Chapter 6.
SCDOT’s Recommended Preferred Alternative

The NEPA/404 Merger Process has allowed the United States Army Corps of Engineers (USACE) to provide input throughout the project. This chapter was developed in coordination with USACE to ensure that the evaluation of the alternatives is sufficient to make a decision pertaining to the Department of the Army (DA) permit and the 404(b)(1) Guidelines. This chapter contains information needed by USACE to make an informed decision regarding permit issuance or denial.

This chapter provides a detailed description of each of the Reasonable Alternatives that were evaluated for the project and a brief summary of their environmental impacts. Tables summarizing the benefits and impacts for Reasonable Alternatives are shown in Table 6.1 - Parts 1 and 2, on pages 6-21 and 6-22.

The 404(b)(1) Guidelines outline conditions that must be satisfied in order for USACE to make a finding that the proposed discharge (of dredged or fill material) complies with these guidelines. A direct comparison of the Reasonable Alternatives assists USACE in evaluating the conditions of the guidelines, which states that USACE cannot issue a permit if the proposed discharge would have a practicable alternative which would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. South Carolina Department of Transportation’s (SCDOT) Recommended Preferred Alternative is identified in section 6.2, on page 6-23. Section 6.2.1 provides a direct comparison of the Recommended Preferred Alternative to each of the other Reasonable Alternatives with respect to the impacts and environmental consequences on various resources, including the aquatic ecosystem. This detailed analysis and comparison of the Reasonable Alternatives should lead USACE to clearly identify the “least damaging practicable alternative.”

In addition, this chapter discusses measures, including construction techniques, that could be utilized to minimize impacts of construction of the Recommended Preferred Alternative and identifies potential mitigation.

6.1 Comparison of Reasonable Alternatives

Each of the Reasonable Alternatives would have different benefits and impacts as a result of construction of the proposed project, which were compared in order for SCDOT to recommend a Preferred Alternative. Chapter 5 provides detailed information about the potential benefits and impacts of each of the Reasonable Alternatives. The Reasonable Alternatives are shown in Figure 6-1.
Chapter 6.
SCDOT's Recommended Preferred Alternative

FIGURE 6-1
THE REASONABLE ALTERNATIVES

NOTE: To see individual maps of each alternative, please see section 6.1
The No-build Alternative
The No-build Alternative was included in the DEIS as a benchmark against which the impacts of other alternatives can be compared. For information about how the No-build Alternative was used as a baseline for evaluation of the preliminary alternatives analysis, see Section 3.3.

Alternative A
Alternative A is a total of 8.5 miles in length, with 5.2 miles of bridges including one crossing of the Atlantic Intracoastal Waterway (AIWW), see Figure 6-2.

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

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

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

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

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

The estimated cost for Alternative A is $652 million (2009 dollars), the most expensive Reasonable Alternative.

Alternative A has a total of 29 relocations, 24 residences and 5 businesses. It would directly impact two communities: Oakland and Ellis Creek; it would be within proximity (within 200 feet) of ten communities: Citadel Woods, Stone Creek, Battery Haig on the Stono River, Waterway South, Air Harbor, Headquarters Plantation, The Preserve at Fenwick, The Regatta, Quarterdeck, and the EME Apartments. Alternative A does not provide bicycle/pedestrian facilities because it was proposed as a controlled-access highway. Alternative A would have approximately 180 impacted noise receptors (132 residential and 48 commercial).
Chapter 6.
SCDOT's Recommended Preferred Alternative

FIGURE 6-2
ALTERNATIVE A

Legend
- Freeway/Expressway
- Primary Highway
- State/County Road
- Greenway
- Citadel Mall
- Dill Sanctuary
- James Island County Park
- Refined Study Area
- Alternative A
Alternative A would impact 10 hazardous material sites.

Alternative A would impact two historic districts, the Dill Historic District and the Fenwick Hall Historic District, in addition to two archaeological sites. No historical structures would be impacted by Alternative A. Alternative A would impact four 4(f) resources: Dill Historic District, Fenwick Hall Historic District, West Ashley Greenway and James Island County Park. The James Island County Park is also a 6(f) resource. For more information on impacts to 4(f) and 6(f) resources see Chapter 5 and Appendix C, Draft Section 4(f) Evaluation.

Alternative A passes through the Dill Sanctuary in the vicinity of documented nesting populations of the wood stork, a state and federally protected endangered species. Alternative A could potentially impact these nesting populations of wood stork through construction and traffic impacts.

Impacts within the right of way limits for Alternative A would fill 17.11 acres of wetlands. This alternative would cross the Stono River twice and would cross an additional 10 streams, with 574 feet of unbridged stream impacts. It would cross 149.39 acres of floodplains.

**Alternative B**

Alternative B is a total of 9.9 miles in length, with 4.8 miles of bridging, including one over the AIWW, see Figure 6-3.

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

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

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

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

The proposed interchange with I-526 and Folly Road is a Single Point Urban Interchange (SPUI). The new interchange will carry the new roadway over Folly Road to connect to the existing James Island Connector, which currently terminates at Folly Road.

The estimated cost for Alternative B is $629 million in 2009 dollars.

Alternative B would have the most relocations, a total of 72 (60 residences, 10 businesses and 2 churches). Alternative B would directly impact five communities: Oakland, Barberry Woods, Cane Slash Road area, Tremont and Ellis Creek; it would be located in proximity (within 200 feet) of nine communities: Citadel Woods, Stone Creek, Battery Haig on the Stono River, Waterway South, Air Harbor, Whitney Lake, The Regatta, Quarterdeck, and the EME Apartments. Alternative B would have approximately 191 impacted noise receptors (147 residential and 44 commercial). Alternative B does not provide bicycle/pedestrian facilities because it was proposed as a controlled-access highway. Alternative B would impact one cemetery located on Johns Island.

Alternative B would impact 10 hazardous material sites.

Alternative B would impact one historic district, the Dill Historic District, in addition to one archaeological site. No historical structures would be impacted by Alternative B. Alternative B would impact three 4(f) resources: Dill Historic District, West Ashley Greenway and James Island County Park. The James Island County Park is also a 6(f) resource. For more information on impacts to 4(f) and 6(f) resources see Chapter 5 and Appendix C, Draft Section 4(f) Evaluation.

Alternative B passes through the Dill Sanctuary in the vicinity of documented nesting populations of the wood stork, a state and federally protected endangered species. Alternative B could potentially impact these nesting populations of wood stork through construction and traffic impacts.

Impacts within the right of way limits for Alternative B would fill 29.39 acres of wetlands. This alternative would cross the Stono River twice and 10 additional streams, impacting 1,095 feet of unbridged stream impacts. It would cross 126.07 acres of floodplains.
Chapter 6.
SCDOT's Recommended Preferred Alternative
Alternative C

Alternative C is a total of 7.4 miles in length, with 4.4 miles on structure, including one crossing of the AIWW, see Figure 6-4.

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

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

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

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

The estimated cost for Alternative C is $607 million in 2009 dollars.

Alternative C would have the second highest number of relocations, with a total of 53 (42 residences and 11 businesses). Alternative C would directly impact one community: Oakland; it would come within 200 feet of 11 communities: Citadel Woods, Stone Creek, Battery Haig on the Stono River, Waterway South, Air Harbor, Headquarters Plantation, The Preserve at Fenwick, West Woodland Shores, The Regatta, Quarterdeck, and the EME Apartments. Alternative C does not provide bicycle/pedestrian facilities because it was proposed as a controlled-access highway. Alternative C would have approximately 208 impacted noise receptors (160 residential and 48 commercial).

Alternative C would impact 10 hazardous material sites.

Alternative C would impact one historic district, the Fenwick Hall Historic District, in addition to one archaeological site. No historical structures would be impacted by Alternative C. Alternative C would impact two 4(f) resources: the Fenwick Hall Historic District and the West Ashley Greenway. For more information on impacts to 4(f) and 6(f) resources see Chapter 5 and Appendix C, Draft Section 4(f) Evaluation.

Impacts within the right of way limits for Alternative C would fill 17.21 acres of wetlands. This alternative would cross the Stono River twice and cross an additional 10 streams, impacting 874 feet of unbridged stream. It would cross 139.38 acres of floodplains.
Chapter 6. SCDOT’s Recommended Preferred Alternative

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

FIGURE 6-4
ALTERNATIVE C
Alternative D

Alternative D is approximately 7.9 miles in length, with 4.4 miles on structure, including one crossing of the AIWW. Spur A is an additional 2.7 miles in length with 1.3 miles on structure. Spur B is an additional 1.6 miles in length with 0.3 mile on structure, see Figure 6-5.

