US 278 CORRIDOR IMPROVEMENTS

Casting a Light on the Community's Transportation Future

TECHNICAL MEMORANDUM:

PHASE I TRAFFIC REPORT

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1.1 INTRODUCTION

The South Carolina Department of Transportation (SCDOT) is proposing to improve US 278 between Bluffton and Hilton Head Island, which includes replacing the deficient bridges within the corridor and adding capacity for all modes, which will improve congestion, mobility, and safety. The limits of this study are from Moss Creek Drive to Wild Horse Road/Spanish Wells Road. The location map is shown in **Figure 1**.

Existing observed traffic conditions and level of service analysis shows deficiencies that will continue to deteriorate without transportation improvements. The purpose of this report is to present the traffic analysis performed in support of transportation network improvements that will meet the future needs of the corridor and to provide improvement recommendations that will meet those future needs.

1.2 STUDY AREA

1.2.1 Project Location

The study area extends from Moss Creek Drive in the west to Wild Horse Road/Spanish Wells Road in the east and includes all the signal and stop-controlled intersections between these two intersections. The study area is shown in **Figure 2.**

1.2.2 Existing Transportation Facilities

The study area contains several signalized and stop-controlled intersections. **Table 1** lists the location and type of intersection. **Figure 3** shows the control type for each intersection.

Table 1: US 278 Intersection Summary

Cross Street	Intersection Type	Type of Access
Moss Creek **Drive**	Signalized	Full Access
Salt Marsh Drive	Stop-Controlled	Full Access
Fording Island Road Ext	Stop-Controlled	Median Channelization
Bluffton Parkway	Merge/Diverge	-
Pinckney Wildlife Refuge	Stop-Controlled	Full Access
Blue Heron Point Road	Stop-Controlled	Full Access
Crosstree Drive/Gateway Drive	Stop-Controlled	Median Channelization; Right-in/Right-out
Jenkins Road	Stop-Controlled	Full Access
Squire Pope Road	Signalized	Full Access
Wild Horse Road/Spanish Wells Road	Signalized	Full Access

US 278 also crosses two rivers via bridges:

- Mackay Creek (Karl S. Bowers Bridge) between Bluffton Parkway and Pinckney Wildlife Refuge
- Skull Creek (J. Wilton Graves Bridge) between Pinckney Wildlife Refuge and Blue Heron Point Road

Limited pedestrian and bicycle facilities are located at the eastern end of the project. There are sidewalks adjacent to the mainline of US 278 from the eastern end of the causeway at Jenkins Island to Wild Horse Road/Spanish Wells Road as well as a network of paved multiuse paths along the connecting side roads.

1.2.3 Historic Traffic Volumes

The South Carolina Department of Transportation (SCDOT) maintains a traffic count database of the estimated Average Annual Daily Traffic (AADT) volumes for over 12,000 locations across the state. **Figure 4** shows the locations of the count stations in the vicinity of the project area and the 2017 AADT for each station.

Figure 5 shows the traffic volumes obtained from SCDOT at the 10 locations near the project for the years 2009-2017. The data show the general traffic trends in the area over the past nine years. Six of the stations show a positive growth trend in traffic volumes; however, the following locations show a general reduction in volumes for the time period in which data were available:

- US 278 between Trimblestone Road and Sawmill Creek Road (west of the project area)
- US 278 between Wild Horse Road and Cross Island Parkway (east of the project area)
- Burnt Church Road (west of the project area)
- Sawmill Creek Road (northwest of the project area)

