Chapter 3. Development of Alternatives

This chapter explains how alternatives were developed and evaluated for the Mark Clark Expressway project. It describes the range of alternatives, including those that became “Reasonable Alternatives” and those “other alternatives” that were eliminated from detailed study (23 CFR 771.123(c)).

This process began as the study team developed 17 alternatives for the proposed project. These alternatives were taken to the public for comment and review. An additional 19 alternatives were included in the range of alternatives to be evaluated based on public input. The project team developed criteria to determine how the range of alternatives met the goals of the project. The range of alternatives also included the No-build Alternative, transportation systems management and mass transit, for a total of 39 alternatives which were evaluated through the preliminary alternatives analysis. The range of alternatives were named Alternative 1, Alternative 2, et cetera through Alternative 39. The preliminary alternatives analysis revealed six Reasonable Alternatives and three additional alternatives (No-build Alternative, transportation systems management [TSM] and mass transit) to be evaluated in this Draft Environmental Impact Statement (DEIS). Once the Reasonable Alternatives were identified, they were renamed Alternative A, Alternative B, et cetera through Alternative F. As the project progressed, a seventh Reasonable Alternative was developed by the project team in response to public comments. Alternative G is a hybrid of two of the Reasonable Alternatives identified through the preliminary alternatives analysis.

3.1 Preliminary alternatives

3.1.1 What are the conditions of the No-build Alternative?

The No-build Alternative consists of the anticipated roadway network and forecast land use in 2035 without the completion of a build alternative. The No-build Alternative establishes a baseline of traffic, environmental and human conditions to which the build alternatives can be compared. This includes existing and committed (E+C) roadway projects and anticipated land developments provided by the Berkeley Charleston Dorchester Council of Governments (BCDCOG) region. A comprehensive review of year 2035 committed roadway projects was performed by including transportation projects from:

- Charleston Area Transportation Study (CHATS) Long Range Transportation Plan (LRTP);
- BCDCOG Transportation Improvement Program (TIP);
- State Transportation Improvement Plan (STIP);

“E+C roadway network” is defined as the roadway system that exists in the project base year (2003) as well as projects that are committed through planning, funding and programming.

1 FHWA http://www.fhwa.dot.gov/legsregs/directives/techadvst664008a.htm
• Charleston County RoadWise sales tax program;
• Dorchester County Sales Tax program; and
• City of Charleston development plans.

Figure 3-1 shows the existing plus committed projects. The E+C roadway project names and descriptions are listed in Table 3.1.

“No-build” Land Use Data
The study team reviewed socioeconomic data, including household, population and employment data, to determine historical trends and baseline conditions, which were then used to make projections for the BCD region through 2035.

The following studies were reviewed to identify local development trends, land use characteristics and planned improvements:

• Draft - Community Impact Analysis: Estimates the level of growth and development on Johns Island with and without I-526 extension (Charleston County);
• Johns Island Community Plan (City of Charleston);
• Maybank Highway Traffic Study (Charleston County RoadWise);
• James Island/Folly Road interchange (Charleston County RoadWise);
• Cross Island Parkway traffic study (Charleston County RoadWise);
• Bees Ferry Traffic Study (Charleston County RoadWise);
• Glenn McConnell at I-526 Traffic Study (SCDOT);
• Long Savannah Traffic Impact Statement (Developer – presented to the City of Charleston); and
• I-26 Relocation Study (BCDCOG).

Based on these studies and consultation with local planning departments, land use forecasts were developed and used to update the CHATS Travel Demand Model in 2008.

3.1.2 What is the study area for the proposed project?

The project team has conducted ongoing reassessment and modification of the area of study for the Mark Clark Expressway project in order to provide the most effective level of analysis for the appropriate stage of the project development process.

At the beginning of the project, the “scoping area” was established, within which the project team developed a broad range of preliminary alternatives that could potentially improve traffic conditions in the region. The scoping area encompassed the areas west of downtown Charleston, the Charleston peninsula and areas along I-526 from West Ashley to I-26.

As the project progressed and the needs for the project for traffic improvements were further focused on the Johns Island, James Island and West Ashley areas, the area of study was reduced to ensure that the study team could empha-
<table>
<thead>
<tr>
<th>Project name</th>
<th>Location</th>
<th>Project Description</th>
<th>Stat.U.S.</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacon's Bridge Road</td>
<td>From existing 4-lane to Ashley River</td>
<td>Widen from 3 lanes (TWLTL)</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>Berlin Myers – North Extension</td>
<td>Maple St to Berlin Myers Pkwy</td>
<td>New 2-lane</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>Bowman Road</td>
<td>Mathis Ferry Rd to Rifle Range Rd</td>
<td>Widen from 2 to 4 lanes; improve intersections</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>College Park Road</td>
<td>Crowfield Blvd to U.S. 17A</td>
<td>Widen from 2 to 4 lanes</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>Dorchester Road</td>
<td>Trolley Rd to Ashley Phosphate</td>
<td>Widen from 4 to 6 lanes</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>N. Rhett Extension (Alt 1)</td>
<td>Liberty Hall Rd to Goose Creek Blvd</td>
<td>New 2-lane with median</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>Old Orangeburg Road</td>
<td>Dorchester Rd to Mallard Rd</td>
<td>Widen from 2 to 4 lanes</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>SC 41</td>
<td>U.S. 17 to Dunes West Pkwy</td>
<td>Widen to 5 lanes (TWLTL)</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>SC 41</td>
<td>Dunes West Pkwy to Berkeley Co Line</td>
<td>Widen to 3 lanes (TWLTL)</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>U.S. 17 N</td>
<td>I-26 to U.S. 17 E (State Rd)</td>
<td>Widen to 4 lanes with TWLTL</td>
<td>Existing</td>
<td>STIP</td>
</tr>
<tr>
<td>Virginia Avenue</td>
<td>U.S. 52 (Rivers Ave) to I-26</td>
<td>Widen to 4 lanes with TWLTL</td>
<td>Existing</td>
<td>STIP</td>
</tr>
<tr>
<td>Ladson Road</td>
<td>U.S. 78 to Dorchester Rd</td>
<td>Widen to 4 lanes with TWLTL</td>
<td>Existing STIP</td>
<td>LRTP</td>
</tr>
<tr>
<td>N. Rhett Extension (Alt 2)</td>
<td>Red Bank to Goose Creek Blvd</td>
<td>New 2 lane with median (landscaped)</td>
<td>Existing STIP</td>
<td>LRTP</td>
</tr>
<tr>
<td>Ashley Phosphate Rd</td>
<td>U.S. 52 (Rivers Ave) to Dorchester Rd</td>
<td>Widen to 7 lanes (TWLTL)</td>
<td>Existing</td>
<td>STIP/LRTP</td>
</tr>
<tr>
<td>Berlin Myers Parkway – Last Phase III</td>
<td>Bacon's Bridge (SC 165) to U.S. 17A</td>
<td>New 4-lane divided</td>
<td>Committed</td>
<td>STIP/LRTP</td>
</tr>
<tr>
<td>U.S. 17</td>
<td>I-526 to Isle of Palms Connector</td>
<td>Widen from 5 to 7 lanes (TWLTL)</td>
<td>Existing</td>
<td>STIP/LRTP</td>
</tr>
<tr>
<td>U.S. 78</td>
<td>Jedburg Rd to 0.75 miles S. of Berlin Myers</td>
<td>Widen to 4/5 w/median; widening removed from bonding package</td>
<td>Committed</td>
<td>STIP/LRTP</td>
</tr>
<tr>
<td>Bacon's Bridge Rd (SC 165)</td>
<td>Trolley Rd to U.S. 17A</td>
<td>Widen from 2 to 4 lanes with TWLTL</td>
<td>Committed</td>
<td>TIP</td>
</tr>
<tr>
<td>Bees Ferry Rd</td>
<td>Glenn McConnell Rd to Ashley River Rd (SC 61)</td>
<td>Widen from 2 to 5 lanes (TWLTL)</td>
<td>Committed</td>
<td>LRTP</td>
</tr>
<tr>
<td>Bees Ferry Rd</td>
<td>U.S. 17 S to Glenn McConnell Rd</td>
<td>Widen from 2 to 4 lanes</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>Dorchester Rd (SC 642)</td>
<td>Trolley Rd to U.S. 17 A</td>
<td>Widen from 2 to 4 lanes w/median</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>Dorchester Rd (SC 642)</td>
<td>Trolley Rd to U.S. 17 A</td>
<td>Widen from 2 to 4 lanes w/median</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>Harborside Road</td>
<td>James Island Connector to Fort Johnson Rd</td>
<td>Improved 2-lane / Add turn lanes</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>I-26 Port Access Road</td>
<td>I-26 to New Port Terminal</td>
<td>New Limited Access Road</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>Johnnie Dodds Blvd</td>
<td>Cooper River Bridge to I-526</td>
<td>Widen from 4 to 6 lanes; improve intersections; interchange at Bowman Rd</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>Maybank Hwy (SC 700)</td>
<td>Bohicket Rd to E. of Stono River</td>
<td>Widen from 2 to 5 lanes</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>I-26 Widening, Intersection Improvements</td>
<td>I-526 to Ashley Phosphate Rd</td>
<td>Widen from 6 to 8 lanes (4 lanes each way)</td>
<td>Committed</td>
<td>TIP / LRTP</td>
</tr>
<tr>
<td>Isle of Palms Connector</td>
<td>U.S. 17 N to Rifle Range Rd</td>
<td>Widen from 2 to 4 lanes, undivided</td>
<td>Committed</td>
<td>Town of Mt. Pleasant</td>
</tr>
<tr>
<td>Hungry Neck Blvd (Phase 1)</td>
<td>IOP Connector to U.S. 17 N @ I-526</td>
<td>New 4-lane with a TWLTL</td>
<td>Committed</td>
<td>Town of Mt. Pleasant</td>
</tr>
<tr>
<td>Hungry Neck Blvd (Phase 2)</td>
<td>Bowman Road to Hungry Neck Blvd</td>
<td>New 2-lane with a TWLTL</td>
<td>Committed</td>
<td>Town of Mt. Pleasant</td>
</tr>
<tr>
<td>Hungry Neck Blvd (Phase 3)</td>
<td>IOP Connector to Six Mile Road</td>
<td>New 4-lane with a TWLTL</td>
<td>Committed</td>
<td>Town of Mt. Pleasant</td>
</tr>
<tr>
<td>Palmetto Commerce Parkway</td>
<td>Ladson Rd to Ashley Phosphate</td>
<td>New 2-lane collector</td>
<td>Committed</td>
<td>Charleston County Roadway</td>
</tr>
<tr>
<td>Future Drive</td>
<td>Palmetto Commerce Plgw to U.S. 78</td>
<td>New 4-lane, divided</td>
<td>Existing</td>
<td>Charleston County Roadway</td>
</tr>
<tr>
<td>Northside Drive</td>
<td>Future Drive to Ashley Phosphate Rd</td>
<td>New 2-lane collector</td>
<td>Committed</td>
<td>Charleston County Roadway</td>
</tr>
<tr>
<td>Bee Street</td>
<td>Courtenay Drive to Lockwood Drive</td>
<td>Widen to 4 lanes, divided</td>
<td>Existing</td>
<td>Charleston County Roadway</td>
</tr>
<tr>
<td>Courtney Drive</td>
<td>Spring Street to Bee Street</td>
<td>Widen to 3 lanes, undivided</td>
<td>Committed</td>
<td>Charleston County Roadway</td>
</tr>
<tr>
<td>Glenn McConnell</td>
<td>Orleans Rd to Charlie Hall Road</td>
<td>New 2-lane / 4 lane collector</td>
<td>Existing</td>
<td>Charleston County Roadway</td>
</tr>
<tr>
<td>West Ashley Circle</td>
<td>Glenn McConnell/Bees Ferry /Long Savannah Connector</td>
<td>New 2-lane / 4 lane collector</td>
<td>Existing</td>
<td>Charleston County Roadway</td>
</tr>
<tr>
<td>Long Savannah Connector</td>
<td>West Ashley Circle to Long Savannah Development</td>
<td>New 2-lane collector</td>
<td>Existing</td>
<td>City of Charleston</td>
</tr>
<tr>
<td>Westbridge Road Extension</td>
<td>Existing road to new Long Savannah Connector</td>
<td>New 2-lane local</td>
<td>Existing</td>
<td>City of Charleston</td>
</tr>
<tr>
<td>Sanders Road</td>
<td>Existing road to new Carolina Bay Drive</td>
<td>New 2-lane local</td>
<td>Existing</td>
<td>City of Charleston</td>
</tr>
<tr>
<td>Carolina Bay</td>
<td>Savannah Hwy to Sanders Rd / Wildcat</td>
<td>New 2-lane local</td>
<td>Existing</td>
<td>City of Charleston</td>
</tr>
<tr>
<td>Wildcat Way Blvd</td>
<td>Existing road to new Carolina Bay Drive</td>
<td>New 2-lane local</td>
<td>Existing</td>
<td>City of Charleston</td>
</tr>
<tr>
<td>Boltons Landing / Blue Water Way</td>
<td>Bees Ferry Rd to Savannah Hwy</td>
<td>New 2-lane local</td>
<td>Existing</td>
<td>City of Charleston</td>
</tr>
</tbody>
</table>