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

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

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

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

The estimated cost for Alternative D is $646 million in 2009 dollars (the second most expensive Reasonable Alternative).

Alternative D has a total of 51 relocations (39 residences, 11 businesses and one church) and would directly impact three communities: Oakland, Cane Slash Road area and Ellis Creek; it would come within proximity (within 200 feet) of 13 communities: Citadel Woods, Stone Creek, Battery Haig on the Stono River, Waterway South, Air Harbor, Headquarters Plantation, The Bend at River Road, The Commons at Fenwick, Tremont, Barberry Woods, The Regatta, Quarterdeck, and the EME Apartments. Alternative D does not provide bicycle/pedestrian facilities because it was proposed as a controlled-access highway. Alternative D would have approximately 180 impacted noise receptors (136 residential and 44 commercial).

Alternative D would impact 11 hazardous material sites.

Alternative D would impact one historic district, the Fenwick Hall Historic District. No historical structures would be impacted by Alternative D. Alternative D would impact three 4(f) resources: Fenwick Hall Historic District, West
Legend

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

FIGURE 6-5
ALTERNATIVE D
Ashley Greenway and James Island County Park. The James Island County Park is also a 6(f) resource. For more information on impacts to 4(f) and 6(f) resources see Chapter 5 and Appendix C, Draft Section 4(f) Evaluation.

Impacts within the right of way limits for Alternative D would fill 26.90 acres wetlands. This alternative would cross the Stono River twice and would cross an additional 19 streams, impacting 1,601 feet of unbridged streams. It would cross 187.05 acres of floodplains.

**Alternative E**

Alternative E is approximately 7.9 miles in length, with 4.4 miles on structure, including one crossing of the AIWW. Spur A is an additional 2.7 miles in length with 1.3 miles on structure, see Figure 6-6.

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

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

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

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

The estimated cost for Alternative E is $615 million in 2009 dollars.

Alternative E has a total of 50 relocations (38 residences, 11 businesses and one church) and would directly impact three communities: Oakland, Cane Slash Road area and Ellis Creek; it would come within proximity (within 200 feet) of 13 communities: Citadel Woods, Stone Creek, Battery Haig on the Stono River, Waterway South, Air Harbor, Headquarters Plantation, The Bend at River Road, The Commons at Fenwick, Tremont, Barberry Woods, The Regatta, Quarterdeck, and the EME Apartments. Alternative E does not provide bicycle/pedestrian facilities because it was proposed as a controlled-access highway. Alternative E would have approximately 174 impacted noise receptors (130 residential and 44 commercial). Alternative E would impact one cemetery located on Johns Island.
Alternative E would impact 10 hazardous material sites.

Alternative E would impact one historic district, the Fenwick Hall Historic District. No historical structures would be impacted by Alternative E. Alternative E would impact three 4(f) resources: Fenwick Hall Historic District, West Ashley Greenway and James Island County Park. The James Island County Park is also a 6(f) resource. For more information on impacts to 4(f) and 6(f) resources see Chapter 5 and Appendix C, Draft Section 4(f) Evaluation.

Impacts within the right of way limits for Alternative E would impact approximately 24.05 acres wetlands. This alternative would cross the Stono River twice and would cross an additional 15 streams, impacting 1,600 feet of unbridged streams. It would cross 164.07 acres of floodplains.
FIGURE 6-6
ALTERNATIVE E
**Alternative F**

Alternative F is a proposed four-lane parkway with a 15-foot wide raised planted median, multi-use path or bicycle lane, curb and a lower mainline design speed of 45 miles per hour. Alternative F is approximately 7.5 miles in length, with an additional 1.6 miles of connector roads, for a total length of 9.1 miles with 5.7 miles on structure including one over the AIWW. Connector A is a total of 0.8 mile in length with 0.5 mile on structure. Connector B is a total of 0.8 mile in length, see Figure 6-7.

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

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

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

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

The estimated cost for Alternative F is $495 million in 2009 dollars.
It has a total of 35 relocations, 28 residences, six businesses and one church. Alternative F would directly impact one community: Oakland; it would come within proximity (within 200 feet) of nine communities: Citadel Woods, Stone Creek, Battery Haig on the Stono River, Waterway South, Air Harbor, Laurel Park, The Regatta, Cane Slash Road area and the Quarterdeck. Alternative F does provide bicycle/pedestrian facilities. Alternative F would have approximately 142 impacted noise receptors (95 residential and 47 commercial). Alternative F would impact one cemetery located on James Island.

Alternative F would impact eight hazardous material sites and cross two power lines.

Alternative F would impact one historic district, the Fenwick Hall Historic District, and one archaeological site. Coordination with the State Historic Preservation Office (SHPO) determined that one historical structure, the Murray LaSaine Elementary School would be impacted by Alternative F. Alternative F would impact three 4(f) resources: Fenwick Hall Historic District, West Ashley Greenway and Murray-LaSaine Elementary School. For more information on impacts to 4(f) and 6(f) resources see Chapter 5 and Appendix C, Draft Section 4(f) Evaluation.

Impacts within the right of way limits for Alternative F would fill 15.85 acres of wetlands. This alternative would cross the Stono River twice, and would have 11 additional stream crossings impacting 409 feet of unbridged streams. It would cross 105.62 acres of floodplains.
Chapter 6.
SCDOT's Recommended Preferred Alternative

FIGURE 6-7
ALTERNATIVE F
Alternative G

Alternative G is a proposed four-lane parkway with design speeds of 45 miles per hour (mph) and posted speed of 35 to 45 mph. Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles with 4.5 miles on structure and one crossing of the AIWW. The remaining portions of the parkway will be at ground level, with a 15-foot wide raised planted median. A multi-use path would be included along the entire length of the roadway, see Figure 6-8.

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

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

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

On James Island, Alternative G continues east within the northern property line of the James Island County Park and then curves slightly to the south to avoid the park administration building. Alternative G then provides connections to the local road network at Riverland Drive, Riley Road and Up on the Hill Road. Alternative G would continue northeast to intersect with Folly Road at the James Island Connector. Intersection improvements include widening the existing right of way on Folly Road to accommodate additional turn lanes.

The estimated cost for Alternative G is $489 million in 2009 dollars.

Alternative G has the lowest number of potential relocations with a total of 26 (22 residences and four businesses). Alternative G would directly impact two communities: Oakland and Ellis Creek; it would come in proximity (within 200 feet) to nine communities: Citadel Woods, Stone Creek, Battery Haig on the Stono River, Waterway South, Air Harbor, Cane Slash Road area, the EME Apartments, The Regatta and the Quarterdeck. Alternative G would have 134 impacted noise receptors (86 residential and 48 commercial). Alternative G provides bicycle/pedestrian facilities.
Alternative G would impact eight hazardous material sites.

Alternative G would impact one historic district, the Fenwick Hall Historic District, and one archaeological site. Alternative G would impact three 4(f) resources: Fenwick Hall Historic District, West Ashley Greenway and James Island County Park. The James Island County Park is also a 6(f) resource. For more information on impacts to 4(f) and 6(f) resources see Chapter 5 and Appendix C, Draft Section 4(f) Evaluation.

Impacts within the right of way limits for Alternative G would impact approximately 17.43 acres of wetlands. This alternative would cross the Stono River twice and cross 17 additional streams, impacting 939 feet of unbridged streams. It would cross 132.13 acres of floodplains.
FIGURE 6-8
ALTERNATIVE G

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

Chapter 6.
SCDOT’s Recommended Preferred Alternative

Draft Environmental Impact Statement
Page 6-20
6.1.1 Comparison of Impacts for the Reasonable Alternatives

