Preliminary Project Planning and Environmental Screening Report

Jenkins Island Access Management System

Beaufort County, South Carolina

November 20, 2015

Executive Summary

The Jenkins Island Access Management Study, as reported in this document, is to analyze and evaluate traffic conditions on the island (along US 278 between the J. Wilton Graves bridge and the causeway onto Hilton Head Island) and develop and evaluate alternative roadway improvements to ease the existing access issues on the island, while also improving safety and operational efficiency with minimal disruption to through traffic along US 278. Secondly, the report develops a Purpose and Need, in compliance with NEPA, to prepare the project for future stages of development; evaluating each alternative against potential environmental impacts. This Purpose and Need statement shall guide the project through the NEPA process to ensure that the proposed solution has been duly analyzed to meet the stated Purpose and Need.

US 278 is a four-lane, median divided principal arterial servicing approximately 53,200 vehicles per day (2014 SCDOT data), with access points at Blue Heron Point Rd., Crosstree Dr. and Jenkins Island Rd. All three side roads are stop-controlled at their intersection with US 278. Drivers at these intersections currently (and in the future without any improvements) experience extremely long delays (the time it takes to make a desired turn from the side road onto US 278) and obvious safety concerns. Safety issues include the lack of acceptable gaps in US 278 traffic for left turns, therefore causing motorists to make split-second decisions, and for right turns, the lack of available acceleration lanes for merging movements. These safety concerns have been evaluated through the review of accident data and reports and analyzed against the proposed alternatives.

Analysis of the available accident data shows a total of 79 accidents over a three year period with 67 of the 79 occurring at the three intersection points along US 278 on Jenkins Island. The majority of accidents are rear-end, run-off-the-road and angle type crashes which are attributed to excessive speeds, lack of acceleration / deceleration lanes, inadequate shoulder widths and risky turning movements from side roads. Of the 79 total accidents reported under this study, no fatalities were reported. There are no known geometric deficiencies (horizontal and vertical) along the US 278 corridor within the project boundary excepting line-of-sight deficiencies at intersections. Vegetative growth in the median and adjacent to the roadway, along with intersection alignments relative to the US 278 mainline curvature are instrumental in these existing deficiencies. The speed limit along US 278 is 55 mph within the project area (posted speed beginning on the J. Wilton Graves Bridge) with normal running speeds much higher. Speeds along US 278 are a concern to the citizens of the area and are attributable to a majority of the safety issues along the corridor. Reduction of the speed limit within the project area is a primary recommendation for the project irrespective of any access improvements. A reduction to 45 mph should provide improvement to the safety conditions while at the same time minimizing impacts to the operation of the through traffic along US 278. Speed reduction, along with the access management alternatives studied and recommended in this report, should provide acceptable benefits to the transportation needs of the surrounding communities.

An alternatives analysis was conducted for the corridor to include a No-Build option and two Build options, each analyzing existing and future traffic operations, while also examining potential alternatives for consideration. Alternatives that were considered but eliminated from further review included a grade-separated structure with connector roads and the potential relocation of Crosstree Dr. to Jenkins Island Rd. with the installation of a new traffic signal. The grade-separated structure alternative was eliminated due to considerable residential relocations that would have been required while the proposed, new signal-controlled intersection was eliminated due to failing signal warrant

studies. The two Build options that were analyzed, including their notable design features, are shown below;

Alternative 1: Right-in Right-out with Frontage Road

- *Closes all existing median cross-overs, therefore, all left turn movements from side roads and from US 278 would be prohibited; only right-in, right-out movements allowed.*
- *A new frontage road to be constructed between Blue Heron Point Rd. and Jenkins Island Rd.*
- *The intersection of Blue Heron Point Rd. and US 278 would require realignment and widening to accommodate heavy vehicle turning movements.*
- *The Windmill Harbour maintenance access road intersecting Blue Heron Point Rd. would require modifications in order to provide ingress / egress.*
- *Adequate acceleration / deceleration lanes along US 278 to be provided at each intersection.*

Alternative 2A: Modified Super-Street with Traffic Signals

- *Existing median cross-overs at Crosstree Dr. and Jenkins Island Rd. to be closed while the cross-over at Blue Heron Point Rd. to be reconstructed, however, only right-in, right-out movements from the side roads to be allowed at these intersections.*
- *The existing intersection with Blue Heron Point Rd. to be reconstructed to provide a left turn in from US 278 while also constructing a bulb-out to allow westbound US 278 traffic to make a U-turn. The left and U-turn movements would be protected by the proposed placement of a traffic signal in the US 278 eastbound direction.*
- *A second traffic signal would be installed in the westbound direction of US 278, just west of the Jenkins Island Rd. intersection. This traffic signal installation would allow eastbound US 278 traffic to make a protected U-turn.*
- *A third travel lane would be constructed in both the eastbound and westbound directions of US 278 from the end of the J. Wilton Graves bridge to the causeway onto Hilton Head Island. These lanes would provide acceleration / deceleration and capacity along US 278.*
- *A dedicated right turn lane from US 278 onto Crosstree Dr. to be constructed in order to provide storage for vehicles entering Windmill Harbour so that operational capacity of the three lanes on US 278 are not delayed.*

For a new traffic signal to be considered for installation, applicable signal warrant guidelines, as published by the Federal Highway Administration (FHWA) and strictly followed by the SCDOT, must be met prior to consideration. A warrant analysis was conducted for the considered, new signal-controlled intersection at Crosstree Dr. and Jenkins Island Rd. and for the Build option of Alternative 2A as described above. Of the four applicable signal warrants for this study, Alternative 2A met three of the four, while the considered, new signal-controlled intersection met no warrants, thus its feasibility as an applicable alternative was excluded. Approval of new traffic signals by the SCDOT require submittal of the raw traffic data utilized for the warrants along with the signal warrant output data and applicable studies for their review. Should no warrants be met for a location proposed for a traffic signal, the SCDOT will not approve the location. The applicable warrants for this study included eight-hour vehicular volumes, four-hour vehicular volumes, peak hour volumes and crash experience. The considered signal-controlled intersection at Crosstree Dr. and Jenkins Island Rd. does not meet the vehicular volume requirements for the minor road approaches (Crosstree Dr. and

Jenkins Island Rd. volumes combined) respective of the warrant criteria and the project traffic counts. Regarding the warrant for crash experience, a location must have a minimum of five reported crashes within a single year in which the installation of a traffic signal would have made correctable. The traffic signal options studied under this report would not meet this warrant because the majority of the historical accidents within the project area would not be reduced by the implementation of a traffic signal. See Section 4.4 of the report for details of the signal warrant analysis.

An operational analysis was conducted for both Build alternatives to determine the level of service (LOS) conditions for the opening year and the design year (2020 & 2035, respectively). This analysis concluded that each alternative would provide satisfactory operations and LOS through the design year with Alternative 1 providing slightly better operations. The analysis of Alternative 2A indicates that the installation of traffic signals along US 278 would not expect to produce any significant adverse impacts on through traffic along US 278 as the majority of green time would be allocated to the through movements.

The Jenkins Island Access Management Study also researched environmental resources and evaluated their impacts based on the proposed Build alternatives. Evaluated resources include wetlands, fish and endangered species, permitting requirements, cultural resources, noise, air quality, hazardous materials and right-of-way acquisitions. Preliminary environmental impacts associated with Alternative 1 include wetlands requiring US Army Corps of Engineers permitting, floodplain coordination, noise analysis requirements and nearly 6 acres of new right-of-way acquisition. Alternative 2A would require less stringent permitting due to no wetland impacts, no noise analyses and only 1 acre of new right-of-way. The comparison charts below provide positive and negative influences of each alternative based on roadway geometry, operations, safety, cost and environmental impacts.

Alternative 1: Right-in Right-out with Frontage Road

Advantages

1. Provides prohibition of all left turns
2. Provides acceleration / deceleration lanes
3. Significantly reduces the number of conflict points (from 9 to 2)
4. Minimizes disruption to through traffic on US 278
5. Mitigates crashes related to all left-turning movements
6. No median crossovers

Disadvantages

1. Increase in travel distances & time
2. Merging conflicts
3. Some weaving conflicts between side road traffic
4. Most expensive to construct ($13.9 million)
5. Wetland impacts requiring special permitting
6. Increased right-of-way acquisition
7. Noise analysis required
8. Turning movements more difficult for large vehicles
9. Potential negative impacts to Blue Heron Point, Mariners Cove and Windmill Harbour residents

Alternative 2A: Modified Super-Street with Traffic Signals

Advantages

1. Prohibition of left turns from side roads
2. Traffic signals to provide protected left and U-turn movements
3. Reduced number of conflict points (from 9 to 5)
4. Mitigates crashes related to left-turns from side roads
5. Less expensive to construct (approx. $7.4 million)
6. No critical wetland impacts
7. Less right-of-way acquisition
8. No noise analysis required
9. Signals located in areas of adequate visibility and sight distance
10. Provides widening of US 278 to three lanes in each direction (future planned project)

Disadvantages

1. Increase in some travel distances & time
2. Still have to wait for gap in oncoming traffic to turn right from side roads
3. Weaving conflicts for some side road traffic and U-turn movements
4. Minimal disruption to through traffic on US 278
5. Potential increase in accidents related to signals (rear-end)

The proposed Recommended Alternative for this project is Alternative 2A: Modified Super-Street with Traffic Signals. This report shows the operational and safety benefits of the proposed improvements while minimizing impacts and delay to the through traffic along US 278. Costs, environmental impacts and rights-of-way acquisitions are all reduced and / or negated with Alternate 2A. The improvements recommended under this alternate shall also provide for the widening of US 278 to three lanes in each direction, which is an anticipated project on Beaufort County's Long-Range Transportation Plan (LRTP) in order to meet current and future traffic demands. Providing additional credence to the recommended alternative is a project proposed by the Town of Hilton Head Island for improvements to US 278 at the intersection of Squire Pope Rd. The Town's project proposes the construction of a third lane along US 278 in the westbound direction from Squire Pope Rd. to Jenkins Island Rd. which matches the improvements to Alternative 2A. Therefore, to increase the benefit of the proposed third lane along US 278 in the eastbound direction within the Jenkins Island project corridor, it is proposed to potentially extend this lane to the Squire Pope Rd. intersection. These recommended improvements would therefore provide three lanes of travel in each direction from the termini of the J. Wilton Graves Bridge on Jenkins Island to Squire Pope Rd. Alternative 2A will provide added safety for the access points along Jenkins Island while prohibiting left turns from the side roads and protected left turns / U-turns at the signal locations. The existing Crosstree Dr. intersection, while becoming an exclusively right-in / right-out access, will gain a clear gap in US 278 traffic during the green time for the left turn / U-turn phase at the Blue Heron Point Rd. signal location. This will allow traffic to turn right from Crosstree Dr. and navigate to the left turn / U-turn signal past Jenkins Island Rd. safely during the signal phase. Motorists from Crosstree Dr. will still be able to make right turns from the access upon yielding during the signal phase where US 278 is on green. The access point at Jenkins Island Rd. will operate exactly the same as the movements from Crosstree Dr., gaining a clear gap in US 278 traffic during the green phase for the left turn / U-turn signal just past Jenkins Island Rd. This right-turning traffic can then navigate to the left turn / U-turn signal at Blue Heron Point Rd. safely during this gap. Blue Heron Point Rd. shall become right-in / right-out / left-in (from US 278) with the proposed recommendations following the same operations at Crosstree Dr. and Jenkins Island Rd as described above.

The Jenkins Island Access Management Study provides evaluation of the existing conditions, proposed alternatives, traffic operations, signal warrant studies and environmental constraints particular to the project corridor. The document provides specific details and justifications for the proposed recommendations as a tool for future project development and access management improvements for the communities on Jenkins Island and the daily flow of traffic utilizing US 278 between Bluffton and Hilton Head Island.

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1 Introduction

1.1 Project Study Area

The Project Study Area is located on US Highway 278 (herein, US 278) in Beaufort County, between Pinckney Island and Hilton Head Island (Figure 1-1 and Figure 1-2). The Project Study Area includes US 278 from the termini of the J. Wilton Graves Bridge to the beginning of the causeway onto Hilton Head Island, for a length of approximately 5,500 linear feet. The Project Study Area includes approximately 69 acres along Jenkins Island and Hog Island, incorporating portions of the South Carolina Department of Transportation (SCDOT) Right-of-Way, SCDOT-owned parcels, and a high-voltage electrical transmission lines easement owned by Santee Cooper (Figure 1-3). The Town of Hilton Head Island owns a larger parcel north of US 278 on Jenkins Island.

1.2 Project History

Communities within the Project Study Area have expressed concern about safe access to and from US 278 via the three existing median cross-overs: Blue Heron Point Road, Windmill Harbour Entrance, and Jenkins Island Road. During the past several years, the SCDOT, Beaufort County, and Windmill Harbour Property Owners Association have evaluated potential solutions to improve access within the study corridor.

- In 2009, the SCDOT conducted a signal justification study at US 278 and the Windmill Harbor entrance. The study found that volume from Crosstree Drive and Gateway Drive did not warrant signalization. The collision history also did not reveal a pattern of collisions that could be corrected with the installation of a traffic signal.
- In 2010, the Town of Hilton Head Island provided an Engineering Study to the SCDOT indicating that traffic signals were not warranted at US 278 and the Windmill Harbour entrance. The study recommended constructing a parallel route on the northern side of US 278 between Blue Heron Point Road and Jenkins Road as a long-term solution to improve access, operations and safety. The study also considers the use of U-turn median lanes with “jughandles” at the three cross-overs; however, the study found that U-turn lanes generally work in longer segments of road to prevent lane changes in preparation for a left-turn in the median. The study also recommended the SCDOT study reducing the speed limit west of the Project Study Area from 55 MPH to 50 MPH.
- In 2011, at the request of the Town and County, the roadway improvement project was included in SCDOT’s Six Year (2009 to 2015) Statewide Transportation Improvement Program (STIP). Since inclusion in the STIP, the State has managed the project and provided $1,400,000 in funding. The project is not listed in the current STIP, Revision 16, dated March 19, 2015.
- In August 2013, Windmill Harbour Property Owners Association provided Beaufort County with a “Compromise Plan to Provide Major Safety Improvements to Jenkins Island Residents”. The plan expressed concern with the construction of a “flyover”

connecting Bluffton Parkway to US 278 approximately 2 miles west of the Project Study Area.

Figure 1-1. Project Location

Figure 1-2. USGS Topographic MapThis page is intentionally left blank.

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Figure 1-3. Parcels and Communities Surrounding Project Study Area
Source: Beaufort County GIS

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Residents of Windmill Harbour Property Owners Association were concerned that the flyover would eliminate existing gaps in traffic that allow turning movements from Windmill Harbour onto US 278. The plan recommended constructing a new westbound intersection near Blue Heron Point Road that would provide access and egress from US 278 to Windmill Harbour; Mariner's Cove, and Blue Heron Point neighborhoods. The plan also recommended closing the existing Blue Heron Point intersection, converting the back entrance to Windmill Harbour to an exit only option, and deceleration and acceleration lanes on US 278 at the entrance to Windmill Harbour.

- In January 2014, Beaufort County Traffic Engineering provided a review of Windmill Harbour Property Owner's Association Compromise Plan. The review supported the proposed intersection in order to eliminate left-turn exits at Blue Heron Point Rd and Windmill Harbor. The review found that, with additional design revisions, the plan should provide a significant safety benefit to visitors and residents without negatively impacting the significant volume of daily thru traffic on US 278.
- Current construction (SCDOT Project ID 0041808 – 2014) along US 278 at the Windmill Harbour entrance (Crosstree Drive) proposes to extend the outbound acceleration lane (eastbound) to approximately 1000 feet and constructing an offset median left turn lane with median channelization islands. No new rights-of-way are proposed for the construction of this project.

Separately, but directly connected to the transportation issues relative to this project, the Town of Hilton Head Island has proposed improvements at the intersection of Squire Pope Road and US 278, approximately 0.50 miles east of the Jenkins Island Access Management Study project termini. The improvements proposed by the Town include the widening of westbound US 278 from Squire Pope Road to Jenkins Island Road; therefore, adding a full, third lane between these roads. As of the date of this report, the project proposed by the Town of Hilton Head Island is in the preliminary design phase. Future design initiatives involving the Jenkins Island Access Management project should coordinate closely with the Town of Hilton Island and their proposed plans in order to maximize potential transportation benefits offered by both projects.

2 Purpose and Need

2.1 Purpose

The purpose of the project is to improve operational efficiency along the US 278 corridor on Jenkins Island in Beaufort County. A goal of the project is to improve the Level of Service at intersections within the Project Study Area. The scope of the project includes development of a solution through alternative analysis, and in consideration of environmental constraints, to provide a safe and efficient access to local communities with minimum disruption to “through” traffic on US 278.

2.2 Need

2.2.1 System Linkage

The Lowcountry 2007 Long-Range Transportation Plan (LRP) forecasts transportation system conditions within Beaufort, Jasper, and Colleton Counties. US 278 provides an important transportation link between Bluffton and Jenkins Island, Hog Island, and Hilton Head Island in meeting daily transportation needs and as a hurricane evaluation route. Beaufort County and Hilton Head Island have and are continuing to experience rapid population growth.

In the mid-1970s, US 278 was widened from two to four travel lanes within the Project Study Area. US 278 has since been widened to a six-lane divided highway, tapering to four lanes in the approach to Karl V. Bowers Bridge onto Pinckney Island, approximately 2 miles west of the Project Study Area. The US 278 Karl V. Bowers Bridge and J. Wilton Graves bridges over Mackay Creek and Skull Creek, respectively, only accommodate two travel lanes in each direction. US 278 remains a four-lane divided highway on Hog Island and Jenkins Island, widening to a six-lane highway at Squire Pope Road on Hilton Head Island, approximately 0.5 miles from the Project Study Area.

2.2.2 Operational Deficiencies

The LRP identifies the Project Study Area as highly congested. US 278 in the vicinity of the Study Area is a four-lane divided principal arterial serving approximately 53,200 vehicles per day (SCDOT 2014 ADT). Beaufort County commissioned a traffic study to identify transportation deficiencies and the need for improvements.

The traffic study uses Level of Service (LOS) as the measure to evaluate and compare operating conditions within the Project Study Area. LOS is a qualitative measurement of traffic factors including speed, volume, geometric features, interruptions, delay and the ability to maneuver. The Highway Capacity Manual (HCM) defines six levels of service ranging from LOS “A”, which represents the best operating conditions, to LOS “F”, which represents the worst.