Definitions:

**TWLTL** – Two Way Left Turn Lane

**SPAWT** – State Ports Authority Wando Terminal
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Development of Alternatives

FIGURE 3-1
E + C NETWORK
size these areas in the project development process. The “scoping area” was condensed to a smaller “study area”. The study area encompasses the majority of the existing roadway network in West Ashley, Johns Island and James Island that may be affected by the proposed Mark Clark Expressway project. See Figure 3-2 to see the study area as compared to the scoping area.

Once the alternatives which best met the needs for the project were identified, the Reasonable Alternatives, the area of study was again evaluated to ensure the most effective level of analysis. The “refined study area” is an area focused on the footprint of the alternatives and the area immediately adjacent to them. Although the refined study area is not introduced in in Chapter 3, it will be discussed in Chapter 5, where the impacts of the Reasonable Alternatives are evaluated.

**3.1.3 What criteria were used to develop the preliminary alternatives?**

In conjunction with the Federal Highway Administration (FHWA), U.S. Army Corps of Engineers (USACE) and Charleston County, the study team developed guidelines for the engineering design criteria to be used for developing the alternatives for the proposed Mark Clark Expressway project. This chapter of the DEIS is a summary of Appendix K: Alternative Development and Analysis Technical Memorandum. For the purpose of developing the preliminary alternatives, it was assumed that a new location alternative would be a four-lane divided, controlled-access interstate (Urban Principal Arterial – Freeway). This assumption was confirmed through traffic forecasts and modeling. The South Carolina Highway Design Manual (2003) and the American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets “Green Book” (2001) were used to establish engineering design criteria that complies with state and federal guidelines for vehicle safety and mobility.

Numerous state, federal and local agencies were contacted and asked to provide their Geographic Information System (GIS) data to the study team (Table 3.2). In addition to the 2006 aerial photography provided by the South Carolina Department of Natural Resources (SCDNR), aerial photography was obtained in the Spring of 2008 for the proposed Mark Clark Expressway study area, see Figure 3-2. This photography, along with the GIS data, served as the base data for the alternatives development.
<table>
<thead>
<tr>
<th>Agencies Contacted to Acquire GIS Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National</strong></td>
</tr>
<tr>
<td>Federal Emergency Management Agency</td>
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<tr>
<td>Federal Highway Administration</td>
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<td>U.S. Army Corps of Engineers</td>
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<td>National Park Service</td>
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<td>U.S. Census Bureau</td>
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<tr>
<td>U.S. Environmental Protection Agency</td>
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<tr>
<td>U.S. Geological Survey</td>
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<td><strong>State</strong></td>
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<td>S.C. Department of Archives and History</td>
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<td>S.C. Department of Commerce</td>
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<tr>
<td>S.C. Department of Health and Environmental Control – Bureau of Air Quality</td>
</tr>
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<td>S.C. Department of Health and Environmental Control – Bureau of Land and Waste Management</td>
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<tr>
<td>S.C. Department of Health and Environmental Control – Bureau of Water</td>
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<td>S.C. Department of Natural Resources</td>
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<td>S.C. Institute of Archaeology &amp; Anthropology</td>
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<tr>
<td>S.C. Natural Resources Conservation Service</td>
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<tr>
<td>S.C. Office of Research and Statistics</td>
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<tr>
<td><strong>County</strong></td>
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<tr>
<td>Berkeley Charleston Dorchester Council of Governments</td>
</tr>
<tr>
<td>Charleston County</td>
</tr>
<tr>
<td><strong>City</strong></td>
</tr>
<tr>
<td>City of Charleston</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>University of South Carolina - Columbia</td>
</tr>
</tbody>
</table>

The following three criteria were established for use in developing the initial new location alternatives:

1. **Avoid key areas within the study area**

Some features within the study area were identified as areas to avoid to the greatest extent possible when developing the new location alignments. Generally, this was because of the unique or sensitive nature of a feature or site. However,
because of the number of important features and sites within the study area, it was impossible to avoid all key areas, while adhering to the preliminary design criteria. The following features were considered in developing the preliminary alignments:

- Mitigation Banks and Sites;
- Bay/Estuary as identified on the National Wetlands Inventory (NWI) Mapping;
- Salt Marsh as identified on the NWI Mapping;
- Forested and non-forested Wetland as identified on the NWI Mapping;
- Open Water as identified on the NWI Mapping;
- Floodplains;
- Earthworks (Civil War earthen fortifications);
- National Register Sites;
- Historic Resources – Architectural (eligible and potentially eligible);
- Archaeological Sites;
- Parks;
- Charleston Municipal Golf Course; and
- Protected Lands (Federal, state, county and private conservation easements, including Dill Sanctuary).

2. Utilize areas with limited or no development to the greatest extent possible (as identified by the aerial photography and Charleston County tax maps)

The aerial mapping was reviewed and areas of upland that appeared undeveloped or vacant were explored first as possible routes for a new alignment. In certain cases, it was not possible to utilize undeveloped areas exclusively, and it became necessary to route the alignment through developed properties. Where it became necessary to route an alternative through a developed area, the alternative was located in such a way to minimize the impact to the development. Using the Charleston County tax maps, efforts were made to maintain the new alignments within a single parcel rather than crossing between two parcels, thus impacting fewer land owners.

3. Identify optimum location to cross the Stono River

It is generally ideal to cross a navigable waterway with a proposed bridge structure as close to perpendicular to the channel as possible. This increases the acute angle of the alignment, or structure, relative to the channel, which in turn maximizes spacing between piers for ship navigation and minimizes structure length, which in turn minimizes the cost of the structure. Alignments were developed to optimize near perpendicular crossings of the Stono River, taking into account channel width and direction. The overall crossing length of the associated Stono River marsh boundary was also considered and attempts were made to minimize this impact in conjunction with the channel crossing.

3.1.4 How was the public engaged in the development of alternatives?

Public involvement has been an integral part of the development of alternatives. The public had opportunities to comment on the project through the following methods: scoping and information meetings, stakeholder meetings, the Mark Clark Expressway project website and a telephone hotline.

A Stakeholders Group was organized as a forum for public interest groups, neighborhood association representatives, community leaders and local representatives (to see the list of project stakeholders, see Appendix J, Agency Coordina-
tion and Public Involvement Plan). The Stakeholders were engaged through a series of meetings to receive information about the project and provide feedback to the study team. For more information about stakeholder involvement, see Chapter 4, Public Involvement and Agency Coordination.

The project website, http://www.scdot.org/i526, was developed and updated periodically throughout the project with new information about the project, meeting dates, times and locations. All meeting materials and handouts were made available on the website for viewing or download. The website also allowed the public to submit comments concerning the project. The toll-free telephone hotline, 1-888-MCE-1526, was established to provide project information for citizens without internet access. The hotline also allowed for members of the public to submit comments about the proposed project via voice mail.

Comments and recommendations gathered from the various public involvement activities were reviewed and taken into consideration while developing the alternatives. Please refer to Chapter 4 for more information on the public involvement process.

**3.1.4.1 How were public comments collected to help the study team develop the preliminary alternatives?**

At the initiation of the proposed project, a Public Scoping Meeting was held April 10, 2008 at Murray-LaSaine Elementary School. Residents provided input on the needs for the proposed project and the concerns of the surrounding communities. Attendees were encouraged to either locate their areas of concern on aerial map displays or detail them on flip charts. For more information see Chapter 4.

Comments and areas of concern provided by the public at the scoping meeting were taken into consideration while developing the preliminary alternatives. The most frequently mentioned issues from the public scoping meeting included:

- consider other alternatives or other modes of transportation;
- concern for over development of rural spaces;
3.1.5 What are the preliminary alternatives?

Using the three criteria, input from the public scoping meeting and in light of the need and purpose, the study team developed thirteen new location build alternatives. The four alternatives that were presented in the 1995 Draft Supplemental Environmental Impact Statement (DSEIS) for the portion of the Mark Clark Expressway project that this DEIS is evaluating were also included as preliminary alternatives. In total, 17 alternatives were designated as the preliminary build alternatives (see Figures 3-3 through 3-19). In addition to the No-build Alternative other options such as mass transit and transportation systems management (TSM), were identified to be further evaluated.

3.2 The Range of Alternatives

3.2.1 How was the public involved?

In addition to the 13 alternatives developed by the study team, four alternatives from the 1995 DSEIS were also included as preliminary alternatives. A total of 20 preliminary alternatives were presented to the public including:

- the No-build Alternative;
- mass transit;
- transportation systems management (TSM); and
- the 17 new location preliminary alternatives.

These alternatives were presented to the public in a series of three Public Information Meetings and one Stakeholders’ Meeting in November and December of 2008. Following the meetings, the public comment period was open for 60 days. With respect to the development of alternatives, the goal for these meetings was to collect input, comments and suggestions regarding the preliminary 20 alternatives presented and additional alternatives to be considered.
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Development of Alternatives

FIGURE 3-3
ALTERNATIVE 1

FIGURE 3-4
ALTERNATIVE 2

FIGURE 3-5
ALTERNATIVE 3

FIGURE 3-6
ALTERNATIVE 4

Legend
- Freeway/Expressway
- Dill Sanctuary
- Primary Highway
- State/County Road
- James Island County Park
- Citadel Mall

Distance:
0 0.9 1.8 Miles
Comments expressed:
- concern about impacts to neighborhoods and relocations;
- concern about impacts to marshes/wetlands;
- support for “New Way to Work” as an alternative;
- support for improving existing roads instead of completing the Mark Clark Expressway;
- support for mass transit either as a stand-alone alternative or in combination with a build alternative; and
- concerns about impacts to the James Island County Park and Dill Sanctuary.