Figure 1: Study Area Regional Map

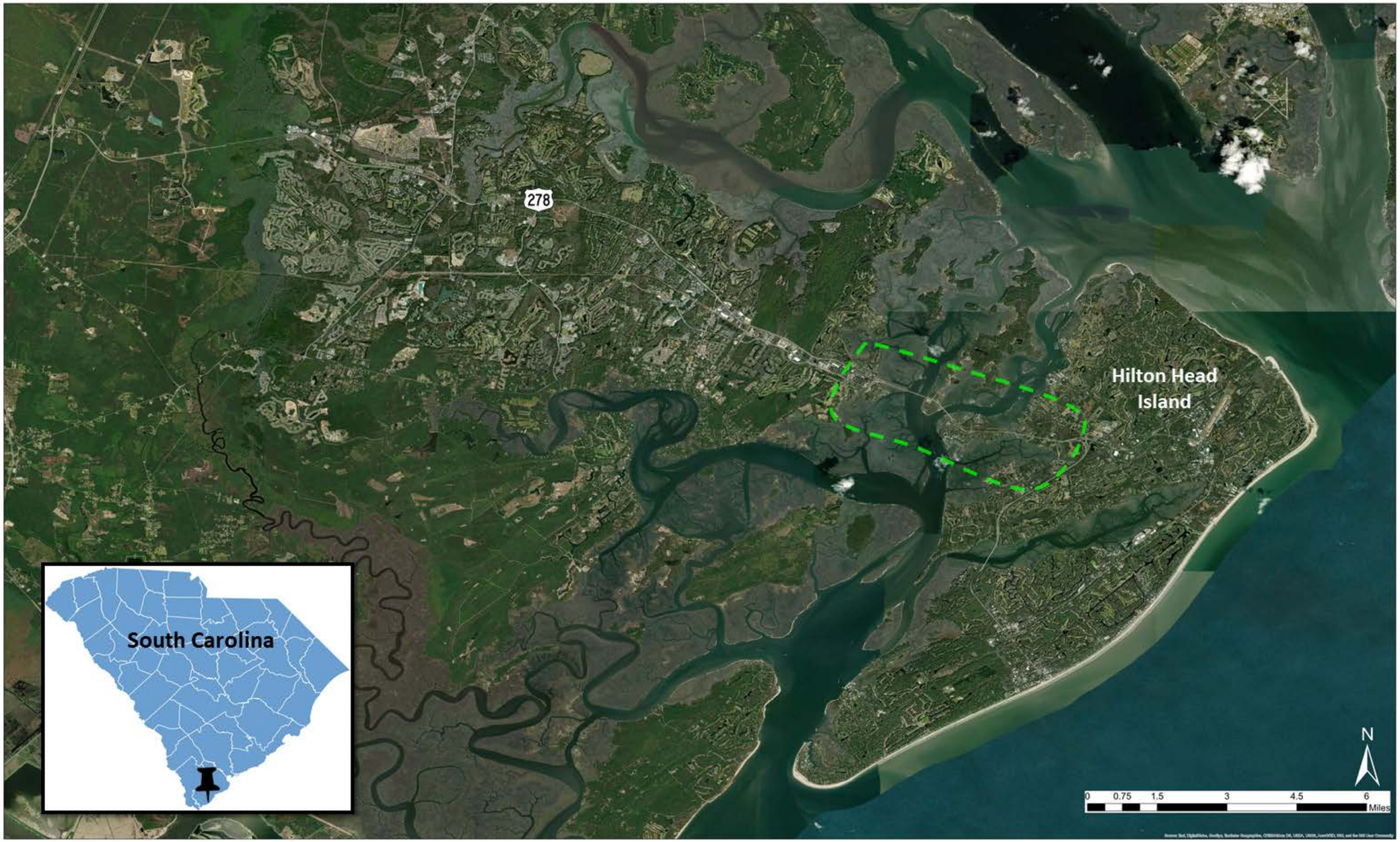
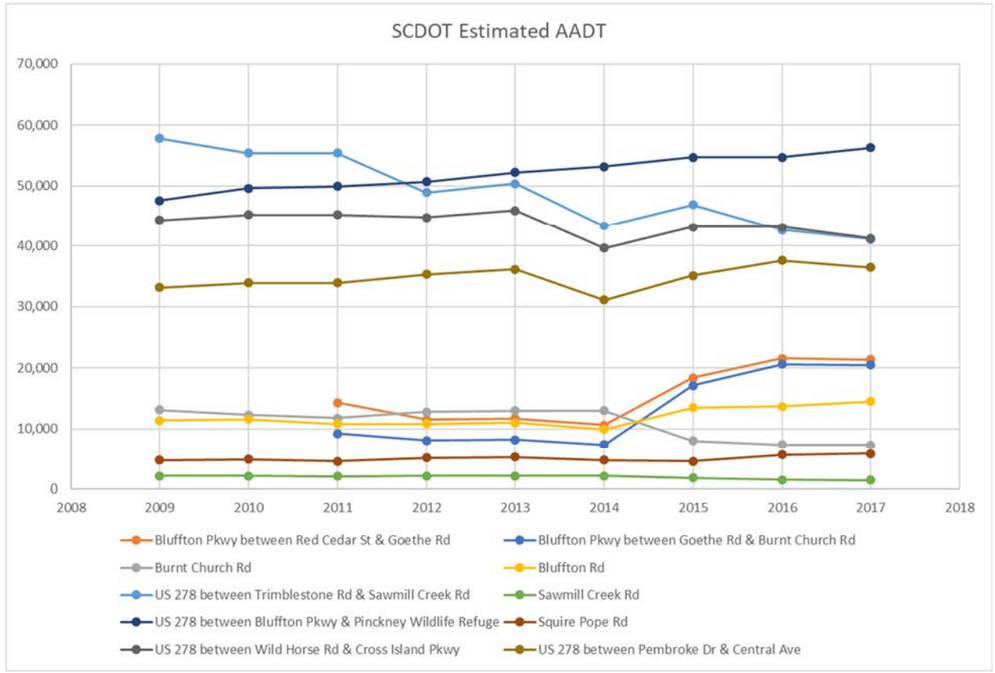


