Folly Road is a Single Point Urban Interchange (SPUI). The new interchange will carry the new roadway over Folly Road to connect to the existing James Island Connector, which currently terminates at Folly Road. See Figure 3-61.
FIGURE 3-61
ALTERNATIVE C

Legend
- Freeway/Expressway
- Primary Highway
- State/County Road
- Greenway
- Dill Sanctuary
- James Island County Park
- Refined Study Area
- Citadel Mall
- Alternative C

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Alternative D (formerly Alternative 11)

Alternative D is approximately 7.9 miles in length, with 4.4 miles on structure, including one crossing of the AIWW. Spur A is an additional 2.7 miles in length with 1.3 miles on structure. Spur B is an additional 1.6 miles in length with 0.3 mile on structure.

In West Ashley, Alternative D extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. The proposed interchange at the proposed Mark Clark Expressway and U.S. 17 is a Single Point Urban Interchange (SPUI).

Crossing the Stono River, Alternative D continues south between Rushland Plantation and Headquarters Island and curves southeast 1.2 miles northwest of Maybank Highway and then curves again south 0.4 mile northwest of Maybank Highway on Johns Island, bridges over Maybank Highway 0.85 mile east of River Road. Alternative D turns eastward to cross the Stono River along the existing power line easement.

A full interchange is not planned for Maybank Highway. Instead, Alternative D provides two spur interchanges on Johns Island. The first (Spur A) is a partial interchange with River Road one mile northeast of Maybank Highway which continues to a T-intersection at Maybank Highway 0.5 mile west of the Maybank Highway/River Road intersection. The second spur interchange (Spur B) is a partial interchange to River Road, which terminates as a T-intersection with River Road 0.7 mile south of the Maybank Highway and River Road intersection.

Alternative D continues onto James Island, extending 0.5 mile inside of the northern boundary of the James Island County Park, adjacent to the power line easement. After crossing Riverland Drive, Alternative D passes through the Ellis Creek neighborhood and curves to the northeast, continuing behind the Regatta Apartments, Carmike James Island Cinema and the U.S. Post Office where it ties into the existing James Island Connector/Folly Road interchange. The proposed interchange at the proposed Mark Clark Expressway and Folly Road is a Single Point Urban Interchange (SPUI) which connects to the James Island Connector (SC Route 30). See Figure 3-62.
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FIGURE 3-62
ALTERNATIVE D
Alternative E (formerly Alternative 11A)

Alternative E is approximately 7.9 miles in length, with 4.4 miles on structure, including one crossing of the AIWW. Spur A is an additional 2.7 miles in length with 1.3 miles on structure.

In West Ashley, Alternative E extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. The proposed interchange at the proposed Mark Clark Expressway and U.S. 17 is a Single Point Urban Interchange (SPUI).

Crossing the Stono River, Alternative E continues south between Rushland Plantation and Headquarters Island and curves southeast 1.2 miles northwest of Maybank Highway and then curves again south 0.4 mile northwest of Maybank Highway on Johns Island, bridges over Maybank Highway 0.85 mile east of River Road. Alternative E turns eastward to cross the Stono River along the existing power line easement.

Alternative E provides one partial interchange spur on Johns Island, with a connection to River Road one mile northeast of Maybank Highway. The spur would continue across River Road and terminate at a T-intersection at Maybank Highway, 0.5 mile west of River Road.

Alternative E continues onto James Island, extending 0.5 mile inside of the northern boundary of the James Island County Park, adjacent to the power line easement. After crossing Riverland Drive, Alternative E passes through the Ellis Creek neighborhood and curves to the northeast, continuing behind the Regatta Apartments, Carmike James Island Cinema and the U.S. Post Office where it ties into the existing James Island Connector/Folly Road interchange. The proposed interchange at the proposed Mark Clark Expressway and Folly Road is a Single Point Urban Interchange (SPUI) which connects to the James Island Connector (SC Route 30). See Figure 3-63.
Figure 3-63
ALTERNATIVE E

Legend

- Freeway/Expressway
- Primary Highway
- State/County Road
- Greenway
- Dill Sanctuary
- James Island County Park
- Refined Study Area
- Alternative E
- Citadel Mall

0 0.4 0.8 Miles

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Alternative F (formerly Alternative 36)

Alternative F is a proposed four-lane parkway with a 15-foot wide raised planted median, multi-use path or bicycle lane, curb and a lower mainline design speed of 45 miles per hour. Alternative F is approximately 7.5 miles in length, with an additional 1.6 miles of connector roads, for a total length of 9.1 miles with 5.7 miles on structure including one over the AIWW. Connector A is a total of 0.8 mile in length with 0.5 mile on structure. Connector B is a total of 0.8 mile in length.

In West Ashley, Alternative F extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. The proposed interchange at the proposed Mark Clark Expressway and U.S. 17 is a Single Point Urban Interchange (SPUI).

Crossing the Stono River, Alternative F continues south between Rushland Plantation and Headquarters Island and curves southeast 1.2 miles northwest of Maybank Highway and then curves to the south 0.5 mile northwest of Maybank Highway on Johns Island and crosses Maybank Highway 0.75 mile east of River Road, then follows the power line easement across the remainder of Johns Island. Alternative F introduces tighter highway curvature due to lower speeds than the freeway alternative on the mainline on Johns Island to directly coincide with the power line easement. Alternative F turns eastward to cross the Stono River along the existing power line easement 0.4 mile south of Maybank Highway. Alternative F is grade separated at Maybank Highway with no direct access. Access on Johns Island is provided by two new connector roads identified as Connector A and Connector B.