The traffic study focused on delays experienced by drivers at the three intersections within the Project Study Area: Blue Heron Point at US 278, Crosstree Drive at US 278, and Jenkins Island Road at US 278. These intersections are not controlled by a traffic

signal. The study analyzed how long drivers wait to turn from a secondary roadway onto US 278, otherwise known as the “control delay”. Table 2-1 summarizes the relationship between control delay and Level of Service for unsignalized intersections.

Table 2-1. Level of Service Criteria

Level of Service	Control Delay (seconds/vehicle)	Traffic Flow Description
	Unsignalized Intersection	
A	0-10	Free-flow conditions. Desired movements are virtually unaffected by the presence of other vehicles.
B	> 10-15	Traffic flow is stable. The presence of other vehicles only slightly restricts the freedom to maneuver.
C	> 15-25	Traffic flow is stable, but increasing difficulty of turning maneuvers.
D	> 25-35	Approaching unstable traffic flow conditions.
E	> 35-50	Unstable traffic flow conditions.
F	>50	Unacceptable LOS. Very unstable traffic flow conditions exist.

The traffic study was performed for the existing year (2015), opening year (2020) and design year (2040) traffic volumes. For the 2035 No-Build condition, it was assumed that US 278 would be widened to provide an additional through lane in each direction.

Table 2-2 shows the results of the capacity analyses for no-build condition. The analyses of the existing condition (2015) indicate that all intersections (side road approach) are currently operating at LOS E and LOS F with long delays during peak periods. Due to high volumes of through traffic and not having adequate gaps, some of the side road traffic is expected to wait more than 10 minutes to safely make left-turns onto US 278. During field investigations and public outreach, it was determined that during peak hours many motorists from these side roads are forced to make right-turns and then go to the nearest signalized intersections (more than a mile on US 278) to make a U-turn to reach their destination. Under future no-build conditions, the side road traffic would continue to operate at LOS F with longer delays. It should be noted that for the 2035 no-build condition, US 278 was considered to be widened to provide three lanes in each direction. The capacity analyses (2035 no-build condition) indicate that improvements to US 278 alone would not alleviate the existing operational deficiencies of the side road traffic.

Table 2-2: Intersection Levels of Service Summary – No Build Condition

Intersection	Control	Movement	Condition	AM Peak			PM Peak			Weekend		
				LOS	Delay (Sec)	v/c	LOS	Delay (Sec)	v/c	LOS	Delay (Sec)	v/c
Blue Heron Point Road @ US 278	Free	WB (L)	Existing	E	40.6	0.03	C	18.1	0.06	D	28.0	0.05
			2020	E	42.8	0.03	C	18.6	0.06	D	29.2	0.05
			2035	E	48.9	0.04	C	20.0	0.07	D	32.6	0.06
	Stop	NB	Existing	F	1374	2.55	F	1238	2.07	F	354	0.63
			2020	F	1619	2.93	F	1454	2.38	F	421	0.73
			2035	F	1423	2.68	F	687	1.36	F	275	0.55
Crosstree Drive @ US 278	Free	WB (L)	Existing	F	53.7	0.22	C	20.1	0.20	D	29.4	0.12
			2020	F	57.8	0.24	C	21.9	0.21	D	30.9	0.13
			2035	F	70.2	0.29	C	23.0	0.24	D	34.9	0.15
	Stop	NBL	Existing	F	738	1.04	F	267	0.77	F	430	0.95
			2020	F	842	1.16	F	300	0.83	F	488	1.05
			2035	F	1146	1.53	F	248	0.76	F	627	1.27
Jenkins Road @ US 278	Free	EB (L)	Existing	B	13.3	0.01	F	61.5	0.19	C	21.1	0.14
			2020	B	13.5	0.01	F	66.3	0.20	C	21.9	0.15
			2035	B	14.1	0.02	F	80.7	0.25	C	24.1	0.17
	Stop	SB	Existing	E	48.9	0.21	F	473	1.25	F	70.8	0.30
			2020	F	51.6	0.23	F	547	1.38	F	76.0	0.32
			2035	E	38.0	0.18	F	632	1.55	F	70.4	0.31

Notes:

v/c refers to volume to capacity ratio, which is defined as the number of vehicles on the roadway at a specific time divided by the capacity of the roadway.

Control refers to the movement of the vehicle at the turn. For example, a vehicle traveling westbound on US 278 is not required to stop before turning left onto Blue Heron Point Road. However, a vehicle traveling northbound on Crosstree Drive is required to stop at a stop sign before turning left or right onto US 278.

Beaufort County 2010 Comprehensive Plan establishes a goal of LOS “D” for roads within the County. Red text indicates unacceptable LOS, or those worse than “D”.

3 Existing Facility and Conditions

US 278 in the vicinity of the Project Study Area is a four-lane divided principal arterial serving approximately 53,200 vehicles per day (SCDOT 2014 ADT). The existing roadway has earthen shoulders and a grassed landscaped median. The posted speed limit on US 278 is 55 miles per hour (MPH) west of the Study Area on the J. Wilton Graves Bridge. The speed limit on US 278 reduces to 50 MPH within the Project Study Area. The speed limit reduces to 45 MPH as US 278 approaches Hilton Head Island. US 278 is classified by the SCDOT and Beaufort County as a Principal Arterial Road and a Hurricane Evacuation route.

Three median cross-overs, Blue Heron Point Road, Windmill Harbour Entrance, and Jenkins Island Road, are currently serving the local, adjacent communities with limited or full access control on US 278.

- Blue Heron Point Road provides access to the residential communities on Hog Island, including Blue Heron Point and Mariner's Cove. The entrance to Blue Heron Point Road is located to the south of US 278, approximately 1,000 feet from the base of the J. Wilton Graves Bridge. The road then travels underneath the bridge to provide access to Hog Island. The Blue Heron Point Road intersection is located near the beginning of and within a long, broad horizontal curve on US 278.
    - A gated maintenance access connects Blue Heron Point Road to Crosstree Drive inside the Windmill Harbour community, which was used as the only access to the Windmill Harbour community during past renovations to their main entrance on US 278.
- The entrance to Windmill Harbour, a large residential community south of US 278, is located on Crosstree Drive. Gateway Drive is located across from the Windmill Harbour entrance, north of US 278, and provides access to an undeveloped Town-owned property. A water treatment facility operated by the Hilton Head Public Service District is located on the property.
- Jenkins Island Road provides access to Hilton Head Island RV Resort and Marina, which includes a restaurant, 200 RV sites, recreational facilities, and a 101 slip marina. The roadway is located north of US 278. The intersection is commonly used by recreational vehicles and vehicles pulling boat trailers.

3.1 Typical Section and Right-of-Way

The typical section of US 278 within the Project Study Area includes two, 12 foot travel lanes in each direction (eastbound and westbound) with 12 foot auxiliary left and right turning lanes at its intersections with Blue Heron Point Rd, Gateway Drive / Crosstree Drive and Jenkins Island Road. Two foot paved shoulders exist along the outer

eastbound and westbound lanes of US 278 within the project area.

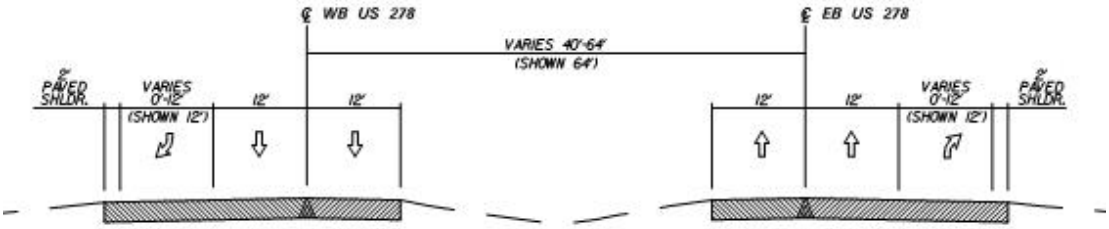

Figure 3-1. Typical Section of Existing US 278 Roadway

All existing side road intersections are stop-controlled. Blue Heron Point Road, Crosstree Drive and Jenkins Island Road provide full-access control with their intersections with US 278. Gateway Drive currently provides right-in / right-out only movements. At all intersections, the left-turn movements conflict with the opposing left-turns from US 278 due to the divided median; therefore, the opposing movements must share the paved median cross-overs for their turning movements and queue storage.

Blue Heron Point Road includes two, 11 foot lanes with no paved shoulders and is considered a local road as it currently serves all residential traffic. The existing Blue Heron Point Road that exists adjacent to the eastbound lanes of US 278 is the original alignment of US 278 prior to the construction of the bridges over Mackay Creek.

Gateway Drive is a two-lane, curb and gutter roadway with a landscaped median that serves an auxiliary Hilton Head Island Public Service District (PSD) site and is constructed wholly within undeveloped Town of Hilton Head Island property. The roadway also crosses the Santee Cooper transmission utility easement.

Crosstree Drive serves as the primary access point for the Windmill Harbour community and is opposite the intersection of Gateway Drive along US 278. The existing roadway at its intersection with US 278 is curb and gutter with a landscaped median. Within the community, all are two-lane, curb and gutter roadways.

Jenkins Island Road includes two, 11 foot lanes with no paved shoulders is considered a local road. It serves the Hilton Head RV Resort and Marina at its termini.

Existing rights of way along US 278 vary, with the majority of the roadway within a 150 foot right of way based upon the eastbound centerline (100 feet north of the centerline, 50 feet south of centerline). All rights-of-way along eastbound US 278 was recorded under SCDOT File No. 7.408 (1977), including the westbound direction from Gateway Drive to the causeway onto Hilton Head Island. The remaining rights-of-way along westbound US 278 (from the bridge to Gateway Drive was recorded under SCDOT File No. 7.419.1 (1978) and is based on the westbound centerline.

3.2 Traffic

3.2.1 Existing Traffic

In order to determine existing traffic demands and vehicular flow patterns, manual 12-hr turning movement counts were collected between 7:00 a.m. - 7:00 p.m. on Tuesday,

June 16, 2015 and 7:00 a.m. - 7:00 p.m. on Saturday, June 13, 2015 for the following intersections:

- Intersection of US 278 and Blue Heron Point Road
- Intersection of US 278 and Crosstree/Gateway Drive
- Intersection of US 278 and Jenkins Road

Summarized traffic count sheets are attached in the Appendix A. The existing traffic volumes for the AM and the PM peak periods for the study intersection are summarized in Table 3-1 and are graphically represented in Appendix B (Figure B-1).

Table 3-1. 2015 Existing Traffic Volume Summary

Intersection	Time Period	Total Volume (vph)
Blue Heron Point Road @ US 278	Weekday AM	4366
	Weekday PM	4963
	Weekend Peak	4569
Crosstree Drive/ Gateway Drive @ US 278	Weekday AM	4446
	Weekday PM	5069
	Weekend Peak	4618
Jenkins Road @ US 278	Weekday AM	4423
	Weekday PM	5026
	Weekend Peak	4601

vph = Vehicles per hour

The traffic count data indicates that weekday AM peak hour generally occurs from 7:30 a.m. to 8:30 a.m., weekday PM peak hour generally occurs from 4:30 p.m. to 5:30 p.m., and weekend peak hour generally occurs between 3:45 p.m. to 4:45 p.m. for all the study area intersections.

In addition to the peak-hour manual traffic counts, annual average daily traffic volume on US 278 was obtained from the SCDOT. The 2014 Average Annual Daily Traffic Volume on US 278, which represents 2-way traffic, is approximately 53,200 vehicles per day (SCDOT 2014 ADT).

3.2.2 Future Traffic

In order to develop future traffic volumes, it is necessary to have a basis for projecting local and regional traffic growth. Travel Demand Model is a tool for projecting future traffic and assigning traffic to the roadway considering future growth in the area. The 2030 and 2040 projected traffic volumes within the study area were obtained from the Lowcountry Regional Transportation Model. The output files from the models are attached in Appendix A. Based on these models, an average growth rate of 0.35% per year was estimated. This growth rate was applied to the existing turning movement counts for the study area intersections to estimate opening year (2020) and design year

(2035) traffic volumes. The 2020 opening year and 2035 design year traffic volumes for the study area intersections are attached in Appendix B (Figure B-2 and Figure B-3).

3.3 Safety

To assess the current safety conditions within the study area, crash data was obtained from SCDOT and Town of Hilton Head Island for the most recent three-year period available. The data includes crash data recorded from January 2012 through May 2015. Crash data summary sheets were prepared for the analysis area and are summarized in the following sections. The roadway segments and the intersections within the study area were analyzed. Safety analyses include the total number of crashes, the crash rate, the types of crashes at each location, and a severity summary. Based on recorded crash data, collision diagrams have been developed for the study area intersections and roadway segments. These collision diagrams provide detailed graphical representations of the recorded crashes. The collision diagrams are attached in Appendix C.

Table 3-2 and vpd = vehicles per day

Table 3-3 show the total crashes for the study area roadway segments and intersection locations. Crash rates were then calculated which show the crashes as a proportion of the traffic volume of the roadway segments or total traffic volume entering at that intersection. The following equations were used to determine the crash rates for the roadway segment and intersections.

$$CRsec = C \times 10^8 / (365 \times T \times V \times L)$$

$$CRspot = C \times 10^6 / (365 \times T \times V)$$

Where:

CRsec = Crash Rate for the roadway section per 100 million vehicle miles of travel (100 MVM).

CRspot = Crash Rate for the spot (intersection) per million entering vehicles (MEV)

C = Number of reported crashes

T = Time period of the analysis (years)

V = Annual average daily traffic

L = Length of the segment (miles)

Table 3-2. Roadway Segment Crash Data Summary

Roadway Segments	AADT (vpd)	Segment Length (miles)	Total Crashes	Crash Rate (per 100MVM)
US Route 278	53200	1.04	79	114

vpd = vehicles per day

Table 3-3. Intersection Crash Data Summary

Intersections	Estimated AADT (vpd)	Total Crashes	Crash Rate (per MEV)
Blue Heron Point @ US 278	53,400	26	0.39
Crosstree Drive @ US 278	54,300	28	0.41
Jenkins Road @ US 278	53,600	13	0.19

Notes:
vpd = vehicles per day
MEV = million entering vehicles
The methodology to estimate intersection AADT is shown in Appendix C.

Table 3-4 and Table 3-5 summarize the severity of crashes for the study roadway segment and intersections. For the corridor, there were 19 crashes with injuries (an average rate of around 6 injuries per year). A total of 60 crashes resulted in property damage only (an average rate of around 18 property damage only crashes per year). For the study intersections, there were 16 crashes with injuries (an average rate of around 5 injuries per year). A total of 51 crashes resulted in property damage only (an average rate of around 15 property damage only crashes per year). It should be noted that around 85 percent of the reported crashes have occurred at or near the study intersections.

Table 3-4. Roadway Segment Crash Data by Severity

Roadway Segments		Total Crashes	Fatal	Injury	Property Damage Only
US Route 278	Total	79	0	19	60
	Avg.	*23.7*	*0*	*5.7*	*18*

Table 3-5. Intersection Crash Data by Severity

Intersections		Total Crashes	Fatal	Injury	Property Damage Only
Blue Heron Point @ US 278	Total	26	0	8	18
	Avg.	*7.8*	*0*	*2.4*	*5.4*
Crosstree Drive @ US 278	Total	28	0	8	20
	Avg.	*8.4*	*0*	*2.4*	*6.0*
Jenkins Road @ US 278	Total	13	0	0	13
	Avg.	*3.9*	*0*	*0*	*3.9*
Total	**Total**	**67**	**0**	**16**	**51**
	Avg.	**20.1**	**0**	**4.8**	**15.3**

Table 3-6 and Table 3-7 show a breakdown of each type of crashes by the roadway segment and study intersections. According to the data, the majority of the recorded crashes at or near the study intersections and roadway segment are associated with rear end crashes. A further review of these rear end crashes shows the major contributing factor as driving too fast for conditions. The posted speed limit may be too high for vehicles to properly navigate the roadway. Secondly, there are not adequate acceleration/deceleration lanes and taper lengths to safely merge/diverge the slow moving vehicles to/form through traffic.

The second most type of crashes along the corridor is associated with run-off-the-road types. The contributing factors may include: excessive speed, inadequate shoulder width, and roadside clearance. Several crashes at the study intersections are also associated with angle type of crashes. Due to high through traffic volume, the side road traffic is often forced to make turns in inadequate gap in the traffic stream and, as a result, angle type crashes typically occur. If no improvements are made, these types of accidents would continue to increase, and may even result in a future fatality. With the proposed improvements, consideration should be given so that the side road traffic can make the turns safely without making any unnecessary risks.

Table 3-6. Roadway Segment Crash Data by Types

Roadway Segment		Rear End	Angle	Head On	Side Swipe	Run Off	Other	Total Crashes
US Route 278	Total	40	10	1	4	20	4	79
	%	51%	13%	1%	5%	25%	5%	100%

Table 3-7. Intersection Crash Data by Types

Intersection		Rear End	Angle	Head On	Side Swipe	Run Off	Other	Total Crashes
Blue Heron Point @ US 278	Total	11	3	0	1	10	1	26
	%	42%	12%	0	4%	38%	4%	100%
Crosstree Drive @ US 278	Total	13	7	1	1	5	2	28
	%	46%	25%	4%	4%	18%	3%	100%
Jenkins Road @ US 278	Total	9	1	-	1	1	1	13
	%	68%	8%	0	8%	8%	8%	100%

3.4 Geometry

There are no known horizontal or vertical geometric deficiencies of the US 278 mainline within the Project Study Area per the data available at the time of this report (based on existing plans, aerial imagery and provided GIS contour data). Line of sight deficiencies do exist at the intersections with Blue Heron Point Road, Crosstree Drive and Jenkins Island Road. The sight distance deficiencies at these side roads are due in part to their locations along the sweeping horizontal curve of US 278 and increased by specific

median vegetation and signs as well as vegetation adjacent to US 278 overhanging the roadway. Increased travel speeds and volume (since the original construction of the existing alignment of US 278) has increased the needed sight distance for turning vehicles along this corridor.

4 Alternatives

Based on gathered information (traffic data, crash data, previously performed traffic studies, feedback from stakeholders and County staff), alternatives were evaluated to mitigate the existing operational deficiencies of the transportation facilities. Alternatives include: (1) complete closure of existing median cross-overs in conjunction with new frontage roads/connectors, (2) complete closure of existing median cross-overs in conjunction with connector roads and grade separation structures over/under US Route 278, (3) modification to existing median cross-overs in conjunction with median U-turns, and (4) modification to the existing access points and median cross-overs on US 278 to combine into access point(s) with directional movements.