Figure 2: Study Area Map

Figure 3: Study Area Intersection Map

Figure 4: 2017 AADT – SCDOT Traffic Count Stations

Figure 5: Historical SCDOT AADT at Study Area Count Stations



1.3 Scope of Data Collection

The data collection effort for the US 278 Corridor Study traffic analysis includes the following:

- Segment Geometry Data
- Speed Limits
- Intersection Geometries and Traffic Control
- Hourly volume over a 24-hour period on May 30, 2018 at the following locations:
  - East of Salt Marsh Drive
  - West of Pinckney Wildlife Refuge
  - East of Squire Pope Road
- Peak period (7AM-9AM, 11AM-2PM, 4PM-6PM) turning movement counts for the following 8 intersections on August 8, 2018:
  - Moss Creek Drive
  - Salt Marsh Drive
  - Fording Island Road Extension
  - Pinckney Wildlife Refuge
  - Blue Heron Point Road
  - Crosstree Drive/Gateway Drive
  - Jenkins Road
  - Squire Pope Road
- INRIX Speed Data for May 2018 and August 1-15, 2018
- 2017 Traffic Volumes from SCDOT ATR 0035 on US 278 east of Pinckney Wildlife Refuge
- Historical AADT Traffic Volumes from SCDOT
- Most recent three years (January 2015-June 2018) of tabulated crash data from SCDOT
- Traffic signal timing data sheets for signalized intersections at Moss Creek Drive and Squire Pope Road

1.4 Relationship to Other US 278 Corridor Studies

In June 2019, Stantec prepared a comprehensive US 278 Traffic Engineering Report for SCDOT. This report includes several safety improvement recommendations for intersections along the corridor within this study area which are described as follows:

- **US 278 at Moss Creek/Buckingham Plantation Drive:**
  - Add retroreflective backplates to all signal heads.
  - For the Northbound and Southbound approaches, replace existing 5-section left-turn signal heads with 4-section flashing yellow arrow left-turn signal heads and an additional 3-section head for the through movements.
- **US 278 at Salt Marsh Drive (The Gatherings Median Opening):**
  - Channelize left-turns to eliminate left-turn and through movements from side streets.
  - Offset Eastbound left-turn lane.
- **US 278 at Fording Island Road Extension Median Opening:**
  - No improvements recommended
- **US 278 at Squire Pope Road/Chamberlin Drive:**
  - Convert the US 278 left-turn movements from five-section heads to four-section heads with flashing yellow arrow.
  - Update pavement marking transitions from TWLTL to left-turn lanes to increase left-turn storage.
- **US 278 at Wild Horse Road/Spanish Wells Road**
  - Restripe the outside Eastbound lane on US 278 and the Northbound approach of Spanish Wells Road.

