Chapter 3: Alternatives Analysis

3.0 Alternatives Analysis

This chapter provides an analysis of the various alternatives evaluated during the development of the project. These alternatives included the No Build Alternative, which consists of South Carolina Department of Transportation (SCDOT) making no improvement to the US 278 corridor. The No Build Alternative is used as the baseline for comparison of the Build Alternatives. Input received during the public involvement process, including input from stakeholders and agencies, were incorporated throughout the development of the alternatives.

The alternative analysis follows the three step process presented below.

Step 1: Identify and Screen Preliminary Range of Alternatives

Alternatives are developed based on evaluation of the corridor and input from the public, state and federal agencies. Table 3-1 shows how the alternatives were assessed based on the evaluation criteria.

Table 3-1 Preliminary Range of Alternatives Screening Criteria

Evaluation Criteria		Data Source
Meets Structural Deficiency Portion of Purpose & Need	Address Structural Deficiencies to eastbound over Mackay Creek	SCDOT Design Criteria
GIS Based Wetlands	Freshwater	Proprietary GIS layer developed by project team. Data sources include U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), U.S. Geological Survey (USGS), National Hydrography Dataset (NHD), Natural Resources Conservartion Service (NRCS), Soil Survey Geographic database (SSURGO), South Carolina Department of Natural Resoures (SCDNR) lidar, and aerial imagery
	Critical Area	
	Total Wetlands	
Right-of-Way Impacts (# of parcels)	# of Tracts	Beaufort County Tax Map Data
	Acres	
Neighborhoods	# of Neighborhoods	Beaufort County Neighborhood Data
	Names	
Protected Lands	# of Tracts	USGS Protected Areas Database (PAD-US), National Conservation Easement Database (NCED)
	Acres	
Consistent with Pinckney Island National Wildlife Refuge (PINWR) Purposes	Consistent or Potentially Consistent or Not Consistent	Coordination with USFWS

If a Preliminary Alternative is unable to meet the criteria above, then it is considered not practicable or feasible. The alternatives that meet the screening criteria are identified as Proposed Reasonable Alternatives.

Step 2: Identify & Detail Impact Evaluation of the Proposed Reasonable Alternatives

The Preliminary Alternatives that best meet the criteria above (as well as public and agency input) are carried forward as the Proposed Reasonable Alternatives. Table 3-2 shows the criteria for the evaluation of the proposed Reasonable Alternatives.

Table 3-2 Reasonable Alternatives Screening Criteria

Evaluation Criteria		Data Source
Meets Overall Purpose & Need	Address Structural Deficiencies at Eastbound Mackay Creek	Phase I Traffic Report
	Reduce Congestion - decreasing travel delay relative to 2045 No Build during peak traffic hours	
Level of Service (LOS)	Squire Pope Road at US 278	Phase I Traffic Report
	Spanish Wells Road at US 278	
Delineated Wetlands	Freshwater	Proprietary GIS layer developed by project team. Data is based on project team technical expertise and fieldwork.
	Critical Area	
	Total Wetlands	
Floodplains	Acres	Beaufort County Floodplains Data
Relocations	# of Buildings	Beaufort County Tax Map Data
Environmental Justice	# of Impacts	
Right-of-Way	#of Tracts, Acres to be Purchased	Beaufort County Tax Map Data
Neighborhoods	# of Neighborhoods	Beaufort County Neighborhood Data
Private/Public/Protected Lands, Parks or Mitigation Sites	# of Tracts, Acres	USGS PAD-US, NCED
Consistent with PINWR Purposes	Less Consistent, Consistent, More Consistent	Coordination with USFWS
Threatened & Endangered Species	TBD by Biological Evaluation	Biological Evaluation and technical expertise and fieldwork, coordination with USFWS
Shellfish Harvesting Waters	Acres	South Carolina Department of Health and Environmental Control (SCDHEC)
Essential Fish Habitat (EFH)	EFH Type, # of Acres	EFH Assessement and technical expertise and fieldwork, coordination with National Oceanic and Atmospheric Administration (NOAA) Fisheries
Cultural Resources	# of Sites, Structures, and/or Properties	Cultural Resources Survey and technical expertise and fieldwork, coordination with SHPO/THPOs and USFWS
Noise	# of Impacted Properties	Noise Analysis, FHWA Noise Regulations, and SCDOT Noise Abatement Policy
Hazardous Materials	# of Sites	Phase I Environmental Site Assessment
Meets Current Seismic Design Standards	# of Structures	SCDOT Seismic Design Specifications
Construction Duration	Years	Project engineers and SCDOT support staff
Utilities	# of Impacts	Coordination with utility companies
Estimated Construction Cost	Cost	Project engineers and SCDOT support staff

Step 3: Recommended Preferred Alternative

The Proposed Reasonable Alternative that best balances the potential impacts to the human and natural environment will be recommended as the Preferred Alternative.

3.1 Preliminary Range of Alternatives

Several methods were used to identify the Preliminary Range of Alternatives. These methods included coordination with SCDOT, the project team, and stakeholders; as well as consideration of public comments gathered during the public information meetings. A wide range of alternatives have been developed and analyzed to determine compatibility with the project's purpose and need to repair the structurally deficient bridge over Mackay Creek. Nineteen preliminary alternatives, assuming three lanes in each direction, have been developed, including:

- No Build
- Transportation System Management/Transportation Demand Management (TSM/TDM)
- Mass Transit
- Build Alternatives

Table 3-3 summarizes the screening of the Preliminary Range of Alternatives and the details are included in sections 3.1.1. through 3.1.4.

Table 3-3 Preliminary Range of Alternatives Summary

Evaluation Criteria		No Build	TSM/ TDM*	Mass Transit*	Alt 1	Alt 2	Alt 3A	Alt 3B	Alt 4A	Alt 4B	Alt 4C	Alt 4D	Alt 4E	Alt 4F	Alt 5A	Alt 5B	Alt 6A	Alt 6B	Alt 6C	Alt 6D	Alt 6E	Alt 7	Alt 8
Addresses Structural Deficiencies to EB over Mackay Creek	Yes or No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GIS Based Wetlands	Freshwater	0	0	0	1.2	3.3	3	3.8	3.4	4.6	2.5	2.8	2.4	0.6	12.8	1.1	15.1	8.4	1.8	5.8	5.9	8	7.4
	Critical Area	0	0	0	29.4	44.9	37.4	78.9	49.2	67.6	40.5	37.2	37.9	44.8	78	94.3	92.3	92.6	86.2	116.5	116.3	58.7	46.1
	TOTAL Wetlands	0	0	0	30.6	48.2	40.4	82.7	52.6	72.2	43	40	40.3	45.4	90.8	95.4	107.4	101	88.1	122.3	122.2	66.7	53.5
Right-of-way Impacts	# of Tracts	0	0	0	30	124	124	131	130	131	143	132	130	126	97	47	166	120	133	83	58	81	84
	# of Acres	0	0	0	29	82.3	79.9	97.5	86.8	101.7	89	88.4	86.1	57.5	128.2	55.9	162.5	98.3	97.9	109.6	87.2	108	110.2
Neighborhoods	# of Neighborhoods Impacted	0	0	0	3	7	7	7	7	7	7	7	7	5	6	6	8	10	10	11	7	7	8
Protected Lands	Yes or No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
	# of Tracts	0	0	0	1	5	5	5	5	5	5	5	5	4	4	3	2	0	0	2	3	5	5
	# of Acres	0	0	0	14.8	36.9	32.8	47.7	37.8	49.5	33.9	35.6	34.3	10.9	80.7	72.2	31.2	0	0	48.3	59.7	54.4	54.9
Consistent with PINWR Purposes **	Consistent or Potentially Consistent or Not Consistent	C	C	C	C	C	PC	C	PC	PC	PC	PC	PC	PC	NC	NC	C	C	C	C	C	PC	PC
Carried Forward to Reasonable	**Yes or No**	**Yes**	**No**	**No**	**No**	**Yes**	**Yes**	**No**	**Yes**	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**Yes**
Reasonable Alternative	RA #	No Build				RA 1	RA 2		RA 3			RA 4										RA 5	RA 6