4.1 No-Build Alternative

The no-build alternative, which consists of no improvements to the side roads, was considered a baseline for comparison. Under opening year (2020) no-build condition, it was assumed two through lanes in each direction of US Route 278. Under design year (2035) no-build condition, it was assumed that US Route 278 would be widened to provide an additional through lane in each direction. However, the study intersections would remain the same.

4.2 Alternative Considered But Eliminated From Further Review

A number of alternatives were initially considered to mitigate the existing operational deficiencies. The following presents the alternatives which were considered but eliminated from further review:

- **Relocating the existing Crosstree Drive across from Jenkins Island Road with a possible signal installation**. This alternative was eliminated due to the fact that the proposed intersections would not meet any signal warrant (Section 4.4). Without the signal, the side road traffic would experience the same operational and safety deficiencies as existing.
- **Grade separation structure over/under US 278 and connector road.** This alternative would involve construction of a grade separation structure over/under US 278, construction of connector roads along the north and south sides of US 278. This alternative was eliminated due to significant impact to residential properties and significant construction costs associated with grade separation structures.

4.3 Proposed Alternatives

After thorough analyses/investigation of a number of alternatives, the following were found to provide safe and efficient access to local communities with minimal disruption to through traffic on US 278. The following provides a brief description of each of the alternatives.

4.3.1 Alternative 1: Right-in Right-out with Frontage Road

All existing median cross-overs on US 278 would be closed and existing access points (Blue Heron Point Road, Gateway Drive, Crosstree Drive, and Jenkins Island Road) would be reconstructed to allow only for right-in and right-out movements. A new frontage/access road would be constructed along the north side of US 278 connecting Blue Heron Point Road to the west and Jenkins Island Road to the east. The existing Blue Heron Point Road would be reconstructed / improved to accommodate heavy vehicular traffic. Adequate acceleration and deceleration lanes would be provided at each access point to accommodate safety for merging / diverging to/from the through traffic. This alternative would also require enhancement of the Windmill Harbour maintenance entrance from Blue Heron Point Road. With the construction of the new frontage road and enhancement to the existing access points, full access to all the communities can be maintained without requiring any left-turn maneuvers onto / from US 278. This alternative would remove the major conflicting traffic maneuvers from the access points, hence improving safety and mobility along the corridor. Figure 4-1 and Figure 4-2 illustrate the proposed alternative. The opening year (2020) and design year (2035) projected traffic volumes associated with Alternative 1 are illustrated in Appendix B (Figure B-4 and Figure B-5).

4.3.2 Alternative 2: Modified Super Street

Under this scenario, the existing three median cross-overs would be reconstructed to allow for left-turns into the communities from US 278 while providing better refuge and sight distance for turning vehicles. The existing access points (Blue Heron Point Road, Gateway Drive, Crosstree Drive, and Jenkins Island Road) would be reconstructed which would allow the traffic from the communities to only make right-turns onto US 278. Two new median openings would be constructed between Crosstree Drive/Gateway Drive and Jenkins Road with adequate storage length and U-turn facilities on US 278. Adequate acceleration lanes would also be provided at all access points. The existing left-turn traffic from Blue Heron Point Road and Crosstree Drive would make right-turns on US 278 and then make a U-turn in the new median cross-over to travel westward on US 278. Similarly, the existing left-turn traffic from Jenkins Island Road would make right-turns on US 278 and then make a U-turn on the new median cross-over to travel eastward on US 278. This alternative is illustrated in Figure 4-3 and Figure 4-4.

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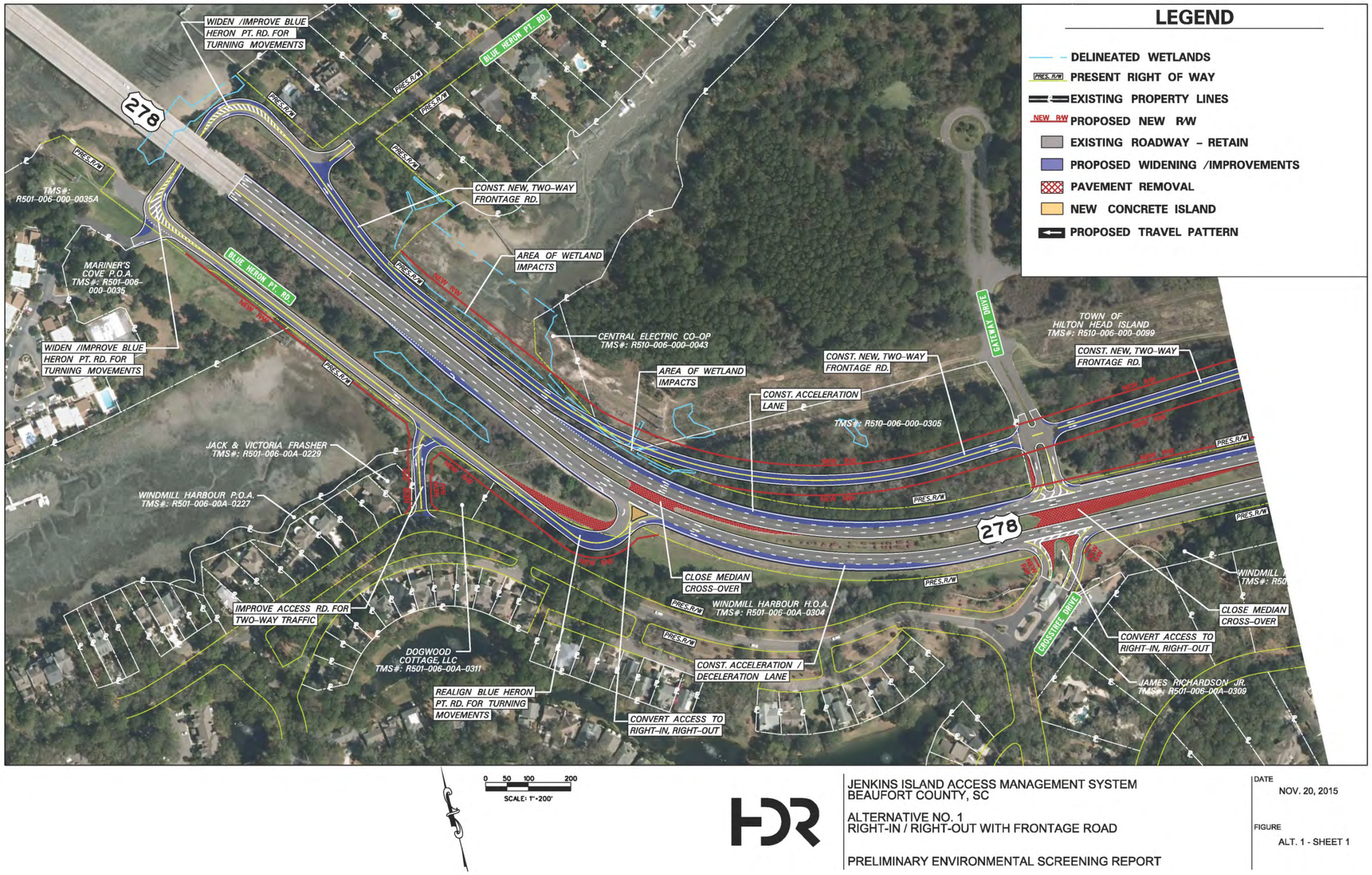

Figure 4-1. Alternative 1 (Sheet 1 of 2)

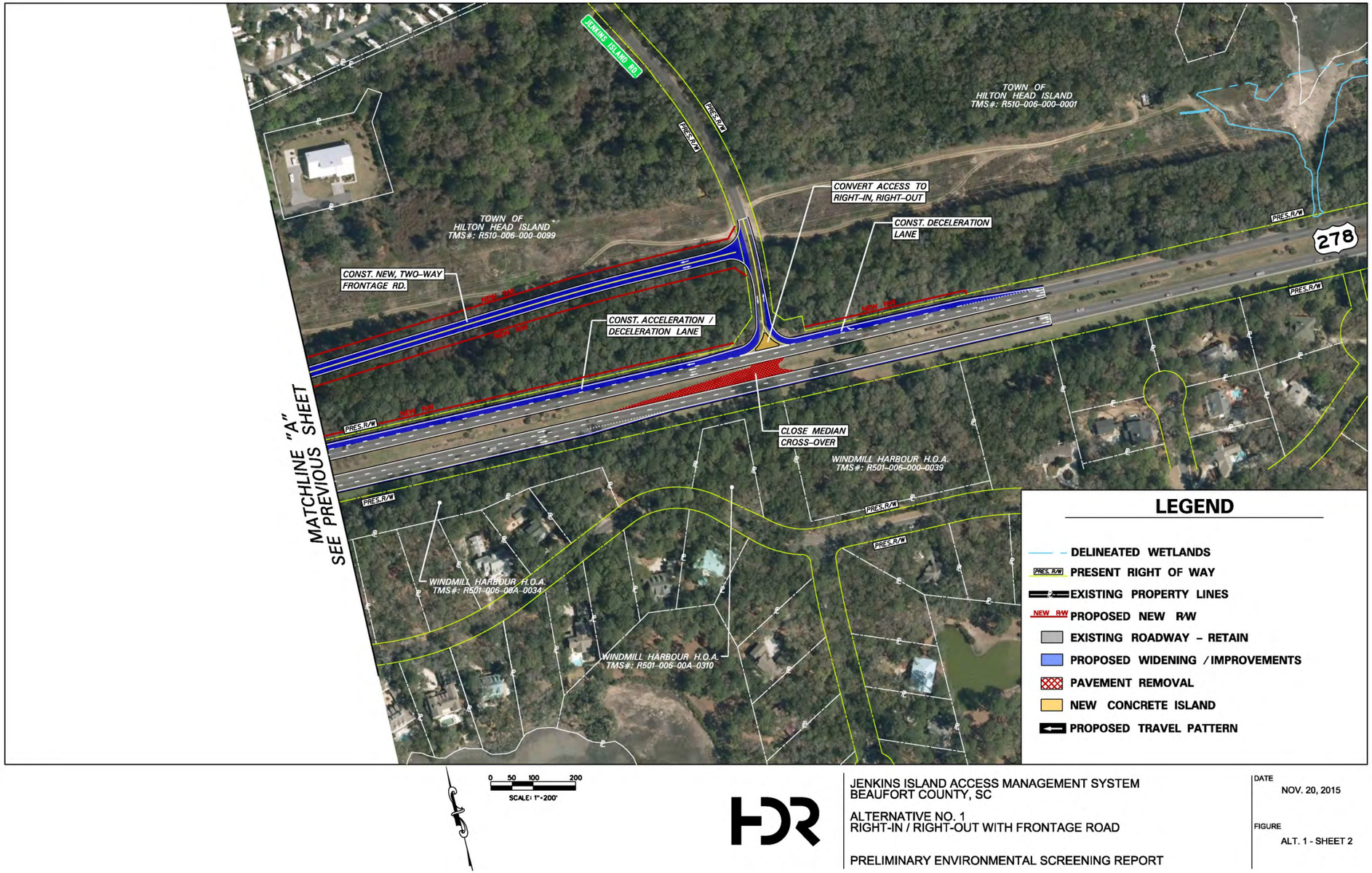

Figure 4-2. Alternative 1 (Sheet 2 of 2)

Figure 4-3. Alternative 2 (Sheet 1 of 2)

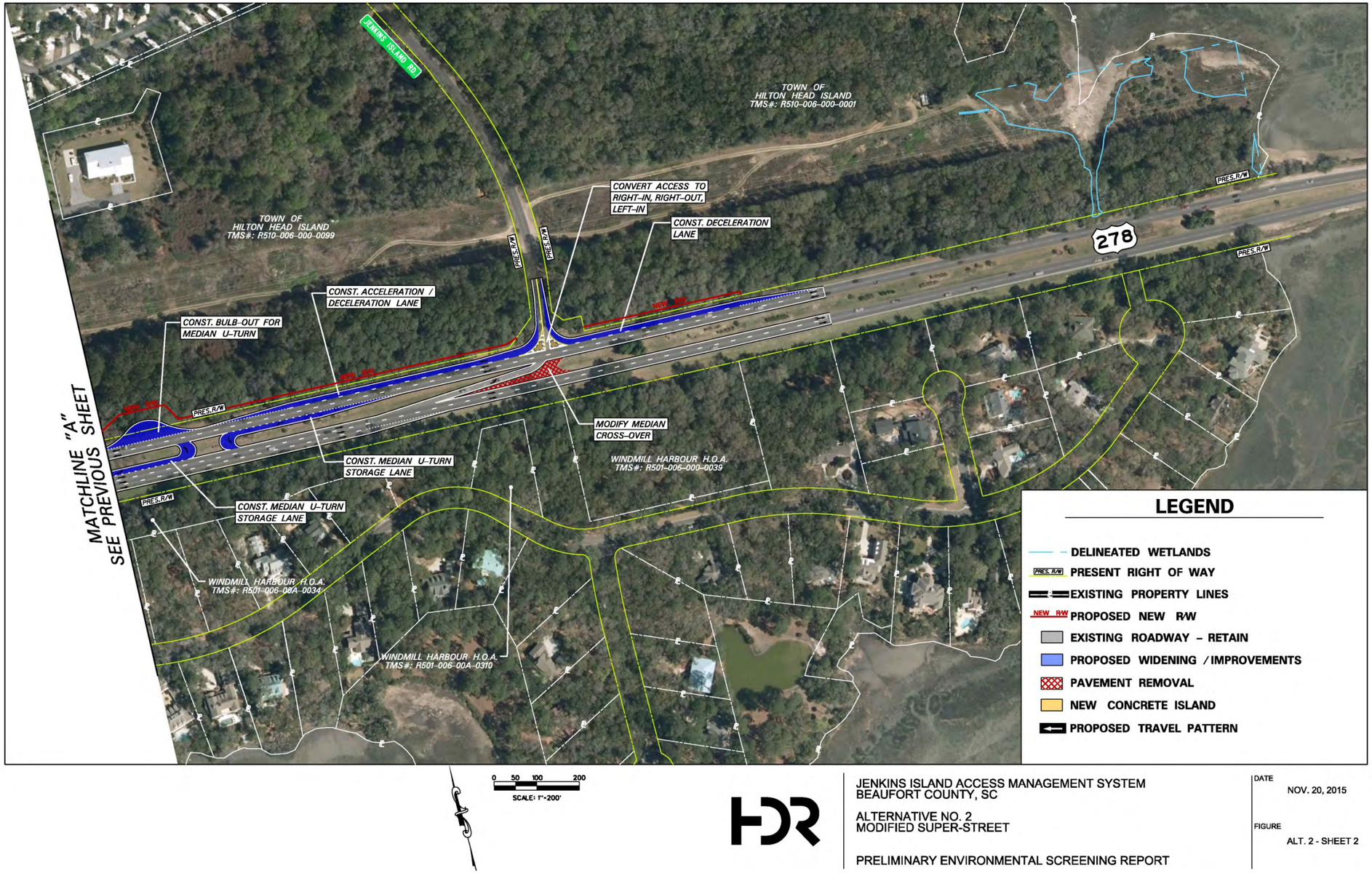

Figure 4-4. Alternative 2 (Sheet 2 of 2)

4.3.3 Recommended Alternative: Modified Super Street with Signals (Alternative 2A)

Based on comments received during the public information meeting, Alternative 2 was modified (becoming Alternative 2A) to include two signals and additional design enhancements to improve the operation of the proposed U-turns. The existing median cross-over at Blue Heron Point would be reconstructed to allow for left-turns into Blue Heron Point and U-turns onto US 278. A new signal with two-phase operation would be installed at this location. The remaining cross-overs at Crosstree Drive and Jenkins Island Road would be reconstructed, allowing traffic from the communities to make only right-turns on US 278. The new median opening was moved to the east of Jenkins Island Road in order to provide adequate left turn / U-turn storage and additional distance for weaving / merging from the Crosstree Drive access point. A new signal with two-phase operation would be constructed at this location as well. The existing left-turn traffic from Blue Heron Point Road and Crosstree Drive would make right-turns on US 278 and then make U-turns at the new median cross-over to travel westward on US 278. The existing left-turn traffic entering into Jenkins Road would also make U-turns at the new median cross-over and then turn right onto Jenkins Road. The existing left-turn traffic from Jenkins Road would make right-turns on US 278 and then make U-turns at Blue Heron Point to travel eastward on US 278. The existing left-turn traffic entering into Crosstree Drive would also make U-turns at the Blue Heron Point cross-over and then turn right onto Crosstree Drive. A third through lane would be introduced in both directions in advance of these intersections. The additional lanes eastbound / westbound on US 278 are proposed to span the limits of the project corridor; from the termini of the J. Wilton Graves Bridge to the causeway onto Hilton Head Island. Additionally, a dedicated right turn lane would be provided between Blue Heron Point Road and Crosstree Drive for storage capacity of right turns into Windmill Harbour, specifically to reduce any potential queues along US 278 from the Crosstree Drive guardhouse situated close to the intersection. Figure 4-5 and Figure 4-6 illustrate the alternative. The opening year (2020) and design year (2035) projected traffic volumes associated with Alternative 2A are illustrated in Appendix B (Figure B-6 and Figure B-7).

4.4 Signal Warrant Analysis

The installation of a traffic signal should improve the overall safety and operation of the intersections and should not seriously disrupt progressive traffic flow. A thorough analysis that considers traffic conditions, pedestrian characteristics, crash history, and physical characteristics of the location such as sight distances and speed limits, and good engineering judgment must all be considered before the installation of a traffic signal is proposed.

A signal warrant study was performed for the following three scenarios:

- *Scenario 1: No-Build* – Under this scenario, all side roads, Blue Heron Point Road, Crosstree Drive, and Jenkins Island Road, are evaluated for their existing configuration.

- *Scenario 2: Relocation* – Under this scenario, Crosstree Drive would be considered to be relocated across from Jenkins Island Road and evaluated for signal installation (see Section 4.2).
- *Scenario 3: Alternative 2 Modified Superstreet* – This scenario is described in Section 4.3.2.

The procedures used in conducting the traffic signal warrant study are consistent with the guidelines set forth in the *Manual on Uniform Traffic Control Devices* (MUTCD), *2009 Edition* published by Federal Highway Administration (FHWA). The MUTCD identifies nine warrants to be considered as justifying criteria necessary to be met before the installation of a traffic signal is considered.