The safety recommendations containing geometric modifications from the existing roadway configuration were included in the future intersection operational analyses; however, the recommendations to change signal heads and storage lengths do not impact the Synchro outputs and were therefore not included.

In November 2015, HDR prepared a preliminary project planning report in which they analyzed a No-Build and two Build options to mitigate safety concerns along US 278 between the J. Wilton Graves bridge and the causeway onto Hilton Head Island. The goal of this study was to provide safe and efficient access to the local communities without disrupting the through traffic along US 278. The major safety concern within this section is the lack of acceptable gaps in US 278 for left turns from the stop-controlled intersections and the lack of available acceleration lanes for right turns. Due to the low volumes on the side streets, signals were not warranted for any of the intersections. The

resulting preferred alternative proposes to close the existing median cross-overs and provide signalized left turn/U-turn lanes at the Blue Heron Point Road intersection and east of the Jenkins Road intersection. This alternative also proposes to provide a third lane in each direction from the bridge to the Squire Pope Road intersection. In February 2019, the Hilton Head Town Council approved the project for construction. **Figure 6** provides the concept design for the Jenkins Island Superstreet.

The future traffic analysis in this report will take into account the reassignment of turning movements at Blue Heron Point Road, Crosstree Drive/Gateway Drive, and Jenkins Road.

1.5 Analysis Methodology

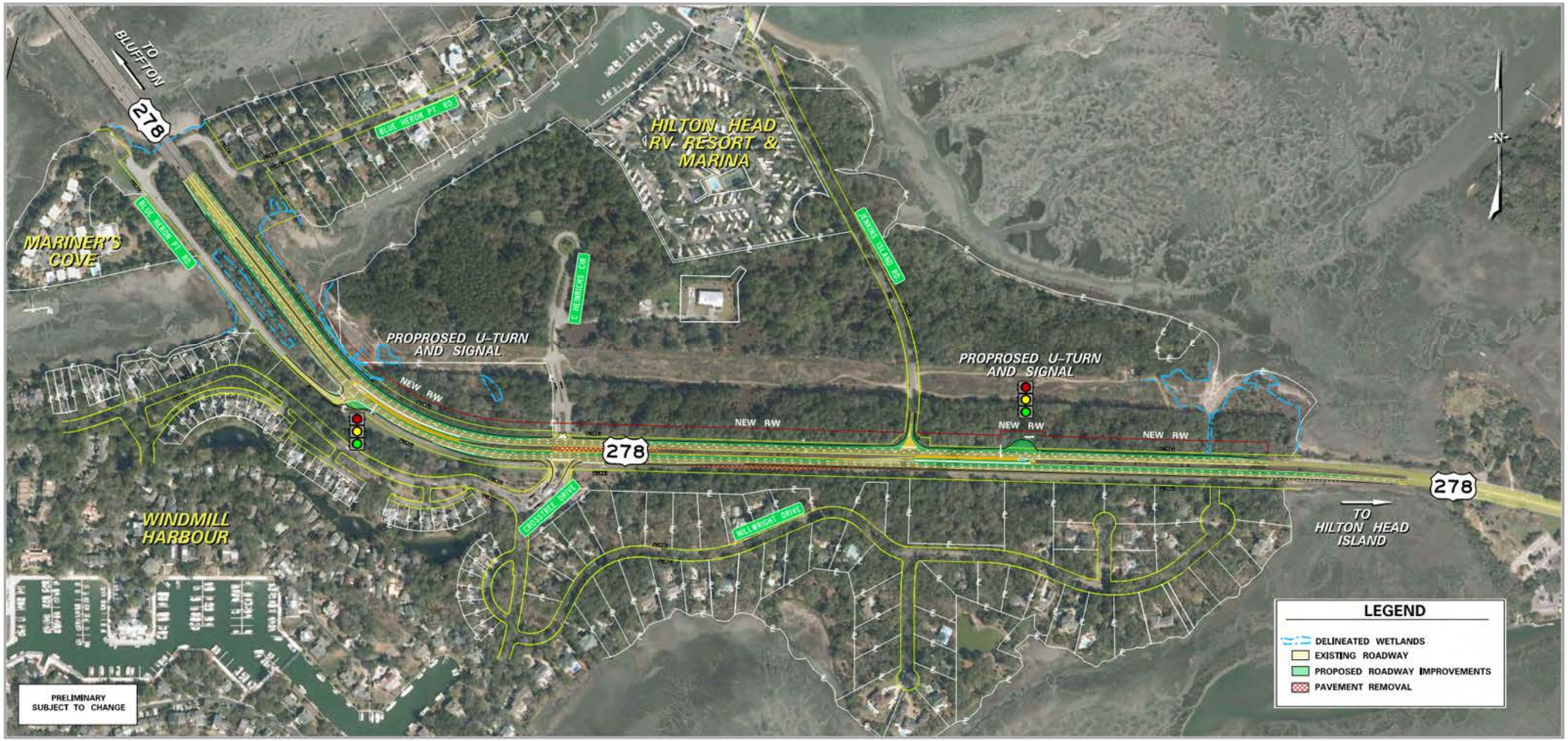
This traffic report presents the existing and future level of service analyses for the US 278 corridor. The analysis of existing conditions uses the design hour volumes that were calculated based on the Design Hour Volume memorandum approved by SCDOT. Due to the high seasonality of Hilton Head Island and the surrounding areas, the raw traffic volumes collected on August 8, 2018 were factored by +4% to reflect the 30th highest design hour in an effort to provide a conservative yet realistic analysis approach. The existing intersection and segment level of service analysis was performed using the latest Highway Capacity Software and Synchro software. Field observations and anecdotal evidence were also used to calibrate the existing analysis findings.