3.1.1 No Build

Under the provisions of National Environmental Policy Act (NEPA), the effects of not implementing the proposed action must also be considered. The No Build alternative provides a baseline for comparing potential benefits and environmental impacts with the other alternatives. Analysis of the No Build alternative must discuss the existing conditions as well as what would be reasonably expected to occur in the foreseeable future if the proposed project is not constructed. The existing condition of the system is discussed in Chapter 1 of the Environmental Assessment (EA). For example, the No Build alternative must include transportation projects that can reasonably be expected to be in place for the design year. Reasonably foreseeable projects typically come from the fiscally constrained list of projects in the Statewide Transportation Improvement Program (STIP) and in the local metropolitan planning organization (MPO) long-range plan, as well as other programming documents from the municipalities in which the project occurs. Though the No Build alternative would not meet the purpose and need of the project, it will be carried forward as it provides the foundation for comparing the benefits and environmental impacts of the other alternatives.

3.1.2 Transportation System Management and Transportation Demand Management

Transportation System Management (TSM) and Transportation Demand Management (TDM) options include measures that improve efficiency and safety through lower cost improvements. Examples of TSM options include signal timing improvements, additional turn lanes, and/or adding high occupancy vehicle lanes. TDM focuses on reducing travel demand by decreasing the number of vehicle miles traveled on a roadway or redistributing this demand in space or time to decrease system deficiency. Employers could also support non-standard work hours or telecommuting options for employees. A detailed analysis was completed for a reversible lane scenario and determined that it should not be considered for the proposed project, refer to Appendix C.

Given the US 278 Corridor's current and future LOS, as well as the safety concerns throughout the corridor, TSM/TDM improvements are not sufficient to adequately improve the corridor and meet the purpose and need as a standalone alternative. TSM/TDM also does not address the structural deficiency of the eastbound Mackay Creek bridge. A shift in commuter behavior is required throughout the region for TDM activities to be successful. As such, the TSM/TDM alternative is eliminated as a single solution to satisfy the purpose and need of the project. The preferred alternative could incorporate elements of TSM/TDM strategies.

3.1.3 Mass Transit

According to the FHWA Technical Advisory 6640.8A: Guidance for Preparing and Processing Environmental and Section 4(f) documents, a mass transit alternative should include those reasonable and feasible transit options (bus systems, rail, etc.) even though they may not be within the existing FHWA funding authority. Mass transit alternatives should be considered on all proposed major highway projects in urbanized areas with a population greater than 200,000. While consideration of this alternative may have been accomplished by referencing the Lowcountry Area Transportation Study (LATS) Long Range Transportation Plan, its aging status and scheduled update lead the study team to conduct an independent analysis during project development.

The mass transit alternatives that will be evaluated in this analysis include fixed route bus transit and demand response transit services. A corridor can be defined as an overall travel shed or travel demand market area that uses a common set of transportation facilities (freeway, arterials, transit lines, etc.) to reach a common general destination.

For this study, the common general destinations are the areas of dense employment in the study area, being the City of Beaufort, Town of Bluffton and the Town of Hilton Head Island. The major employers include:

- SERG Group Restaurants;
- Sea Pine Resort;
- Hilton Head Regional Medical Center;
- Marriott Vacation Club International;
- Beaufort County School District; and
- Cypress Club, Inc.

Mass transit was introduced as an alternative of interest for local citizens. Viewed as an alternative to new construction in terms of cost and impacts, mass transit was suggested in eight comments (out of 340 comments) during the first public information meeting and comment period.

During the second public information meeting in Fall 2018 where reasonable alternatives were presented, the public had the opportunity to learn about the Build Alternatives and the other alternatives to be considered in this EA, which included a mass transit alternative. During this public comment period, four comments (out of 103) supported the mass transit alternative.

Palmetto Breeze, formally known as the Lowcountry Regional Transportation Authority provides the majority of existing transit service in the counties of Allendale, Colleton, Hampton, Jasper and Beaufort. In addition to Palmetto Breeze, a number of local human service agencies provide transportation services geared toward the general public, the elderly and disabled. Many private transportation and taxicab companies offer personalized transportation services as well.

Palmetto Breeze has historically focused on bringing rural residents to jobs in Beaufort County via fixed route commuter lines taking commuters to their workplaces in the morning and returning them to their residential communities in the evening. Local funding is provided by the five member counties with most of the contributions coming from Beaufort County and the Town of Hilton Head Island.

Palmetto Breeze also provides demand response service in Beaufort County. Reservations must be made at least one day in advance. This service is available for all residents and visitors and most vehicles are equipped with wheelchair lifts. Palmetto Breeze operating hours are from 4:30 am to 8:00 pm, Monday through Sunday. Palmetto Breeze offers fixed bus routes to and from locations in Allendale, Beaufort, Colleton, Hampton, and Jasper Counties to Hilton Head Island.

Mass transit was not moved forward as a standalone alternative due to the inability to address the structural deficiences at the eastbound Mackay Creek bridge, low public interest, and relative availability of Palmetto Breeze.

3.1.4 Preliminary Alternatives

Improving the existing US 278 Corridor from Moss Creek Drive to Wild Horse/Spanish Wells Road is proposed to accommodate the current and future vehicular demands, as well as population and employment increases. Nineteen alternatives were developed that consider improvements to the existing US 278 Corridor, refer to Figures 3-1 through 3-19.

Figure 3-1 Alternative 1

Alternative 1 - A partial alternative from Moss Creek Drive to Pinckney Island. Alternative 1 is eliminated because it is similar to Alternative 2, which provides a full corridor improvement option.