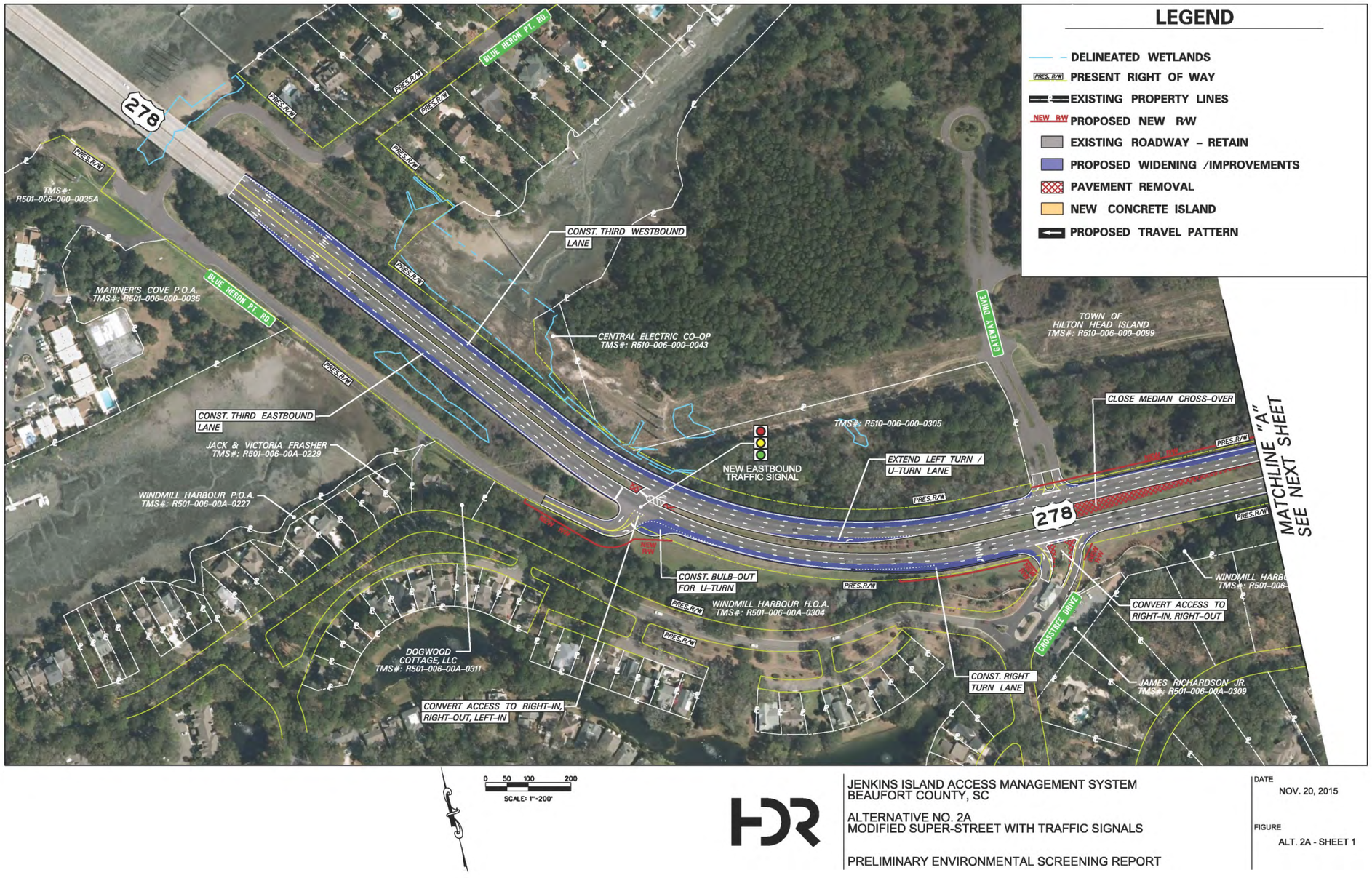

Figure 4-5. Alternative 2A (Sheet 1 and 2)

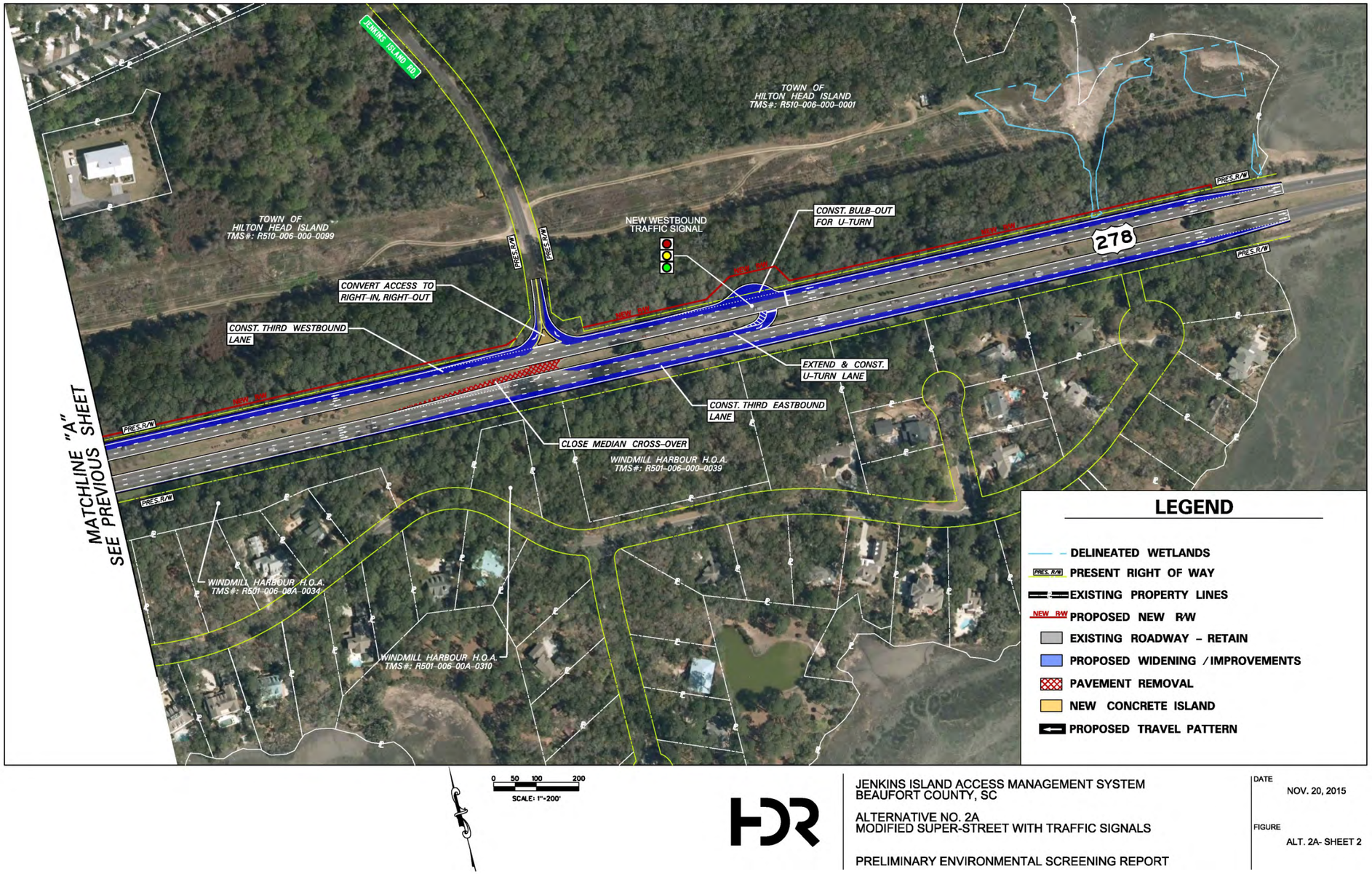

Figure 4-6. Alternative 2A (Sheet 2 and 2)

These warrants are:

- Warrant 1: Eight-Hour Vehicular Volume Warrant,
- Warrant 2: Four-Hour Vehicular Volume Warrant,
- Warrant 3: Peak Hour Warrant,
- Warrant 4: Pedestrian Volume Warrant,
- Warrant 5: School Crossing Warrant,
- Warrant 6: Coordinated Signal System Warrant,
- Warrant 7: Crash Experience Warrant,
- Warrant 8: Roadway Network Warrant, and
- Warrant 9: Intersection near a Grade Crossing Warrant.

4.4.1 Warrant 1: Eight Hour Vehicular Volume

Warrant 1 is intended for the application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal or where the traffic volume on a major street is so heavy that traffic on a minor street suffers excessive delay or conflict in entering or crossing the major street. If either Condition A or B is satisfied, then the criteria for Warrant 1 is satisfied.

To meet the requirements for Warrant 1A (Minimum Vehicular Volume), the total number of vehicles per hour on the major street and the higher volume minor street approaches should meet the required minimum volumes. At least 8 hour volumes of the major street and minor street should meet the minimum volume threshold to satisfy this warrant. Warrant 1A is not satisfied for Scenario 1, Scenario 2, or Scenario 3.

To meet the requirements for Warrant 1B (Interruption of Continuous Traffic), the total number of vehicles per hour on the major street and the higher-volume minor street approach should meet the required minimum volume. At least 8 hour volumes of the major street and minor street should meet the minimum volume threshold to satisfy this warrant.

- Scenario 1 - Warrant 1B not satisfied.
- Scenario 2 - Warrant 1B not satisfied.
- Scenario 3 - Warrant 1B is satisfied for the proposed Blue Heron Point Rd. intersection and shows very close proximity (3 hours over 100%, 3 hours over 90% and 3 hours over 75% warrant threshold value) for the new median U-turn intersection.

Tables showing the results of Warrant 1 analysis for the three scenarios are attached in Appendix D.

4.4.2 Warrant 2: Four Hour Vehicular Volume

Warrant 2 is intended for the application at locations where the volume of intersecting traffic is the principal reason to consider installing a traffic signal. To meet the

requirements for Warrant 2, the total number of vehicles per hour on the major street and the higher volume minor street approaches should meet the required minimum volumes. At least 4 hour volumes of the major street and minor street should meet the minimum volume threshold to satisfy this warrant.

- Scenario 1 - Warrant 2 not satisfied.
- Scenario 2 - Warrant 2 not satisfied.
- Scenario 3 - Warrant 2 is satisfied for proposed Blue Heron Point Rd. intersection and shows close proximity (3 hours over 90% and 1 hour over 80% warrant threshold value) for the new median U-turn intersection.

Tables showing the results of Warrant 1 analysis for the three scenarios are attached in Appendix D.

4.4.3 Warrant 3: Peak Hour Vehicular Volume

Warrant 3 is intended to be applied where traffic conditions are such that for a minimum of 1 hour of an average day, the minor street traffic suffers undue delay when entering the major street. Warrant 3 has two conditions. If either Condition A or B is satisfied, then the criteria for Warrant 3 is satisfied.

To meet the requirements for Warrant 3A, all of the following three conditions must be met for the same one hour of the day:

- The total stopped delay experienced by the traffic on the minor-street approach exceeds 5 vehicle-hours for a two lane approach.
- The volume of the minor street approach exceeds 100 vehicles per hour for one moving lane of traffic.
- The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour.

To meet the requirement for Warrant 3B, the total number of vehicles per hour on the major street and the higher volume minor street approaches should meet the required minimum volumes.

- Scenario 1 - Warrant 3 not satisfied.
- Scenario 2 - Warrant 3 not satisfied.
- Scenario 3 - Warrant 3 is satisfied for the proposed Blue Heron Point Rd. intersection and shows close proximity (over 75% threshold value) for the new median U-turn intersection.

Tables showing the results of Warrant 1 analysis for the three scenarios are attached in Appendix D.

4.4.4 Warrant 4: Pedestrian Volume – *Not Applicable*

Warrant 4 is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. To meet Signal Warrant 4, the pedestrian volume crossing the major street at an intersection or

midblock location during an average day should be 75 or more for each of any 4 hours or 93 or more during any 1 hour of an average day. This warrant is not applicable.

4.4.5 Warrant 5: School Crossing – *Not Applicable*

Warrant 5 is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic signal. This warrant is not applicable. There is no existing school crossing at these intersections.

4.4.6 Warrant 6: Coordinated Signal System – *Not Applicable*

Warrant 6 is applicable in situations where a coordinated signal system sometimes necessitates the installation of a traffic signal to maintain proper platooning of vehicles. The adjacent signalized intersections located more than a mile to the east and west of the study intersections. Thus, a signal can not be justified solely based on the criteria.

4.4.7 Warrant 7: Crash Experience

When there is a history of crashes at an intersection, the Crash Experience Warrant (Warrant 7) can be used to justify the consideration of a traffic signal installation. The following criterion should be considered in the application of this warrant.

Prior to the installation of a traffic signal based on accident history, less restrictive measures must be attempted and enforced. If other measures to reduce accident frequency fail, then a traffic signal installation may be considered. The Crash Experience signal warrant applies to intersections where five or more reported accidents have occurred within a twelve month period that can be avoided by a traffic signal and where vehicular volume or pedestrian traffic is greater than 80 percent of the requirements specified by the Eight-Hour Vehicular Volume warrant or Pedestrian Volume warrant.

The MUTCD states that there must be a history of crashes at the subject intersection amounting to at least 5 reported crashes within the past year resulting in personal injury or property damage above the reporting thresholds. The types of these crashes must also be such that they are correctable by the installation of a traffic signal. An adequate trial of alternatives must also have been attempted, along with increased enforcement. In addition to meeting these criteria, a certain amount of vehicular and pedestrian volumes must be present for 8 hours of the day.

During the last three and half year period, 26 crashes were reported at the existing Blue Heron Point Road cross-over, 28 crashes were reported at Crosstree Drive, and 13 crashes were reported at Jenkins Island Road. The detailed information is provided under Section 3.3. During the last three and half year period, three crashes were related to the left-turning traffic to/from Blue Heron Point Road, seven crashes were related to the left-turning traffic to/from Crosstree Drive, and one crash was related to the left-turning traffic exiting to/from Jenkins Island Road. None of the study intersections have at least 5 reported crashes within a single year period which can be correctable by a signal installation. Thus, the minimum criterion for Warrant 7 is not met.

4.4.8 Warrant 8: Roadway Network – *Not Applicable*

Warrant 8 is intended to be applied to the intersection of two or more major routes. The side street does not exhibit any of the characteristics of a major route. This warrant is not applicable.

4.4.9 Warrant 9: Intersection near a Grade Crossing – *Not Applicable*

Warrant 9 is not applicable for the study intersection since there is no grade crossing near the intersections.

All the vehicular volume warrants: Eight Hour Vehicular Volume Warrant, Four Hour Vehicular Volume Warrant, and Peak Hour Vehicular Volume Warrant are met for the proposed Blue Heron Point intersection and show very close proximity to meet the threshold values for the proposed median U-turn intersection (east of Jenkins Road). Based on the results of the signal warrant analysis, traffic signal is recommended at these two proposed intersections. It should be noted that both signals can be installed with two-phase operation and would not seriously disrupt the progressive traffic flow along US 278.

The traffic signal warrant analysis conducted for the proposed scenarios provides credence to the direct feasibility of the Modified Super-Street / Median U-turn (Alternative 2 / 2A) option. The SCDOT shall require evidence of passing signal warrant studies for the application of new traffic signals prior to their approval and permit for installation. Public input highly recommended the installation of a traffic signal at Crosstree Drive; for this study, a traffic signal was proposed for the relocated intersection of Crosstree Drive at Jenkins Island Road in order to attempt to justify increased side road volumes by combining the volumes from Crosstree Drive and Jenkins Island Road at a single intersection. The results of this analysis shows that even with combined side road volumes, the required minimum volumes to satisfy the warrants were not met.

4.5 Operational Analysis

Operational analyses of the proposed Alternative 1 and Alternative 2A were performed for the opening year (2020) and design year (2035) traffic volumes. The results of the operational analysis are included in Appendix E.

Table 4-1 shows the results of the capacity analyses for Alternative 1. Under future build conditions, all three intersections would operate at satisfactory LOS A with free-flow right-turn movement.

Table 4-1. Intersection LOS Summary – Build Condition – Alternative 1

Intersection	Control	Movement	Condition	AM Peak			PM Peak			Weekend		
				LOS	Delay (Sec)	v/c	LOS	Delay (Sec)	v/c	LOS	Delay (Sec)	v/c
Blue Heron Point Road @ US 278	Free	NBR	2020	A	0.5	0.02	A	0.4	0.02	A	0.6	0.02
			2035	A	0.4	0.02	A	0.4	0.02	A	0.5	0.02
Crosstree Drive @ US 278	Free	NBR	2020	A	0.8	0.03	A	0.9	0.03	A	0.7	0.01
			2035	A	0.7	0.03	A	0.8	0.03	A	0.7	0.01
Jenkins Road @ US 278	Free	SBR	2020	A	1.0	0.01	A	0.8	0.02	A	0.6	0.01
			2035	A	0.8	0.01	A	0.8	0.02	A	0.8	0.01

Table 4-1 Notes:

Control refers to the movement of the vehicle at the turn. For example, a vehicle traveling northbound on Blue Heron Point Road would not be required to stop before merging onto US 278.

Movement refers to vehicle direction and turning movement. For example, NBR indicates a vehicle traveling northbound on Blue Heron Point Road and turning right onto US 278.

Due to free flow conditions, delay were estimated from SimTraffic simulation and v/c were estimated from saturation flow rate.

In Alternative 1, auxiliary lanes were considered between Blue Heron Point Road and Crosstree Drive in the eastbound direction and between Jenkins Island Road and Gateway Drive in the westbound direction. Both of these auxiliary lanes introduce weaving conditions between these intersections. Weaving analyses were performed to evaluate the operating conditions between these intersections. The results of the analyses are shown in Table 4-2. Based on the analyses, both the weaving sections are expected to operate at satisfactory LOS B or better during both opening (2020) and design year (2035) traffic volume conditions.

Table 4-2. Weave Segment Analysis – Build Condition – Alternative 1

Weave Section	Direction	Condition	AM Peak		PM Peak		Weekend	
			LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
US 278 between Blue Heron Point Road & Crosstree Drive	EB	2020	B	22.0	B	13.3	B	18.0
		2035	B	16.9	A	10.3	B	13.9
US 278 between Jenkins Island Road & Gateway Drive	WB	2020	A	9.7	B	22.7	B	14.1
		2035	A	7.6	B	17.4	A	10.9

Table 4-3 shows the results of the capacity analyses for Alternative 2A. Based on the results of the capacity analysis, both the proposed signalized intersections are expected to operate at satisfactory LOS B or better during 2020 opening and 2035 design year traffic volumes.