Based on comments received from the public, agencies and project stakeholders during the comment period following the meetings, an additional 19 alternatives were developed. In total, the range of alternatives included 39 alternatives, including the No-build Alternative, which were then evaluated to determine whether or not they would meet the needs of the project.
Alternatives 18 and 19 were suggested by project stakeholders. Alternatives 20-23 and Alternative 36 were developed by the study team based on suggestions from the public. Alternatives 20-23 include four different scenarios of improving existing roads without construction of a new location alignment. Alternatives 16, 17, 24-35 were suggested through public comments and are described in detail in the following sections. A complete list of the range of alternatives is shown in Table 3.3. Stakeholder and public comments that suggested additional alternatives to be evaluated are included in the Appendix K, Alternative Development and Analysis Technical Memorandum.

### 3.2.2 How was the range of alternatives defined?

In addition to the new location design criteria listed in Section 3.1.3, design criteria also had to be established for the alternatives that were not categorized as “new location” alternatives. In order to evaluate the alternatives at a comparable and equal level of detail, design criteria were established for the following three categories of alternatives:

- Alternative 18 and 36: parkway concept;
- Alternative 19: grid network; and
- Alternatives 20-23: improving existing roads.

#### The Parkway Concept (Alternatives 18 and 36)

The City of Charleston submitted a proposal for a new location build alternative for the proposed Mark Clark Expressway project during the public comment period. This proposal included a parkway concept (Alternative 18) that would have at-grade intersections instead of interchanges and lower speeds (generally 45 mph, instead of 55 mph). The proposal suggested that with the use of intersections and lower design speeds, less right of way would be required for the project. The route for this parkway would be similar to the Preferred Alternative from the 1995 DSEIS, but would avoid the James Island County Park. Instead, the city’s parkway concept proposed improvements to existing Central Park Road with signalized intersections at Folly Road and Riverland Drive on James Island. In addition, the city’s parkway concept would have a signalized intersection at Maybank Highway on Johns Island. The city’s parkway concept could also provide the opportunity for intersections with other roads in the future, as warranted.

Based on input from the City of Charleston, the study team developed the alignment and right of way widths for preliminary analysis. The existing road, amount of traffic and posted speed limits were considered when planning improvements to Central Park Road. Based on traffic projections, the alternative would require adding an additional travel lane in each direction. This typical section was used to determine the new right of way that would be required. In addition to Alternative 18, the study team developed a variation of the city’s parkway proposal, which became Alternative 36.

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**For the purpose of this project, the “parkway concept” is a roadway facility where the design speeds are lower than the interstate facility. This allows the introduction of roadside amenities such as curbs, trees, bicycle facilities, sidewalks and pedestrian lighting.**


**Speed - distance traveled by a vehicle over a specified time. Expressed in Miles-per-Hour (MPH) for U.S. highway applications.**
**Alternative 18** is proposed to be a parkway with low posted speeds ranging from 35-45 miles per hour. Alternative 18 extends southward from the existing interchange at I-526/U.S. 17, passing between the Oakland, Stone Creek, and Battery Haig neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. Crossing the Stono River, Alternative 18 continues south between Rushland Plantation and Headquarters Island on its way to Johns Island and curves southeast at Maybank Highway on Johns Island, east of River Road. Alternative 18 turns eastward to cross the Stono River north of the existing power line easement. On James Island, the parkway continues south along Lucky Road directly adjacent to Murray-LaSaine Elementary School, north of the James Island County Park. After crossing Riverland Drive, Alternative 18 would utilize Central Park Road, which would be widened to four lanes and tie into the James Island Connector at Folly Road. Various access points will be provided along Central Park Road at signalized intersections. Additional points of access for future connections will be identified as the project progresses. This alternative would provide bicycle and pedestrian facilities. See Figure 3-20.

**Alternative 36** (Figure 3-21) is proposed to be a parkway with low posted speeds, ranging from 35-45 miles per hour. Alternative 36 extends southward from the existing interchange at I-526/U.S. 17, passing through Oakland, Stone Creek and Battery Haig neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. Crossing the Stono River, Alternative 36 continues south between Rushland Plantation and Headquarters Island, crossing the Stono River parallel to the existing power line easement. On Johns Island, this alternative provides two connector roads - Connector A would be a partial interchange located at Maybank Highway just south of Rushland Landing Drive. Connector B would be an at-grade intersection connecting to River Road south of Maybank Highway. On James Island, the parkway continues along Lucky Road, adjacent to Murray-LaSaine Elementary School.
School. After crossing Riverland Drive, Alternative 36 would utilize Central Park Road, which would be widened to four lanes and tie into the James Island Connector at Folly Road. Various access points would be provided along Central Park Road at signalized intersections. This alternative would provide bicycle and pedestrian facilities. Alternative 36 was developed from the alignment of Alternative 18, with the addition of the two connector roads on Johns Island. See Figure 3-21.

**Grid Network /“New Way to Work” (Alternative 19)**

The South Carolina Coastal Conservation League (SCCCL) submitted a proposal, “New Way to Work,” as an alternative to the extension of the proposed Mark Clark Expressway project during the public comment period. The “New Way to Work” proposal included various local road networks to be constructed in order to provide increased connectivity between existing principal arterials or collector streets in the West Ashley, Johns Island and James Island study area. For the purposes of this project, the “New Way to Work” proposal will be referred to as a grid network from this point on.

In January 2009 the study team received the “A New Way to Work: Implementation Analysis - January 2009”, which included a detailed alternative proposal. The proposal presented new construction improvements in the form of a grid of connecting roadways at several specific locations within West Ashley, Johns Island and James Island along with detailed typical sections and right of way widths for the types of roadways to be used. The proposal was assessed based on current SCDOT and Federal roadway design guidelines. Each road in the proposal was “matched” to a roadway facility classification, defined by SCDOT Highway Design Manual (2003) and the AASHTO “Green Book” (2001). These classifications were used to define minimum criteria for design features such as design speed, travel lane widths, auxiliary lane use, bike facilities and minimum sidewalk widths. In cases where the proposed roadway did not meet the minimum design criteria, the study team revised the design to meet SCDOT and Federal standards. For clarification, these revisions were then discussed with the SCCCL stakeholders. See Appendix K: Alternative Development and Analysis Technical Memorandum for the road category and right of way designation used for Alternative 19. See Figure 3-22.

**Alternative 19.** would include operational improvements to a series of roads in the James Island, Johns Island and West Ashley areas. The proposal includes a network of local streets in the following areas: Harborview Road, Folly Road and the James Island Connector, allowing additional access to the connector on James Island; Maybank Highway, River Road and Maybank...
Highway on Johns Island; along U.S. 17 and at the I-526/U.S. 17 interchange in West Ashley. This alternative would provide bicycle and pedestrian facilities. For more information about the A New Way to Work Alternative, please see Appendix K: Alternative Development and Analysis Technical Memorandum.

**Improve existing roads (Alternatives 20 - 23)**

The Updated CHATS Travel Demand Model was used to identify roads that would operate at an unacceptable level of service (LOS) in the year 2035. For these roads, it was assumed that the capacity of the facility or roadway could be improved by constructing an additional lane in each direction. For more information about 2035 LOS, see Chapter 2. The features of each existing roadway were investigated including the number of travel lanes, the presence of turning lanes and medians (flush, raised or depressed), the presence of curb or sidewalks and the existing right of way widths. Based on typical section, use, and posted speed limit, new typical sections were created by adding a single travel lane in each direction and the right of way width required to construct the new typical section was defined. See Appendix K: Alternative Development and Analysis Technical Memorandum for typical sections established to develop the four improve existing roads alternatives.

**What roads were included in the four improve existing roads alternatives?**

“Fix our roads first” was frequently expressed by the public during the scoping phase of this project. Acknowledging that it can be both fiscally responsible and potentially less disruptive to communities and the physical environment to “improve” existing roadways, the study team developed four alternatives that could satisfy the goals of the proposed Mark Clark Expressway project.

Steps were taken to develop four alternatives to evaluate improving existing roads as an alternative for the proposed Mark Clark Expressway project. The first was to identify roads within the study area having a failing LOS (LOS E or F) forecasted from the Updated CHATS Travel Demand Model. Second, subsets of the list of roads with LOS E or F were created to more precisely evaluate the needs for improvements serving the purpose of connecting the James Island, Johns Island and West Ashley subareas of the Charleston area. Once the roads that would operate at LOS E or F were identified, typical sections were developed, and four alternatives were created by identifying roads most frequently used by drivers to travel between different districts of the study area.

**Level of service (LOS) is a term that reflects the ability of a roadway to accommodate traffic, which uses the letters A through F to reflect traffic conditions and maneuverability. The America Association of State Highway Transportation Officials’ (AASHTO’s) Geometric Design of Highways and Streets defines LOS A as free-flow and LOS F as forced or breakdown flow.**
Alternative 20: James Island to West Ashley
The roads identified as principal connections between James Island and West Ashley were selected using the above methodology. Portions of U.S. 17, Folly Road, Maybank Highway, and portions of Main Road were all modeled with a single additional travel lane in each direction to evaluate impacts on regional traffic, as well as environmental impacts for the additional right of way and construction. See Figure 3-23.

Alternative 21: West Ashley to Downtown Charleston
Carrying traffic between West Ashley and the central business district of Charleston, portions of U.S. 17, Ashley River Road, St. Andrews Boulevard, Main Road (from Bees Ferry Road to U.S. 17), Glenn McConnell Parkway and Bees Ferry Road were selected based on their failing level of service. These were modeled with one additional travel lane in each direction to evaluate impacts on regional traffic, as well as environmental impacts for the additional right of way and construction. See Figure 3-24.
Alternative 22: West Ashley to North Charleston
Corridors in the West Ashley and North Charleston districts of the study area are forecasted to see an increase in
development and to continue carrying heavy traffic volumes. This resulted in the study team selecting corridors within
these portions of the study area for inclusion in this improve existing roads alternative. This selection also took into
account the current performance of the existing segments of the I-526/Mark Clark Expressway in West Ashley. This
pairing of origins and destinations, combined with the list of failing roadway facilities, resulted in this alternative
evaluating the improvements of portions of U.S. 17, Ashley River Road, St. Andrews Boulevard, Sam Rittenberg Bou-
levar, Old Towne Road, Main Road, Glenn McConnell Parkway, Bees Ferry Road, existing Mark Clark Expressway
and existing I-26. These were modeled with one additional travel lane in each direction to evaluate impacts on regional
traffic, as well as environmental impacts for the additional right of way and construction. See Figure 3-25.