Figure 3-2 Alternative 2

Alternative 2 - Uses the existing alignment as much as possible and provides a new eastbound bridge to the south of the existing Mackay Creek bridge. Alternative 2 is carried forward as Reasonable Alternative 1.

Figure 3-3 Alternative 3A

Alternative 3A - Provides a new eastbound bridge to the north of the existing Mackay Creek bridge. Alternative 3A is carried forward as Reasonable Alternative 2.

Figure 3-4 Alternative 3B

Alternative 3B - Proposes a new bridge to the north of the transmission lines and the existing US 278 corridor. Alternative 3B is eliminated because it is similar to Alternative 3A but with higher impacts.

Figure 3-5 Alternative 4A

Alternative 4A - Provides a new eastbound bridge to the south of the existing Mackay Creek bridge and adds a new eastbound bridge to the south of the existing Skull Creek bridge. Alternative 4A is carried forward as Reasonable Alternative 3.

Figure 3-6 Alternative 4B

Alternative 4B - Provides a new eastbound bridge to the south of the existing Mackay Creek bridge and the boat landing on Pinckney Island. Also adds a new eastbound bridge to the south of the existing Skull Creek bridge. Alternative 4B is eliminated because it is similar to Alternative 4A but with higher impacts.

Figure 3-7 Alternative 4C

Alternative 4C - Proposes to replace the existing Mackay Creek and Skull Creek bridges with a new 6-lane bridge to the south of the existing corridor. Alternative 4C is eliminated because it is similar to Alternative 4D but with higher impacts.

Figure 3-8 Alternative 4D

Alternative 4D - Similar concept as Alternative 4C but is modified to be closer to the existing corridor. Alternative 4D is carried forward as Reasonable Alternative 4.

Figure 3-9 Alternative 4E

Alternative 4E - Similar to Alternative 4D but crosses Pinckney Island further south. Alternative 4E is eliminated because it is similar to Alternative 4D but access to Pinckney Island is not improved and this alternative would incur increased maintenance costs in the future..

Figure 3-10 Alternative 4F

Alternative 4F - Similar to Alternative 4D but completely avoids Pinckney Island to the south. Alternative 4F is eliminated because access to PINWR is not improved and it would incur increased maintenance costs in the future.

Figure 3-11 Alternative 5A

Alternative 5A - Most northern alignment with a new interchange at Squire Pope/Spanish Wells Road. Alternative 5A is eliminated due to high impacts.

Figure 3-12 Alternative 5B

Alternative 5B - Similar to Alternative 5A but uses more of the existing US 278 corridor with a new interchange at Cross Island Parkway. Alternative 5B is eliminated due to high impacts.

Figure 3-13 Alternative 6A

Alternative 6A - Most southern alignment with a new interchange at Burnt Church Road and Cross Island Parkway. Alternative 6A is eliminated due to high impacts.

Figure 3-14 Alternative 6B

Alternative 6B - Starts near Moss Creek Drive and ties into Bluffton Parkway to the south of the existing corridor with a new interchange at Cross Island Parkway. Alternative 6B is eliminated due to high impacts.

Figure 3-15 Alternative 6C

Alternative 6C - Similar to Alternative 6B but with a different interchange at Cross Island Parkway. Alternative 6C is eliminated due to high impacts.

Figure 3-16 Alternative 6D

Alternative 6D - Starts near Moss Creek Drive and ties into Bluffton Parkway to the south of the existing corridor and ties into the Cross Island Parkway near US 278. Alternative 6D is eliminated due to high impacts.

Figure 3-17 Alternative 6E

Alternative 6E - Starts near Moss Creek Drive and ties into Bluffton Parkway to the south of the existing corridor and ties into the Cross Island Parkway near US 278. Alternative 6E is eliminated due to high impacts.

Figure 3-18 Alternative 7

Alternative 7 - Similar to Alternative 4A through Pinckney Island and Hog Island, then routes through a power line easement on Jenkins Island to a new interchange at Cross Island Parkway. Alternative 7 is carried through as Reasonable Alternative 5.

Figure 3-19 Alternative 8

Alternative 8 - Combination of Alternative 4A and Alternative 7. Alternative 8 is carried forward as Reasonable Alternative 6.

3.2 Proposed Reasonable Alternatives

Based on the screening previously described in section 3.1, the following alternatives are identified as Proposed Reasonable Alternatives (RA):

- No Build
- Existing Corridor Improvements:
  - RA 1
  - RA 2
  - RA 3
  - RA 4
  - RA 5
  - RA 6

The Preliminary Range of Alternatives and the Proposed Reasonable Alternatives were presented to the public at a Public Information Meeting on September 19, 2019. Based on input received from the public and agencies, the Proposed Reasonable Alternatives were revised at three main locations.

Pinckney Island National Wildlife Refuge - Coordination with USFWS regarding the six Proposed Reasonable Alternatives resulted in a revision to Alternative 4 that moved the proposed interchange on PINWR closer to the existing US 278 Corridor. This revision resulted in a new alternative, Alternative 4A, refer to Figure 3-20.

Figure 3-20 Reasonable Alternatives 4 & 4A at PINWR

Hog Island - All of the Proposed Reasonable Alternatives, except for Alternative 5, were revised to provide more efficient ingress/egress to properties on Hog Island. In addition, the revised Hog Island access allows for improved maintenance of traffic during construction. Figure 3-21 illustrates the ingress/egress developed for Alternative 2 which is representative of all the Proposed Reasonable Alternatives, except for Alternative 5.

Figure 3-21 Reasonable Alternative 2 at Hog Island

Jenkins Island - Alternative 5 and Alternative 6 utilize the existing power line easement to relocate US 278 to a new six-through lanes (travel lanes) from the end of the new Skull Creek Bridges through Jenkins Island. Based on input from Santee Cooper Utility company, these two alternatives were revised to traverse south of the existing power line easement across Jenkins Island. These revisions resulted in two new alternatives, Alternative 5A and Alternative 6A. Figure 3-22 illustrates the shift of Alternative 6 slightly to the south, resulting in Alternative 6A. This is representative of the changes from Alternative 5 and Alternative 5A as well.

Figure 3-22 Reasonable Alternatives 6 & 6A at Jenkins Island

Due to public input and the revisions explained above, the six reasonable alternatives were revised to nine Proposed Reasonable Alternatives. These are:

- No Build
- Existing Corridor Improvements:
  - RA 1
  - RA 2
  - RA 3
  - RA 4
  - RA 4A
  - RA 5
  - RA 5A
  - RA 6
  - RA 6A

Therefore, nine Proposed Reasonable Alternatives are being evaluated based on impacts to the criteria and the details are included in sections 3.2.1 through 3.2.9.