Table 4-3. Intersection LOS Summary – Build Condition – Alternative 2A

Intersection	Control	Movement	Condition	AM Peak			PM Peak			Weekend		
				LOS	Delay (Sec)	v/c	LOS	Delay (Sec)	v/c	LOS	Delay (Sec)	v/c
Blue Heron Point Road @ US 278	Signal	Overall	2020	A	5.2	0.71	A	6.9	0.56	A	5.6	0.65
			2035	A	5.4	0.74	A	7.1	0.58	A	5.7	0.67
Crosstree Drive @ US 278	Stop	NBR	2020	D	34.9	0.35	A	9.8	0.10	B	10.1	0.07
			2035	E	41.1	0.41	A	9.9	0.10	B	10.3	0.07
Jenkins Road @ US 278	Stop	SBR	2020	A	9.9	0.03	D	29.5	0.19	B	10.5	0.03
			2035	B	10.0	0.03	D	32.1	0.22	B	10.6	0.04
Median U-Turn east of Jenkins Road	Signal	Overall	2020	B	12.8	0.39	A	8.4	0.72	B	10.6	0.53
			2035	B	12.8	0.40	A	8.9	0.75	B	10.8	0.55

Notes:

Control refers to the movement of the vehicle at the turn. For example, a vehicle traveling northbound on Blue Heron Point Road would be required to stop at a signal before merging onto US 278.

Movement refers to vehicle direction and turning movement. For example, NBR indicates a vehicle traveling northbound on Blue Heron Point Road and turning right onto US 278.

Due to free flow conditions, delay were estimated from SimTraffic simulation and v/c were estimated from saturation flow rate.

SIMTRAFFIC from Synchro 8 software was also used to analyze the travel time and travel speed within the study corridor. The analysis was performed using the 2020 opening year and 2035 design year traffic volumes considering both no-build and build conditions. For both 2035 no-build and 2035 build condition, it was assumed that US 278 would be widened to provide an additional through lane in each direction. The results of the analysis are shown in Table 4-4.

Table 4-4. Arterial Travel Time and Speed Analysis

Movement	Condition	Travel Time (sec)			Travel Speed (mph)		
		AM	PM	Weekend Peak	AM	PM	Weekend Peak
US 278 Eastbound	2020 No-Build Condition	87.3	64.4	70.4	35	46	42
	2020 Build Condition-Alternative 1	*84.7*	*63.3*	*68.0*	*35*	*47*	*44*
	2020 Build Condition-Alternative 2A	*100.0*	*80.6*	*87.6*	*33*	*41*	*38*
	2035 No-Build Condition	65.9	62.3	63.0	45	47	47
	2035 Build Condition- Alternative 1	*64.7*	*61.8*	*63.5*	*46*	*48*	*47*
	2035 Build Condition- Alternative 2A	*78.5*	*75.2*	*76.6*	*42*	*44*	*43*
US 278 Westbound	2020 No-Build Condition	80.7	115.8	85.8	43	30	35
	2020 Build Condition – Alternative 1	*75.3*	*97.4*	*78.8*	*44*	*35*	*42*
	2020 Build Condition – Alternative 2A	*75.8*	*123.6*	*78.9*	*38*	*23*	*37*
	2035 No-Build Condition	74.3	79.4	69.9	45	42	43
	2035 Build Condition – Alternative 1	*68.4*	*72.3*	*74.7*	*49*	*46*	*45*
	2035 Build Condition – Alternative 2A	*73.0*	*78.8*	*71.7*	*40*	*37*	*40*

Table 4-4 shows an improvement on the facility travel time and speeds for the build conditions for Alternative 1. This alternative would eliminate the conflicting left-turning movements from the traffic stream and hence improve the overall traffic operations on US 278. Due to the addition of traffic signals in both the eastbound and westbound directions on US 278, Alternative 2A would have some impact on the travel time and

speed for the build conditions. However, both signals would function under two-phase operation and would allocate the majority of green time to the through traffic on US 278. Thus, the proposed traffic signals of Alternative 2A are not expected to have significant adverse impact on the through traffic on US 278.

5 Preliminary Impact Analysis

The following section describes the environmental resources that currently exist in the Study Area. Environmental resources were assessed based on available data, GIS mapping, and a delineation of wetlands and waters within the Project Study Area. This section also provides a preliminary analysis of impacts associated with each Build Alternative. The environmental resources would be evaluated in greater detail and impacts would be refined during future NEPA evaluations for the project. Table 5-1 presents a matrix summarizes the preliminary impacts for each environmental resource.

Table 5-1. Preliminary Impact Analysis Matrix

Resource	Alternative 1 (Right Turn Only with Frontage Road)	Alternative 2A (Modified Super Street with Signal)
Water Resources		
Surface Waters	No Direct Impact; Indirect impacts minimized through BMPs	No Direct Impact; Indirect impacts minimized through BMPs
Wetlands	Approximately 0.3 Acres (0.2 acres of tidal salt marsh and 0.1 acres of freshwater wetlands)	No Impact
Permitting	SCDOT General Permit or NWP #14 NOI for South Carolina NPDES Construction General Permit SCR160000	NOI for South Carolina NPDES Construction General Permit SCR160000
Essential Fish Habitat	0.2 Acres of estuarine wetlands; EFH Assessment required	No Impact
Threatened and Endangered Species	Habitat survey and Biological Assessment needed; Project is not expected to impact protected species	Habitat survey and Biological Assessment needed; Project is not expected to impact protected species
Floodplains	Would likely require coordination with local floodplain administrator	No Impact
Land Use	Potential affect to parks and recreation land use on Town of Hilton Head Island Property	No Impact
Farmlands	No loss of Prime Farmlands	No loss of Prime Farmlands
Cultural Resources	No Impact; Cultural Resource Survey would likely be required.	No Impact; Cultural Resource Survey likely not required.
Section 4(f)	3.1 Acres of ROW Acquisition on Town of Hilton Head Island park property; Would require Section 4(f) evaluation	0.8 Acre of ROW Acquisition on Town of Hilton Head Island park property; Would require Section 4(f) evaluation
Noise	Would require noise analysis	Would not require noise analysis
Air Quality	Low Potential MSAT Effects; Expected to remain in attainment and conformity	Low Potential MSAT Effects; Expected to remain in attainment and conformity
Hazardous Materials	No Impacts	No Impact
Displacements & ROW Acquisition	1.7 Acres of ROW Acquisition No Displacements	0.0 Acres of ROW Acquisition No Displacements

Resource	Alternative 1 (Right Turn Only with Frontage Road)	Alternative 2A (Modified Super Street with Signal)
Environmental Justice	No Impact	No Impact

5.1 Water Resources

5.1.1 Surface Waters

The Study Area is located in the Lower Savannah River subbasin or USGS Hydrologic Unit Code (HUC) No. 03060110. The subwatershed designation is HUC 03060110-03 for the Calibogue Sound (Figure 5-1). The closest USGS named surface waters include MacKay Creek, Skull Creek, and Jarvis Creek. There are no Federal or state wild or scenic rivers within or in close proximity to the Study Area.

Classified Waters and Water Quality Monitoring Stations

The waterways near the Study Area are classified as class "SFH" or Shellfish Harvesting waters, by the South Carolina Department of Health and Environment Control (SCDHEC). SCDHEC defines SFH class waters as “tidal saltwaters protected for shellfish harvesting. Suitable for primary and secondary contact recreation, crabbing, and fishing. Also suitable for the survival and propagation of a balanced indigenous aquatic community of marine fauna and flora.” (SCDHEC, 2012a).

Section 303(d) of the Clean Water Act requires that states develop a list of waters not meeting water quality standards or which have impaired uses. SCDHEC must prioritize these water bodies and prepare a management strategy or total maximum daily load (TMDL). SCDHEC monitors for fecal coliform in the shellfish harvesting waters near the Study Area (Figure 5-2). According to the State of South Carolina Integrated Report for 2014, Part I: Section 303(d) List of Impaired Waters (SCDHEC, 2014), no shellfish monitoring stations are listed for impairments in Skull Creek or Jarvis Creek near the Study Area. The Study Area is not located within a TMDL watershed.

NPDES Permits

The National Pollutant Discharge Elimination System (NPDES) Permit Program was created by Section 402 of the 1972 Federal Clean Water Act. SCDHEC Bureau of Water administers the NPDES Permit Program in SC. Typical regulated point source discharges are:

- Discharges from wastewater treatment systems owned by municipalities, industries, private utilities, State and Federal government, etc.;
- Discharges such as cooling water, boiler blow down, etc.;
- Stormwater discharges from municipal separate storm sewer systems (MS4s);
- Stormwater discharges associated with industrial activity; and
- Stormwater dischargers from Construction Sites.

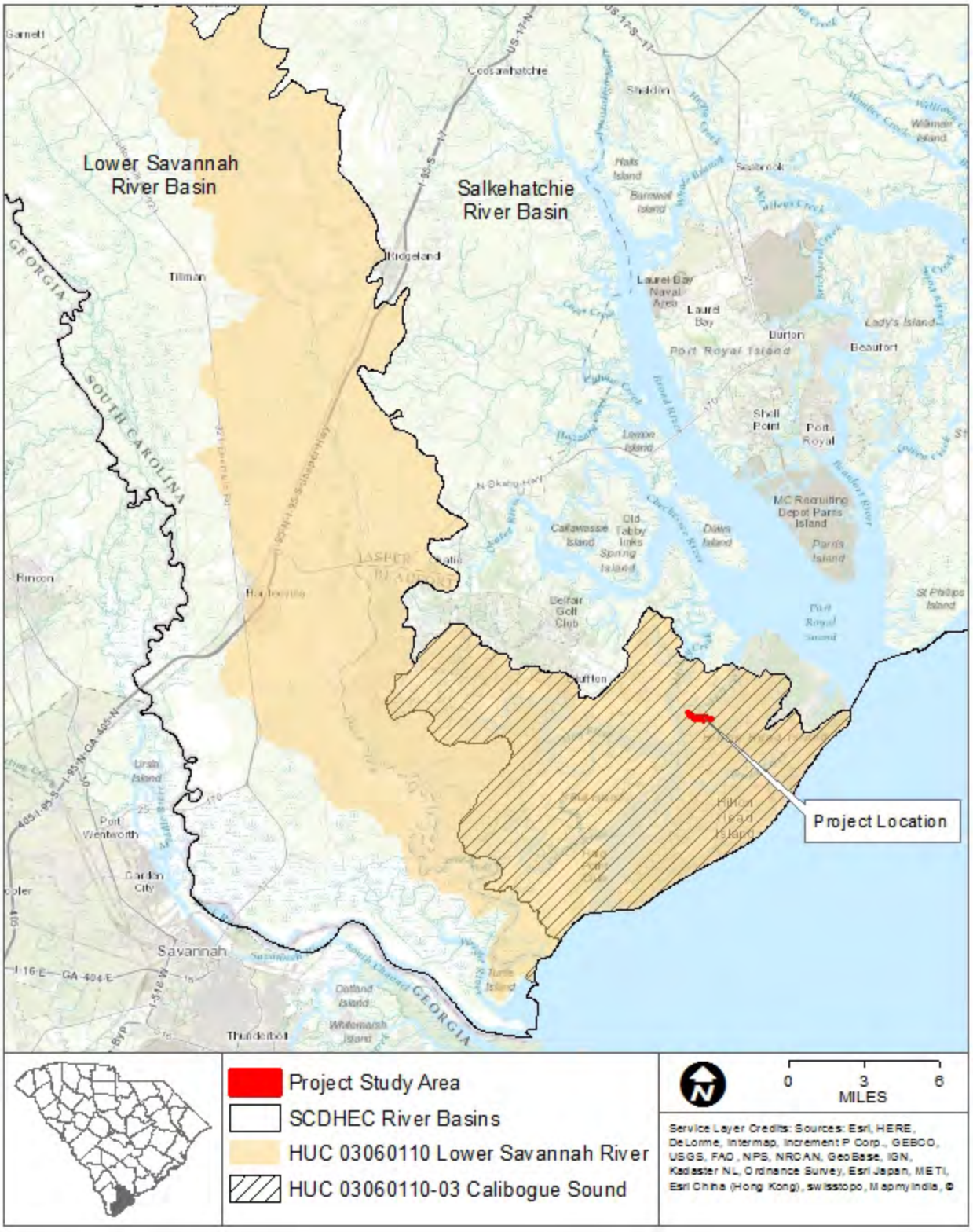

Figure 5-1. Lower Savannah River Basin and Associated Watersheds

Source: USGS

Figure 5-2. SCDHEC Shellfish Monitoring Stations and NPDES Permitted Facilities
Source: SCDHEC

According to the SCDHEC's GIS, no NPDES Permitted facilities are located within the Project Study Area. Two NPDES permitted facilities operated by Town of Hilton Head Island are located north of the Study Area (Figure 5-2).

The proposed project would not result in direct impacts to surface waters. During construction, appropriate sediment and erosion control structures would be employed to minimize impacts to water quality in adjacent waters. Alternative 1 and Alternative 2A would require a Notice of Intent for coverage under South Carolina NPDES Construction General Permit SCR160000. The application would require a Stormwater Pollution Prevent Plan (SWPPP), including Stormwater Management and Sediment Control Plan.

5.1.2 Wetlands

The US Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) define wetlands as: "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." (Environmental Laboratory, 1987). The USACE uses three parameters to identify jurisdictional wetlands. These parameters are as follows: 1) Hydrophytic Vegetation, 2) Wetland Hydrology, and 3) Hydric Soils. Except in certain atypical situations, all three parameters must be present in order for an area to be determined to be a jurisdictional wetland.

Tidal waters within the Project Study Area are also regulated as "Critical Area" by the South Carolina Department of Health and Environmental Control (SCDHEC) Office of Ocean and Coastal Resource Management (OCRM).

On June 5 and 18, 2015, the Project Study Area was reviewed for jurisdictional waters of the U.S. under Section 404 of the Clean Water Act. The Project Study Area was examined according to the methodology described in the USACE 1987 Wetland Delineation Manual, USACE Post-Rapanos guidance, and the USACE Atlantic and Gulf Coastal Plain Regional Supplement. Table 5-2 and Figure 5-3 provide a summary of the delineated features.

Table 5-2. Summary of On-Site Jurisdictional Waters of the U.S.

Site Number or Name	Acres (Approximate)	Latitude	Longitude	Class of Aquatic Resource
Wetland A	1.4	32.22056	-80.7776	Tidal OCRM Critical Area
Wetland B	0.1	32.21972	-80.7769	Freshwater
Wetland C	0.3	32.2221	-80.7795	Tidal OCRM Critical Area
Wetland D	Outside Project Area	32.22039	-80.7786	Tidal OCRM Critical Area
Wetland E	0.2	32.21967	-80.7776	Tidal OCRM Critical Area
Wetland F	1.3	32.21931	-80.7636	Tidal OCRM Critical Area
Wetland G	0.1	32.21924	-80.7651	Freshwater
Wetland H	<0.1	32.21947	-80.7761	Freshwater

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Figure 5-3. Wetlands within Project Study Area

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The Project Study Area contains tidal salt marsh, tidal ditches, and freshwater wetlands. The salt marshes (Wetland A, C, D, E, and F) are tributaries to Mackay Creek and Skull Creek. Wetland D is located outside of the Project Study Area. Observed salt marsh vegetation includes bushy seaside tansy (*Borrichia frutescens*), smooth cordgrass (*Spartina alterniflora*), and black needlerush (*Juncus roemerieanus*). Wetland hydrology indicators in the salt marsh include standing water, saturated soils, and drift deposits.

Figure 5-4. Salt Marsh Between Hog Island and Jenkins Island.

Three freshwater wetlands (Wetland B, G, and H) were also identified within the Project Study Area.

- Wetland B connects to Wetland A through a roadside ditch. Vegetation is disturbed by maintenance of the powerline easement. Remaining vegetation includes wax myrtle (*Morella cerifera*) and Jesuit's bark (*Iva frutescens*) in the shrub layer and swamp smartweed (*Polygonum hydropiperoides*), Johnsongrass (*Sorghum halepense*), and bushy bluestem (*Andropogon glomeratus*) in the herbaceous layer. Hydrology indicators include drift deposits and algal mats.
- Wetland G is located in the powerline easement. Construction of powerline and clearing of right-of-way have disturbed the vegetation and soils. No trees or saplings are present. Jesuit's bark is the primary shrub. Herbaceous vegetation includes cattails (*Typha latifolia*), swamp smartweed, nodding beaksedge (*Rhynchospora inexpansa*), common rush (*Juncus effusus*), and bushy bluestem. Access roads in powerline easement have created a low area where water collects after rain events.
- Wetland H is a forested wetland located adjacent to the powerline easement. The wetland is sparsely-vegetated. Vegetation includes red maple *(Acer rubrum*) trees. Soils were dry during the field visit but water-stained leaves were observed.

Alternative 1 would impact approximately 0.2 acres of tidal salt marsh (Critical Area) and 0.1 acres of freshwater wetlands. Alternative 2A would not impact wetlands. The USACE and SCDHEC-OCRM have not reviewed the wetland and Critical Area boundaries;

therefore, these boundaries are subject to change. This report will be amended if substantial changes are made to the wetland and Critical Area boundaries that result in changes to the recommended alternative.

Permitting

A USACE Section 404 permit is required for impacts to jurisdictional waters of the U.S., including wetlands. Section 404 of the CWA is administered by the USACE. Depending on the type and extent of jurisdictional waters of the U.S., including wetlands, to be affected, Section 404 permitting requirements can range from activities that are considered exempt or preauthorized to those requiring preconstruction notification (PCN) for a Nationwide Permit (NWP), SCDOT General Permit, or Individual Permit from the USACE.

The SCDOT General Permit may be used for the project if the SCDOT elects to be the permit applicant. Under the SCDOT GP, impacts are not to exceed 3.0 acres of freshwater impacts, 0.5 acre of tidal wetland impacts, and/or 300 linear feet of jurisdictional stream impacts. If the SCDOT General Permit is not used for the project, the proposed improvements would likely qualify under the NWP. Under NWP #14 for Linear Transportation Projects, impacts are not to exceed 0.5 acre in freshwater wetlands and 0.33 acre in tidal waters.