The following matrix summarizes the benefits and impacts of the Reasonable Alternatives. Table 6.1 - Part 1 provides a comparison of how well each of the Reasonable Alternatives meet the needs defined for the proposed project. Table 6.1 - Part 2 provides a comparison of the impacts that each of the Reasonable Alternatives would have on the human and natural environments.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to reduce congestion on existing roads</td>
<td>Yes/No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vehicle Miles of traffic (less than the No-build)</td>
<td>Miles, Average Daily</td>
<td>5,025,367</td>
<td>25,271</td>
<td>163,878</td>
<td>28,912</td>
<td>55,673</td>
<td>55,401</td>
<td>100,887</td>
<td>98,797</td>
</tr>
<tr>
<td>Vehicle Hours of traffic (less than the No-build)</td>
<td>Hours, Average Daily</td>
<td>127,420</td>
<td>6,284</td>
<td>9,314</td>
<td>6,976</td>
<td>8,176</td>
<td>7,372</td>
<td>8,866</td>
<td>6,946</td>
</tr>
<tr>
<td>Delay (less than the No-build)</td>
<td>Hours, Average Daily</td>
<td>23,024</td>
<td>4,294</td>
<td>4,627</td>
<td>4,580</td>
<td>5,550</td>
<td>5,085</td>
<td>5,433</td>
<td>5,020</td>
</tr>
<tr>
<td>Ability to increase safety on existing roads</td>
<td>Yes/No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of Segments Improved</td>
<td>Number of Segments</td>
<td>0</td>
<td>19</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>17</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Ability to improve regional mobility and system linkage</td>
<td>Yes/No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>West Ashley Trip Reduction (less than the No-build)</td>
<td>Average Trip length Minutes, Average Daily</td>
<td>21.4</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Johns Island Trip Reduction (less than the No-build)</td>
<td>Average Trip length Minutes, Average Daily</td>
<td>30.2</td>
<td>4.1</td>
<td>5.2</td>
<td>4.4</td>
<td>5.6</td>
<td>4.9</td>
<td>5.6</td>
<td>4.6</td>
</tr>
<tr>
<td>James Island Trip Reduction (less than the No-build)</td>
<td>Average Trip length Minutes, Average Daily</td>
<td>21.7</td>
<td>0.6</td>
<td>0.5</td>
<td>0.9</td>
<td>0.9</td>
<td>0.8</td>
<td>1.1</td>
<td>0.6</td>
</tr>
</tbody>
</table>

* No-build totals against which reasonable alternatives differences are measured.
### Table 6.1
Reasonable Alternatives Matrix - Part 2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Need &amp; Purpose</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Engineering Criteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Criteria</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Total Length</td>
<td>Miles</td>
<td>8.5</td>
<td>9.9</td>
<td>7.4</td>
<td>12.3</td>
<td>10.6</td>
<td>9.1</td>
<td>9.5</td>
</tr>
<tr>
<td>Mainline Miles</td>
<td>Miles</td>
<td>8.5</td>
<td>9.9</td>
<td>7.4</td>
<td>7.9</td>
<td>7.9</td>
<td>7.5</td>
<td>7.9</td>
</tr>
<tr>
<td>Spurs/Connectors Miles</td>
<td>Miles</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.4</td>
<td>2.7</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Length of Bridges</td>
<td>Miles</td>
<td>5.2</td>
<td>4.8</td>
<td>4.4</td>
<td>6.0</td>
<td>5.7</td>
<td>4.6</td>
<td>5.0</td>
</tr>
<tr>
<td>Mainline Miles</td>
<td>Miles</td>
<td>5.2</td>
<td>4.8</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.1</td>
<td>4.5</td>
</tr>
<tr>
<td>Spurs/Connectors Miles</td>
<td>Miles</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.6</td>
<td>1.3</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Stono River Crossings #</td>
<td></td>
<td>2222222</td>
<td>2222222</td>
<td>2222222</td>
<td>2222222</td>
<td>2222222</td>
<td>2222222</td>
<td>2222222</td>
</tr>
<tr>
<td>Construction Cost (Year 2009) $ Millions</td>
<td>$652</td>
<td>$629</td>
<td>$607</td>
<td>$646</td>
<td>$615</td>
<td>$495</td>
<td>$489</td>
<td></td>
</tr>
<tr>
<td>Bicycle and Pedestrian Facilities</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Natural Features</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetlands Total Acreage</td>
<td></td>
<td>167.01</td>
<td>145.54</td>
<td>146.70</td>
<td>161.72</td>
<td>154.98</td>
<td>108.04</td>
<td>106.17</td>
</tr>
<tr>
<td>Freshwater - Fill Acreage</td>
<td></td>
<td>11.70</td>
<td>26.71</td>
<td>12.66</td>
<td>21.32</td>
<td>18.49</td>
<td>14.87</td>
<td>14.11</td>
</tr>
<tr>
<td>Saltmarsh (Creel Area) - Fill Acreage</td>
<td>5.41</td>
<td>2.68</td>
<td>4.55</td>
<td>5.58</td>
<td>5.56</td>
<td>0.98</td>
<td>3.32</td>
<td></td>
</tr>
<tr>
<td>Total Wetland Fill Impacts Acreage</td>
<td>17.11</td>
<td>29.39</td>
<td>17.21</td>
<td>26.90</td>
<td>24.05</td>
<td>15.85</td>
<td>17.43</td>
<td></td>
</tr>
<tr>
<td>Stream Crossings - Total # of Crossings</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>15</td>
<td>11</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Stream Crossings - Unbridged # of Crossings</td>
<td>36</td>
<td>37</td>
<td>36</td>
<td>62</td>
<td>54</td>
<td>45</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Stream Crossings - Unbridged Impacts Linear Feet</td>
<td>574</td>
<td>1,095</td>
<td>874</td>
<td>1,601</td>
<td>1,600</td>
<td>409</td>
<td>939</td>
<td></td>
</tr>
<tr>
<td>Water Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outstanding Resource Waters</td>
<td># of Crossings</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>303(d) Impaired Sites # of Crossings</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>TMDLs required? Yes/No (Water Body)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Floodplains Acreage</td>
<td></td>
<td>149.39</td>
<td>126.07</td>
<td>139.38</td>
<td>187.05</td>
<td>164.07</td>
<td>105.62</td>
<td>132.13</td>
</tr>
<tr>
<td>Uplands (Weak only) Acreage</td>
<td></td>
<td>182.52</td>
<td>225.01</td>
<td>168.94</td>
<td>246.66</td>
<td>212.57</td>
<td>149.56</td>
<td>168.42</td>
</tr>
<tr>
<td>Critical Habitat Present/Not Present</td>
<td>Present</td>
<td>Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td></td>
</tr>
<tr>
<td>Threatened and Endangered Species (Upland and Biological Communities)</td>
<td>Present</td>
<td>Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td>Not Present</td>
<td></td>
</tr>
<tr>
<td>Affected/Not Affected</td>
<td>Affected</td>
<td>Affected</td>
<td>Not Affected</td>
<td>Not Affected</td>
<td>Not Affected</td>
<td>Not Affected</td>
<td>Not Affected</td>
<td></td>
</tr>
<tr>
<td>Essential Fish Habitat Yes/No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Justice # of EJ Block Groups*</td>
<td>55</td>
<td>44</td>
<td>45</td>
<td>44</td>
<td>45</td>
<td>44</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Disproportionate Yes/No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Community Impacts - Direct #</td>
<td>2513312</td>
<td>Oakland (WA), xxxxxxx</td>
<td>Ellis Creek (James) xxxxxxx</td>
<td>Barberry Woods (Johns) xxxxxxx</td>
<td>Cane Slash Road area (Johns) xxxxxxx</td>
<td>Tremont (Johns) xxxxxxx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Impacts - Proximity #</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>13</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Sec 4(f) Prop/Parks and Wildlife Refuges</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Dill Historic District</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenwick Hall Historic District</td>
<td>x</td>
<td>xxxxxxx</td>
<td>x</td>
<td>xxxxxxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>James Island County Park</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td></td>
</tr>
<tr>
<td>West Ashley Greenway</td>
<td>xxxxxxx</td>
<td>xxxxxxx</td>
<td>xxxxxxx</td>
<td>xxxxxxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murray-LaSaine Elementary School</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Sec 6(f) Prop/Parks and Wildlife Refuges</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>James Island County Park</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Historical Structures # (Direct or Visual)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Visual - Murray-LaSaine Elementary School</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Historical Districts #</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Dill Historic District</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Fenwick Hall Historic District</td>
<td>x</td>
<td>xxxxxxx</td>
<td>x</td>
<td>xxxxxxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archaeological Sites #</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total Noise Impacts #</td>
<td>180</td>
<td>191</td>
<td>208</td>
<td>180</td>
<td>174</td>
<td>142</td>
<td>134</td>
<td></td>
</tr>
<tr>
<td>Residential #</td>
<td>132</td>
<td>147</td>
<td>160</td>
<td>136</td>
<td>130</td>
<td>95</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>Commercial #</td>
<td>48</td>
<td>44</td>
<td>48</td>
<td>44</td>
<td>44</td>
<td>47</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Churches #</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Railroad Crossings #</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Power Line Crossings #</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hazardous Material Sites #</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>NRCS Farmland Conversion Evaluation Point Total</td>
<td>118</td>
<td>122</td>
<td>117.5</td>
<td>120</td>
<td>111</td>
<td>117.5</td>
<td>117.5</td>
<td></td>
</tr>
<tr>
<td>Infrastructure Impacts to Community Features</td>
<td>School(s) #</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fire/Police Stations #</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cemeteries #</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Railroad Crossings #</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Power Line Crossings #</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>


6.2 SCDOT’s Recommended Preferred Alternative

SCDOT selected Alternative G as the Recommended Preferred Alternative. Alternative G is the least expensive of the seven Reasonable Alternatives. Alternative G provides bicycle and pedestrian facilities and would provide enhancements and additional access to the James Island County Park and the West Ashley Greenway. Alternative G also has the lowest number of relocations and noise impacts. For detailed maps and renderings of Alternative G, see Figure 6-9 through Figure 6-13.