Alternative 23: James, Johns Islands & West Ashley to North Charleston
Again, recognizing a forecasted increase in development is expected on Johns Island and seeing the near build out
conditions of James Island, coupled with the increase in commercial development in the North Charleston portion of
the study area, the study team identified this heavy traffic flow for inclusion in this improve existing roads alternative.
This list of roads includes portions of U.S. 17, St. Andrews Boulevard, Main Road, Sam Rittenberg Boulevard, Folly
Road, Camp Road, Riverland Drive, Central Park Road, Maybank Highway, River Road, Bohicket Road, existing
I-26, Lockwood Boulevard, and the James Island Connector. These were modeled with one additional travel lane in
each direction to evaluate impacts on regional traffic, as well as environmental impacts for the additional right of way
and construction. See Figure 3-26.
New location alternatives developed through public comment

The new location design criteria listed in Section 3.1.3 was also used to develop Alternatives 16, 17, 24, 26-35 which were suggested to the study team through public comments. Below are brief descriptions of these alternatives:

**Alternative 16** begins at the existing interchange at I-526/U.S. 17 and follows U.S. 17 south for 1.7 miles to a new interchange at the U.S. Vegetable Laboratory; the section of U.S. 17 between I-526 and the new interchange would be widened with an additional lane in each direction. Alternative 16 extends southward crossing the Stono River, intersecting with Maybank Highway on Johns Island. An interchange is proposed to be located at Maybank Highway. Alternative 16 continues due east across the Stono River through the northern portion of the James Island County Park. Alternative 16 continues northeast 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, see Figure 3-27.

**Alternative 17** extends southward from the existing interchange at I-526/U.S. 17. Crossing the Stono River, Alternative 17 continues south to the proposed interchange at Maybank Highway on Johns Island. Once across the Stono River for the second time, Alternative 17 continues southeast passing through the Dill Sanctuary, then turns to the east following George Griffith Boulevard connecting with Folly Road. Approximately 1.8 miles of Folly Road would be widened with one-lane in each direction from Fort Johnson Road to Central Park Road, see Figure 3-28.
Alternative 24 is a tunnel and extends underground southward from the existing interchange at the existing Mark Clark Expressway/U.S. 17, crossing underneath marshland and under the Stono River. Alternative 24 does not intersect directly with Johns Island. Instead, it would have portal entrance/exit ramps on Maybank Highway, west of Riverland Drive. Beyond Riverland Drive, Alternative 24 continues underground, then ties into the existing James Island Connector/Folly Road interchange above ground near Folly Road. See Figure 3-29.

Alternative 26 is an outer beltway connecting the current I-526 to U.S. 17. Alternative 26 extends northwest from International Avenue at I-526. After crossing Michaux Parkway, Alternative 26 turns southwest crossing Dorchester Road and the Ashley River; it then continues approximately three miles and turns south towards Bees Ferry Road. Alternative 26 crosses Bees Ferry Road and ties into Main Road at U.S. 17. See Figure 3-30.
Alternative 27 extends south from the existing interchange at I-526/U.S. 17. Crossing the Stono River, Alternative 27 passes between Rushland Plantation and Headquarters Island and curves southeast intersecting with Maybank Highway on Johns Island, east of River Road. At Maybank Highway, Alternative 27 merges into the existing Maybank Highway using the existing Maybank Highway bridge to cross the Stono River. An additional interchange with Maybank Highway would be located west of Riverland Drive, west of the Charleston Municipal Golf Course. Alternative 27 would begin on new location in a southerly direction before curving to the east to pass north of James Island County Park, south of Murray-LaSaine Elementary School. It continues to the northeast, south of Central Park Road, to tie into the existing James Island Connector/Folly Road interchange. See Figure 3-31.

Alternative 28 was recommended during the public comment period in the Fall of 2008. Upon further investigation, it was determined that Alternative 28 was the same as Alternative 2. Therefore, Alternative 28 was not taken through the evaluation process.

Alternative 29 extends south on new location from the existing interchange at I-526/U.S. 17. Crossing the Stono River, Alternative 29 passes between Rushland Plantation and Headquarters Island and curves southeast intersecting with Maybank Highway on Johns Island, east of River Road. Alternative 29 uses the existing Maybank Highway bridge to cross the Stono River to James Island. An additional interchange with Maybank Highway would be located at Riverland Drive, within the Charleston Municipal Golf Course. Alternative 29 continues along Riverland Drive to Woodland Shores Road before turning east, on new location, to cross Central Park Road. Alternative 29 then turns to the northeast south of Central Park Road to tie into the existing James Island Connector/Folly Road interchange. See Figure 3-32.
**Alternative 30** extends south on new location from the existing interchange at I-526/U.S. 17, through the Oakland, Stone Creek, Mainland and Arlington Village neighborhoods on the west and the Oakland, Citadel Woods and Air Harbor neighborhoods on the east. Crossing the Stono River, Alternative 30 passes between Rushland Plantation and Headquarters Island and curves southeast intersecting with Maybank Highway on Johns Island, 0.8 mile east of River Road. Alternative 30 uses the existing Maybank Highway bridge to cross the Stono River to James Island. An additional interchange with Maybank Highway will be located at Riverland Drive. Alternative 30 would widen Riverland Drive one lane in each direction from Maybank Highway to Folly Road. See Figure 3-33.

**Alternative 31** proposes to widen the existing I-526 one lane in each direction from I-26 to U.S. 17 in West Ashley, approximately seven miles. See Figure 3-34.
**Alternative 32** proposes a new interchange at Glenn McConnell Parkway/Paul Cantrel Blvd./I-526, extending west from the existing I-526. After crossing Long Branch Creek, Alternative 32 extends southward to intersect with U.S. 17. Alternative 32 then extends southward from the new interchange at the U. S. Vegetable Laboratory/U.S. 17 west of and parallel to Long Branch Creek. After crossing the Stono River, Alternative 32 passes to the west of Rushland Plantation and curves southeast intersecting with Maybank Highway on Johns Island, east of River Road. Alternative 32 then follows the power line easement on Johns Island, then turns east to cross the Stono River. Alternative 32 continues due east across the Stono River adjacent to the power line. Alternative 32 continues through the middle portion of the Dill Sanctuary and crosses Riverland Drive to Folly Road. Alternative 32 continues northeast, along Folly Road to tie into the existing James Island Connector/Folly Road interchange. See Figure 3-35.

**Alternative 33** is an extension of Glenn McConnell Parkway from its current endpoint at Bees Ferry Road, continuing northwest, parallel to Ashley River Road. Approximately 3 miles from Bees Ferry Road, Alternative 33 turns west to continue parallel to the power line easement for 4 miles, after which it turns north continuing for another 4.5 miles. Alternative 33 then crosses Bacons Bridge Road and Ashley River Road, tying into SC Route 642 (Dorchester Road) in Summerville. See Figure 3-36.
Alternative 34 is an outer beltway connecting the existing I-526 to U.S. 17 which uses both a new location alignment and existing road improvements. Alternative 34 extends northwest from existing International Avenue at I-526. After crossing Michaux Parkway, Alternative 34 turns southwest to cross Dorchester Road and the Ashley River. Alternative 34 turns south parallel to the Ashley River to tie into Ashley River Road, approximately 0.5 mile north of the Seaboard System Railroad Line. Alternative 34 utilizes approximately 0.3 mile of Ashley River Road before turning southwest onto Bees Ferry Road. Alternative 34 uses Bees Ferry Road to tie into Main Road at U.S. 17. Portions of Ashley River Road and Bees Ferry Road will be widened one lane in each direction. See Figure 3-37.

Alternative 35 is also known as the Sea Island Greenway, which is currently under consideration by Charleston County. Alternative 35 would begin at Maybank Highway approximately 0.7 mile east of River Road. Alternative 35 extends southwest from Maybank Highway crossing River Road approximately 0.3 mile from the River Road/Maybank Highway intersection. Alternative 35 continues southwest, intersecting Plow Ground Road and Edenville Road. The alternative turns slightly west again, continuing for 4.5 miles where it ties into River Road at Betsy Kerrison Parkway. See Figure 3-38.

Figure 3-39 shows all of the preliminary alternatives, parkway concept, grid network, improve existing roads and the range of alternatives developed through public comment.
Chapter 3.
Development of Alternatives

Draft Environmental Impact Statement

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### 3.3 Preliminary Alternatives Analysis Overview

#### 3.3.1 Overview of the preliminary alternatives analysis process

To equally evaluate the range of alternatives, a set of traffic and environmental criteria were proposed to determine how well each alternative would meet the goals of the project (Table 3.4). Traffic data was collected from the Updated CHATS Travel Demand Model (for more information about the Updated CHATS Travel Demand Model, please see Appendix L, Model Modification Report - Charleston Area Transportation Study (CHATS) Regional Travel Demand Model) and environmental data was obtained through field studies and existing GIS data layers. Once data was collected, the study team analyzed the data to determine a methodology which would filter the large number of alternatives (36) to a reasonable number that would best meet the goals of the project. The criteria, units of measure and the preliminary alternatives analysis process were presented to the participating agencies and cooperating agencies in October 2008 and to the public in November of 2008. Mass transit and TSM were not evaluated through this preliminary alternatives analysis. These alternatives are evaluated in Sections 3.6 (mass transit) and 3.7 (TSM).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Units of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to reduce congestion on existing roads</td>
<td>Change in Vehicle Hours of Travel (VHT) &amp; delay versus the No-build Alternative</td>
</tr>
<tr>
<td>Ability to improve regional mobility &amp; system linkage</td>
<td>Change in Vehicle Miles of Travel (VMT) &amp; Vehicle Hours of Travel (VHT), delay, travel time between districts versus the No-build Alternative</td>
</tr>
<tr>
<td>Ability to increase safety on existing roads</td>
<td>Crash rates and fatality rates to identify road segments, V/C ratio to compare traffic conditions</td>
</tr>
<tr>
<td>Potential relocations</td>
<td>Number of residences, businesses, churches and schools relocated</td>
</tr>
<tr>
<td>Potential wetland impacts</td>
<td>Acres of wetlands impacted</td>
</tr>
</tbody>
</table>
3.3.1.1 Why was the traffic criteria used in the preliminary alternatives analysis?

The traffic criteria (shown in Table 3.4) was used in the preliminary alternatives analysis to assess whether or not the alternatives meet the need and purpose of the proposed project. The purpose of the Mark Clark Expressway project is to increase the capacity of the regional transportation system, improve safety and enhance mobility to and from the West Ashley, Johns Island and James Island areas of Charleston.

How was each alternative assessed in regards to the traffic criteria?

To assess an alternative's ability to meet the project goals, the study team employed the Updated CHATS Travel Demand Model. To appraise each alternative's ability to “reduce congestion on existing roads” and “delays” (which is the amount of time travelers spend in congested conditions) the model was used to calculate the number of hours that travelers spent in their vehicles on a daily basis. To assess an alternative's ability to “improve regional mobility,” the study team used the model to calculate the hours that travelers spent in their vehicles and number of miles they traveled on a daily basis. Crash rates and fatality rates were calculated for road segments to identify roads that had rates above the statewide average to assess an alternative's ability to “increase safety on existing roads.”

3.3.1.1.1 Why was the project assessed on both a local and regional level?

For the purpose of this preliminary alternatives analysis, traffic performance was evaluated on both a localized level, as well as on a regional level, using the Updated CHATS Travel Demand Model. These two levels of analysis enabled the study team to evaluate the performance of the range of alternatives on both the roadways adjacent to the proposed project as well as on a larger, regional scale. The localized and regional analysis of the Updated CHATS Travel Demand Model allowed the study team to ensure a project would benefit traffic both locally, within James Island, Johns Island and West Ashley and regionally, in the BCD region.