For future level of service analysis, the growth rates shown from historical trends, population forecasts, and forecasts from the regional travel demand model were used to project traffic volumes for 2025 and 2045. The intersection and segment level of service analyses were performed using the latest Highway Capacity Software and Synchro software. The approved design for US 278 between the J. Wilton Graves bridge and the causeway onto Hilton Head Island (Jenkins Island Superstreet) was incorporated into the future roadway network and volumes were redistributed appropriately at the modified median openings. From this analysis, the inherent deficiencies of the existing roadway network were identified, and a new configuration was determined that will be able to handle the future roadway volumes. These improvement recommendations are provided in the subsequent sections.

Figure 6: Jenkins Island Proposed Improvements

Proposed Improvements

One additional lane will be added to US 278 Eastbound and Westbound along the entire length of the project. The intersection at Blue Heron Point Road will be modified to eliminate left turns from Blue Heron Point Road onto US 278 Westbound and a U-turn movement will be provided for vehicles from US 278 Westbound to the Eastbound direction. A signal will be added for the Eastbound traffic at this location. Both the Crosstree Drive/C. Heindrichs Circle intersection as well as the Jenkins Road intersection will be modified to eliminate the median openings and only allow right-in/right-out movements from these roads. A U-turn and traffic signal will be added east of Jenkins Road for vehicles from US 278 Eastbound to the Westbound direction.



2.0 INVENTORIES

An inventory was taken along US 278 that included the number of basic lanes, median widths and type, shoulder widths, speed limits, intersection geometries, and intersection control type.

2.1 GEOMETRICS

A Google desktop review was undertaken to determine the lane, median, and shoulder widths. **Figure 7** shows a Cross Section Key Map for the following six illustrations, which depict the geometric features of the US 278 corridor.