The following section provides a comparison of Alternative G to the other Reasonable Alternatives.

6.2.1 Why is Alternative G SCDOT’s Recommended Preferred Alternative?

Alternative G as compared to Alternative A:
Both Alternatives G and A meet the need and purpose of the proposed project. Alternative G showed a greater ability to reduce congestion on existing roads than Alternative A in all three categories: vehicle miles of travel (VMT), vehicle hours of travel (VHT) and delay. Alternative G’s ability to increase safety on existing roads was higher than Alternative A’s. Alternative G and Alternative A had the same results for two of the three categories which measured the alternatives ability to improve regional mobility (West Ashley and James Island). Alternative G improved Johns Island trip length more than Alternative A.

Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles. Alternative A is 8.5 miles in length with no additional spurs or connector roads. Alternative G would cost $489 million (in 2009 dollars) and Alternative A would cost $652 million. Alternative G provides bicycle and pedestrian facilities, Alternative A does not.

Alternative A impacts approximately 0.32 acre less of total wetlands than Alternative G. Alternative A impacts approximately 2.41 fewer acres of freshwater wetlands than Alternative G. Alternative A impacts approximately 2.09 more acres of critical area wetlands than Alternative G. Both alternatives cross the Stono River twice. Alternative G would not impact any threatened and endangered species, while Alternative A would potentially impact the nesting populations of the wood stork, a federally-endangered species.

Alternative G has three fewer potential relocations (26) than Alternative A (29). Both Alternative G and Alternative A would directly impact the same two communities. Both alternatives would come in proximity (within 200 feet) to nine communities. Alternative G and Alternative A do not impact any churches. Alternative G impacts 46 fewer noise receptors than Alternative A. Alternative G would impact 8 hazardous material sites, while Alternative A would impact 10.

Alternative G would impact one historic district and one archaeological site, Alternative A would impact two historic districts and two archaeological sites. Alternative G would impact three 4(f) resources while Alternative A would impact four. Both alternatives would impact the West Ashley Greenway and the James Island County Park. Because Alternative G is a parkway facility which provides a multi-use path for bicycle and pedestrian uses, enhancements to bicycle and pedestrian facilities at both locations would benefit the community. Additional improvements and access to the James Island County Park would create benefits for residents including improved access and additional bike paths linking to the park.
Alternative G and Alternative A do not impact any cemeteries or schools. Alternative G would cross two power line easements, while Alternative A would cross one.

**404 (b)(1) Guidelines**

Generally, the analysis of reasonable alternatives required for NEPA provides the information for the evaluation of “practicable” alternatives under the 404 (b)(1) Guidelines. The “overall” project purpose is used to determine whether “practicable” alternatives exist to a proposed project. According to 40 CFR 230.10(a)(2), “[a]n alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” No discharge of dredged or fill material will be permitted “if there is a practicable alternative to the proposed discharge that would have a less adverse impact on the aquatic ecosystem.”

**Alternative A - 404 (b)(1) Summary:**

Alternative A impacts approximately 2.41 fewer acres of freshwater wetlands than Alternative G. However, Alternative A crosses through the Dill Sanctuary in the vicinity of documented nesting populations of wood storks, a federally-endangered species. The selection of Alternative A would potentially impact these nesting populations of wood stork through construction and traffic impacts. Alternative A would relocate two additional residences, one additional business and impact an additional acre of saltmarsh. In addition, Alternative A would cost approximately $163 million dollars more than Alternative G. Taking into consideration cost and environmental consequences, Alternative A is less practicable than Alternative G.

**Alternative G as compared to Alternative B:**

Both alternatives meet the need and purpose of the proposed project. Alternative B showed a greater ability to reduce congestion on existing roads than Alternative G in all three categories: VMT, VHT and delay. Alternative G’s ability to increase safety on existing roads was higher than Alternative B’s. Alternative G and Alternative B had the same results for one of the three categories which measured the alternatives ability to improve regional mobility (West Ashley). Alternative G improved Johns Island trip length more than Alternative B, while Alternative B improved James Island trip length more than Alternative G.

Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles. Alternative B is 9.9 miles in length with no additional spurs or connector roads. Alternative G would cost $489 million (in 2009 dollars) and Alternative A would cost $629 million. Alternative G provides bicycle and pedestrian facilities, Alternative B does not.

Alternative B impacts approximately 11.96 acres more of total wetlands than Alternative G. Alternative B impacts approximately 12.60 acres more of freshwater wetlands than Alternative G. Alternative B impacts approximately 0.64 acres less of critical area wetlands than Alternative G. Both Alternatives A and G cross the Stono River twice. Alternat-
Alternative G would not impact any threatened and endangered species, while Alternative B would potentially impact the nesting populations of the wood stork, a federally-endangered species.

Alternative G has 46 fewer potential relocations (26) than Alternative B (72). Alternative G would directly impact two communities, while Alternative B would directly impact five communities. Alternative G would come in proximity (within 200 feet) to nine communities, while Alternative B would come in proximity (within 200 feet) to nine communities. Alternative G does not impact any churches. Alternative B would require the relocation of two churches, (Johns Island House of Prayer and Church of God of Prophecy). The relocation of these churches could present a challenge to the local minority and low-income population, as both of these churches serve those populations. Alternative G impacts 57 fewer noise receptors than Alternative B.

Alternative G would impact 8 hazardous material sites, while Alternative B would impact 10 hazardous material sites.

Both Alternative G and Alternative B would impact one historic district and one archaeological site. Both Alternative G and Alternative B would impact three 4(f) resources. Both Alternative G and Alternative B would impact the West Ashley Greenway and the James Island County Park. Because Alternative G is a parkway facility which provides a multi-use path for bicycle and pedestrian uses, enhancements to bicycle and pedestrian facilities at both locations would benefit the community. Additional improvements and access to the James Island County Park would create benefits for residents including improved access and additional bike paths linking to the park.

Alternative G does not impact any cemeteries, Alternative B would impact one cemetery. Neither Alternative G nor B would impact any schools. Alternative G would cross two power line easements, while Alternative B would cross one.

**Alternative B - 404 (b)(1) Summary:**
Alternative B impacts 0.64 fewer acre of saltmarsh than Alternative G. However, Alternative B has 12.60 acres more freshwater impacts than Alternative G. Alternative B crosses through the Dill Sanctuary, in the vicinity of documented nesting populations of wood storks, a federally-endangered species. The selection of the Alternative B would potentially impact these nesting populations of wood stork through construction and traffic impacts. Alternative B also relocates 38 additional residences, six additional businesses and two churches, for a total of 72 relocations – the highest of any of the reasonable alternatives. Alternative B also costs $140 million more than Alternative G. Taking into consideration cost and its environmental consequences, Alternative B is less practicable than Alternative G.
Alternative G as compared to Alternative C:
Both Alternatives G and C meet the need and purpose of the proposed project. Alternative G showed a greater ability to reduce congestion on existing roads, than Alternative C in two categories: VMT and delay. Alternative C performed better in VHT. Alternative G’s ability to increase safety on existing roads was better than Alternative C’s. Alternative G and Alternative C had the same results for one of the three categories which measured the alternatives’ ability to improve regional mobility (West Ashley). Alternative G improved Johns Island trip length more than Alternative C, while Alternative C improved James Island trip length more than Alternative G.

Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles. Alternative C is 7.4 miles in length with no additional spurs or connector roads. Alternative G would cost $489 million (in 2009 dollars) and Alternative C would cost $607 million. Alternative G provides bicycle and pedestrian facilities, Alternative C does not.

Alternative C impacts approximately 0.22 acre less of total wetlands than Alternative G. Alternative C impacts approximately 1.45 acres less of freshwater wetlands than Alternative G. Alternative C impacts approximately 1.23 acres more of critical area wetlands than Alternative G. Both Alternatives C and G cross the Stono River twice. Neither Alternative G or Alternative C would impact any threatened and endangered species.