If impacts are greater than the thresholds for the SCDOT General Permit or the NWP, the County would be required to submit an application for an Individual Permit. Individual Permit applications typically include detailed project information, permit drawings, biological assessments, and a cultural resource survey. USACE and SCDHEC review and certification typically requires 9 to 12 months, which includes a 30-day public notice period.

SCDHEC administers the Water Quality Certification program pursuant to Section 401 of the CWA. Section 401 requires that the state issue certification for any activity which requires a USACE Section 404 permit and may result in a discharge to State waters. All activities requiring a Section 404 permit result in a discharge to waters or wetlands. Therefore, SCDHEC must take certification action on all Section 404 permit applications. The Section 404 permit is not valid until Section 401 certification is approved.

Compensatory Mitigation

Compensatory mitigation for wetland and stream impacts would require purchasing mitigation credits from an approved mitigation bank, based on credit availability. Permittee-responsible mitigation to cover the mitigation credits may be required if no credits are available at the time of permitting. The required mitigation for this project would be determined during final design through consultation with SCDOT, the USACE and other resource agencies.

5.2 Essential Fish Habitat

In accordance with Magnuson-Stevens Fishery Conservation and Management Act, Federal agencies (e.g., FHWA) must consult with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) on all projects that may adversely affect Essential Fish Habitat (EFH). Essential fish habitat includes all

types of aquatic habitat—wetlands, coral reefs, seagrasses, rivers—where fish spawn, breed, feed, or grow to maturity (NOAA-NMFS, 2015).

While a detailed EFH assessment has not been conducted for the project, the Study Area contains EFH. Estuarine wetlands, or salt marsh, between Hog Island and Jenkins Island would be considered EFH. Alternative 1 would impact approximately 0.2 acres of estuarine wetlands; Alternative 2A would not impact EFH.

If there are adverse impacts to EFH from a proposed project, the EFH Survey Form would be completed during the NEPA phase and submitted to NOAA-NMFS for coordination. The EFH Survey Form would provide information on the proposed alternative, analysis of EFH impacts, and proposed avoidance, minimization and mitigation measures.

5.3 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973, as amended, states that any action likely to adversely affect a species classified as federally protected is subject to review by the USFWS. This act makes illegal the killing, harming, harassing, or removing of any federally listed species from the wild. Section 7 of the ESA requires federal agencies to ensure that actions they fund or authorize do not jeopardize any federally listed species. The assessment also considers species protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668c), which prohibits anyone, without a permit issued by the Secretary of Interior, from “taking” bald or golden eagles, including their parts, nests, or eggs.

A resource list was obtained from the US Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) site. A total of 14 Federally Endangered and Threatened species were identified on the resource list (Table 5-3). According to IPaC, there are no USFWS-designated Critical Habitats for the above-listed species within the Project Study Area.

The South Carolina’s Department of Natural Resources’ (SCDNR) GIS database for rare, threatened, and endangered species and vegetation communities was also consulted. As shown in Figure 5-5, no species or communities were identified within the Project Study Area.

Table 5-3. Evaluated Federally Endangered and Threatened Species (IPaC 2015)

Common Name	*Scientific Name*	Designation
American Chaffseed	*Schwalbea americana*	Endangered
Canby’s dropwort	*Oxypolis canbyi*	Endangered
Pondberry	*Lindera melissifolia*	Endangered
Frosted flatwoods salamander	*Abystoma cingulatum*	Threatened
Kirtland’s Warbler	*Setophaga kirtlandii*	Endangered
Piping plover	*Charadrius melodus*	Threatened

Common Name	*Scientific Name*	Designation
Red Knot	*Calidris canutus rufa*	Threatened
Red-Cockaded woodpecker	*Picoides borealis*	Endangered
Wood stork	*Mycteria americana*	Threatened
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered
West Indian Manatee	*Trichechus manatus*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered

5.3.1 Habitat Descriptions

The following provides summarized habitat descriptions for Federally-Listed species listed from USFWS IPaC (Table 5-3). During the NEPA process, the Study Area would be evaluated for potential suitable habitat for the above listed species. A biological assessment would be prepared and submitted to USFWS for review and concurrence.

American chaffseed (*Schwalbea americana*) – E

American chaffseed is a perennial herb approximately 1 to 2 feet in height, with mostly unbranched stems. The 2-lipped flowers are yellow with purple highlights and bloom from April through June in its historical southern range. American chaffseed is found primarily in the coastal plain along the Atlantic and Gulf Coasts. Its historic range is from Florida to Massachusetts and westward to east Texas. Its preferred habitat in is open pine flatwoods, bogs, palustrine pine savannahs, and lowland pine forests, as it requires acidic-sandy or peaty soils. A U.S. Fish and Wildlife Service (USFWS) survey in 1995 ([U.S. Fish and Wildlife Service [USFWS], 1995) documented 42 occurrences of this species in South Carolina (NatureServe, 2014a).

Canby’s dropwort (*Oxypolis canbyi*) – E

Canby’s dropwort is a perennial plant found in the South Carolina Coastal Plain with erect stems from 2.6 to 3.9 feet tall (USFWS, 2010). The leaves are slender, hollow and quill-like, and the flowers are compound umbels with white petals that appear from mid-August to early October, giving off a slight dill odor. The flowers fruits are 4 to 6 millimeters (mm) in length, with prominent wings, and split into multiple single seeded parts upon maturation. Canby’s dropwort reproduces primarily via asexual means through rhizomes. Approximately 53 populations have been documented over the past 30 years in Georgia, Maryland, North Carolina, and South Carolina in pond cypress wetlands, pineland savannas, Carolina bays, and along the edges of cypress-pine ponds. There have been 33 documented findings in the following South Carolina counties: Allendale, Bamberg, Barnwell, Berkeley, Clarendon, Colleton, Florence, Hampton, Richland, Sumter, and Williamsburg (NatureServe 2014b).

Figure 5-5. Species Occurrence Data

Source: SCDNR GIS

Pondberry (*Lindera melissifolia*) – E

Pondberry is a dioecious deciduous shrub from 1.6 to 6.5 feet in height, and usually grows in large clonal clumps. The small yellow flowers bloom from March to April and the fruits mature in early fall. When crushed, the leaves give off a lemony-sassafras odor. Pondberry is known to occupy a variety of habitats from bogs, fens, and forested wetlands to hardwood forests, as long as its hydrological requirements are met. It's usually found in shaded areas but is able to tolerate full sun. The pondberry's range is primarily the Atlantic coastal plain from Florida to North Carolina and along the Gulf coastal plain from Alabama to Mississippi. South Carolinas' historical documented populations have been found in Beaufort, Berkeley, and Colleton Counties (NatureServe, 2014d).

Frosted flatwoods salamander (*Ambystoma cingulatum*) – T

The frosted flatwoods salamander has a black body with varying amounts of gray dorsal markings that create a net-like appearance. Adults reach lengths of 1 to 1.3 inches and can weigh up to 0.4 ounces. Breeding habitats include small (generally <1 to 10 acres (ac) acidic, depressional standing bodies of fresh water (wetlands) that are seasonally flooded by rainfall, are geographically isolated from other water bodies, and occur within pine flatwoods–savanna communities. Non-breeding habitat includes upland pine flatwoods–savanna habitat that is open, mesic woodland maintained by frequent fires and is within 1,500 ft of adjacent and accessible breeding ponds. Frosted flatwoods salamander's range includes the lower southeastern coastal plain of the U.S. from South Carolina to north-central Florida and westward into southern Georgia and from there south into northern Florida. In South Carolina, they've been observed breeding in the same waters as the Mabee's salamander (Ambystoma mabeei) which it is commonly confused with (NatureServe, 2014c).

Kirtlands warbler (*Setophaga kirtlandii*) – E

The Kirtlands warbler is a coastal migrating songbird reaching 6 inches in length and 0.45 ounces in weight. They have blue-gray plumage with black streaks and a yellow underbelly. Eggs are usually laid between late May and June and chicks are fledged between 8 and 12 days after hatching. Nest mortality is generally a result of predation by American crows, blue jays, hognose and garter snakes, and squirrels (NatureServe, 2014h).

Kirtlands warblers preferred breeding habitat is fire generated dense stands of jack pine with little or no hardwoods present. However, they also nest on the ground at the base of pine trees in their breeding ranges of upper Michigan, Wisconsin, and Ontario, Canada. Winter migration sightings occur along their route from their breeding habitats to their destination in the Bahamas, including areas of the southeastern coast of the U.S (NatureServe 2014h).

Piping plover (*Charadrius melodus*) – T

The piping plover is considered small for a shorebird averaging approximately 6.5 to 7.0 inches in length and between 1.6 and 2.3 oz. in weight. They are mostly white in color with a dark band across the front of the crown and black shoulder patches. During

breeding season, adult females arrive at the breeding area several weeks after the males have arrived and have established territories (NatureServe 2014k).

Piping plovers preferred foraging habitat consists of beach dunes, intertidal flats, and tidal pool edges. U.S. breeding locations have been documented in the Great Plains, eastern Montana, Minnesota, the Dakotas, southeastern Colorado, Iowa, Nebraska, New York, New Jersey, Massachusetts, Virginia, and North Carolina. Wintering populations reside from Florida to North Carolina, and at various locations in the Gulf Coast States (NatureServe 2014k).

Rufa red knot (*Calidris canutus rufa*) –T

The rufa red knot (RRK) is approximately 9 to 11 inches in length with an average wingspan of 22 inches. The RRK is about the size of a robin with a mottled pattern of black, gray, and rose colored feathers on its back and a rose underbelly reaching up through the throat and around the eyes (Fretwell 2014). They feed primarily on horseshoe crab eggs along their US Atlantic Coast seasonal migration route but have also been known to feed on mollusks and marine worms (USFWS 2010). Delaware Bay and coastal Virginia remain their largest concentration areas during their spring and fall migrations, but overwintering populations have been observed on sandy beaches and in mud flats on the South Carolina coast. RRK nests are found on the ground in shallow depressions lined with leaves and lichens near water (SCDNR 2014n).

Red-cockaded woodpecker (*Picoides borealis*) – E

The red-cockaded woodpecker (RCW) is approximately 7.1 to 7.9 in length with a 13.8 to 15.0 cm wingspan. It has a dull white breast with black spots, barred back feathers of black and white, black wings, a black cap, and a tell-tale large white patch on both cheeks. It gets its name from the distinctive red streaks or “cockades” on the sides of the head which are more visible on females and juveniles than on adult males (Chadwick 2003).

The RCW requires mature stands of longleaf and/or loblolly pine to excavate a living cavity and encircles the cavity with small holes to encourage the flow of tree sap which is believed to protect it from predators (USFWS 2003). This habitat requires burning, which eliminates scrub oaks and other hardwoods which discourage nesting of RCWs. RCWs lay their eggs between April and June and fledge their offspring between 26 and 29 days after hatching. The RCW’s historic range extends from New Jersey to Texas and inland to Missouri, but its current range excludes New Jersey, Maryland, and Missouri (NatureServe 2014e).

Wood stork (*Mycteria americana*) –T

Adult wood storks are one of the largest wading birds in North America with a wingspan of 59 to 65 inches and a head-to-tail length of 33 to 45 inches (USFWS 1997). They are all white in color except for the black primary and secondary wing and tail feathers, and a long thick black bill. Their habitats consist of cypress swamps, bottomland hardwood forests, tidally influenced freshwater wetlands, and abandoned rice fields maintained for water fowl, but they also feed in salt marshes (Brooks 2007). Wood storks generally nest

in colonies from February to April and lay eggs from March to late May. Hatchlings usually emerge from early May to mid-June and fledge in July or August.

The wood stork's historic breeding range is from South Carolina and Florida to Mexico, Central America, Cuba, and Northern Argentina. Today's North American populations are increasing in South Carolina primarily due to migration from Florida as a result of decreasing habitat. The wood stork species was recently reclassified from endangered to threatened when an average of 6,000 nesting pairs were recorded and more than 1.5 chicks per nest per year reached fledgling age, over a 3 year period (USFWS 2014; Rodgers et al. 2008).

Shortnose sturgeon (*Acipenser brevirostrum*) – E

The shortnose sturgeon can reach up to 3.3 feet in length, has a heterocercal tail, a short shovel-shaped blunted snout, ventral mouth, and large bony scutes on the head, back, and sides. Adults feed at the freshwater/saltwater boundary in their southern range and swim upstream to spawn. Spawning generally begins in late winter or early spring and last a few days to several weeks and usually does not occur in consecutive years. Females can live up to 67 years and males up to 30 years (NMFS 2007).

The shortnose sturgeons' historic range is along the Atlantic Coast of North America from the Saint John River in New Brunswick to the St. Johns River in Florida. The federal recovery plan (NMFS 1998) identified 4 distinct populations in South Carolina; Winyah Bay, Santee River Basin, Cooper River, and the Ace Basin (NatureServe 2014o).

West Indian manatee (*Trichechus manatus*) – E

The Florida manatee, also known as the West Indian Manatee, is a large brown/gray herbivorous marine mammal reaching 10 to 13 feet in length and up to 1,000 ponds (lbs.) in weight. They are slow moving inquisitive animals with large flattened tails and paddle like forelimbs. Females reach breeding age from 7 to 9 years and males from 9 to 10 years with longevity of more than 50 years. Manatees are usually solitary; however they sometimes cavort in large groups or can be found in mating herds. Manatee habitats are fully marine although they are attracted to freshwater outlets. They prefer slow moving waters 3 to 6 feet deep and feed on marsh grass at high tide, floating vegetation, and algae off of marine structures. The U.S populations appear to originate from Florida, but transient groups and individuals are commonly found in Alabama, Georgia, and South Carolina coastal waters (NatureServe 2014d).

Green sea turtle (*Chelonia mydas*) – T

Although it's common name is the "green" sea turtle, its carapace is predominantly brown with wavy dark blotches with a mostly white plastron. Adults generally weigh between 250 and 650 lbs. and have carapace lengths between 3 and 4 feet. Adults migrate up to 1,850 miles between breeding habitats (beaches) and feeding habitats. Adults prefer shallow low energy waters with adequate submerged vegetation, mollusks, sponges, crustaceans, and jellyfish for feeding (NatureServe 2014f).

Kemp's ridley sea turtle (*Lepidochelys kempii*) – E

The kemp's ridley sea turtle has an olive green nearly circular carapace and yellow plastron; juveniles have a gray colored carapace. Adults generally weigh between 80 and 100 lbs. with carapace lengths between 23 and 30 inches. Adults prefer shallow marine and estuarine waters in the Gulf of Mexico where crabs are plentiful. Juveniles feed primarily on sargassum and mollusks. In addition to the Gulf, Kemps sea turtles also inhabit waters in the Long Island Sound, New England, and Nova Scotia. Sixty percent of all nesting occurs at the Rancho Nuevo Beach, in Tamaulipas, Mexico, although sporadic nesting has been documented on North Carolina beaches (NatureServe 2014g).

Leatherback sea turtle (*Dermochelys coriacea*) – E

The leatherback is the largest of the sea turtles with a carapace length of 53 to 74 inches and weighs between 650 to 2,000 lbs. Their carapace is dark blue to blackish in color with seven prominent longitudinal ridges and no scutes. Adults have been documented migrating between hundreds and thousands of miles between nesting and feeding waters. Preferred nesting habitat is on sloping continental beaches with the absence of a fringing reef, often near deep and/or rough ocean waters. Those nesting in the Caribbean are known to migrate north along the Atlantic Coast, reaching New England by late summer. Considered almost entirely pelagic, they move from the open ocean to the edge of continental shelves (NatureServe 2014i).

Bald eagle (*Haliaeetus leucocephalus*) – BGEPA

Adult bald eagles are large raptors with a distinctive white head and tail, dark brown body, and bright yellow bill and feet (SCDNR, 2014). Bald eagle nests are typically found within approximately 0.5 miles of open water. Coastal areas, bays, large river systems, and lakes provide adequate foraging opportunities for fish, waterfowl, and water birds. Preferred nesting habitat is usually found in large conifer trees with open limb structure.

5.4 Floodplains

The Project Study Area is located on Hog Island and Jenkins Island, which are surrounded by MacKay Creek, Skull Creek, and Jarvis Creek. The Project Study Area is located within Zone A8 of the Federal Emergency Management Agency (FEMA) FIRM 4500250118D and 4500250115D (Figure 5-6). These areas are subject to inundation by the 1-percent-annual-chance flood event. The Base Flood Elevation for this zone is 15 Feet.

Alternative 2A would have minimal fill impacts within the floodplains. While Alternative 1 would be designed to avoid and minimize the placement of above grade fill within FEMA regulated floodplains, this alternative would likely require coordination with the local floodplain administrators. Alternative 1 would be designed to maintain flood flows across US 278; the road elevation would not impede or divert flows.

Two 60-inch culverts are located under US 278 at the base of the J. Wilton Graves Bridge. These culverts were intended to maintain tidal flows in the creek and salt marsh between Hog Island and Jenkins Island. According to stakeholders and local residents,

the culverts are clogged and tidal flows are not connected under US 278. If Alternative 1 is constructed, the culverts may be extended beneath the frontage road and maintained to support tidal exchange under US 278.

5.5 Land Use

Table 5-4 shows the zoning designations for the communities and properties within the Study Area. The surrounding communities and properties are within the Town of Hilton Head Island and unincorporated areas of Beaufort County, South Carolina. Land use surrounding the proposed project includes wooded, undeveloped areas and residential development. Jenkins Island Road leads to the privately-owned Hilton Head Island RV Resort and marina. The Town of Hilton Head Island owns a larger parcel north of US 278 on Jenkins Island, which is designated for parks and recreation land use. The parcel is not currently operated or managed as a park or recreation area. A portion of the Town-owned property is used by the public service district. Jenkins Island Cemetery is also located north of the Project Study Area.

The proposed project is not expected to modify existing residential land use or change the timing or density of development in the area. The frontage road proposed in Alternative 1 would require right-of-way acquisition within the Town of Hilton Head Island Parcel. Alternative 1 would require coordination with the Town to determine how the proposed roadway improvements would affect potential parks and recreation land use on the surrounding parcel. Alternative 2A would not result in any land use changes.

Table 5-4. Land Use Within and Surrounding Project Study Area

Parcel/Community	Zoning Designation
Mariner's Cove	Neighborhood Mixed-Use
Blue Heron Point	Neighborhood Mixed-Use
Hilton Head Island RV Resort and Marina	Neighborhood Mixed-Use
Windmill Harbour	Existing Planned Unit Development
Town of Hilton Head Island Property	Parks and Recreation

Source: Beaufort County. 2010.
Town of Hilton Head Island. 2014.