3.2.1 Reasonable Alternative 1

Figure 3-23 Reasonable Alternative 1

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new three-lane eastbound Mackay Creek bridge south of the existing bridge
- The existing eastbound Mackay Creek bridge will be removed once construction is complete
- Reconditions and widens westbound Mackay Creek bridge to accommodate three lanes
- At PINWR, the roadway shifts from the newly constructed Mackay Creek bridge to use the existing US 278 alignment as much as possible as it crosses Skull Creek
- A new right-in/right-out interchange is added to PINWR and C.C. Haigh, Jr. Boat Landing allowing vehicles to pass underneath the existing bridges to access either side of the island and provide full access to US 278
- Reconditions and possibly widens the Skull Creek bridges to accommodate six lanes of through traffic

3.2.2 Reasonable Alternative 2

Figure 3-24 Reasonable Alternative 2

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new three-lane westbound Mackay Creek bridge north of the existing bridge
- The existing eastbound Mackay Creek bridge will be removed once construction is complete
- Reconditions and widens westbound Mackay Creek Bridge to accommodate three lanes of eastbound traffic
- At PINWR, the roadway shifts from the newly constructed Mackay Creek bridge and uses the existing alignment as much as possible as it crosses Skull Creek
- A new right-in/right-out interchange is added to the PINWR and C.C. Haigh, Jr. Boat Landing allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- Reconditions and possibly widens the Skull Creek bridges to accommodate six lanes of through traffic
- Widens the existing US 278 corridor to six-through (travel) lanes through Jenkins Island to Spanish Wells Road

3.2.3 Reasonable Alternative 3

Figure 3-25 Reasonable Alternative 3

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new three-lane eastbound Mackay Creek bridge south of the existing bridge
- The existing Mackay Creek bridge will be removed once construction is complete
- Reconditions and widens westbound Mackay Creek bridge to accommodate three lanes of traffic
- A new right-in/right-out interchange is added to the PINWR and C.C. Haigh, Jr. Boat Landing allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- Builds a new three-lane eastbound Skull Creek bridge to the south of the existing bridge
- Reconditions and possibly combines the existing Skull Creek bridges to accommodate three lanes of westbound through traffic
- Modifies existing Blue Heron Point Road to accommodate new eastbound Skull Creek bridge
- Widens the existing US 278 corridor to six-through (travel) lanes through Jenkins Island to Spanish Wells Road

3.2.4 Reasonable Alternative 4

Figure 3-26 Reasonable Alternative 4

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new six-lane eastbound and westbound Mackay Creek bridge and a new eastbound and westbound Skull Creek bridge south of the existing US 278 alignment and connecting back to the existing US 278 corridor at the end of the existing Skull Creek bridges
- The existing Mackay Creek bridges and Skull Creek bridges will be removed once construction is complete
- A new right-in/right-out interchange is added to the PINWR and C.C. Haigh, Jr. Boat Landing allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- The existing at-grade intersection on PINWR would be abandoned
- Relocates the existing Blue Heron Point Road north of the existing US 278 and create a new intersection with Gateway Drive/C. Heinrichs Circle
- Widens the existing US 278 corridor to six-through (travel) lanes through Jenkins Island to Spanish Wells Road

3.2.5 Reasonable Alternative 4A

Figure 3-27 Reasonable Alternative 4A

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new six-lane eastbound and westbound Mackay Creek bridge and a new eastbound and westbound Skull Creek bridge south of the existing US 278 alignment and connecting back to the existing US 278 corridor at the end of the existing Skull Creek bridges
- The existing Mackay Creek bridges and Skull Creek bridges will be removed once construction is complete
- A new right-in/right-out interchange will be introduced at the PINWR and C.C. Haigh, Jr. Boat Landing closer to the existing interchange alignment allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- The existing at-grade intersection on PINWR will be abandoned
- Relocates the existing Blue Heron Point Road north of the existing US 278 and create a new intersection with Gateway Drive/C. Heinrichs Circle
- Widens the existing US 278 corridor to six-through lanes through Jenkins Island to Spanish Wells Road

3.2.6 Reasonable Alternative 5

Figure 3-28 Reasonable Alternative 5

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new three-lane eastbound Mackay Creek bridge south of the existing bridge and the existing bridge will be removed
- Reconditions and widens westbound Mackay Creek bridge to accommodate three lanes of traffic
- A new right-in/right-out interchange will be introduced at the PINWR and C.C. Haigh, Jr. Boat Landing closer to the existing interchange alignment allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- Builds a new three-lane eastbound Skull Creek bridge to the south of the existing bridge
- Reconditions and possibly combines the existing Skull Creek bridges to accommodate three lanes of westbound through traffic
- Modifies existing Blue Heron Point Road to accommodate new eastbound Skull Creek bridge
- Uses the existing power line easement to relocate US 278 to a new six-through lane section from the end of the new Skull Creek bridges through Jenkins Island, creating a new bridge(s) over Gateway Road and/or Jenkins Road, as well as a new bridge over the Causeway extending up the cove and over Squire Pope Road, then curves back down the power line easement where the bridge ends and the at-grade road heads towards Old Wild Horse Road (creating a new intersection) and then extends down to existing US 278 and Spanish Wells Road where the newly aligned US 278 ties back into the existing US 278
- The existing US 278 from the end of the Skull Creek Bridges to Old Horse Road would then be converted to a local road providing access to the Squire Pope Road area, Jenkins Island, Blue Herron and Hog Island

3.2.7 Reasonable Alternative 5A

Figure 3-29 Reasonable Alternative 5A

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new three-lane eastbound Mackay Creek bridge south of the existing bridge and the existing bridge will be removed
- Reconditions and widens westbound Mackay Creek bridge to accommodate three lanes of traffic
- A new right-in/right-out interchange will be introduced at the PINWR and C.C. Haigh, Jr. Boat Landing closer to the existing interchange alignment allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- Builds a new three-lane eastbound Skull Creek bridge to the south of the existing bridge
- Reconditions and possibly combines the existing Skull Creek bridges to accommodate three lanes of westbound thru traffic
- Modifies existing Blue Heron Point Road to accommodate new eastbound Skull Creek bridge
- US 278 is relocated south of the existing power line easement to a new six-through (travel) lane section from the end of the new Skull Creek bridges thru Jenkins Island, creating a new bridge(s) over Gateway Road and/or Jenkins Road, as well as a new bridge over the Causeway that extends up the cove and over Squire Pope Road, then curves back down south the power line easement where the bridge ends and the at-grade road heads towards Old Wild Horse Road (creating a new intersection) and then extends down to existing US 278 and Spanish Wells Road where the newly aligned US 278 ties back into the existing US 278
- The existing US 278 from the end of the Skull Creek Bridges to Old Horse Road would then be converted to a local road providing access to the Squire Pope Road area, Jenkins Island, Blue Herron and Hog Island