This methodology of evaluating a smaller traffic network, as well as a regional traffic network, enabled a balanced look at changes on facilities within the study area, as well as the overall regional transportation system. Traffic performance [change in Vehicle Miles of Travel (VMT), Vehicle Hours of Travel (VHT) and total delay] for the project level traffic analysis network was collected using the same methodology as that of the regional CHATS Travel Demand Model network. By considering the effects of the project on both localized traffic and regional traffic, the potential/possibility of relocating bottlenecks or other traffic issues to another area of the road network could be avoided. The two traffic analysis networks used for this project will be referred to as:

A travel demand model includes elements such as roadway and transit networks, and population and employment data to calculate the expected demand for transportation facilities. Within the model, mathematical equations are used to represent each individual’s decision-making process of: “Why,” “When,” “Where,” and “How” to make the trip, and “What” route to follow to complete the trip. The model results for these individual choices are combined so that the aggregate impacts of roadway vehicle volumes and transit route ridership on the average travel times can be determined. A

A North Central Texas Council of Governments http://nctcog.org/trans/modeling/
For regional traffic: CHATS Travel Demand Model Network
For the purpose of long-range transportation planning, MPOs are required to develop a regional travel demand model. The highway network developed for regional planning is often referred to as the CHATS Travel Demand Model network. The CHATS Travel Demand Model network represents all publicly maintained roads throughout the BCD region, see Figure 3-40.

While the purpose for the proposed project includes congestion and mobility improvement in the areas of West Ashley, James Island and Johns Island, a project of this magnitude has the potential for impacts on the regional network. The inclusion of the CHATS Travel Demand Model Network in this traffic analysis ensured the consideration of impacts to both adjacent highway facilities, as well as routes outside of the study area.

For local level traffic: project level traffic analysis network
For the purpose of quantifying traffic performance of the proposed Mark Clark Expressway project, a subset of the CHATS Travel Demand Model was created to evaluate traffic impacts on a more immediate level in proximity to the proposed project. This subset of roads was expected to see the most direct changes in traffic performance (congestion, LOS) as a result of the proposed project, see Figure 3-41.

During the project scoping process, comments from the public expressed concern about traffic bottlenecks being moved from existing areas to other areas adjacent to the study area. Some of these facilities were outside of the proposed Mark Clark Expressway study area (Figure 3-2), but to accurately assess traffic benefits and/or impacts, they were included in the localized traffic analysis. For this reason, roads that are either outside the study area (including Calhoun Street, Lockwood Drive, and Harborview Road) or extend past the study area (I-26, I-526, Folly Road, Bees Ferry Road, Maybank Highway and River Road) were included in the project level traffic analysis network.

3.3.1.2 Why were two environmental categories used in the preliminary alternatives analysis?
In addition to the traffic criteria, two environmental categories, wetlands and relocations, were used to assist in narrowing the range of alternatives to a reasonable number of alternatives that would be studied and compared in this DEIS.

3.3.1.2.1 Why were potential wetland impacts and relocations used to evaluate the alternatives?
Comments received at the Public Scoping Meeting held on April 10, 2008, educated the study team on important issues and concerns of the public. Impacts to wetlands/marsh and communities were two of the most commonly heard concerns not related to traffic. A total of 588 comments were received during the public comment period for this meeting; 68 comments expressed concern relating to community issues (including relocations) and 46 comments expressed concern for the environment. As the project progressed, the study team continued to consider comments from the public throughout the development of the project. Comments received at the first series of Public Information Meetings held in November and December of 2008 reinforced the importance of these two issues. A total of 460 comments were received during the public comment period for this meeting; 71 comments expressed concerns relating
to neighborhoods and relocations and 41 comments expressed concern over impacts to wetlands/marsh (for more information about public involvement, see Chapter 4).

“Reasonable alternatives must be presented in a “comparative form” that sharply defines the issues and provides a clear basis for a choice by the decisionmaker and the public (40 CFR 1502.14). If a preliminary analysis identifies an alternative with adverse impacts that are significantly higher than those of other alternatives, such an alternative might not need to be carried forward for more detailed analysis in the DEIS. In this case, the preliminary analysis would probably be sufficient to provide the decisionmaker and the public with adequate information upon which to base a decision.”

At this early stage of the project process, potential relocations (residence, business, church, school, etc.) and acres of wetland impacts, could be equally and comparatively evaluated in a timely and cost-effective manner for each alternative using GIS.

**How was each alternative evaluated in regards to the environmental criteria?**

**Potential Relocations**
Aerial photography was used to locate all of the buildings within the study area. A detailed field study was conducted to identify each building type (residence, business, church, school, etc.) within the study area. This same methodology was completed for the alternatives proposed through public comment which extended past the study area boundary. The building data was entered into a GIS data layer.

**Wetland Impacts**
The project is located in a coastal area where both freshwater and saltwater wetlands are found throughout the study area. GIS data layers of the NWI maps were used to quantify the potential impacts to wetlands. The methodology of quantifying wetland impacts included the following categories: freshwater pond, freshwater forested/shrub wetland, freshwater emergent wetland, estuarine and marine wetland and estuarine and marine deepwater. Two categories of wetlands (estuarine and marine wetland and estuarine and marine deepwater) were not included in the calculation of impacts because these types of wetlands were assumed to be bridged.

Due to the importance of relocations and wetland impacts to the public, and the ability to equally and comparatively evaluate the range of alternatives in a timely and cost-effective manner; these two environmental categories were added as evaluation criteria for the preliminary alternatives analysis.

**3.3.1.3 Why weren’t mass transit and TSM evaluated with the range of alternatives in the preliminary alternatives analysis?**

Three alternatives were not analyzed through the evaluation process, Alternative 25 (mass transit), Alternative 28 and TSM. Two alternatives, mass transit and TSM, were carried through the preliminary alternatives analysis to be further evaluated in this DEIS, while Alternative 28 was removed from the preliminary alternatives analysis altogether.

- Alternative 25, Mass Transit, was not evaluated in the preliminary alternatives analysis; it was carried...
through the process to be further evaluated in this DEIS. Mass transit should be considered on all proposed major highway projects in urbanized areas over 200,000 in population (FHWA Technical Advisory 6640.8A).

• Alternative 28 was recommended during the public comment period in the Fall of 2008. Upon further investigation, it was determined that Alternative 28 was the same as Alternative 2. Therefore, this Alternative was removed from the preliminary alternatives analysis. Alternative 28 will not be mentioned again in this document.

• TSM was not assigned an alternative number and it was not evaluated in the preliminary alternatives analysis, it was carried through the process to be further evaluated in this DEIS.

At the time of this analysis, both mass transit and TSM were conceptual alternatives. The study team developed these two alternatives at the same time the Reasonable Alternatives were further engineered. Because mass transit and TSM had not been developed to a tangible alternative at the time of this analysis, they could not be modeled or analyzed using the Updated CHATS Travel Demand Model. As a result, mass transit and TSM were not evaluated through this preliminary alternatives analysis. These alternatives are evaluated in Sections 3.6 (mass transit) and 3.7 (TSM).

3.3.1.4 How was the range of alternatives evaluated?

The process for analyzing the data from the GIS analysis and the Updated CHATS Travel Demand Model was not pre-determined. Numerous methodologies were considered for this process to ensure the evaluation was appropriate for the datasets. After analyzing the distribution of the data, natural breaks in the data were evident; the study team determined natural breaks was the best data classification method.

Using natural breaks is a data classification system which minimizes variances within the dataset based on large changes in value. In this classification method (also known as Optimal Breaks and Jenks’ Method), the data are assigned to classes based upon their position along the data distribution relative to all other data values. “Widely used within GIS packages, natural breaks are forms of variance-minimization classification. Breaks are typically uneven, and are selected to separate values where large changes in value occur.”

The natural breaks identified outliers in the data, meaning it identified alternatives that performed substantially worse than other alternatives from a traffic standpoint and/or alternatives that had substantially higher impacts on wetlands and/or relocations. Logically, it would be difficult and imprudent to pursue an alternative that either does not meet project goals as well as other alternatives or that has substantially higher impacts when alternatives with less impacts exist that still meet the project goals. Based on this, the project team determined the four-step process outlined below was best suited for analyzing the data resulting from the traffic model and GIS quantifications.

According to the Engineering Statistics Handbook, an outlier is an observation that lies an abnormal distance from other values in a random sample from a population. In a sense, this definition leaves it up to the analyst (or a consensus process) to decide what will be considered abnormal.

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**Step 1 of the preliminary alternatives analysis:**

The first step in the evaluation of alternatives identified natural breaks in data from the GIS analysis (relocation and wetland impacts) and the Updated CHATS Travel Demand Model traffic analysis (VMT, VHT, delay and travel times). Identification of natural breaks is a method of manual data classification based on the natural gaps in the data values.

Natural Breaks: Classes are based on natural groupings of data values. Natural break points are identified by looking for groupings and patterns inherent in the data. The features are divided into classes whose boundaries are set where there are relatively large jumps in the distribution of data values.4

**Step 2 of the preliminary alternatives analysis:**

The second step compared alternatives that followed similar alignments to determine which corridor provided better traffic benefits.

**Step 3 of the preliminary alternatives analysis:**

The third step assessed how well each of the remaining alternatives improved travel times between West Ashley, James Island and Johns Island in addition to analyzing relocation and wetland impacts. Natural breaks were identified for changes in travel times for Johns Island and James Island and for wetland impacts and relocations.

**Step 4 of the preliminary alternatives analysis:**

The fourth step assessed whether or not, the remaining alternatives were practical or feasible from a technical and/or economic standpoint, based on the Council on Environmental Quality (CEQ) definition of “reasonable alternatives.”

The criteria, units of measure and the preliminary alternatives analysis process were evaluated and refined by the project team. Once the process was finalized, the criteria, units of measure and the preliminary alternatives analysis process were presented to the participating agencies and cooperating agencies in October 2008 and to the public in November of 2008 (see Chapter 4, Public Involvement and Agency Coordination).

Comments regarding the preliminary alternatives analysis were received from the following agencies: S.C. Department of Natural Resources (SCDNR), National Oceanic and Atmospheric Administration - National Marine Fisheries Service (NOAA-NMFS) and U.S. Fish and Wildlife Service (USFWS). Copies of this correspondence can be found in Appendix F. The study team assessed and addressed any questions and concerns regarding the process brought forward by the participating and cooperating agencies. Agency comments regarding the preliminary alternatives analysis are located in the section of the document titled Chapter 7, Comments and Responses.

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4 EPA http://www.epa.gov/esd/land-sci/emap_west_browser/pages/wemap_mm_rc_rnnat30_nb_md.htm#mapnav
3.4 Preliminary Alternatives Analysis

3.4.1 What criteria were used in the preliminary alternatives analysis process?

3.4.1.1 How was the ability to reduce congestion on existing roads assessed?

To assess an alternative’s ability to “reduce congestion on existing roads,” the study team used the Updated CHATS Travel Demand Model. This model was used to calculate the number of hours that travelers spent in their vehicles on a daily basis for each alternative. The study team also used the model to assess delays within the study area, which is the amount of time travelers spend in congested conditions. The changes in vehicle hours of travel (VHT) and traffic delays were compared to the No-build Alternative results for the project level traffic analysis network roads. The project level traffic analysis network roads include roads in West Ashley, James Island and Johns Island, and roads that are either outside the study area boundary (including Calhoun Street, Lockwood Drive, and Harborview Road) or extend past the study area (I-26, I-526, Folly Road, Bees Ferry Road, Maybank Highway and River Road) were included in the project level traffic analysis network, see Figure 3-41.