Figure 5-6. Flood Zones

Source: FEMA

5.6 Farmlands

The USDA Natural Resources Conservation Service (NRCS) has classified lands into three categories based on suitability for agricultural uses. These include soils of prime, unique, and statewide importance. Criteria used for prime and unique farmlands were published January 31, 1978 in the Federal Register and amended in June 17, 1994. Soils of prime, unique and statewide importance occurring within the Study Area are shown in Figure 5-7 and summarized in Table 5-5.

The USDA has defined Prime farmlands (PFL) as soils that are best suited to producing crops, feed, forage, fiber, and oil seed crops, and also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). These soils produce the highest yields with minimal inputs of energy and economic resources. Unique farmlands include soils that have a special set of properties that are unique for producing certain high value crops. Farmland of Statewide Importance are lands that do not meet the requirements for prime farmland but that are of statewide importance for the production of food, feed, fiber, forage, and oil seed crops.

Table 5-5. Soils of Prime, Unique and Statewide Importance

Map Unit	Potential Statewide Importance or Prime Farmland	Acres in Study Area	Percent in Study Area
Coosaw	Statewide Importance	6	9%
Bertie	Prime farmland	12	17%

None of the Study Area is currently in agricultural production. Coosaw soils are mapped on Hog Island and are listed as soils of Statewide Importance. Bertie soils are mapped north of US 278 and are listed as Prime Farmland. Yemassee soils have the potential to be prime farmland, if drained; Wando and Seabrook soils have the potential to be prime farmland, if irrigated. The proposed project would not result in the loss of any Prime Farmlands. Alternative 1 would impact approximately 2.2 acres of land classified as Farmland of Statewide Importance or Prime Farmland. Alternative 2A would not impact land classified as Farmland of Statewide Importance or Prime Farmland.

5.7 Cultural Resources

The National Register of Historic Places (NRHP) is the nation's inventory of historic places and the national repository of documentation on the variety of historic property types, significance, abundance, condition, ownership, and other information. A database search of the NRHP listed no known historical structures or historical districts located within the Study Area, or on Jenkins Island or Hog Island (NRHP, 2014). The online resource, ArchSite, operated by the South Carolina Institute of Archaeology and Anthropology (SCIAA) and the South Carolina Department of Archives and History (SCDAH) was also consulted. Figure 5-8 shows no sites were identified within the Study Area on ArchSite. Therefore, no direct or indirect impacts to NRHP listed structures or sites are anticipated. The State Historic Preservation Office (SHPO) would likely require a cultural resource survey for Alternative 1 because of the proposed frontage road through previously-undisturbed property. Alternative 2A may not require a cultural resource survey because the improvements are confined to previously-disturbed areas.

Figure 5-7. NRCS Soils

Source: NRCS

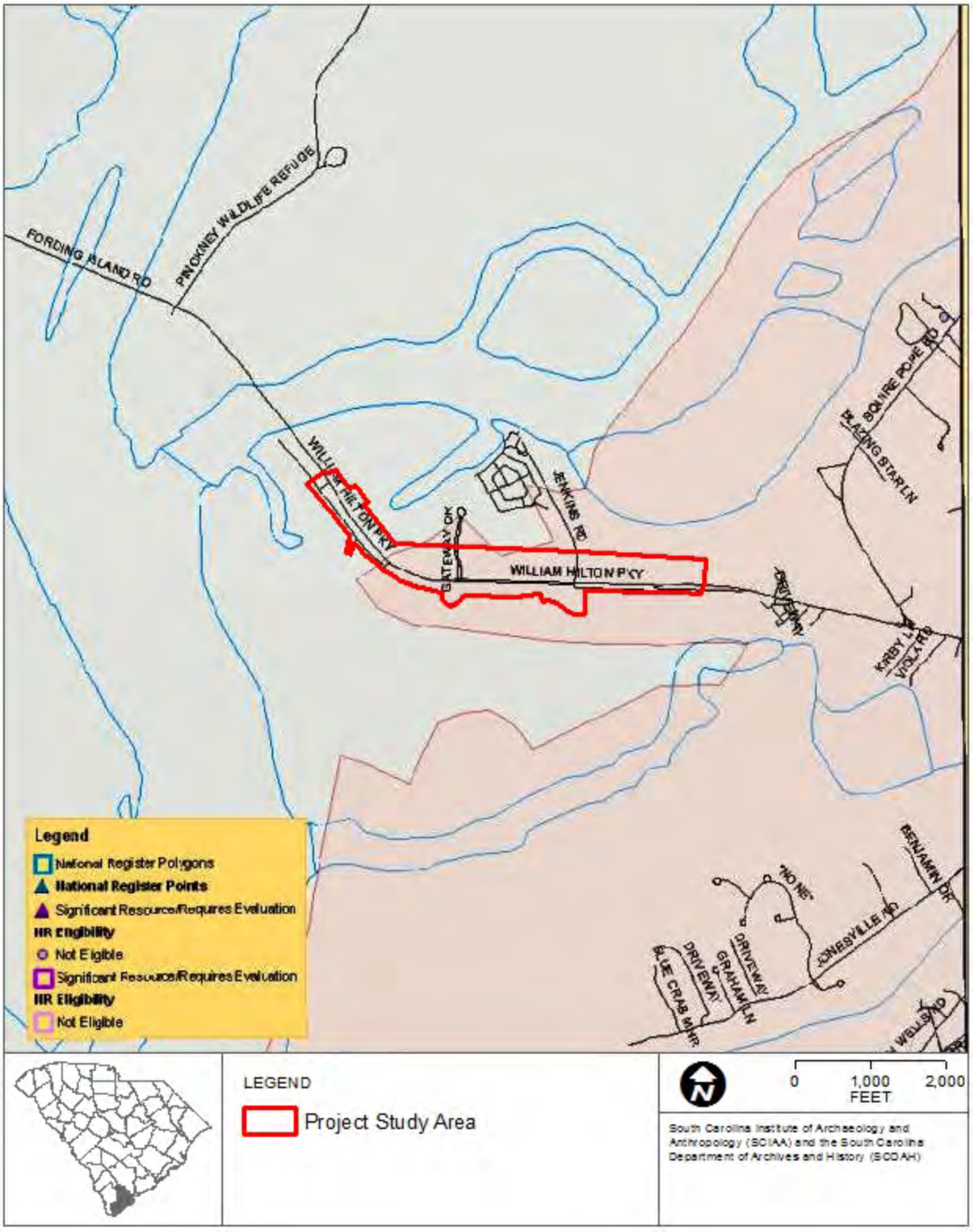

Figure 5-8. National Register of Historic Places

Source: SCIAA-SCDAH ArchSite

5.8 Section 4(f)

Section 4(f) of the Department of Transportation Act of 1966 requires the FHWA to consider a project's affect on:

- Parks and recreational areas of national, state, or local significance that are both publicly owned and open to the public,
- Publicly owned wildlife and waterfowl refuges of national, state, or local significance that are open to the public to the extent that public access does not interfere with the primary purpose of the refuge, and
- Historic sites of national, state, or local significance in public or private ownership regardless of whether they are open to the public.

The Project Study Area does not contain wildlife and waterfowl refuges and public or private historic sites subject to Section 4(f) review.

A parcel within the Study Area is owned by the Town of Hilton Head Island and is zoned for Parks and Recreation use. While this parcel is not currently managed as a park or recreation area, coordination would be required with the Town of Hilton Head Island about the property's intended use.

The frontage road proposed in Alternative 1 would impact the Town parcel and require approximately 3.1 acres right-of-way acquisition from the Town. Alternative 2A would also require approximately 0.8 acres of right-of-way from the Town parcel to accommodate the U-turn and acceleration/deceleration lanes.

Therefore, both alternatives would likely require preparation of a Section 4(f) evaluation. The evaluation would determine whether there is a feasible and prudent alternative that completely avoids the use of Town property and identify the required next steps for compliance with Section 4(f).

5.9 Noise

The proposed project would be conducted in accordance with 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise," effective July 2011 and the SCDOT Traffic Noise Abatement Policy, effective September 1, 2014.

A noise analysis is required for proposed federal-aid highway projects that would physically alter an existing highway or increase the number of through-traffic lanes. Alternative 1 would involve construction of a roadway in a new location; therefore, this alternative would require a detailed noise analysis. Because Alternative 2A does not involve additional lanes or new roads, a noise analysis would not be required.

For Alternative 1, a noise analysis would be conducted to evaluate the existing noise levels and potential noise impacts associated with the proposed project. Existing and future noise levels would be evaluated. When traffic noise impacts are identified, FHWA and SCDOT require that noise abatement be evaluated for feasibility and reasonableness. Noise abatement, such as barriers, would be evaluated for the affected receptors. A noise barrier evaluation would be performed to determine whether feasible and reasonable barriers could be constructed at the noise sensitive sites as means to reduce or eliminate traffic noise impacts. Noise barriers must achieve a 5 dBA reduction

for at least 75 percent or more of the affected receptors, achieve an 8 dBA reduction for at least 80 percent of the benefited receptors, and is cost effective. If the cost per benefitted receptor is more than $30,000 then the barrier is determined to not be cost effective.

5.10 Air Quality

Beaufort County is currently in attainment with national ambient air quality standards. This report includes a basic analysis of the likely Mobile Source Air Toxics (MSATs) emission impacts of this project. Alternative 1 and 2 would be considered “Projects with Low Potential MSAT Effects” because the proposed improvements would not add substantial new capacity.

Available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives in this report. Due to these limitations, the following discussion is included in accordance with Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

Evaluating the environmental and health impacts from MSATs on a proposed roadway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

As discussed above, in Appendix C of FHWA’s December 6, 2012 guidance, “Interim Guidance Update on Air Toxic Analysis for NEPA Documents,” technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis. A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives, found at: www.fhwa.dot.go/environment/air_quality/air_toxics/research_and_analysis/methodology/methodology00.cfm.

The purpose of the project is to improve operational efficiency at the three intersections on Jenkins Island. The project would not result in additional capacity within the Study Area. Alternative 1 and 2A would improve the Level of Service for turning movements at

the intersections; thereby, reducing vehicle idling time that contributes to MSAT emissions.

The additional frontage road contemplated as part of the Alternative 1 would have the effect of moving some traffic closer to nearby homes; therefore, there may be localized areas where ambient concentrations of MSATs could be higher under Alternative 1 than Alternative 2A and the No-Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build alternative and Alternative 2A cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts.

In sum, the localized level of MSAT emissions for the Build Alternatives could be higher relative to the No-Build Alternative, but this could be offset due to reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT would be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, would over time cause substantial reductions that, in almost all cases, would cause region-wide MSAT levels to be significantly lower than today.

5.11 Hazardous Materials

A review of environmental records available at SCDHEC was conducted to determine if any sites with potential or existing environmental contamination were present within or directly adjacent to the Project Study Area. Databases included, but were not limited to, above ground storage tanks (ASTs), Underground Storage Tanks (USTs), leaking underground storage tanks (LUSTs), dry cleaners, and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites.

No sites were identified within the Project Study Area (Figure 5-9). The records review indicated t two USTs are located on Jenkins Island, one at Windmill Harbour marina and one at Hilton Head Island RV Resort Marina. The USTs are over 2,000 feet from the Project Study Area; therefore, not impacts to hazardous material sites are anticipated as part of the proposed project.

It is SCDOT’s practice to avoid the acquisition of USTs and other hazardous waste materials, if at all possible. If soils that appear to be contaminated with petroleum products were encountered during construction, SCDHEC would be informed. If stained soils or potentially hazardous materials are identified during construction, further investigation in the form of Phase I Environmental Site Assessment may be required to assess potential recognized environmental concerns. Hazardous materials would be tested and removed and/or treated with the U.S. Environmental Protection Agency (EPA) and SCDHEC requirements, if necessary.

5.12 Displacements and Right-of-Way Acquisition

Alternative 1 would require the acquisition of approximately 5.9 acres of new right-of-way, while Alternative 2A would require approximately 1.0 acre of right-of-way. After review of the proposed project, it has been determined that the project would not result in the relocation/displacement of any residential establishments.

Figure 5-9. Underground Storage Tanks surrounding Project Study Area
Source: SCDHEC

5.13 Environmental Justice

EPA's Office of Environmental Justice defines Environment Justice as follows: "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations directs federal agencies to analyze “the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low income communities” when doing a NEPA analysis. The 2010 U.S. Census Data from the Project Study Area was gathered to identify communities that were either minority or low-income (Table 5-6). Based on this data the town of Hilton Head Island would not be considered a Low Income Community.

Based on the 2010 census data, approximately 37,099 people live in the Town of Hilton Head Island. The population of the Town of Hilton Head Island is 82.9% white and 7.5% black or African American. The population of Beaufort County as a whole is 71.9% white and 19.3% black or African American. The median household income in Town of Hilton Head Island is higher than the median household income in Beaufort County and the State median. The percentage of individuals living below the poverty level is lower in Hilton Head Island (8.5%) than the levels for Beaufort County (12.5%) and South Carolina (18.1%).

The proposed project is not located within a low-income community and would not have an adverse affect on any group, including minorities or low income populations. The project would not result in the displacement of any person or community. The proposed project would result in improved service and access to the residents of Hilton Head Island and the surrounding areas and communities.

Table 5-6. Select Socioeconomic Characteristics of Study Area

Attribute	Town of Hilton Head Island	Beaufort County	South Carolina
POPULATION AND RACE			
Population	37,099	162,233	4,625,364
White	82.9%	71.9%	66.2%
Black	7.5%	19.3%	27.9%
American Indian and Alaskan Native	0.2%	0.3%	0.4%
Asian	0.9%	1.2%	1.3%
Native Hawaiian and Other Pacific Islander	0.1%	0.1%	0.1%
Other	7.3%	5.2%	2.5%
Two or More Races	1.2%	2.1%	1.7%
AGE, HOUSEHOLD SIZE, AND INCOME			
Median Age	50.9	40.6	37.9
Average Household Size	2.23	2.42	2.49
Median Household Income (in dollars)	$69,772	$57,316	$44,779
Below poverty Level	8.5%	12.5%	18.1%
EDUCATION LEVELS OF POPULATION 25+ YEARS IN AGE (BY PERCENT)			
Up to 12th Grade, No Diploma	7.6%	12.1%	23.7%
High School Diploma or Equivalent	18.1%	24.2%	30.0%
Some College, No Degree	21.8%	23.5%	19.3%
Associate Degree	6.6%	6.9%	6.7%
Bachelor's Degree	30.8%	21.6%	13.5%
Graduate or Professional	15.1%	11.7%	6.9%
HOUSING CHARACTERISTICS			
Median Home Value (owner occupied; in dollars)	$447,900	$275,500	$137,400
Number of Housing Units	33,306	93,023	2,137,683
Owner Occupied	36.1%	49.3%	58.4%
Renter Occupied	13.5%	20.5%	25.9%
Vacant	50.4%	30.2%	15.7%

Source:

U.S. Census Bureau, Census of Population and Housing 2010. Accessed August 28, 2015 and August 31, 2015. Available from: http://www.census.gov/2010census/popmap/ipmtext.php

US Census Bureau. 2010 Census. American FactFinder. Accessed August 28, 2015 and August 31, 2015. Available from: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

U.S. Census Bureau, Census 2000 Summary File 3, Matrices P37 and PCT25.

U.S. Census Bureau, 2009-2013 5-Year American Community Survey (ACS)

6 Utility Coordination

The information provided below regarding existing utilities was obtained from field visits to record above-ground facilities and initial coordination with utility owners to obtain copies of available records. No field surveying has been conducted at this time, therefore, no actual utility locates have been requested. Prior to field surveying services, these utilities should be marked by SC811.Subsurface utility engineering (SUE) may be deemed necessary dependent upon the proposed improvements and potential conflict areas. At the time of this report, none of the utility companies surveyed have plans for extensions or relocations to the existing lines.

6.1 Water and Sewer

Existing water and sewer service in the Project Study Area is owned and maintained by Hilton Head PSD (1 Oak Park Drive #21, Hilton Head Island, SC 29926). In general, the majority of the PSD utilities are located adjacent to and along the boundary of Santee Cooper's transmission line right-of-way. Additional crossings of US 278 right-of-way occur at the intersections with Blue Heron Point Road, Gateway Drive / Crosstree Drive and Jenkins Island Road. See Appendix F for exhibit of Hilton Head PSD water and sewer utilities within the Project Study Area.

6.2 Electrical

Electrical service in the Project Study Area is provided by Palmetto Electric (1 Cooperative Way, Hardeeville, SC 29927). In general, Palmetto Electric's cable and equipment is outside of the SCDOT right-of-way, except at crossings. They do have power along the northern edge of Santee Cooper's transmission line right-of-way to supply power to two wells for Hilton Head PSD. There are no plans for expansion in this area, per coordination with Palmetto Electric. However, Palmetto Electric indicated they would build to serve any new loads that may not currently be identified. See Appendix F for exhibit of Palmetto Electric electrical power service utilities within the Project Study Area.

Electrical transmission utilities in the Project Study Area are owned by Santee Cooper and exist along both the north and south side of US 278. Multiple facilities along the north side of US 278 lie within a 150 foot transmission utility easement bisecting the Town of Hilton Head Island-owned property. A single transmission line exists along the south side of US 278 from Bluffton to the existing maintenance access road for Windmill Harbour intersecting Blue Heron Point Road. The utility line then crosses Blue Heron Point Road and US 278 into the existing transmission easement. Santee Cooper shall require an encroachment permit for any developments / encroachments within their easement, therefore, initial and regular contact with the utility during the design phase of the project would be paramount to the project design and construction schedule. Santee Cooper design standards also require certain horizontal setbacks from their facilities and vertical clearance requirements that must be met. If the selected alternative affected the transmission line, future designs should avoid and minimize direct impacts to the

transmission line structures because of the costs associated with the relocation of such structures.

6.3 Communication and Cable

Communication and cable service in the Project Study Area is provided by Hargray Communications (PO Box 3380, Bluffton, SC 29910). In general, Hargray has communication lines (cable and fiber) throughout the Project Study Area along the US 278 corridor including portions of the centerline, northern and southern shoulders and perpendicular crossings. Some of these utilities were recently (or in the process of being) relocated by Hargray for the intersection improvement at US 278 and Windmill Harbour. See Appendix F for exhibit of Hargray's communication and cable service utilities within the Project Study Area.