Alternative G has 27 fewer potential relocations (26) than Alternative C (53). Alternative G would directly impact two communities, while Alternative C would directly impact one community. Alternative G would come in proximity (within 200 feet) to nine communities; Alternative C would come in proximity (within 200 feet) to 11 communities. Alternative G and Alternative C do not impact any churches. Alternative G impacts 74 fewer noise receptors than Alternative C. Alternative G would impact eight hazardous material sites, while Alternative C would impact 10 hazardous material sites.

Alternative G and Alternative C would impact one historic district and one archaeological site. Alternative G would impact three 4(f) resources, while Alternative C would impact two 4(f) resources. Both Alternative G and Alternative C would impact West Ashley Greenway and Fenwick Hall Historic District. Alternative G would impact the James Island County Park. Because Alternative G is a parkway facility which provides a multi-use path for bicycle and pedestrian uses, enhancements to bicycle and pedestrian facilities at the West Ashley Greenway and the James Island County Park would benefit the community. Additional improvements and access to the James Island County Park resulting from Alternative G would create benefits for residents including improved access and additional bike paths linking to the park.

Alternative G and Alternative C do not impact any cemeteries or schools. Alternative G would cross two power line easements, while Alternative C does not cross any.

Alternative C - 404 (b)(1) Summary:
Alternative C impacts approximately 1.45 fewer acres of freshwater wetlands than Alternative G. However, Alternative C crosses through more populated areas of James Island than Alternative G and relocates an additional 20 residences and seven businesses, for a total of 53 relocations – the second highest of the reasonable alternatives. It also has the highest number of noise impacts. In addition to impacts, Alternative C also costs $118 million more than Alternative G. Taking into consideration cost and its environmental consequences, Alternative C is less practicable than Alternative G.
Alternative G as compared to Alternative D:
Both Alternatives G and D meet the need and purpose of the proposed project. Alternative G showed a greater ability to reduce congestion on existing roads, than Alternative D in one of three categories: VMT. Alternative D performed better in VHT and delay. Alternative G’s ability to increase safety on existing roads was better than Alternative D’s. Alternative D performed better in the three categories which measured the alternatives ability to improve regional mobility (West Ashley, Johns Island amd James Island).

Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles. Alternative D is 7.9 miles in length with an additional 4.4 miles of spurs, for a total length of 12.3 miles. Alternative G would cost $489 million (in 2009 dollars) and Alternative D would cost $646 million. Alternative G provides bicycle and pedestrian facilities, Alternative D does not.

Alternative D impacts approximately 9.47 acres more of total wetlands than Alternative G. Alternative D impacts approximately 7.21 acres more of freshwater wetlands than Alternative G. Alternative D impacts approximately 2.26 acres more of critical area wetlands than Alternative G. Both Alternatives D and G cross the Stono River twice. Neither would impact any threatened and endangered species.

Alternative G has 25 fewer potential relocations (26) than Alternative C (51). Alternative G would directly impact two communities, while Alternative D would directly impact three communities. Alternative G would come in proximity (within 200 feet) to nine communities, Alternative D would come in proximity (within 200 feet) to 13 communities. Alternative G does not impact any churches. One church (Church of God of Prophecy) would be relocated under Alternative D. The relocation of this church could present a challenge to the local minority and low-income population, as this church has been identified as serving these populations. Alternative G impacts 46 fewer noise receptors than Alternative D. Alternative G would impact eight hazardous material sites, while Alternative D would impact 11 hazardous material sites.

Both Alternative G and Alternative D would impact one historic district and one archaeological site. Alternative G and Alternative D would impact three 4(f) resources. Both Alternative G and Alternative D would impact the West Ashley Greenway and the James Island County Park. Because Alternative G is a parkway facility which provides a multi-use path for bicycle and pedestrian uses, enhancements to bicycle and pedestrian facilities at both locations would benefit the community. Additional improvements and access to the James Island County Park resulting from Alternative G would create benefits for residents including improved access and additional bike paths linking to the park.


Alternative D - 404 (b)(1) Summary:
Alternative D would fill 21.32 acres of freshwater wetlands and 5.58 acres of saltmarsh, for the second highest total impacts on wetlands of all the Reasonable Alternatives. In addition, Alternative D has 51 relocations, almost twice as many as SCDOT’s Recommended Preferred Alternative; these relocations include the relocation...
of one church. Alternative D also impacted 180 noise impacts and the highest number of hazardous materials sites (11). It would cost $157 million more than Alternative G. Taking into consideration cost and its environmental consequences, Alternative D is less practicable than Alternative G.

**Alternative G as compared to Alternative E:**

Both Alternatives G and E meet the need and purpose of the proposed project. Alternative G showed a greater ability to reduce congestion on existing roads, than Alternative E in one of three categories: VMT. Alternative D performed better in VHT and delay. Alternative G’s ability to increase safety on existing roads was better than Alternative E’s. Alternative E performed better in all of the three categories which measured the alternatives ability to improve regional mobility (West Ashley, Johns Island and James Island trip length).

Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles. Alternative E is 7.9 miles in length with an additional 2.7 miles of spurs, for a total length of 10.6 miles. Alternative G would cost $489 million (in 2009 dollars) and Alternative E would cost $615 million. Alternative G provides bicycle and pedestrian facilities; Alternative E does not.


Alternative G has 24 fewer potential relocations (26) than Alternative C (50). Alternative G would directly impact two communities, while Alternative E would directly impact three communities. Alternative G would come in proximity (within 200 feet) to nine communities, Alternative E would come in proximity (within 200 feet) to 13 communities. Alternative G does not impact any churches. One church (Church of God of Prophecy) would be relocated under Alternative E. The relocation of this church could present a challenge to the local minority and low-income population, as this church was identified as serving these populations. Alternative G impacts 40 fewer noise receptors than Alternative E. Alternative G would impact eight hazardous material sites, while Alternative E would impact 10 hazardous material sites.

Both Alternative G and Alternative E would impact one historic district and one archaeological site. Alternative G and Alternative E would impact three 4(f) resources. Both Alternative G and Alternative E would impact the West Ashley Greenway and the James Island County Park. Because Alternative G is a parkway facility which provides a multi-use path for bicycle and pedestrian uses, enhancements to bicycle and pedestrian facilities at both locations would benefit the community. Additional improvements and access to the James Island County Park resulting from Alternative G would create benefits for residents including improved access and additional bike paths linking to the park.

Alternative E - 404 (b)(1) Summary:
Alternative E would fill 18.49 acres of freshwater wetlands and 5.56 acres of saltmarsh, for the third highest total impacts on wetlands of all the Reasonable Alternatives. In addition, Alternative E has 50 relocations, almost twice as many as the Recommended Preferred Alternative; these impacts include the relocation of one church. Alternative E also impacted 174 noise impacts and would cost $126 million more than Alternative G. Taking into consideration cost and its environmental consequences, Alternative E is less practicable than Alternative G.

Alternative G as compared to Alternative F:
Both Alternatives G and F meet the need and purpose of the proposed project. Alternative F showed a greater ability to reduce congestion on existing roads, than Alternative G in all of the three categories: VMT, VHT and delay. Alternative G and Alternative F had the same ability to increase safety on existing roads. Alternative F performed better in all of the three categories which measured the alternatives ability to improve regional mobility (West Ashley, Johns Island and James Island trip length).

Alternative G is 7.9 miles long, with an additional 1.6 miles of connector roads, for a total length of 9.5 miles. Alternative F is 7.5 miles in length with an additional 1.6 miles of connector roads, for a total length of 9.1 miles. Alternative G would cost $489 million (in 2009 dollars) and Alternative F would cost $495 million. Both Alternative G and Alternative F provide bicycle and pedestrian facilities.

Alternative F impacts approximately 1.58 acres less of total wetlands than Alternative G. Alternative F impacts approximately 0.76 acre more of freshwater wetlands than Alternative G. Alternative F impacts approximately 2.34 acres less of critical area wetlands than Alternative G. Both Alternatives F and G cross the Stono River twice. Neither Alternative G or Alternative F would impact any threatened and endangered species.

Alternative G has nine fewer potential relocations (26) than Alternative C (35). Alternative G would directly impact two communities, while Alternative E would directly impact one community. Both Alternative G and Alternative F would come in proximity (within 200 feet) to nine communities. Alternative G does not impact any churches. One church building of the Bethel AME Church would be relocated under Alternative F. The relocation of this church could present a challenge to the local minority and low-income population, as this church was identified as serving these populations. Alternative G impacts eight fewer noise receptors than Alternative F. Both Alternative G and Alternative F would impact eight hazardous material sites.