For the evaluation, the following factors were compared to the No-build Alternative to measure traffic performance of each alternative:

- Change in daily VHT;
- Change in delay (daily hours of delay on network links); and
- LOS.

Using the Updated CHATS Travel Demand Model, the study team quantified improvements in VHT and traffic delay for roads defined as the project level traffic analysis network roads, Figure 3-41. See Table A in the preliminary alternatives analysis (Appendix K: Alternative Development and Analysis Technical Memorandum), which presents the changes in the VMT, VHT and delay within the project level traffic analysis network for each alternative as compared to the No-build Alternative.

3.4.1.2 How was the ability to improve regional mobility assessed?

To assess an alternative’s ability to “improve regional mobility,” the study team calculated the hours that travelers spent in their vehicles and number of miles they traveled on a daily basis. The changes in VHT, VMT, traffic delay and the average travel times between regions (West Ashley, James Island and Johns Island) were compared to the No-build Alternative for the CHATS Travel Demand Model network roads or the regional road network, which includes all roads in the Updated CHATS Travel Demand Model.

For the preliminary alternatives analysis, the following factors were compared to the No-build Alternative to measure traffic performance:

- Change in daily VMT;
- Change in daily VHT;
• Change in delay; and
• Travel times between regions.

The evaluation of these categories was similar to “reducing congestion on the project level traffic analysis network roads,” but the evaluation was expanded to include the roads in the CHATS region (CHATS Travel Demand Model network), see Figure 3-40. The analysis compared each alternative to the No-build Alternative, evaluating daily VHT and hours of delay on the regional road network.

Using the Updated CHATS Travel Demand Model, the average travel time between areas (West Ashley, Johns Island and James Island) in the region were quantified and compared with the No-build Alternative to evaluate how well each alternative improved regional mobility. To address mobility on a regional level instead of a local level, travel times (minutes) for trips between regions (e.g. trips from West Ashley to James Island) were considered in the preliminary alternatives analysis. See Table B in the preliminary alternatives analysis (Appendix K: Alternative Development and Analysis Technical Memorandum), which presents the changes in the VMT, VHT and delay in the region for each alternative.

3.4.1.3 How was the ability to increase safety on existing roads assessed?

To assess an alternative’s ability to “increase safety on existing roads,” crash rates and fatality rates were calculated for road segments in the project level traffic analysis network to identify roads that had rates above the statewide average. Crash rates are calculated based on historical crash data and compared to the vehicle miles of travel on a road. Because future crashes cannot be predicted, a comparison of volume to capacity (V/C) ratio for these road segments was used to indicate an improvement in traffic conditions and thus, in safety. For each alternative, the number of road segments with an improved V/C ratio were quantified. To evaluate the safety improvements for the range of alternatives, the Updated CHATS Travel Demand Model was used to compare the performance of all alternatives to the No-build Alternative.

The study team assessed improvements in segments of roads within the study area that were identified as having:
- Crash rates over the statewide average
- Fatality rates over the statewide average

The road segments and corresponding values are listed in Table 3.5.

To evaluate improvements in safety, the study team compared volume to capacity ratios (V/C ratios) for the road segments listed in Table 3.5 for the No-build Alternative with the V/C ratios from the range of alternatives. If a segment had an improvement in V/C ratio, which represents improved travel conditions, safety on that segment was considered to be improved. By comparing the No-build Alternative with the range of alternatives, each alternative was given a total score based on the number of road segments with improved V/C ratios; these scores are shown in Table C in the preliminary alternatives analysis (Appendix K: Alternative Development and Analysis Technical Memorandum).

All alternatives included in the range of alternatives showed benefits to safety on roads within the project level traffic analysis network, and as a result no alternatives were carried through to the next round or were eliminated from the preliminary alternatives analysis based on safety statistics.
### Table 3.5
Updated CHATS (2003 - 2035) Travel Demand Model –– 6.71 Year Crash Data
Rocks within the Study Area with Crash Rates above the Statewide Average (2.67 / million vehicle miles)

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Road Segment</th>
<th>Total VMT</th>
<th>Total Crashes (6.71 years)</th>
<th>Total Crash per 1M veh-mile (6.71 years)</th>
<th>Fatal Crashes (6.71 years)</th>
<th>Fatal Crash per 100M veh-mile (6.71 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp Rd.</td>
<td>ALL: Riverland Dr. – Fort Johnson Rd.</td>
<td>17,678</td>
<td>230</td>
<td>5.31</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Camp Rd.</td>
<td>Riverland Dr. – Folly Rd.</td>
<td>4,675</td>
<td>79</td>
<td>6.90</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Camp Rd.</td>
<td>Folly Rd. – Fort Johnson Rd.</td>
<td>13,094</td>
<td>151</td>
<td>4.71</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Folly Rd.</td>
<td>Camp Rd. – James Island Conn.</td>
<td>39,509</td>
<td>467</td>
<td>4.83</td>
<td>1</td>
<td>1.03</td>
</tr>
<tr>
<td>Folly Rd.</td>
<td>James Island Conn. – Maybank Hwy.</td>
<td>28,049</td>
<td>374</td>
<td>5.44</td>
<td>1</td>
<td>1.46</td>
</tr>
<tr>
<td>I-526 (West of I-26)</td>
<td>Savannah-Paul Cantrell Blvd. (Section 1)</td>
<td>37,317</td>
<td>306</td>
<td>3.35</td>
<td>2</td>
<td>2.19</td>
</tr>
<tr>
<td>I-26 (Outside of I-526)</td>
<td>Ashley Phosphate Rd. - I-526 (Section 4)</td>
<td>111,076</td>
<td>1850</td>
<td>6.80</td>
<td>2</td>
<td>0.74</td>
</tr>
<tr>
<td>Main Rd.</td>
<td>Bees Ferry Rd. – Savannah Hwy.</td>
<td>1,857</td>
<td>92</td>
<td>20.23</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Maybank Hwy.</td>
<td>Main Rd. – River Rd.</td>
<td>27,034</td>
<td>206</td>
<td>3.11</td>
<td>3</td>
<td>4.53</td>
</tr>
<tr>
<td>Riverland Dr.</td>
<td>ALL: Maybank Hwy. – Grimball Hwy.</td>
<td>20,181</td>
<td>133</td>
<td>2.69</td>
<td>1</td>
<td>2.02</td>
</tr>
<tr>
<td>Riverland Dr.</td>
<td>Maybank Hwy. – Central Park Rd.</td>
<td>6,048</td>
<td>75</td>
<td>5.06</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>SC Route 61</td>
<td>Magwood Rd. – Paul Cantrell Blvd.</td>
<td>18,461</td>
<td>245</td>
<td>5.42</td>
<td>1</td>
<td>2.21</td>
</tr>
<tr>
<td>SC Route 61</td>
<td>ALL: Bacons Bridge Rd. – St Andrews Blvd.</td>
<td>220,485</td>
<td>1976</td>
<td>3.66</td>
<td>6</td>
<td>1.11</td>
</tr>
<tr>
<td>SC Route 61</td>
<td>Bees Ferry Rd. – Maywood Rd.</td>
<td>33,867</td>
<td>459</td>
<td>5.53</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>SC Route 61</td>
<td>Paul Cantrell Blvd. – Sam Rittenburg</td>
<td>16,291</td>
<td>326</td>
<td>8.17</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>SC Route 61</td>
<td>Sam Rittenberg – St Andrews Blvd.</td>
<td>43,205</td>
<td>589</td>
<td>5.57</td>
<td>1</td>
<td>0.95</td>
</tr>
<tr>
<td>U.S. 17/Savannah Hwy.</td>
<td>SC Route 162 - Bees Ferry Rd.</td>
<td>76,538</td>
<td>517</td>
<td>2.76</td>
<td>5</td>
<td>2.67</td>
</tr>
<tr>
<td>U.S. 17/Savannah Hwy.</td>
<td>1-526 - Folly Rd.</td>
<td>138,957</td>
<td>1278</td>
<td>3.76</td>
<td>1</td>
<td>0.29</td>
</tr>
<tr>
<td>U.S. 17/Savannah Hwy.</td>
<td>Folly Rd. – Ravenel Bridge</td>
<td>111,499</td>
<td>1270</td>
<td>4.65</td>
<td>3</td>
<td>1.10</td>
</tr>
</tbody>
</table>

**Roads within the Study Area with Fatality Rates above the Statewide Average (2.10 / 100 million vehicle miles)**

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Road Segment</th>
<th>Total VMT</th>
<th>Total Crashes (6.71 years)</th>
<th>Total Crash per 1M veh-mile (6.71 years)</th>
<th>Fatal Crashes (6.71 years)</th>
<th>Fatal Crash per 100M veh-mile (6.71 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Folly Rd.</td>
<td>Folly Beach Camp Rd.</td>
<td>117,646</td>
<td>705</td>
<td>2.45</td>
<td>15</td>
<td>5.21</td>
</tr>
<tr>
<td>I-526 (West of I-26)</td>
<td>Savannah Hwy. – Paul Cantrell</td>
<td>37,317</td>
<td>306</td>
<td>3.35</td>
<td>2</td>
<td>2.19</td>
</tr>
<tr>
<td>I-26 (Outside of I-526)</td>
<td>Edge of Model Boundary - U.S. 17A (Section 1)</td>
<td>340,088</td>
<td>731</td>
<td>0.88</td>
<td>20</td>
<td>2.40</td>
</tr>
<tr>
<td>Main Rd.</td>
<td>River Rd – Maybank Hwy.</td>
<td>57,380</td>
<td>285</td>
<td>2.03</td>
<td>4</td>
<td>2.85</td>
</tr>
<tr>
<td>Maybank Hwy.</td>
<td>Main Rd. – River Rd</td>
<td>27,034</td>
<td>206</td>
<td>3.11</td>
<td>3</td>
<td>4.53</td>
</tr>
<tr>
<td>Maybank Hwy.</td>
<td>All: Edge of Model Boundary - Folly Rd.</td>
<td>146,461</td>
<td>602</td>
<td>1.68</td>
<td>11</td>
<td>3.07</td>
</tr>
<tr>
<td>Maybank Hwy.</td>
<td>Edge of Model Boundary – Main Rd</td>
<td>26,228</td>
<td>139</td>
<td>2.16</td>
<td>7</td>
<td>10.90</td>
</tr>
<tr>
<td>River Rd.</td>
<td>Main Rd. – Maybank Hwy.</td>
<td>14,145</td>
<td>88</td>
<td>2.54</td>
<td>4</td>
<td>11.55</td>
</tr>
<tr>
<td>River Rd.</td>
<td>Maybank Hwy. – Edenvale Rd.</td>
<td>42,690</td>
<td>28</td>
<td>0.27</td>
<td>3</td>
<td>2.87</td>
</tr>
<tr>
<td>Riverland Dr.</td>
<td>Camp Rd. – Grimball Hwy.</td>
<td>8,974</td>
<td>28</td>
<td>1.27</td>
<td>1</td>
<td>4.55</td>
</tr>
<tr>
<td>SC Route 61</td>
<td>Magwood Rd - Paul Cantrell Blvd.</td>
<td>18,461</td>
<td>245</td>
<td>5.42</td>
<td>1</td>
<td>2.21</td>
</tr>
<tr>
<td>U.S. 17/Savannah Hwy.</td>
<td>SC Route 162 - Bees Ferry Rd.</td>
<td>76,538</td>
<td>517</td>
<td>2.76</td>
<td>5</td>
<td>2.67</td>
</tr>
</tbody>
</table>

**Note:** VMT = Number of daily vehicle trips * Length (Miles) of roadway segment
3.4.1.4 How were potential relocations quantified?