3.2.8 Reasonable Alternative 6

Figure 3-30 Reasonable Alternative 6

- Widens the existing US 278 corridor to six-through (travel) lanes from Salt Marsh Drive to the Mackay Creek bridges
- Builds a new six-lane eastbound and westbound Mackay Creek bridge and a new eastbound and westbound Skull Creek bridge south of the existing US 278 alignment and connecting back to the existing US 278 corridor at the end of the existing bridges
- The existing Mackay Creek and Skull Creek bridges will be removed once construction is complete
- A new right-in/right-out interchange will be introduced at the PINWR and C.C. Haigh, Jr. Boat Landing closer to the existing interchange alignment allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- The existing intersection at PINWR will be abandoned
- Relocates existing Blue Heron Point Road to a portion of the existing US 278 roadway and connect to Gateway Drive/C. Heinrichs Circle
- US 278 is relocated south of the existing power line easement to a new six-through (travel) lane section from the end of the new Skull Creek bridges through Jenkins Island, creating a new bridge(s) over Gateway Road and/or Jenkins Road, as well as a new bridge over the Causeway that extends up the cove and over Squire Pope Road, then curves back down south the power line easement where the bridge ends and the at-grade road heads towards Old Wild Horse Road (creating a new intersection) and then extends down to existing US 278 and Spanish Wells Road where the newly aligned US 278 ties back into the existing US 278
- The existing US 278 from the end of the Skull Creek Bridges to Old Horse Road would then be converted to a local road providing access to the Squire Pope Road area, Jenkins Island, Blue Herron and Hog Island

3.2.9 Reasonable Alternative 6A

Figure 3-31 Reasonable Alternative 6A

- Builds a new six-lane eastbound and westbound Mackay Creek bridge and a new eastbound and westbound Skull Creek bridge south of the existing US 278 alignment and connecting back to the existing US 278 corridor at the end of the existing bridges
- The existing Mackay Creek and Skull Creek bridges will be removed once construction is complete
- A new right-in/right-out interchange will be introduced at the PINWR and C.C. Haigh, Jr. Boat Landing closer to the existing interchange alignment allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278
- The existing intersection at PINWR will be abandoned
- Relocates existing Blue Heron Point Road to a portion of the existing US 278 roadway and connect to Gateway Drive/C. Heinrichs Circle
- US 278 is relocated south of the existing power line easement to a new six-through (travel) lane section from the end of the new Skull Creek bridges through Jenkins Island, creating a new bridge(s) over Gateway Road and/or Jenkins Road, as well as a new bridge over the Causeway that extends up the cove and over Squire Pope Road, then curves back down south the power line easement where the bridge ends and the at-grade road heads towards Old Wild Horse Road (creating a new intersection) and then extends down to existing US 278 and Spanish Wells Road where the newly aligned US 278 ties back into the existing US 278
- The existing US 278 from the end of the Skull Creek Bridges to Old Horse Road would then be converted to a local road providing access to the Squire Pope Road area, Jenkins Island, Blue Herron and Hog Island

3.3 Reasonable Alternatives Summary

- All the Proposed Reasonable Alternatives meet the Purpose and Need to address structural deficiencies at eastbound Mackay Creek
- All the Proposed Reasonable Alternatives meet the Purpose and Need to reduce congestion along US 278 because all would decrease travel delays within the US 278 corridor relative to the 2045 No Build condition during peak traffic hours
- Alternatives 1 and 2 would only provide 1 bridge that meets current seismic design standards. While these Reasonable Alternatives meet the Purpose and Need of the project, Alternatives 1 and 2 would not provide safe ingress and egress to Hilton Head Island (over Skull Creek) in the event of a damaging earthquake. All of the other Reasonable Alternatives would provide at least one bridge over both Mackay Creek and Skull Creek that meets current seismic design standards
- Proposed Reasonable Alternatives 2 and 4A provide the lowest wetland impacts. Of these,
  - Alternative 2 impacts 0.1 acre (0.5%) less wetlands than Alternative 4A.
  - Alternative 2 would require less right-of-way acquisition, and impact less Essential Fish Habitat.
  - Alternative 4A impacts less tidal salt marsh/critical area wetlands (2.1 acres less than Alternative 2).
  - Alternative 4A would meet current seismic design standards for all bridges throughout the corridor. Alternative 2 would only meet seismic standards in 1 of the 4 bridges.
  - Alternative 4A would impact less floodplains and be more consistent with USFWS purposes of PINWR.
  - Alternative 4A costs exceed Alternative 2 by approximately $30 mil dollars (14.3%); however, Alternative 4A could be constructed in 2 years less than Alternative 2.
- Alternative 4A provides the lowest impacts to floodplains
- Proposed Reasonable Alternatives 1 through 4A provide the lowest right-of-way acreage to be purchased
- Proposed Reasonable Alternatives 5, 5A, 6 and 6A have the largest amount of impact to residential and commercial relocations
- Proposed Reasonable Alternatives 5, 5A, 6, and 6A make new “cuts” through the Stoney community in areas that are presently undisturbed
- Each of the nine Proposed Reasonable Alternatives equally affect the number of neighborhoods impacted
- Each of the nine Proposed Reasonable affect shellfish harvesting waters
- All Proposed Reasonable Alternatives have comparable cultural resource impacts, except Alternative 6 which has the lowest impacts to cultural resources
- Alternative 4A would also have minimum right-of-way and relocation impacts in comparison to the other Proposed Reasonable Alternatives