Both Alternative G and Alternative F would impact one historic district and one archaeological site. Alternative G and Alternative F would impact three 4(f) resources. Both Alternative G and Alternative E would impact the West Ashley Greenway. Because Alternative F and Alternative G are parkway facilities, which provides a multi-use path for bicycle and pedestrian uses, enhancements to bicycle and pedestrian facilities at the West Ashley Greenway would benefit the community. Additional improvements and access to the James Island County Park resulting from Alternative G would create benefits for residents including improved access and additional bike paths linking to the park.

Alternative G does not impact any schools. Alternative F would impact the Murray-LaSaine Elementary School, which is also a historic structure. Alternative F would impact one cemetery, Alternative G would not impact any cemeteries. Alternative G and Alternative F would each cross two power line easements.
Alternative F - 404 (b)(1) Summary:
Alternative F impacts 2.34 acres less saltmarsh than Alternative G. However, Alternative F has slightly more freshwater wetland impacts (0.76 acre). Alternative F relocates six additional residences, two additional businesses and one church, for a total of 35 relocations. Alternative F also impacts a cemetery on James Island. In addition to these impacts, Alternative F costs $6 million more than Alternative G. Taking into consideration its additional adverse environmental consequences, Alternative F is less practicable than Alternative G.
6.3 Section 404(b)(1) Guidelines

6.3.1 Did the alternatives analysis address the requirements of Section 404(b)(1) Guidelines?

As described in Chapter 1.4.2.1, the 404(b)(1) Guidelines outline four conditions that must be satisfied in order for USACE to make a finding that the proposed discharge (of dredged or fill material) complies with these guidelines. The analysis of the Reasonable Alternatives assists USACE in evaluating the first condition which states that USACE cannot issue a permit if the proposed discharge would have a practicable alternative which would have less adverse impact on the aquatic ecosystem as long as the alternative does not have other significant adverse environmental consequences.

When evaluating the proposed project, the study team took into consideration the 404(b)(1) Guidelines during the analysis of the Reasonable Alternatives (see Chapter 5, Existing Conditions and Consequences). Possible impacts to the aquatic ecosystem were included in the analysis, along with the evaluation of other environmental resources. The study team evaluated the range of alternatives in a preliminary alternatives analysis, which determined if the proposed alternatives meet the need and purpose of the project. In addition to the need and purpose, two environmental categories were also used to narrow the range of alternatives to a set of Reasonable Alternatives. Due to public comments, potential impact to the aquatic ecosystem was one of the environmental categories chosen to evaluate the range of alternatives. The six alternatives that were carried through the preliminary alternatives analysis to become Reasonable Alternatives had fewer impacts than the initial 36 alternatives evaluated. The Reasonable Alternatives were then evaluated in detail with respect to the various resources (which included the aquatic ecosystem). This thorough exploration and detailed analysis of the Reasonable Alternatives should lead USACE to clearly identify the “least damaging practicable alternative”.

The NEPA/404 Merger Process has allowed USACE to provide input throughout the project to ensure that the evaluation of the alternatives is sufficient to make a decision pertaining to the 404(b)(1) Guidelines. At the conclusion and signing of this EIS, USACE should have enough information to make an informed decision regarding permit issuance or denial.

6.4 Mitigation

6.4.1 What is mitigation?

The stated objective of the Clean Water Act is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” {33 U.S.C. 1251(a), CWA 101(a).} In order to achieve this goal, the Clean Water Act prohibits the discharge of dredged or fill material into waters of the U.S., including wetlands, without proper authorization. The Council on Environmental Quality (CEQ) has defined mitigation...
in 40 CFR 1508.20 to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time and compensating for impacts. When there is a proposed discharge or impact to waters of the U.S., all appropriate and practicable measures must be taken to first avoid and then minimize impacts. Only when impacts to aquatic resources cannot be avoided, will compensatory mitigation be utilized to offset impacts. Compensatory mitigation is provided on a case-by-case basis through the restoration, establishment, enhancement, or preservation of aquatic habitats.

Compensatory mitigation typically comes from three different forms:

- Mitigation banks;
- in-lieu fee mitigation; and
- permittee-responsible mitigation.

Where banks and in-lieu fee programs are established and maintained by third parties, permittee-responsible mitigation focuses the responsibility for the implementation and success solely on the permittee. Mitigation banks and in-lieu fee programs have always been evaluated on a larger scale with outside agency evaluation and input. Permittee responsible mitigation has not always had the benefit of such attention and in many cases, the success of this type of mitigation has not always fared as well as the third party mitigation.

On March 31, 2008, EPA and USACE announced new standards to promote no net loss of wetlands by improving wetland restoration and protection policies through the 2008 mitigation rule. The 2008 mitigation rule establishes performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu fee projects for activities authorized by Department of the Army (DA) permits. All types of mitigation are now required to include the same 12 fundamental components:

- objectives;
- site selection criteria;
- site protection instruments;
- baseline information;
- credit determination methodology;
- a mitigation work plan;
- a maintenance plan;
- ecological performance standards;
- monitoring requirements;
- a long-term management plan;
- an adaptive management plan; and
- financial assurances.
In accordance with the 2008 mitigation rule, the mitigation that is approved for a project must take into consideration which mitigation alternative is environmentally preferred, while considering the likelihood of success, risk, uncertainty, and temporal loss.

6.4.2 How have impacts of discharge on the aquatic ecosystem been avoided and/or minimized?

Development and Analysis of Alternatives
At the beginning of the project, new location alignments were initially developed to avoid wetlands within the study area to the greatest extent possible, while adhering to the preliminary design criteria. This was accomplished by using National Wetland Inventory mapping as the alternatives were being developed. All alternatives were evaluated at the same level to quantify the impacts. Since specific roadway designs had not been established at the time of this evaluation, some assumptions had to be made. For the preliminary alternatives analysis, all freshwater wetlands in the right of way were assumed to be impacted and all saltwater or critical area impacts were assumed to be bridged. Cost and impacts were based on these assumptions.

As the project progressed, the range of alternatives were evaluated through the preliminary alternatives analysis and the “Reasonable Alternatives” were determined. The waters of the U.S. were delineated in the field for the seven Reasonable Alternatives to better quantify the impacts to the aquatic environment. The study team used these new delineated saltmarsh and critical area lines to further develop the bridge locations and design of the Reasonable Alternatives to ensure the least amount of impacts. While specific design criteria and construction methodology will allow avoidance and minimization, this was not incorporated into the evaluation and design of the Reasonable Alternatives.

Additional Steps to minimize impacts
Wetland and stream impacts for the Reasonable Alternatives were based on a worst case scenario, assuming all freshwater wetlands and streams within the project corridor would be impacted. As the design of the SCDOT’s Recommended Preferred Alternative progresses, the project team will evaluate each wetland site and stream crossing to determine how impacts can be further minimized.

Roadway and bridge design efforts would attempt to avoid impacts to freshwater and tidal wetlands to the extent practicable. Proposed roadway development within the Stono River tidal wetlands would be constructed on an elevated structure above the wetlands to avoid fill impacts. Fill impacts would be limited to the piers of the elevated roadway. Similar avoidance and minimization strategies would be utilized in other segments of the proposed project, including wetlands associated with Pennys Creek and James Island Creek, where feasible and practicable. In addition, bridges would also be utilized where SCDOT’s Recommended Preferred Alternative crosses the Stono River.

Detailed hydraulic and hydrologic studies for each bridge crossing would be performed to determine the correct sizing of bridges and culverts. Bridges would be designed in an attempt to span the entire channel to be crossed, and avoid impacts to the waterway itself. Placement of piers and abutments as well a vertical and horizontal clearance restrictions would be evaluated during the design stage to determine potential waterway impacts and efforts would be made to minimize these impacts to the greatest extent practicable.
6.4.3 What compensatory mitigation would be performed?

The use of mitigation banks as the preferred method of providing compensatory mitigation has been described in 33 CFR 332.4(c)/40 CFR 230.92.4(c). It is anticipated that the SCDOT Huspa Creek Wetland Mitigation Bank in Charleston County would be the preferred mitigation alternative to provide mitigation to satisfy the CWA compensatory mitigation requirements.

Potential on site mitigation or permittee-responsible mitigation would also be considered for the proposed project. Approximately 12 areas within or adjacent to the direct impact area were previously identified by others as potential mitigation sites as part of the environmental studies performed for this project in 1995. At the time of this writing the potential feasibility/viability of these mitigation sites had not been reassessed.