To estimate the number of potential relocations, aerial photography was used to identify buildings in the study area. A detailed field study was conducted to identify each building type (residence, business, church, school, etc.) within the study area. Roadway typical sections were used to develop the preliminary right of way for each alternative in the range of alternatives (see Table 3.6 for preliminary right of way). GIS was used to quantify the number and type of buildings that would be impacted by the right of way of each alternative.

3.4.1.5 How were the potential wetland impacts quantified?

GIS data layers of the NWI maps were used to quantify the potential impacts to wetlands. The quantification of wetland impacts included the following categories: freshwater pond, freshwater forested/shrub wetland, freshwater emergent wetland, estuarine and marine wetland and estuarine and marine deepwater. For preliminary analysis, two categories of wetlands (estuarine and marine wetland and estuarine and marine deepwater), were not included in the calculation of impacts because these types of wetlands were assumed to be bridged. The wetlands which could be potentially impacted by each alternative were determined by quantifying the acreage of wetlands within the proposed right of way.

### Table 3.6
Range of Alternatives and Preliminary Right of Way Widths

<table>
<thead>
<tr>
<th>Name</th>
<th>Preliminary Right of Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 4</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 6</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 7</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 8</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 9</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 10</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 11</td>
<td>250 ft ROW; 125 ft ROW for Spurs A and B</td>
</tr>
<tr>
<td>Alternative 11a</td>
<td>250 ft ROW; 125 ft ROW for Spur A</td>
</tr>
<tr>
<td>Alternative 11b</td>
<td>250 ft ROW; 125 ft ROW for Spur B</td>
</tr>
<tr>
<td>Alternative 12</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 13</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 14</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 15</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 16</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 17</td>
<td>250 ft ROW; Folly Road ROW 125 ft</td>
</tr>
<tr>
<td>Alternative 18</td>
<td>ROW = 125 ft U.S.17 to Riverland; ROW = 90 ft Riverland to JI Conn.</td>
</tr>
<tr>
<td>Alternative 19</td>
<td>Various ROW, see Alternatives Development and Analysis Technical Memorandum</td>
</tr>
<tr>
<td>Alternative 20</td>
<td>Various ROW, see Alternatives Development and Analysis Technical Memorandum</td>
</tr>
<tr>
<td>Alternative 21</td>
<td>Various ROW, see Alternatives Development and Analysis Technical Memorandum</td>
</tr>
<tr>
<td>Alternative 22</td>
<td>Various ROW, see Alternatives Development and Analysis Technical Memorandum</td>
</tr>
<tr>
<td>Alternative 23</td>
<td>Various ROW, see Alternatives Development and Analysis Technical Memorandum</td>
</tr>
<tr>
<td>Alternative 24</td>
<td>Various ROW, see Alternatives Development and Analysis Technical Memorandum</td>
</tr>
<tr>
<td>Alternative 25</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 26</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 27</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 28</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 29</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 30</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 31</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 32</td>
<td>250 ft ROW</td>
</tr>
<tr>
<td>Alternative 33</td>
<td>200 ft ROW</td>
</tr>
<tr>
<td>Alternative 34</td>
<td>200 ft ROW</td>
</tr>
<tr>
<td>Alternative 35</td>
<td>200 ft ROW</td>
</tr>
<tr>
<td>Alternative 36</td>
<td>ROW = 125 ft U.S.17 to Riverland; ROW = 90 ft Riverland to JI Conn; ROW = 150 ft for Connector A &amp; 100 ft for Connector B</td>
</tr>
</tbody>
</table>
3.5 Preliminary Alternatives Analysis Results

3.5.1 How were the results of the preliminary alternatives analysis evaluated?

“Based on FHWA guidance, if an alternative does not satisfy the need and purpose for the action, it should not be included in the analysis as an apparent and reasonable alternative.”

The study team reviewed the results from the Updated CHATS Travel Demand Model traffic analysis and the GIS analysis for each alternative and developed a method of analyzing and comparing the 36 alternatives. This comparison determined which alternatives would be advanced in the project development process and evaluated in detail in this DEIS. The study team established a four step process to eliminate alternatives through the preliminary alternatives analysis.

3.5.1.1 Step 1: Identification of natural breaks in GIS results and traffic data

Identification of natural breaks is a method of manual data classification that finds gaps in data values and sorts data sets based on the natural distribution pattern of the data. For further information on natural breaks, please see Appendix K, Alternative Development and Analysis Technical Memorandum. Alternatives were identified that had acres of wetlands impacts or relocations that were substantially higher than other alternatives or that performed substantially worse than other alternatives from a traffic standpoint. These alternatives were eliminated from further study because logically, it would be difficult and imprudent to pursue an alternative that either does not meet project goals as well as other alternatives or that has substantially higher impacts when alternatives with less impacts exist that still meet the project goals. For further information please see the preliminary alternatives analysis (Appendix K, Alternative Development and Analysis Technical Memorandum.)

Natural Breaks: Classes are based on natural groupings of data values. Natural break points are identified by looking for groupings and patterns inherent in the data. The features are divided into classes whose boundaries are set where there are relatively large jumps in the distribution of data values.


C EPA http://www.epa.gov/esd/land-sci/emap_west_browser/pages/wemap_mm_rc_rnat30_nb_md.htm#mapnav
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**Relocations**
For the 36 alternatives carried through the preliminary alternatives analysis, the number of relocations for each alternative ranged from 2 to 182, see Chart 3.1. The natural break in the number of relocations found in Step 1 of the preliminary alternatives analysis is 58. Thirty-one of the 36 alternatives have values of 58 or less relocations, while five alternatives have 103 or more relocations. These five values are obvious statistical outliers.

The five alternatives that met the criteria for elimination based on the number of potential relocations were:
- Alternative 20 – 120 relocations
- Alternative 21 – 141 relocations
- Alternative 22 – 144 relocations
- Alternative 23 – 182 relocations
- Alternative 24 – 103 relocations

**Wetland Impacts**
For the 36 alternatives carried through the preliminary alternatives analysis, the acreage of wetlands potentially impacted for each alternative ranged from 0.5 to 75.7 acres, see Chart 3.2. The natural break in the acreage of wetland impacts found in Step 1 of the preliminary alternatives analysis is 26.4 acres. Thirty-three of the 36 alternatives have values of 26.4 acres or less, while three alternatives have 48.9 acres or more of potential wetland impact. These three values are obvious statistical outliers.

The three alternatives that met the criteria for elimination based on wetland impacts were:
- Alternative 26 – 48.9 acres
- Alternative 33 – 75.7 acres
- Alternative 35 – 54.6 acres
Meeting the need and purpose of the project
The study team also determined which alternatives did not meet the overall traffic goals for the project and eliminated these alternatives from further consideration.

For the 36 alternatives carried through the preliminary alternatives analysis, the change in hours of traffic delay within the project level traffic analysis network roads for each alternative ranged from 144 to 7,611 hours of traffic delay, see Chart 3.3. A natural break in the change in hours of traffic delay within the project level traffic analysis network roads was found at an improvement of 2,000 hours within the project level traffic analysis network roads (-2,000 hours of delay as compared to the No-build Alternative). Thirty-three of the 36 alternatives have values of 2,057 hours of improvement or more, while three alternatives have 877 hours of improvement or less of traffic delay within the project level traffic analysis network roads. These three values are statistical outliers.

These three alternatives were eliminated because they failed to provide a level of improvement comparable to those alternatives which improved traffic delay on roads within the project level traffic analysis network. Logically, it would be difficult and imprudent to pursue an alternative that does not meet project goals as well as other alternatives when alternatives exist that still meet the project goals. The alternatives eliminated include:

- Alternative 19 – -144 hours, as compared to -2,000 hours
- Alternative 33 (also eliminated due to wetland impacts) – -551 hours, as compared to -2,000 hours
- Alternative 35 (also eliminated due to wetland impacts) – -877 hours, as compared to -2,000 hours
The 36 alternatives carried through the preliminary alternatives analysis ranged from 35,174 VMT to -124,445 VMT within the CHATS travel demand model network roads, see Chart 3.4. Thirty-four of the 36 alternatives have a decrease in VMT, while two alternatives have an increase in VMT within the CHATS travel demand model network roads.

The 36 alternatives carried through the preliminary alternatives analysis ranged from 175,125 VMT to -111,897 VMT within the project level traffic analysis network roads, see Chart 3.5. Thirty of the 36 alternatives have a decrease in VMT, while six alternatives have an increase in VMT within the project level traffic analysis network roads.

After analyzing the traffic data from the CHATS Travel Demand Model, it was determined that any increase in VMT was counter-intuitive to meeting project goals. Any alternative with an increase in VMT, within both the CHATS Travel Demand Model network and the project level traffic analysis network did not meet the project goals and therefore, it was eliminated. Logically, it would be difficult and imprudent to pursue an alternative that does not meet project goals as well as other alternatives when alternatives exist that still meet the project goals.

Two alternatives were eliminated based on increasing VMTs as compared to the No-build Alternative, within both the CHATS Travel Demand Model network and the project level traffic analysis network were:

- Alternative 11B – showed an increase of 35,174 in VMT in the CHATS Travel Demand Model network and an increase of 48,968 in VMT within the project level traffic analysis network.
- Alternative 31 – showed an increase of 11,401 in VMT in the CHATS Travel Demand Model network and an increase of 19,526 in VMT within the project level traffic analysis network.
In summary, a total of 11 alternatives were eliminated in the first step of the preliminary alternatives analysis including: Alternatives 11B, 19, 20, 21, 22, 23, 24, 26, 31, 33 and 35. Twenty-five alternatives (Alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 11A, 12, 13, 14, 15, 16, 17, 18, 27, 29, 30, 32, 34, and 36) were carried forward into the second step of the preliminary alternatives analysis process.

3.5.1.2 Step 2: Comparison of similar alignments

The study team compared the remaining 25 alternatives and found that some followed similar alignments. The study team compared the alternatives that followed similar alignments to reduce redundant alignments within the analysis. Similar alternatives were compared to determine which corridor provided better benefits to traffic and/or had fewer impacts to wetlands and relocations.

The comparison of these alternatives is shown in the preliminary alternatives analysis (Appendix K: Alternative Development and Analysis Technical Memorandum) and summarized below. Alternatives compared included:

- Alternative 1/Alternative 2 – Alternative 1 performed slightly better than Alternative 2 in the following traffic categories: VMT, VHT and delay in the study area and regional VHT and delay. Based on this comparison, Alternative 2 was eliminated. See Figure 3-42.