Connector A and Connector B on Johns Island are low speed collector roads with limited control of access for possible future development and connectivity. Connector A and Connector B form at-grade T-intersections with the mainline parkway 0.8 mile northwest and 0.35 mile southeast of the grade separation with Maybank Highway respectively. Both intersections connect to River Road. Connector A connects to River Road 1.0 mile northwest from the River Road/Maybank Highway intersection just west of the Bend at River Road subdivision. Connector B connects to River Road 0.2 mile southeast of the River Road/Maybank Highway intersection. Intersection improvements include widening the existing right of way on River Road to accommodate additional turn lanes at the Connector A/River Road intersection, the Connector B/River Road intersection and the existing River Road/Maybank Highway intersection.

On James Island, the parkway continues south of the Woodland Shores, Stone Edge and Stono Shores neighborhoods along Lucky Road and intersects Riverland Drive adjacent to Murray-LaSaine Elementary School and approximately 0.25 mile north of the James Island County Park. After crossing Riverland Drive, Alternative F utilizes Central Park Road, which would be widened to four lanes and tie into the James Island Connector at Folly Road with an at-grade intersection. Signalized intersections are proposed at Riverland Drive and Folly Road, while breaks in the raised median to allow non-signalized movements are proposed at Fleming Road, Riley Road, Flint Street, Up on the Hill Road and Yale Drive. An additional point of access through the median is proposed for EME Apartments. Intersection improvements include widening the existing right of way to accommodate additional turn lanes at Riverland Road and Folly Road. See Figure 3-64.
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Legend

- Freeway/Expressway
- Primary Highway
- State/County Road
- Greenway
- Dill Sanctuary
- James Island County Park
- Refined Study Area
- Citadel Mall
- West Ashley
- Stono River (AIWW)
- Dill Sanctuary
- James Island County Park
- Refined Study Area
- Alternative F

FIGURE 3-64
ALTERNATIVE F
**Alternative G**

Alternative G is a proposed four-lane parkway with design speeds of 45 miles per hour (mph) and posted speed of 35 to 45 mph. Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles with 4.5 miles on structure and one crossing of the AIWW. The remaining portions of the parkway will be at ground level, with a 15-foot wide raised planted median. A multi-use path would be included along the entire length of the roadway.

In West Ashley, Alternative G extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. The proposed interchange at the proposed Mark Clark Expressway and U.S. 17 is a Single Point Urban Interchange (SPUI).

Crossing the Stono River, Alternative G continues south between Rushland Plantation and Headquarters Island and curves southeast 1.2 miles northwest of Maybank Highway. The road then curves to the south 0.5 mile northwest of Maybank Highway on Johns Island and crosses Maybank Highway 0.75 mile east of River Road; it then follows the power line easement across the remainder of Johns Island. Alternative G turns eastward to cross the Stono River adjacent to the existing power line easement 0.7 mile south of Maybank Highway. Alternative G will bridge over Maybank Highway with no direct access.

Access to Johns Island is provided by two roads, identified as Connector A and Connector B. These roads are low-speed facilities with limited control of access, which would allow for connectivity to future roads. Connector A and Connector B connect to the parkway at T-intersections to the north and south of Maybank Highway. Connector A then connects to River Road 1.0 mile northwest from the River Road/Maybank Highway intersection just west of the Bend at River Road subdivision. Connector B connects to River Road 0.2 mile southeast of the River Road/Maybank Highway intersection. Intersection improvements would include the addition of turn lanes at the Connector A/River Road intersection, the Connector B/River Road intersection and the existing River Road/Maybank Highway intersection.

On James Island, Alternative G continues east within the northern property line of the James Island County Park and then curves slightly to the south to avoid the park administration building. Alternative G then provides connections to the local road network at Riverland Drive, Riley Road and Up on the Hill Road. Alternative G would continue northeast to intersect with Folly Road at the James Island Connector. Intersection improvements include widening the existing right of way on Folly Road to accommodate additional turn lanes. See Figure 3-65.
Table 3.20 shows a comparison of the Reasonable Alternatives; Part 1 in regards to meeting the need and purpose. Part 2 of the comparison of reasonable alternatives is shown in Chapter 5. Figure 3-66 shows a comparison of the Reasonable Alternatives.

<table>
<thead>
<tr>
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<td>Need and Purpose</td>
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<td>Ability to reduce congestion on existing roads</td>
<td>Yes/No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>25,271</td>
<td>163,878</td>
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<td>17</td>
<td>20</td>
<td>20</td>
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<td>Yes/No</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>and system linkage</td>
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<td>West Ashley Trip Reduction</td>
<td>Average Trip length</td>
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<td>5.6</td>
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<td>James Island Trip Reduction</td>
<td>Average Trip length</td>
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* No-build totals against which reasonable alternatives are measured in difference
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Legend

Freeway/Expressway
Primary Highway
State/County Road
Greenway
Citadel Mall
Dill Sanctuary
James Island County Park
Refined Study Area
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Alternative G

NOTE: To see individual maps of each alternative, please see section 3.2

FIGURE 3-66
THE REASONABLE ALTERNATIVES