According to 33 CFR 332.4(c), Permittee-Responsible Mitigation for Individual Permits responsibilities include:

• preparation of a draft mitigation plan and submit it to the District Engineer (DE) for review;
• preparation of a final mitigation plan, which must be approved by the DE prior to issuing the individual permit;
• the final mitigation plan must be incorporated into the individual permit by reference;
• the final plan must include the twelve components listed below;
• the level of detail of the plan should be commensurate with the impacts; and
• the DE may determine that it would be more appropriate to address any of the twelve components listed below as permit conditions, instead of components of a mitigation plan.

1. Objectives. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation, etc.) and how the anticipated functions of the mitigation project will address watershed needs.

2. Site selection. A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement and/or preservation at the mitigation project site.

3. Site protection instrument. A description of the legal arrangements and instrument including site ownership, that will be used to ensure the long-term protection of the mitigation project site.

4. Baseline information. A description of the ecological characteristics of the proposed mitigation project site, in the case of an application for a Section 404 permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s) and other characteristics appropriate to the type of resource proposed as compensation. The baseline information should include a delineation of waters of the U.S. on the proposed mitigation project site.

5. Determination of credits. A description of the number of credits to be provided including a brief explanation of
the rationale for this determination. For permittee-responsible mitigation, this should include an explanation of how
the mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting
from the permitted activity. The Charleston District USACE issued the Standard Operating Procedure Compensatory
Mitigation in September, 2002 to be used to determine the amount of mitigation credits required
for impacts to wetlands and waters. For permittees intending to secure credits from an approved mitigation bank or
in-lieu fee program, it should include the number and resource type of credits to be secured and how these were deter-
dined.

6. Mitigation work plan. Detailed written specifications and work descriptions for the mitigation project, including:
the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water; methods
for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil man-
agement; and erosion control measures. For stream mitigation projects, the mitigation work plan may also include
other relevant information, such as plan form geometry, channel form (e.g., typical channel cross-sections), watershed
size, design discharge and riparian area plantings.

7. Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the
resource once initial construction is completed.

8. Performance standards. Ecologically-based standards that will be used to determine whether the mitigation project
is achieving its objectives.

9. Monitoring requirements. A description of parameters monitored to determine whether the mitigation project is on
track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting
monitoring results to the DE must be included.

10. Long-term management plan. A description of how the mitigation project will be managed after performance
standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing
mechanisms and the party responsible for long-term management.

11. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other
components of the mitigation project, including the party or parties responsible for implementing adaptive manage-
ment measures.

12. Financial assurances. A description of financial assurances that will be provided and how they are sufficient to
ensure a high level of confidence that the mitigation project will be successfully completed, in accordance with its per-
formance standards. The DE may also require additional information as necessary to determine the appropriateness,
feasibility and practicability of the mitigation project *(Source: Preparation and Approval of Mitigation Plans,

Compensatory mitigation for impacts would be finalized during the permitting phase of the proposed project.
6.5 Other Project Mitigation

6.5.1 What Best Management Practices would be used to minimize pollutants in stormwater runoff?

Indirect impacts could occur to waters in the direct impact area resulting from stormwater runoff from the new impervious roadway surfaces.

Best management practices (BMPs) would be implemented as engineering controls on the roadway for stormwater runoff collection and treatment. BMPs that are installed along the roadway would help to minimize water quality impacts resulting from pollutants carried by roadway stormwater runoff. Continued maintenance of these stormwater BMPs would ensure that these controls are functioning properly for the protection of area waters.

The utilization of BMPs would help mitigate potential impacts to jurisdictional waters of the U.S. by avoiding impacts to jurisdictional areas. Temporary impacts to jurisdictional waters of the U.S. and adjacent lands associated with the construction activities would be mitigated by removal of temporary fill material and replanting disturbed areas with native tidal marsh and freshwater wetland plant species upon project completion, per Executive Order 13112 Invasive Species.

The roadway design would include the use of grassed shoulders and vegetated swales, where feasible to aid in the removal of sediments and nutrients from the stormwater runoff prior to discharge to waters in the vicinity of the proposed project corridor. Retention/detention basins also would be used in certain areas to provide an even greater sediment and nutrient removal from pollutant laden stormwater. Other BMPs could be implemented as necessary to ensure the treatment of stormwater runoff prior to discharging to receiving waters.

6.5.2 What measures were taken to avoid, lessen or mitigate impacts to historic resources by the proposed project?

Resources that are considered eligible but not listed on the NRHP are given the same consideration as those that are listed when determining potential effects by the project. During the development of alternatives, properties listed or eligible for listing on the NRHP were considered constraints and efforts were made to avoid these known resources.

Alternative G bridges archaeological site 38CH1146 over the non-contributing portions of the site. Impacts would be further reduced by requiring best construction practices to assure that further impact to the causeway does not occur.

6.5.3 What mitigation would be required for Section 4(f) Resources?

West Ashley Greenway

Mitigation for the direct use of the West Ashley Greenway would be coordinated with the City of Charleston’s Department of Parks through a Memorandum of Agreement to be included in the FEIS.
James Island County Park
Mitigation for the land converted and park amenities impacted would be coordinated with Charleston County Parks and Recreation Commission, through a Memorandum of Agreement to be included in the FEIS.

Fenwick Hall Historic District
Mitigation for the adverse affects by the project to the historic district would be coordinated with the State Historic Preservation Office through a Memorandum of Agreement to be included in the FEIS.

6.5.4 What mitigation would be required for the Section 6(f) Resource?
Mitigation for the land converted in the James Island County Park could consist of locating compensatory acreage, the purchase and enhancement of which would be coordinated with Charleston County Parks and Recreation Commission through a Memorandum of Agreement to be included in the FEIS.

6.5.5 What mitigation would be required for historic properties?
Mitigation for the adverse affects by the project to the Fenwick Hall Historic District would be coordinated with the State Historic Preservation Office through a Memorandum of Agreement to be included in the FEIS.

6.5.6 How would the use of energy resources be mitigated?
The locally consumed energy during the construction period is not expected to affect energy resources or fuel availability. However, measures to minimize energy consumption during construction could include limiting the idling of construction equipment and employee vehicles, as well as locating staging areas and material processing facilities as close as possible to work sites.

6.6 Construction
6.6.1 What types of bridge construction could be used for the proposed project?
Because of extensive marsh crossings and the challenges they present to bridge construction, the project team explored different construction methods that are available to minimize impacts on the marsh, while considering the overall cost of the project.

From the construction standpoint, the soft soils encountered in marsh environments do not support construction equipment, material delivery trucks or material storage. The soft soils also generally require very deep foundations to support bridge loads, such as bridge piers. These foundation elements require extra effort to install compared to similar foundations in firmer soil conditions and require larger equipment. The lack of suitable access points for construction generally means the contractor can only access the bridge from fewer locations than normal, complicating the logistics of equipment usage, material storage and delivery, and resulting in longer construction times.

Salt marshes are particularly sensitive environments and are susceptible to damage from construction activities. The
Silty soils of marshes are usually thick deposits of loosely placed material that will settle significantly under load. Marsh grasses only grow in a narrow band of soil elevation that produces tolerable water depths. If the soil is depressed too much the marsh grasses cannot grow, making the soil susceptible to erosion and further damage.

Building a bridge through a marsh or wetland environment has been accomplished in a number of different ways. Some of these methods are more cost effective by maximizing construction efficiency, while other methods will sacrifice some level of building efficiency to provide a lesser impact on the environment. Four typical methods to build a bridge over marsh are used in the state of South Carolina: causeway on temporary fill, causeway on barges (or pallets), temporary construction bridge and Top-Down construction.

The benefits, impacts and cost comparison of these methods are described in the following sections.

**Temporary Fill**

A method used to construct marsh bridges is to place soil fill on the marsh to create an embankment causeway alongside the bridge alignment. The causeway provides access for material delivery and support for cranes and other construction equipment. It typically extends from the nearest dry land or haul road. Once construction of the bridge is complete, the fill can be removed and the marsh can recover naturally. In most instances, a geotextile fabric is placed over the existing soils and the fill placed on top of the fabric thus allowing all of the fill material used to be removed leaving only native soils and preserving the vegetative root mass. In other instances the fill is placed directly on the native soils and the fill is removed later to the natural ground line. Since the latter example is more destructive to the marsh grasses, recovery is longer.

The contractor can work from multiple points along the bridge thereby allowing efficient utilization of work crews and equipment. Cranes, pile driving rigs, drilled shaft rigs and other large equipment can be supported. Soil conditions may not support as much weight as could be supported by barges so crane sizes may be somewhat limited. Also, material delivery along the causeway is generally by truck which does not have the weight-carrying efficiency of barge travel.