Table 3-4 Reasonable Alternatives Summary

Evaluation Criteria		RA 1	RA 2	RA 3	RA 4	RA 4A	RA 5	RA 5A	RA 6	RA 6A
Meets Overall Purpose & Need	Address Structural Deficiencies at EB Mackay Creek	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Reduce Congestion along US 278	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of Service AM/PM (2045)	Squire Pope Road at US 278	D/E	D/E	D/E	D/E	D/E	C/C	C/C	C/C	C/D
	Spanish Wells Road at US 278	C/E	C/E	C/E	C/E	C/E	D/E	D/E	D/E	D/E
Delineated Wetlands	Freshwater	2.6	1.8	2.6	4	4	3.4	3.6	4.8	4.6
	Critical Area	16.7	16.6	16.8	15.4	14.5	26.5	23.2	25	21.2
	Total Wetlands	19.3	18.4	19.4	19.4	18.5	29.9	26.8	29.8	25.8
Floodplains	Acres	101.2	99.8	103.1	96.5	99.1	104.9	107.2	99.7	106.2
Right-of-way Impacts	# of Tracts	72	71	76	74	74	77	82	76	84
New Right-of-way to be Purchased	Acres	28.1	27.2	31.5	35.2	36.8	63.9	63.3	71.7	72.3
Relocations	Residential	0	0	0	1 - Mariners Cove Guard Shack	1 - Mariners Cove Guard Shack	3 - Single-Family Homes; 4 - Mobile Homes	4 - Single-Family Homes; 6 - Mobile Homes	3 - Single-Family Homes; 4 - Mobile Homes; 1 - Mariners Cove Guard Shack	4 - Single-Family Homes; 6 - Mobile Homes; 1 - Mariners Cove Guard Shack
	Commercial	10	10	9	10	10	9	9	9	9
	Total # of Relocations	10	10	9	11	11	16	19	17	20
Environmental Justice Impacts	Residential	0	0	0	0	0	3 - Single-Family Homes; 4 - Mobile Homes	4 - Single-Family Homes; 6 - Mobile Homes	3 - Single-Family Homes; 4 - Mobile Homes	4 - Single-Family Homes; 6 - Mobile Homes
	Commercial	8	8	8	8	8	8	8	8	8
	Total # of EJ Relocations	8	8	8	8	8	15	18	15	18
Neighborhoods	# of Neighborhoods	2	2	2	2	2	2	2	2	2
	Names	Stoney, Buckingham	Stoney, Buckingham	Stoney, Buckingham	Stoney, Buckingham	Stoney, Buckingham	Stoney, Buckingham	Stoney, Buckingham	Stoney, Buckingham	Stoney, Buckingham
Private/Public/Protected Lands, Parks or Mitigation Sites	Yes / No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	PINWR # of Acres	17.6	15.9	18.7	18.1	23.3	18.6	18.7	18	22.2
Consistent with PINWR Purposes	Less Consistent, Consistent, More Consistent	Consistent	Consistent	Consistent	Less Consistent	More Consistent	Consistent	Consistent	Consistent	Consistent
Threatened & Endangered Species		May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect
Shellfish Harvesting Waters	Yes / No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Essential Fish Habitat Type (Acres)	Emergent Wetlands	14.1	12.7	15.0	15.6	16.1	30.8	25.0	31.2	26.2
	Intertidal Flat	10.6	10.7	10.9	8.8	11.7	11.2	11.7	9.4	12.9
	Tidal Creek	0.3	0.2	0.3	0.1	0.3	0.3	0.2	0.2	0.3
	Unconsolidated Bottom	20.7	20.2	21.8	19.2	26.8	15.9	21.9	19.6	30
	Oyster	1.9	1.7	2.1	1.6	3.5	2.1	2.1	1.6	3.4
Cultural Resources	# of Archaeological Sites with Indeterminate Eligibility	3	3	3	2	3	2	3	1	2
Meets Current Seismic Design Standards	# of Structures	1 of 4 (EB Mackay Creek)	1 of 4 (WB Mackay Creek)	2 of 4 (EB Mackay Creek and EB Skull Creek)	4 of 4 (Both Mackay and Skull Creek)	4 of 4 (Both Mackay and Skull Creek)	2 of 4 (EB Mackay Creek and EB Skull Creek)	2 of 4 (EB Mackay Creek and EB Skull Creek)	4 of 4 (Both Mackay and Skull Creek)	4 of 4 (Both Mackay and Skull Creek)
Construction Duration		5 Years	5 Years	5 Years	3 Years	3 Years	5.5 Years	5.5 Years	3.5 Years	3.5 Years
Utility Impacts	$	$22,156,125	$22,163,625	$19,958,125	$34,050,750	$33,988,750	$55,260,375	$31,232,375	$65,892,500	$41,578,625
Estimated Construction Cost	$	$241,180,557	$241,455,717	$248,406,992	$281,318,084	$287,573,554	$385,499,062	$362,124,172	$420,691,409	$412,280,094