- Alternative 3/Alternative 4 – Alternative 4 performed slightly better than Alternative 3 in the following traffic categories: VMT and VHT in the study area, VMT, VHT and delay in the region. Based on this comparison, Alternative 3 was eliminated. See Figure 3-43.

- Alternative 5/Alternative 6 – Alternative 5 consistently provided better traffic benefits than Alternative 6, including VMT, VHT, and delay in both the study area and regionally. Based on this comparison, Alternative 6 was eliminated. See Figure 3-44.

- Alternative 7/Alternative 8 – Alternative 8 consistently provided better traffic benefits than Alternative 7, including VMT, VHT, and delay in both the study area and regionally. Based on this comparison, Alternative 7 was eliminated. See Figure 3-45.

- Alternative 12/Alternative 13/Alternative 14/Alternative 15 – Alternative 13 consistently provided better traffic benefits than Alternatives 12, 14 and 15, including VMT, VHT, and delay in both the study area and regionally. Alternative 13 also provided more improvement in regional trip length beginning and/or ending in Johns Island and James Island. Based on this comparison, Alternatives 12, 14 and 15 were eliminated. See Figure 3-46.

- Alternative 16/Alternative 17/Alternative 32 – Alternative 17 performed better than Alternatives 16 and 32 in most traffic categories, including VMT and VHT in the study area, and the region; Alternative 17 also improved trip lengths beginning and/or ending in Johns Island and James Island. Based on this comparison, Alternatives 16 and 32 were eliminated. See Figure 3-47.
These maps are intended to show how similar the alternatives are to one another.

NOTE: To see individual maps of each alternative, please see section 3.2
FIGURE 3-46
ALTERNATIVES 12, 13, 14 & 15

FIGURE 3-47
ALTERNATIVES 16, 17 & 32

FIGURE 3-48
ALTERNATIVES 27, 29 & 30

FIGURE 3-49
ALTERNATIVES 18 & 36

These maps are intended to show how similar the alternatives are to one another.

Legend
- Freeway/Expressway
- Primary Highway
- State/County Road
- Citadel Mall
- Dill Sanctuary
- James Island County Park

Alternative 12
Alternative 13
Alternative 14
Alternative 15
Alternative 16
Alternative 17
Alternative 18
Alternative 27
Alternative 30
Alternative 32
Alternative 36

NOTE: To see individual maps of each alternative, please see section 3.2
• Alternative 27/Alternative 29/Alternative 30 – Alternative 30 performed better than Alternatives 27 and 29 in most traffic categories, including VHT and delay in the study area and VMT, VHT and delay in the region; Alternative 30 also improved trip lengths beginning and/or ending in James Island. Based on this comparison of traffic benefits, Alternatives 27 and 29 were eliminated. See Figure 3-48.

• Alternative 18/Alternative 36 – Alternative 36 was better for traffic in all categories compared (VHT, VMT and delay in the study area and VHT, VMT and delay in the region). Based on this comparison, Alternative 18 was eliminated. See Figure 3-49.

In summary, a total of 20 alternatives were compared to other similar alternatives and 12 alternatives were eliminated in Step 2. These alternatives include: Alternatives 2, 3, 6, 7, 12, 14, 15, 16, 18, 27, 29, and 32. Thirteen alternatives (Alternatives 1, 4, 5, 8, 9, 10, 11, 11A, 13, 17, 30, 34 and 36) were carried forward into the third step of the preliminary alternatives analysis.

3.5.1.3 Step 3: Evaluation of remaining alternatives – identification of natural breaks in GIS results and traffic data

Of the 13 remaining alternatives, the study team assessed how well the alternatives improved travel times between the three regions of the project level traffic analysis network in conjunction with looking at those that had high relocations and wetland impacts. Evaluation of the regional mobility data identified natural breaks for improved travel times for Johns Island and James Island. West Ashley is not included because no natural break was identified in the data. Natural breaks were re-identified for wetlands and relocations. The third elimination of alternatives required that the alternatives fall below the natural breaks in at least two of the following four categories:

• Improved regional travel times for Johns Island (natural break found at -3.6 minutes as compared to the No-build Alternative), see Chart 3.6;
• Improved regional travel times for James Island (natural break found at -0.4 minutes as compared to the No-build Alternative), see Chart 3.7;
• Wetlands (natural break found at 7.1 acres as compared to the No-build Alternative), see Chart 3.8; and
• Relocations (natural break found at 28 as compared to the No-build Alternative), see Chart 3.9.

The following 4 alternatives were eliminated because they failed to meet at least two of the four criteria identified:

• Alternative 4 (fell below the natural breaks for regional travel times for Johns Island and relocations)
• Alternative 5 (fell below the natural break for wetlands and relocations)
• Alternative 13 (fell below the natural break for wetlands and relocations)
• Alternative 34 (fell below the natural break for regional travel times for Johns Island, fell below the natural break for regional travel times for James Island, wetlands and relocations)

A total of four alternatives were eliminated in step three of the preliminary alternatives analysis. These four alternatives include: Alternatives 4, 5, 13 and 34. Nine alternatives (Alternatives 1, 8, 9, 10, 11, 11A, 17, 30 and 36) were carried forward into the next round of the preliminary alternatives analysis evaluation.

3.5.1.4 Step 4: Determination of “Reasonable”

Step four was to determine which of the remaining alternatives were practical or feasible. The Council on Environmental Quality (CEQ) guidance Questions and Answers About the NEPA Regulations (March 1981) states that “reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense rather than simply desirable from the standpoint of the applicant.”6 Determining if an alternative is reasonable allows an agency to decide whether the alternative makes sense and is achievable.

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6 CEQ: http://ceq.hss.doe.gov/nepa/regs/40/1-10.HTM • (Q2A)
Of the nine remaining alternatives, the study team determined that three alternatives were not practical or feasible from the technical and/or economic standpoint.

- **Alternative 9** - Due to engineering and navigation considerations for crossing the Stono River at a skew and a curve in the alignment at the location of the interchange on Maybank Highway, it was determined by the study team that Alternative 9 is not feasible from a technical standpoint. To make this alignment a feasible alternative, engineering modifications would be necessary. The first modification would be to increase the distance between the interchange at Maybank Highway and the curve in the alignment to cross the river. The construction of the interchange within the curve would impact both decision sight distances and deceleration/acceleration lanes for ramp entrances and exits. According to the SCDOT Highway Design Manual, the decision sight distance should be 1.25 times the stopping sight distance. The distance between the interchange and the beginning of the curve is less than the required length for a decision sight distance. The proximity of the curve to the proposed interchange at Maybank Highway constricted both optimum decision stopping distance and deceleration lane length considerations. This would require extending the distance between the interchange and the beginning point of the curve, moving the river crossing further south of Maybank Highway. The second modification would realign the bridge to cross the river and marsh at a 90-degree angle to reduce the bridge length and to provide clear navigation on the river. This change would also require moving the river crossing to the south and the alignment of Alternative 9 would become very similar to either Alternative 10 or Alternative 13. Because the new alignment for Alternative 9 would end up being identical to another alignment (Alternatives 10 or 13), and these alignments were already being evaluated in the analysis process, it was determined that it was not reasonable to continue evaluation of Alternative 9.

- **Alternative 17** – Alternative 17 is considerably longer than the other alternatives under evaluation (3 additional miles), which would substantially increase the cost of the project. In addition, widening Folly Road between this alternative and the James Island Connector would impact many businesses (driveways and parking lots) along both sides of the road. Because of these reasons, Alternative 17 is not practicable or feasible from an economic standpoint.

- **Alternative 30** – Technical difficulties exist with Alternative 30. This alignment would utilize the existing Stono River Bridge, with two new interchanges at Maybank Highway, one on Johns Island and one on James Island. The current Stono River Bridge carries two lanes in each direction with sidewalks and has a signalized intersection at Headquarters Plantation Drive.
Initially, it was assumed that this alternative was beneficial because it would use the existing Stono River Bridge and avoid the impact and cost of constructing another structure across the river. However, to tie a new four-lane roadway into the existing four-lane road across the Stono River Bridge would require that an additional four lanes be added to the bridge. This would be accomplished by either widening the existing bridge or building a parallel structure. The cost and impact of a widened or parallel structure would be comparable to a new location structure.

In addition to four additional travel lanes, acceleration and deceleration lanes would be added for connectivity between the other traffic movements at the interchanges and dual-lane directional ramps would be needed to carry the mainline eastbound traffic to James Island and for westbound traffic to Johns Island. Dual-lane directional ramps carrying the new road would require “flyovers” tying into Maybank Highway. The additional lanes, directional ramps and flyovers would widen the footprint of the two interchanges on Maybank Highway beyond typical interchange configurations involving loops or single-lane directional ramps. The larger scale of these interchanges at two locations on Maybank Highway would result in additional impacts and costs as compared to alternatives with one interchange at Maybank Highway.

The interchange on James Island would begin on Maybank Highway near Charleston Municipal Golf Course and the existing golf cart tunnel crossing under Maybank Highway. A new interchange would impact the golf course, cart tunnel and the adjacent marsh areas. As with the Johns Island side, widening of the existing Stono River Bridge would be required to maintain the existing Maybank Highway traffic plus two-lanes in each direction with new acceleration and deceleration lanes for the mainline and new interchange. In addition, the intersection at Headquarters Island would have to be widened to accommodate four additional travel lanes and turning lanes.

To summarize the engineering difficulties, this alternative would still require a new or widened bridge across the Stono River and would also require two interchanges at Maybank Highway, instead of one, increasing impacts on the adjacent marsh and other resources. The additional interchange on Maybank Highway would also significantly increase project costs. Because of these difficulties and the increased impacts and costs of an additional interchange on Maybank Highway, this alternative was not considered practical or feasible from both the technical and economic standpoints.

Based on the Council on Environmental Quality (CEQ) definition of “reasonable alternatives,” the study team determined that Alternatives 9, 17 and 30 were not practical or feasible from a technical and/or economic standpoint; therefore, they were eliminated. 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: Alternatives 1, 8, 10, 11, 11A and 36.

The results of the preliminary alternatives analysis are shown in Table 3.7.
### Table 3.7 Preliminary Alternatives Analysis

| Alternatives | Elimination Criteria                                                                 | Alternatives | Elimination Criteria                                                                 | Alternatives | Elimination Criteria                                                                 | Alternatives | Elimination Criteria                                                                 | Alternatives | Elimination Criteria                                                                 | Reasonable Alternatives Identified through the Preliminary Alternatives Analysis to be Evaluated in the DEIS |
|--------------|---------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------|
| Alternatives that are not Practical or Feasible | Alternative 28 | Alternative 29 | Alternative 30 | Alternative 31 | Alternative 32 | Alternative 33 | Alternative 34 | Alternative 35 | Alternative 36 | Alternative 37 | Alternative 38 | Alternative 39 | Alternative 40 | Alternative 41 | Alternative 42 | Alternative 43 |

Alternatives Carried through the Preliminary Alternatives Analysis to be evaluated in the DEIS:

- Alternative 25: Mass Transit
- No-Build Alternative

Transportion Systems Management