The environmental impacts of this construction method are essentially temporary. There would be is some consolidation of the native soils under the temporary fill and construction loads, so when the temporary fill is removed a depression would result. In past experiences with this type of construction in the Charleston area this depression has filled in naturally and the marsh environment returned rapidly.

This marsh construction technique has been utilized successfully in the Charleston area. It can be a cost effective
solution for bridges of moderate length and if the borrow material can be readily attained and shipped. It is geometrically flexible and so allows for structures of different types, lengths, interchanges on bridge etc. which are among the alternatives being considered.

**Barge Causeway**

Another method of creating construction access is to use floating barges or portable pallets placed over the marsh. Sometimes special construction barges designed to link together are placed side by side to produce a causeway. The construction process and material delivery are the same as for the causeway on temporary fill. Once construction is completed, the barges or pallets are easily removed from the site.

The construction aspects of this method are similar to the soil fill causeway. However, the barges can be placed somewhat more rapidly than soil fill and moved easily. Therefore they are more temporary and can be moved quickly, and they are often used sequentially within a project, which is an economical plus. Barges will likely have a higher initial cost and lead time than an earthen causeway and so may be more suitable for shorter structures.

Marsh damage caused by the mats will be similar to placing soil fill, but is generally considered somewhat less damaging to the environment. There may be settlement and disturbance of the marsh soils underneath the barge causeway. Since barges or pallets generally are reused, they occupy the marsh for much shorter durations and are less detrimental than the soil option for a given causeway road width. Barges or pallets have vertical sides and occupy less marsh, whereas soil must be placed on slope in order to be stable. The marsh damage is temporary as with the soil option.

The barge/pallet option has been used in the Charleston area on portions of the James Island Connector construction. The solution is cost effective and flexible.

**Construction Bridge**

Another method of creating the construction causeway is to use a temporary bridge. In this method a pile supported trestle bridge is constructed alongside the bridge alignment. One version of this bridge system consists of structural steel piles supporting a structural steel superstructure with a timber deck. A second option is to use a rail system rather than a deck system and use specially built travelers that ride on the rails. Once permanent construction is completed, the construction bridge system is removed.

Like the previous barge causeway option, the construction bridge allows for construction at multiple points along the bridge and flexible and efficient management of construction resources. This method will require more construction
time than the previous causeway options in that construction of the temporary bridge will have to be completed, or nearly so, before permanent bridge construction can begin. Another disadvantage in scheduling is that these systems might be “one-way” (as in the rail system) so construction advancement is affected. This system will also cost more than the previous options (causeway on temporary fill, causeway on barges) for steel components, structural design and fabrication unless a particular contractor is able to reuse a system from another project. Depending on the bridging method used, the system is very flexible allowing for the construction of interchanges, bridges of differing widths and structure types and can follow virtually any alignment.

The damage to the marsh environment from this system is significantly less than the previous two methods (causeway on temporary fill, causeway on barges). The only point of contact between the construction bridge and the marsh is at the piles. Depending on the details of the construction bridge, the marsh grasses underneath the bridge may be slightly adversely affected by being shaded during the construction period. This impact will still be significantly less than that from placing fill or the use of barges on the marsh surface.

Construction bridges were utilized on portions of the James Island Connector construction where a rail system was used and sections of the Cooper River Bridge where a deck system was used. The system is low impact and flexible but more costly than some of the other options.

**Top-Down Construction**

To create the absolute minimum marsh impact the permanent bridge would have to be built without any of the construction causeway access methods described above. The method that accomplishes that is termed “Top-Down” or “End-On” construction. In this method all construction activities are performed using completed portions of the permanent bridge. This can be accomplished by different methods. One is to support all of the construction activities on the permanent bridge deck system which has been placed earlier. Another is to develop construction-works that span the permanent foundation elements and support construction equipment without loading into the permanent deck and beams. A variant of this method is to construct the bridge on land and push it into...
position on a specially designed roller system, which is referred to as launching. Launching is more difficult for long or complex bridges, and rarely used due to increased cost.

There is also a system known as “Modified Top-Down” construction that is a hybrid between top down and the construction bridge method. In this situation, the Contractor uses a temporary trestle system with rails on either side of the permanent bridge alignment. Construction equipment is supported on travelers that ride on the rails. As construction progresses, the permanent bridge can also be used as additional construction access and to provide material supply. Depending on the length of the bridge under construction, the temporary trestle system may be built the entire length of the permanent bridge alignment or it may be shorter and moved along the alignment as construction progresses.

Top-Down construction methods present significant challenges to construction compared to other methods. Top-Down methods often require a significant initial cost to the contractor for the fabrication of the specialized advancing systems. Advancing the construction for longer bridges is totally dependent on the permanent bridge element’s ability to carry load, since the constructed bridge is used to supply materials to the leading edge of construction. Piles in marsh soils require a set up time that varies from a few to many days, and that set up time can dramatically influence construction time and piling costs. Also, construction is focused at only one area at a time so if construction problems arise, there is no opportunity to refocus work on another portion of the bridge while a solution is implemented. For these reasons, Top-Down construction tends to be slower than other options. Additionally, Top-Down methods are best suited to relatively straight, constant width structures. Varying widths, heights, structure types, interchanges provide complexities that may render Top-Down methods either unusable or prohibitively expensive.

6.6.2 Which type of bridge construction is recommended, based on cost and impacts?

Choosing the environmentally correct construction method that best compromises between protection of the marsh environment and the construction cost and schedule, is a complicated endeavor dependent on a number of factors. The impressed construction schedule, bridge layout and complexity, material costs, soil conditions, and even contracting methods must be compared against marsh mitigation requirements, benefits and costs.

All of the studied alignments for this project will have several relatively small segments of marsh bridge construction that are spread out over the entire project. The largest stretch assumed to require bridging would be a little over a mile, with the other stretches being about half a mile or less. This aspect of multiple smaller sites favors using construction causeways by barges/pallets or a construction bridge. Placing, removing, storing and then replacing temporary fill at multiple sites would make using the temporary fill option less cost and time effective. Top-Down methods are not particularly suitable for this project due to the multiple bridges and the need to set up and break down the construction system at each site.

For bridges that have intersections on structure, like the Recommended Preferred Alternative, Top-down construction methods are very cumbersome and not generally suitable due to the variations in deck geometry and the multiple bridge alignments. All three causeway options would have more flexibility to handle complex bridge geometry (T-intersections and interchanges) much more cost and time effectively.
Construction schedule will also affect which construction method is the most advantageous. A tight schedule will favor barge causeways as they would be most likely able to mobilize to the different sites rapidly. Longer schedules would allow a construction bridge since it is more slowly developed.

There is no consensus from other projects of this nature. Main Road over the Stono River, portions of the Cooper River Bridge, and portions of the James Island Connector were constructed using temporary construction bridges. The James Island Connector also used barge/pallets, and a portion was Top-Down. The Maybank Highway over Stono River was constructed using a combination of temporary fill and barges and portions of the Cooper River Bridge were constructed using temporary fill.

The Mark Clark Expressway necessitates cost effectiveness, flexibility with multiple bridge sites, alignment curvature, intersections on structure and minimization of marsh impacts. Considering these constraints, using a causeway on temporary fill or barges/pallets would prove most effective.

### 6.6.3 How would water quality impacts be minimized during construction?

SCDOT and FHWA guidelines on the use of best management practices (BMPs) would be followed during construction activities to minimize sediment and erosion impacts.

The use of BMPs during construction would be the primary method of minimizing water quality impacts during roadway construction. Exposed soils and sediments would occur during earth-working activities, increasing the potential for erosion and sedimentation impacts. Accidental releases of petroleum and/or hydraulic fluids from construction equipment could also contribute to water quality impacts. Information on stormwater management practices and erosion and sediment control techniques are available in The South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activities. Examples of BMPs that would be considered during construction include the following:

- use of filter fabric sediment and erosion control fencing around areas of exposed soils;
- limited clearing and grubbing of vegetation;
- stabilization of stockpiled soils;
- use of sediment basins;
- use of diversion swales to direct stormwater runoff to sediment basin BMPs; and
- use of rock check dams.

The contractor would be responsible for ensuring that construction BMPs are in place, functional and maintained during earth working activities. The contractor would also ensure that the project is in compliance with South Carolina Department of Health and Environmental Control’s (SCDHEC) Environmental Protection and Water Pollution Control as described in the South Carolina Highway Department Standard Specifications for Highway Construction. The project would also need to be in compliance with all current federal and state water quality and stormwater management regulations.