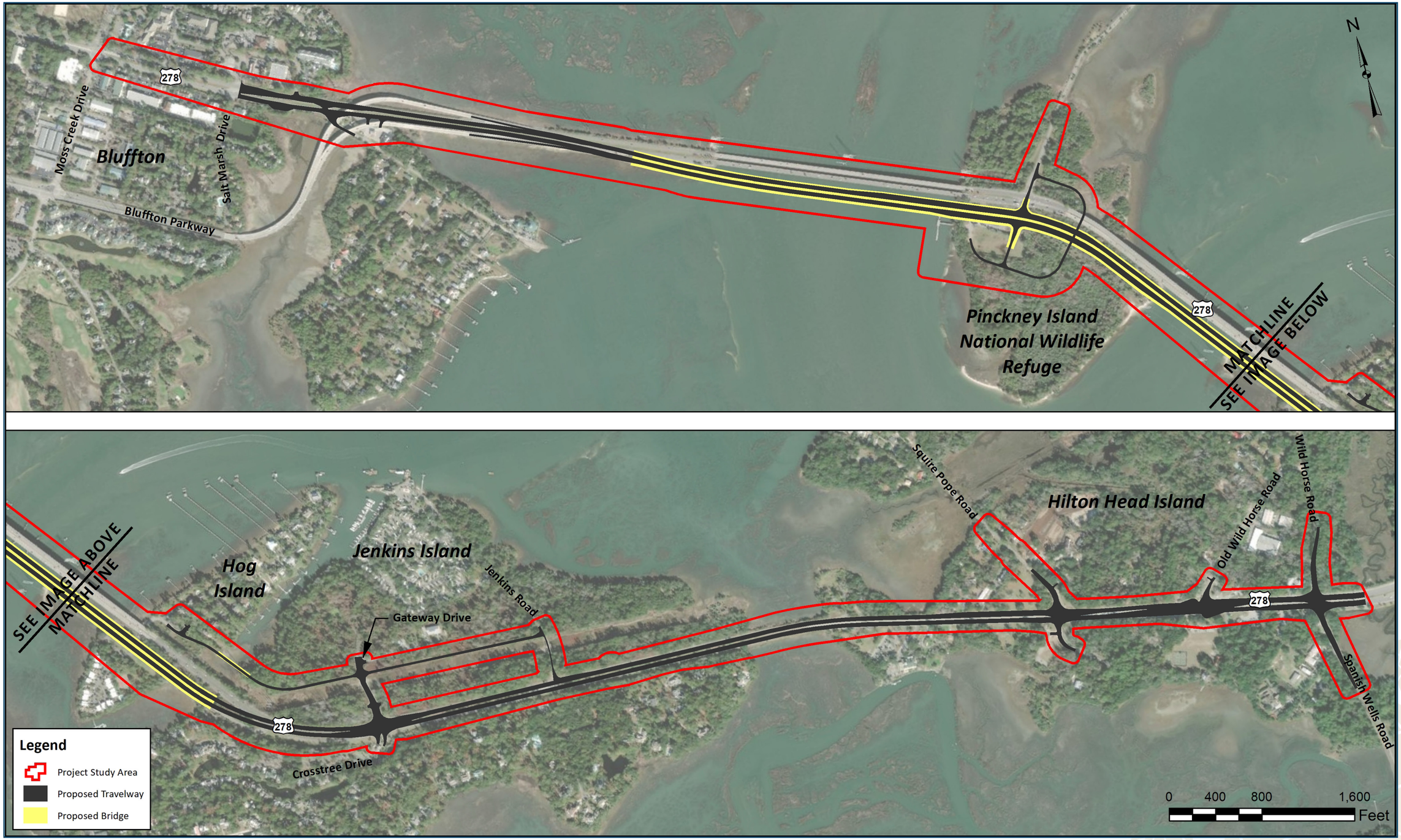

Figure 3-32 Recommended Preferred Alternative 4A

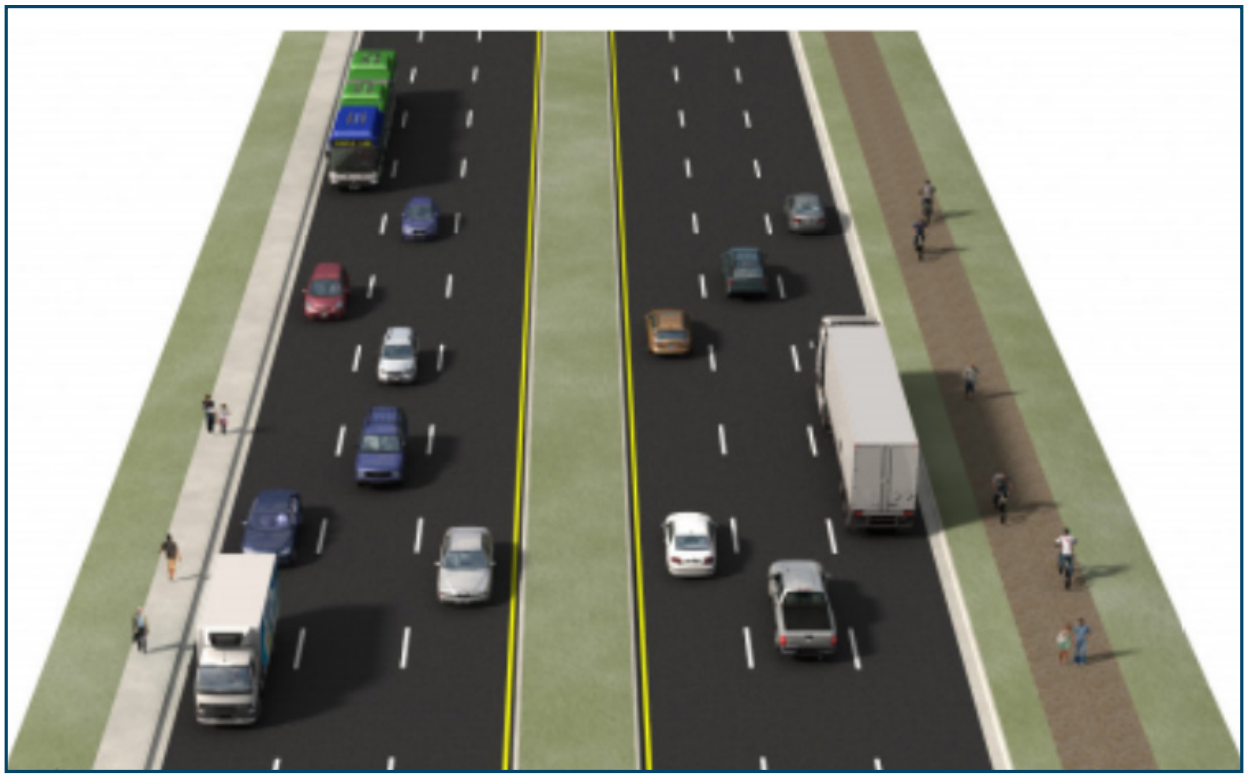

Figure 3-33 Recommended Preferred Alternative 4A Mainline Cross Section

Figure 3-34 Recommended Preferred Alternative 4A Bridge Cross Section

3.4 Recommended Preferred Alternative

Based on evaluation of the alternatives, it was determined that Alternative 4A provides traffic improvements to the project study area (PSA) with minimal impacts to the human and natural environments, refer to Figure 3-32. This alternative is approximately 4.11 miles long and includes widening the existing US 278 corridor to six lanes from Salt Marsh Drive to Mackay Creek bridge, building a new six-lane eastbound and westbound Mackay Creek bridge and Skull Creek bridges south of the existing US 278 alignment and connecting back to the existing US 278 corridor at the end of the existing Skull Creek bridges. The existing Mackay Creek bridges and Skull Creek bridges will be removed once construction is complete. A new right-in/right-out interchange will be constructed at the PINWR and C.C. Haigh, Jr. Boat Landing closer to the existing interchange alignment allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278. The existing at-grade intersection on PINWR will be abandoned. This alternative relocates the existing Blue Heron Point Road to the north of the existing US 278 and creates a new intersection with Gateway Drive/C. Heinrichs Circle. Alternative 4A widens the existing US 278 corridor to six-through lanes through Jenkins Island to Spanish Wells Road.

Alternative 4A would provide a 10-foot paved multiuse path and a 5-foot wide sidewalk along US 278 between Moss Creek Drive and Salt Marsh Drive. The multi-use pathway would continue along the south side of US 278 across the new bridge, providing access at PINWR, to Hilton Head Island. At Hilton Head Island, the multi-use path will loop under the new bridge and continue along the north side of US 278 to Old Wild Horse Road/Spanish Wells Road.

Coordination with USFWS on January 30th, 2020 to discuss the six reasonable alternatives confirmed that Alternative 4A was the most consistent with PINWR purposes to protect, maintain, and where possible, enhance habitat for native wildlife, including migratory and resident birds and threatened and endangered species. USFWS expressed that Alternative 4A was the best alternative for their maintenance and regulatory needs. This alternative also results in fewer impacts on PINWR due to the proposed new facility being elevated. Alternative 4A would also avoid impacts to the intertidal marsh while both Alternative 2 and 3A would require fill to be placed in portions of the marsh. USFWS concurred that that Alternative 4A would have an overall net benefit impacts on the refuge, by providing improved ingress and egress to the refuge.

Following identification of the Recommended Preferred Alternative 4A further evaluation was conducted to ensure compliance with SCDOT and FHWA design standards and guidelines.

In order to further minimize impacts, the following design refinements were made to the Recommended Preferred Alternative 4A:

- Buckingham Landing: The multi-use path along the southside of US 278 was shifted and curved to avoid buildings at the BP Gas Station, souvenir shop and farmers market.
- Mariners Cove: The right-of-way limits were revised to avoid impacting the guard house.
- Multi-Use Path from east end of Skull Creek Bridge to Spanish Wells Road: The multi-use path shifts from the north side of US 278 to the south side of US 278.
- Hilton Head Island, US 278 from Cora Lee Lane to Wild Horse/Spanish Wells Road: Improvements to US 278 were shifted north to avoid impacts to a commercial establishment. The existing US 278 southern curb and gutter will be maintained as it currently exists.

As a result of right-of-way minimization and design refinements, the potential relocations for the Recommended Preferred Alternative 4A to residential relocations were eliminated and commercial relocations were reduced from ten to two. Right-of-way impacts were reduced from 36.8 acres to 34.0 acres. Impacts to Essential Fish Habitat and Cultural Resources were also reduced. Table 3-6 displays a summary of impacts for the refined Recommended Preferred Alternative 4A.