6.4 Stormwater Drainage

Existing stormwater drainage structures in the Project Study Area (within SCDOT-maintained rights-of-way) are owned and maintained by SCDOT. These pipes and swales likely would require modifications due to future proposed improvements. Any future roadway improvements would need to be studied to ensure applicable water quality standards are met. Additionally, depending on the nature of any improvements or impacts to the existing storm drainage system, permitting may also involve state and federal agencies such as SCDHEC-OCRM and USACE.

Public involvement on this project, specifically with the stakeholder's, Mariner's Cove and Blue Heron Point Road communities, identified the existence of dual, 60" reinforced concrete pipe culverts under US 278 between the end of the J. Wilton Graves bridge and the intersection with Blue Heron Point Road, installed under SCDOT File No. 7.419.1 (1978). Tidal cross-flow between Hog Island and Jenkins Island, presumably the reason for the initial installation of these culverts, has degraded over the years with complete non-functionality today. Excavations necessary to uncover and clean these pipes, and / or determine a more efficient and economical way to restore the tidal flow is an important issue to the citizens of the area; although outside of the scope of the access management study, it is recommended that future design efforts investigate the necessary requirements, feasibility, traffic control and permitting issues that would involve improvements to this issue. See Appendix F for exhibit of SCDOT File 4.419.1 (1978) and letter from Town of Hilton Head Island to SCDOT documenting issue.

6.5 Potential Utility Impacts

There are numerous utilities located in the Project Study Area that may be impacted by any proposed improvements. The impact and modifications to the existing utilities would need to be studied further as the project progresses and as detailed plans for improvements are available. Alternative 1 would result in greater utility impacts and necessary coordination because the proposed frontage road would cross the Santee Cooper transmission line right-of-way. Alternatives 1 and 2A would each have comparable effects on existing utilities that parallel US 278 within the current right-of-way.

7 Public Involvement / Scoping

7.1 Stakeholder's Scoping Meeting

A project stakeholder's scoping meeting was held for the project on Tuesday, June 16, 2015 at the Hilton Head Island Library Meeting Room. Those invited to the meeting as stakeholder's included representative employees and officials of Beaufort County, representatives of SCDOT, representatives from each of the affected communities on the island and personnel from the consultant engineering team including HDR/ICA Engineering, HDR and Ward-Edwards. The purpose of the stakeholder's meeting was to provide information regarding project activities, status and schedule; and also to obtain feedback on the project issues, deficiencies and vision. Community outreach via community meetings and an online survey was also discussed.

The meeting included 22 representatives from the above-stated stakeholder parties. Key project issues discussed at the meeting included traffic and safety concerns, potential alternatives to be studied and discussions of the positive and negative attributes of the currently proposed alternatives. The alternatives discussed included the construction of a frontage road along the northern side of US 278, creating right-hand turns for all existing access points, and a median U-turn option.

Environmental issues and impacts due to future project construction were also discussed. The majority of concern involved the health and vitality of the area's natural wetlands and that reduction of these impacts should be greatly considered. Additional conversation included the potential to re-open existing 60" concrete pipe culverts under US 278 so that natural tidal cross-flow could be maintained between Hog Island and Jenkins Island.

See Appendix E for Stakeholder Meeting Minutes.

7.2 Public Information Meetings

Public information meetings were held August 10th and August 12th, 2015 with each of the four affected communities on Jenkins Island. Prior to the meetings, an online survey of project issues and opinions for improvements was developed and included on the Beaufort County website. Venues for the meetings, times and dates were coordinated with individual stakeholders for each community. Notices of the meetings were developed and coordinated directly with the stakeholders for dissemination to residents via email blasts, fliers, community newsletters and active community committees.

Individual meetings were held for each community because of their unique geographic locations and different uses as residential and vacation / hospitality areas.

Large-scale drawings of two proposed alternatives (Alternative 1: Right-In Right-Out with Frontage Road and Alternative 2: Modified Super Street) were brought to each meeting along with a project information sheet, sign-in sheets and hard copies of the online survey.

The Jenkins Island Access Management Project Community Survey was developed in coordination with Beaufort County and per issues and discussion from the project stakeholder meeting. The questions within the survey were developed to illicit responses specific to the opinions of each specific neighborhood. Questions included opinions on existing traffic and safety issues and opinions on proposed solutions. The online survey garnered responses from 211 individuals / households with the majority of responses from the Windmill Harbour community at 79%. The remaining results included percentage of responses by the following; Blue Heron Point (7%), Mariner's Cove (7%), Hilton Head Harbor RV Resort and Marina (4%), with the remaining 3% of results as "other". Separate from motor vehicle access questions, the survey also asked whether respondents would be favorable toward the addition of a dedicated pedestrian / bicycle pathway along US 278; all of the communities polled with a majority favorable toward the issue.

The online survey was also provided in hard-copy at each of the meetings for residents to complete and return or mail-in. The following discussion of individual meetings provides information on community-specific survey responses.

See Appendix F for Public Information Meeting documents for each community.

7.2.1 Hilton Head Harbor RV Resort and Marina

A meeting was held Monday, August 10, 2015 from noon to 2 P.M. at the Hilton Head Harbor RV Resort and Marina Owner's Lounge. The RV Resort includes approximately 200 RV sites and caters to several full-time residents, seasonal vacation and rental sites, marina and hospitality and recreational sites. In attendance were 37 members of the community and county officials. Key issues from this meeting included the concern over ingress / egress from the resort, specifically, the tight movements that large vehicles (trucks and RV's) would need to navigate to the resort should Alternative 1 be constructed. Main issues addressed with Alternative 2 included the potential difficulty to make a U-turn from US 278 under the typical traffic volumes of US 278. Residents of the community were also concerned about the lack of left-turn access from Jenkins Island Road onto US 278, thus increasing the drive time from the RV Resort onto the island.

The Hilton Head Harbor RV Resort and Marina submitted 19 survey responses (9 online and 10 hard copy). Most respondents had an unfavorable opinion on gap times, while traffic visibility was mostly between acceptable and somewhat acceptable. All of the respondents indicated that left-turning movements and traffic movements were the most difficult during the morning and evening peak hour periods, with all-day on weekends (nearly tied) for the third most problematic time period. The respondents overwhelming disapproved of closing median cross-overs with nearly the same stating that right hand turns were not favorable. Safety, turning movements and property values were the most important issues when evaluating a solution with traffic signal installation, acceleration / deceleration lanes and "other" as the preferred solutions. The "other" included the relocation Crosstree Drive opposite Jenkins Island Road (2 responses) with a traffic signal.

7.2.2 Windmill Harbour

A meeting was held Monday, August 10, 2015 from 4 P.M to 6 P.M. at the South Carolina Yacht Club within the Windmill Harbour community. Windmill Harbour is the largest residential community on the island with approximately 300 home sites and a private marina located along the south side of the island. In attendance were 132 community members. Specific issues and concerns addressed at this meeting included intersection safety, travel speeds along US 278 and the lack of left-turning ability during peak volumes. The majority of the discussions from the residents stated the need for a traffic signal at the Windmill Harbour entrance. This improvement was studied and determined that existing traffic volumes from Windmill Harbour would not meet the necessary traffic signal warrants as required by SCDOT.

The Windmill Harbour community submitted 176 survey responses (166 online and 10 hard copy). Most respondents had an unfavorable opinion on gap times and existing traffic visibility and speeds. The majority of the respondents indicated that left-turning movements and traffic movements were the most difficult during the morning and evening peak hour periods with weekend afternoons as the third most problematic time period. The respondents were nearly evenly split on the favorability of closing median cross-overs. The survey included a Windmill Harbour-specific question regarding favorability toward providing neighborhood association property for potential access easements which garnered a 77% percent approval of respondents. Safety, turning movements and motor vehicle / pedestrian / bicycle movements were the most important issues when evaluating a solution with traffic signal installation, providing right hand turns for entrance and exit and the construction of acceleration / deceleration lanes as the preferred solutions.

7.2.3 Blue Heron Point

A meeting was held Wednesday, August 12, 2015 from 4 P.M. to 6 P.M. at the Hilton Head Island Library Meeting Room. In attendance were 22 residents of the community. The Blue Heron Point community is comprised of approximately 28 single-family residences along Blue Heron Point Road on the north side of US 278. The community is located on Hog Island while their access to US 278 is located on Jenkins Island. Key issues as determined from this meeting included concern regarding the influx of traffic in front of the community with Alternative 1 and U-turn safety and viability concerns (specifically during peak hours) with Alternative 2. Residents in this community had very similar concerns as those from the Hilton Head Harbor RV Resort.

The Blue Heron Point community submitted 21 survey responses (15 online and 6 hard copy). The results included a mix of opinions on gap times and traffic visibility with most responses of “somewhat acceptable”. Traffic speeds along US 278 and the bridges were considered “not acceptable” by a majority of respondents. The majority of the respondents indicated that left-turning movements and traffic movements were the most difficult during the weekend morning peak, followed closely by the weekday morning and evening peaks (nearly tied). Nearly all of the respondents overwhelming disapproved of closing median cross-overs, but those who approved were willing to travel up to a half-mile to make a right-hand turn. Safety was the important issue when evaluating a solution, closely followed by turning movement provisions, property values,

environmental stewardship and noise. The most favorable solutions included traffic signal installation, construction of a frontage road, acceleration / deceleration lanes and providing right hand turns for entrance / exits.

7.2.4 Mariner's Cove

The Mariner's Cove meeting was the final pubic information meeting held for the project on Wednesday, August 12, 2015 from 6:30 P.M. to 8:30 P.M. at the Hilton Head Public Service District Community Meeting Room. Mariner's Cove is a 40-unit condominium community, townhouses and flats and is situated opposite from Blue Heron Point on Hog Island. Mariner's Cove also shares the same US 278 access as the residents of Blue Heron Point. In attendance at this meeting were 13 members of the community. Alternative 2 was preferred by most of the residents in attendance, but others were concerned with safety aspects of the design. Regarding Alternative 1, concerns were voiced about wetland disturbance and environmental impacts, as well as the widening of Blue Heron Point Road that would be required in order to bring the road up to standards and to facilitate large vehicles.

The Mariner's Cove community submitted 15 survey responses (14 online and 1 hard copy). The results included a mix of opinions on gap times and traffic visibility with most responses of "somewhat acceptable". Traffic speeds along US 278 and the bridges were considered "not acceptable" by a majority of respondents. The majority of the respondents indicated that left-turning movements and traffic movements were the most difficult during the weekday morning peak, followed closely by the weekday afternoon and weekend afternoon peaks (nearly tied). Nearly all of the respondents overwhelming disapproved of closing median cross-overs, but those who approved were willing to travel up to a half-mile to make a right-hand turn. Safety was the important issue when evaluating a solution, closely followed by turning movement provisions, property values, environmental stewardship and noise. The most favorable solutions included traffic signal installation, construction of a frontage road, acceleration / deceleration lanes and providing right hand turns for entrance / exits.

8 Conclusions and Recommendations

The proposed project and study area were evaluated to identify alternative solutions for the access management along US 278 on Jenkins Island and to identify potential environmental constraints and preliminary impacts that may result from the construction of transportation improvements within the project area. The existing conditions of the project area, to include existing traffic, operational and safety deficiencies, existing roadway facilities and geometry, utilities and existing environmental conditions were evaluated and serve as the basis for any proposed project improvements. Potential improvements, developed through alternative analyses, and in consideration of environmental constraints and in order to provide a safe and efficient access to local communities with minimum disruption to “through” traffic on US 278; the following feasible alternatives have been identified:

- Alternative 1: Right-in Right-Out with Frontage Road,
- Alternative 2A: Modified Super Street with Signals (Recommended Alternative).

Existing traffic conditions, safety and LOS (segmental and intersection) are deficient and would continue to deteriorate without prudent transportation improvements. Both alternatives evaluated in this report provide comparable improvements to traffic conditions, safety and LOS, with differing impacts to the adjacent landscape and environment. Through a comparative analysis of safety, operations, cost, rights-of-way impacts and environmental impacts, Alternative 2A has been concluded as the Recommended Alternative.

Alternative 1 studied in this report provides for the overall safest alternative as all median cross-overs and left turn movements would be prohibited, but when compared to other advantages and disadvantages, Alternative 2A provides for adequate safety as all left turns from side roads are to be prohibited while the left turn from US 278 at Blue Heron Point Rd. and the U-turns will be traffic signal-protected movements. Right turn movements from the side roads, under Alternative 2A, shall also gain a clear gap in US 278 traffic during the median U-turn signal green time, attributing to the increased safety of this alternative.

In order to mitigate rear-end and run-off-the-road crashes as well as increased general safety, the following improvements are proposed:

- Reducing the speed limit along the corridor to 45 mile per hour, along with increased traffic enforcement and / or increased presence of officers along the corridor to ensure that the posted speed limit is obeyed, and;
- Providing adequate turn lane storage lengths, acceleration/deceleration lanes and taper lengths for the study area intersections.
- The widening of the shoulder along the corridor and installation of rumble strips.
- Provide adequate sight distance by clearing roadside obstacles and vegetation within necessary sight lines.

Both alternatives provide for similar level of service operations and capacity with Alternative 1 providing the best. Alternative 2A has a reduction in level of service for US 278 due to the proposed traffic signal installation and the periods of stopped traffic. Although the level of service is affected, no significant adverse impacts to the through traffic along US 278 would be produced because the majority of green time within the traffic signal cycle will be allocated to the through movements.

Additional improvements to the project area, as determined through initial stakeholder scoping and public involvement with affected communities, include the following recommendations:

- Excavations necessary to uncover and clean existing, dual 60" reinforced pipe culverts, and / or determine a more efficient and economical way to restore the tidal cross-flow between Hog Island and Jenkins Island. It is recommended that future design efforts evaluate the hydraulic conditions, feasibility, construction techniques, traffic control and permitting issues that would be required to improve this issue.
- Evaluate, design and construct a dedicated bicycle / pedestrian pathway along US 278, from the termini of the bridge to existing facilities across the causeway on Hilton Head Island.

Alternative 2A has fewer environmental impacts as compared to Alternative 1. No wetland or threatened / endangered species impacts (although further investigations of Biological Assessments is needed), or other major environmental impacts are anticipated. The alternative would require rights-of-way, although a zero-cost is assumed for the acquisition of all Town of Hilton Head Island and other government-owned tracts, as well as Windmilll Harbour P.O.A. properties.

Cost comparisons reflect that Alternative 2A would cost approximately less than half of the probable cost of Alternative 1 while providing nearly identical operational and safety benefits. Beaufort County's LRTP (Long-Range Transportation Plan) has identified the widening of US 278 within the Jenkins Island project area to six lanes as a future, necessary project to keep pace with ever-growing traffic volumes. Alternative 2A proposes to construct a third lane in the eastbound and westbound directions within the project area in order to maximize the operation and capacity along US 278 with the installation of traffic signals. Therefore, the future widening of US 278 could be accomplished under the construction of this project.

Providing additional credence to Alternative 2A is the improvement project proposed by The Town of Hilton Head Island for the intersection of US 278 at Squire Pope Road. The Town's project is currently in the preliminary design stage and proposes to widen US 278 in the westbound direction from Squire Pope Rd. to Jenkins Island Rd., thus providing a third travel lane in this direction; therefore, the improvements proposed for Alternative 2A would tie-in directly with the improvements proposed by the Town. Alternative 2A, although not directly addressed in this report, should therefore consider extending the third eastbound lane to Squire Pope Rd. in order to provide a full, six-lane section from the bridge termini to the existing six-lane section at Squire Pope Rd. Consequently, these additional improvements would incur additional project costs associated with construction, rights-of-way and potential wetland impacts and permitting costs associated with widening along the causeway.

Alternative 2A, as proposed, is the lower-cost, near-term alternative solution with the least amount of environmental constraints and impacts that improves the operational efficiency along US 278 while also providing safe access to the local communities with minimum disruption to through traffic along US 278.

8.1 Cost Analysis

Estimates of probable cost have been conducted for Alternative 1 and Alternative 2A based on the conceptual designs and engineering assumptions. The estimates and cost comparisons are shown in the table below with detailed cost estimate spreadsheets provided in Appendix I of this document.

Table 8-1. Cost Analysis

Alternative	Probable Cost
Alternative 1: Right-Right-Out with Frontage Road	$13.9 million
Alternative 2A: Modified Super-Street w/ Traffic Signals	$7.4 million

Note: Above estimates include roadway construction totals, CE&I, engineering, utility relocations and rights-of-way costs. Costs for wetland mitigation are not included.

Unit prices were established by evaluating the bid tabulations for the most recent project(s) in Beaufort County, specifically the US 278 at Windmill Harbour intersection improvement project (SCDOT Project ID 0041808). All major quantities were calculated to include pavement, curb and gutter, concrete islands, traffic signals (where appropriate) and pavement removals. Upon evaluation of the recent bid tabulation, it was determined that the estimated quantities accounted for approximately 45% of the roadway-specific construction sub-total. Additionally, necessary costs for CE&I, professional engineering and utility relocations were included based on percentages of total roadway construction cost and typical of similar projects. Rights-of-way acquisition costs were also included in the total by utilizing available costs comparable to the project area and in coordination with Beaufort County. Contingencies were added to the subtotal of roadway construction and miscellaneous costs to determine the Total Estimated Construction Cost. This total was then adjusted to reflect the cost in the construction year by assuming a 4% yearly inflation. The estimates do not include costs associated with environmental permitting or any potential wetland mitigation deemed necessary, specifically for Alternative 1.

The pavement design assumed for these conceptual designs and estimates was reflective of existing SCDOT plans (Project ID 0041808) of current construction within the project area. Rights-of-way costs for each alternative were based upon the square footage of new rights-of-way to be obtained, assumed conservative contingencies and acquisition costs per parcel (legal, rights-of-way agent fees, deeds, etc.). Rights-of-way to be obtained from the Town of Hilton Head Island and other government-owned properties, as well as Windmill Harbour P.O.A. tracts, are not included in the estimates as it is assumed dedicated rights-of-way could be obtained.

8.2 Availability of Funding/Funding Recommendations

At the time of this study, there are no existing funding sources available to implement any proposed project improvements. It is recommended that funding sources be

researched and evaluated specific to applicable federal funds and / or grants that may be available for construction of the project. The project is no longer on the STIP (Statewide Transportation Improvement Program), therefore, no funding is directly allocated from the state, but there may be minimal funds available though the MPO (Metropolitan Planning Organization) and LATS (Lowcountry Area Transportation Study), although neither of these sources could provide funding for the current construction costs. A local-option sales tax renewal for transportation improvements may be the most viable and cost-assured avenue of potential funding for the project; such a program would be a renewal of previous sales tax proposals initiated by Beaufort County in the past to improve transportation facilities within the county.

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