The traffic study conducted for the project analyzed all Reasonable Alternatives to evaluate the implementation of the proposed corridor improvements. Historic growth trends are not able to fully capture growth but are beneficial to understanding the current environment; therefore based on the most recent data available, the Lowcountry Area Transportation Study (LATS) Regional Traffic Demand Model was used to estimate future traffic conditions of the US 278 corridor including surrounding roadways.

Many of the segments within the PSA and along the US 278 Corridor currently operate at an unacceptable LOS. With a growing tourism industry and the corresponding increase in economic opportunity, this area continues to see population and business growth. All of the alternatives were comparable in terms of traffic operations. Other factors, as described in Section 3.3, were used to recommend this alternative as the Preferred. Table 3-6 shows the LOS for daily traffic for each segment of the Recommended Preferred Alternative 4A.

Table 3-5 Recommended Preferred Alternative 4A Segment LOS

Segment	Eastbound				Westbound			
	2045 No Build AM	2045 No Build PM	2045 Build AM	2045 Build PM	2045 No Build AM	2045 No Build PM	2045 Build AM	2045 Build PM
Moss Creek Drive to Salt Marsh Drive	C	B	C	B	B	B	B	B
Salt Marsh Drive to Fording Island Road	C	C	C	C	B	D	B	D
Fording Island Road to Bluffton Parkway	D	D	C	C	C	E	B	C
Bluffton Parkway to PINWR	F	E	D	C	C	F	B	E
PINWR to Squire Pope Road	F	D	D*	C*	C	F	B*	D*

** Due to the introduction of signals on Jenkins Island in the Build condition, segment LOS is not available east of Crosstree Drive and Gateway Drive/C. Heinrichs Circle. The LOS is representative of the segment between PINWR and Crosstree Drive at Gateway Drive/C. Heinrichs Circle.*

The segment LOS analysis for Recommended Preferred Alternative 4A shows an improvement in the LOS along the corridor by adding an additional lane in each direction. US 278 is expected to operate at LOS D or better in the eastbound direction in the AM peak hour and LOS C or better in the PM peak hour. The westbound direction is expected to operate at LOS B in the AM peak hour and LOS E or better in the PM peak hour. The levels of service remain the same or better in Recommended Peferred Alternative 4A.

The traffic analysis concludes that three lanes per direction over Mackay Creek, and through PINWR and Jenkins Island are needed to meet 2045 traffic needs along US 278.

Please note that the numbers in this table represent revisions made after the identification of Alternative 4A as the Recommended Preferred Alternative due to design modifications. These design modifications were required to meet SCDOT and FHWA design standards for the proposed bridge and roadway approaches, as well as the intersection improvements within the project corridor. The design modifications and subsequent increases in impacts would be applicable to all the reasonable alternatives.

Table 3-6 Recommended Preferred Alternative 4A Impacts Summary

Recommended Preferred Alternative 4A		
Meets Overall Purpose and Need	Address Structural Deficiencies at Eastbound Mackay Creek	Yes
	Reduce Congestion	Yes
Level of Service AM/PM (2045)	Squire Pope Road at US 278	C/B
	Spanish Wells Road at US 278	A/C
Delineated Wetlands	Freshwater Acres	3.8
	Critical Area Acres	19.1
	Total Wetlands Acres	22.9
Floodplains	Acres	145
Right-of-way Impacts	# of Tracts	68
New Right-of-way to be Purchased	Acres	34
Relocations	Commercial	2
EJ Impacts	Commercial	2
Neighborhoods		1 - Stoney community
Private/Public/Protected Lands, Parks or Mitigation Sites	PINWR # of Acres	32
	Boat Landing	Minimal Impact
	Property owned by Town and County	Minimal Impact
Consistent with PINWR Purposes		Most Consistent
Threatened & Endangered Species		May affect, not likely to adversely affect
Shellfish Harvesting Waters	Yes/No	Yes
Essential Fish Habitat Types (Acres)	Estuarine Emergent Wetland	16.2
	Intertidal Non-Vegetated Flat	6.4
	Tidal Creek	0.3
	Unconsolidated Bottom	0.3
	Oyster	1.5
Cultural Resources	Archaeological Sites	1
	Traditional Cultural Property	1
Meets Current Seismic Design Standards	# of Structures	4 of 4 structures (both Mackay Creek and Skull Creek)
Construction Duration		3 Years
Utility Impact	$	$24,568,500
Estimated Construction Cost	$	$289,902,745

3.5 Intersection Analysis

Following identification of the Recommended Preferred Alternative 4A, NEPA and SCDOT's project development process requires continual design refinements to further avoid and minimize environmental impacts and improve traffic operations. This process includes an analysis of intersections along the project corridor. These design refinements would be necessary for each of the Reasonable Alternatives, and therefore, the difference in potential impacts would be similar for all Reasonable Alternatives.

A technical memorandum has been developed that describes each alternative and outlines advantages and disadvantages of each potential configuration, refer to Appendix C.

The recommended preferred intersection on Jenkins Island consists of a full access signal at Gateway Drive/C. Heinrichs Circle and Crosstree Drive that allows westbound US 278 traffic to turn right onto Jenkins Road. Jenkins Road would be converted to a one-way roadway, allowing northbound traffic only. Traffic travelling south on Jenkins Road would use a new road that connects to Gateway Drive/C. Heinrichs Circle and access to US 278 at the new signalized intersection. A raised median will restrict lefts from US 278 to Jenkins Road. This alternative eliminates the need for an acceleration lane for traffic entering US 278 from Jenkins Road, thus minimizing the overall footprint of the improvements. This alternative would also consolidate all side road traffic on Jenkins Island to a single signalized location. The traffic analysis includes these changes and did improve the LOS, refer to Appendix C.

The recommended preferred intersection between Squire Pope Road and Spanish Wells Road would introduce a new signal at Old Wild Horse Road and eliminates left turns from eastbound US 278 onto Squire Pope Road and Wild Horse Road. All left turns would be consolidated to the new signal at Old Wild Horse Road. Eastbound US 278 vehicles traveling to Squire Pope Road would continue past the intersection and make a U-turn at Old Wild Horse Road. Similarly, eastbound vehicles on US 278 traveling to Wild Horse Road would turn left at Old Wild Horse Road and continue to Wild Horse Road. Consolidating all left turns to one intersection would allow for longer signal phases at the other intersections in the corridor. Left turns from US 278 to Spanish Wells Road would also be restricted. Westbound US 278 traffic travelling to Spanish Wells Road would pass through the intersection and complete a U-turn at the new Old Wild Horse Road signal.

The design will be continue to be evaluated and improved to further reduce potential impacts to the human and natural environment. Chapter 4, Existing Conditions and Environmental Consequences, describes the specific impacts to be anticipated and what measures will be implemented to mitigate those impacts.