2.1.1 Typical Sections

The US 278 Cross Section illustrations are provided in **Figure 8** through **Figure 13**. From Moss Creek Drive to Salt Marsh Drive, US 278 is a 6-lane divided highway with a 35-foot grass median. Except for the portions of US 278 along the bridge sections, the cross section from Salt Marsh Drive to approximately 1700' east of Jenkins Road consists of two 12-foot lanes in either direction and a 40-foot grass median. The width of the median then tapers down to a 14-foot paved two way left turn lane through the Squire Pope Road intersection. East of Squire Pope Road, there are three lanes in either direction.

Figure 7: Cross Section Key Map

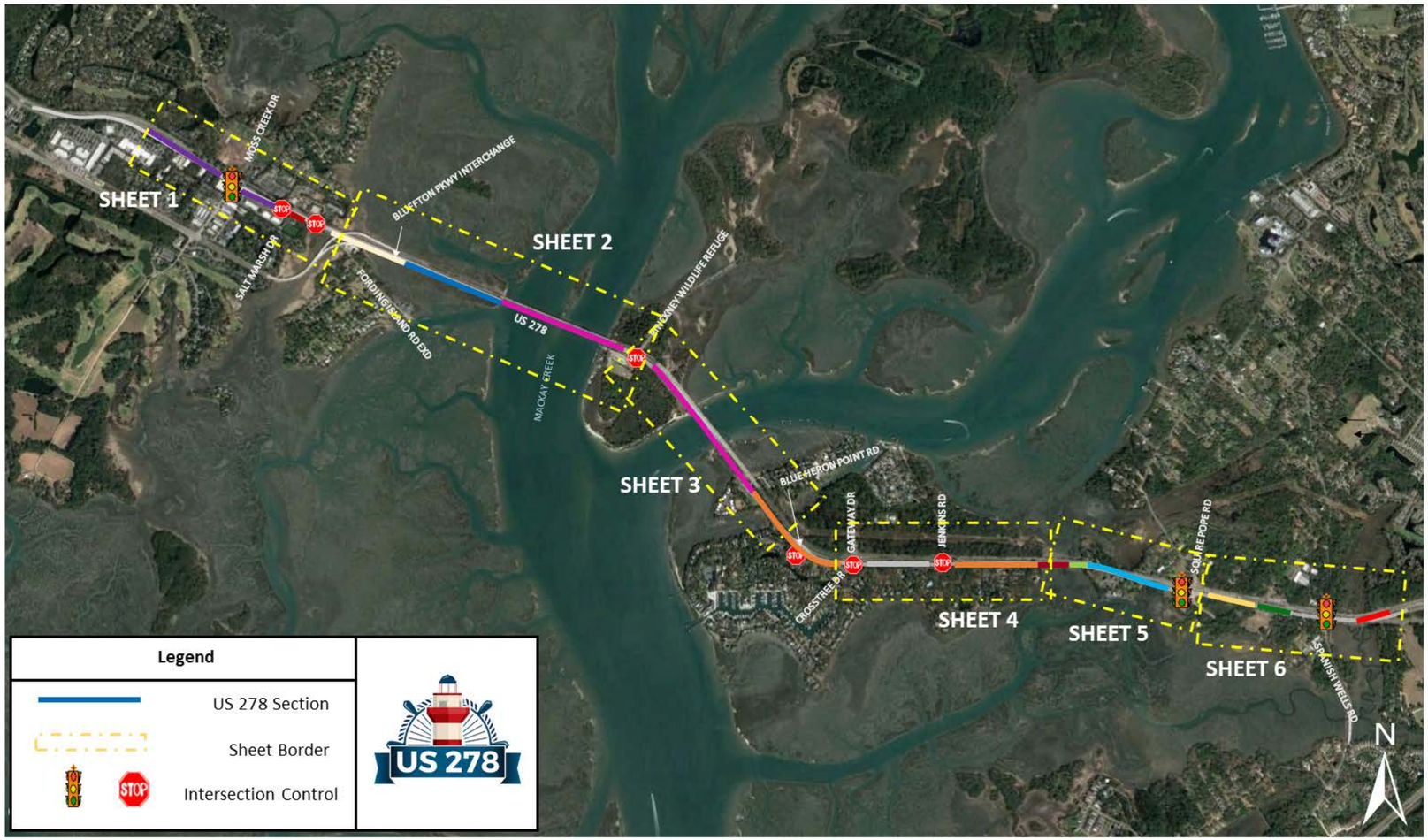


Figure 8: US 278 Cross Sections, Sheet 1

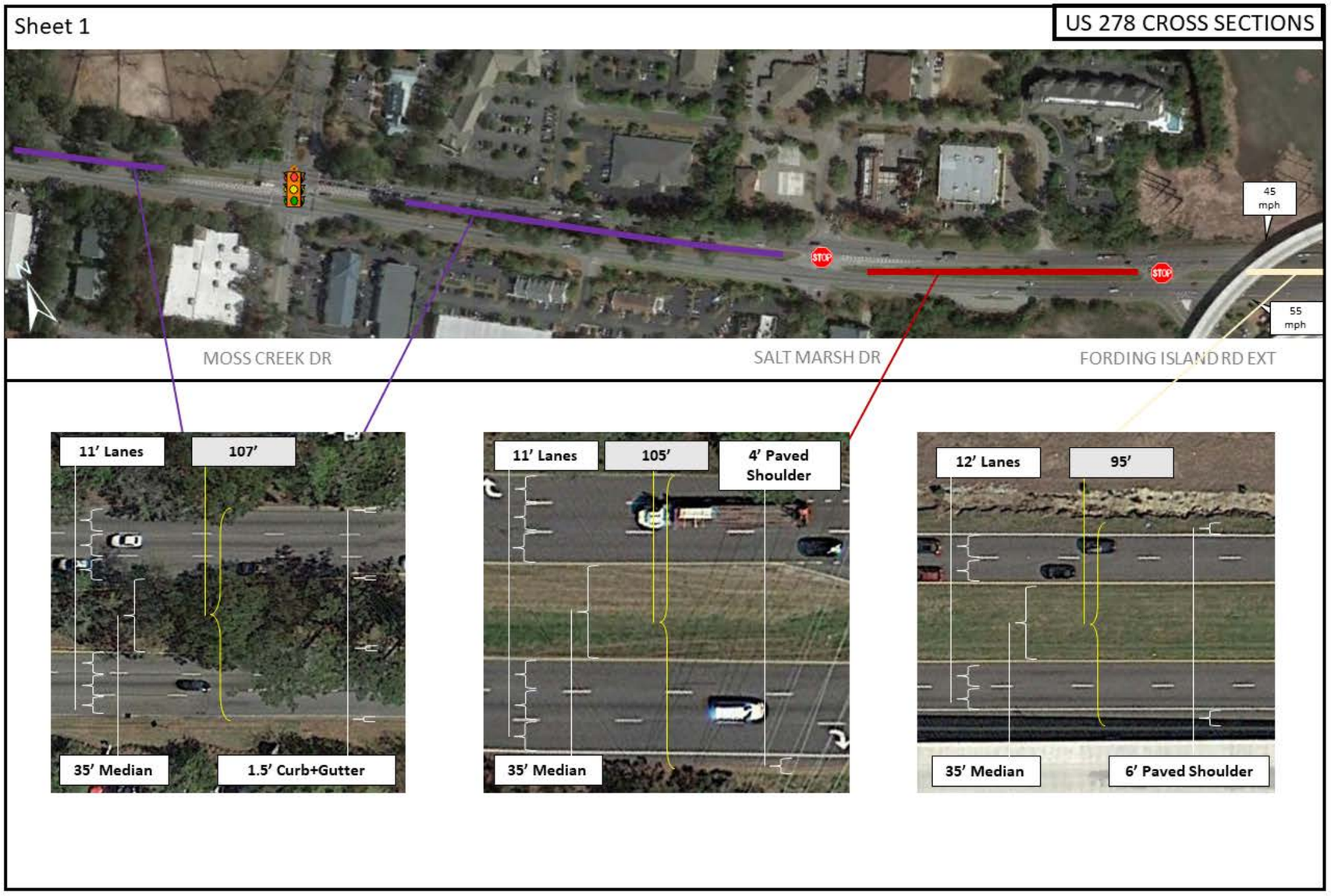


Figure 9: US 278 Cross Sections, Sheet 2

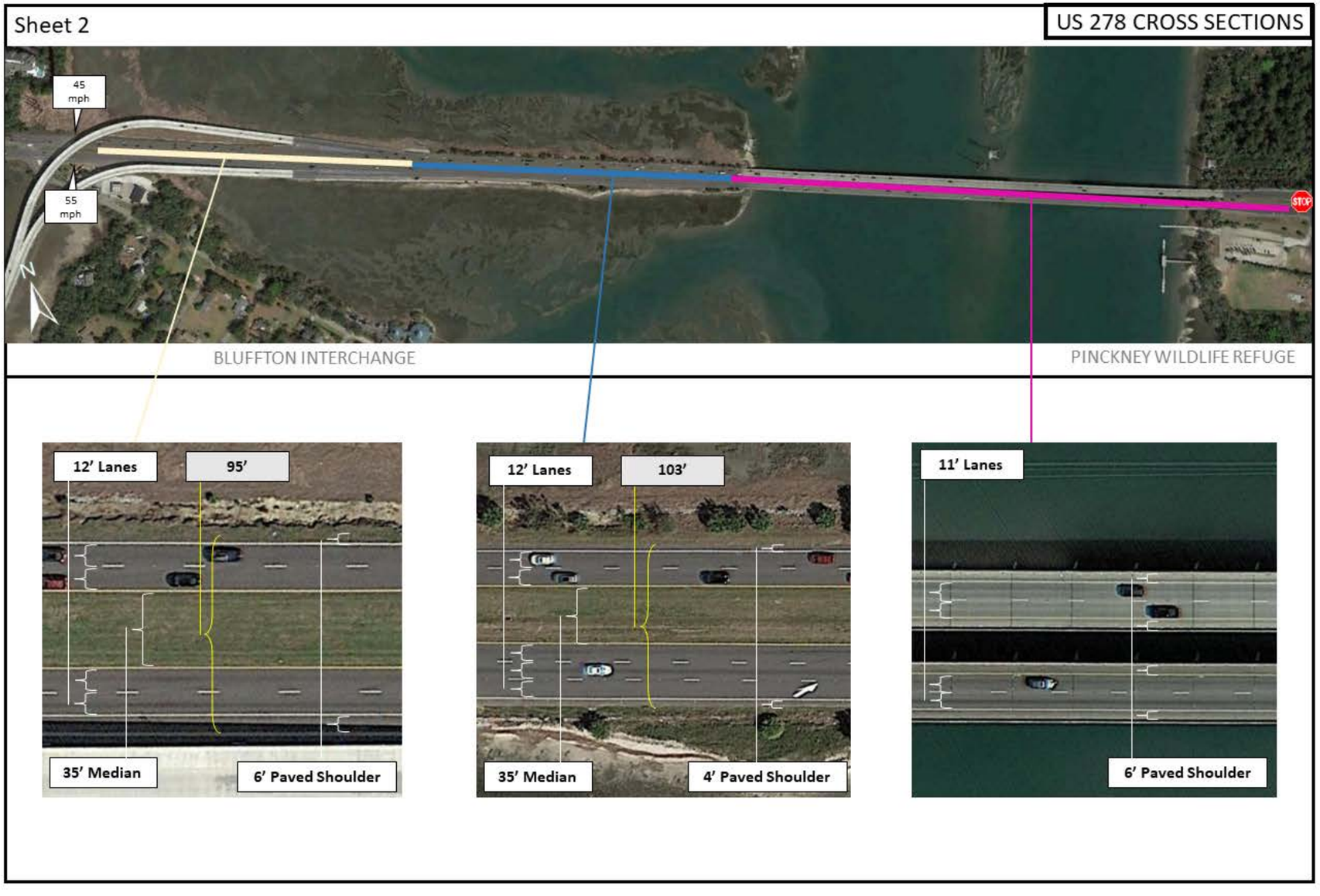


Figure 10: US 278 Cross Sections, Sheet 3

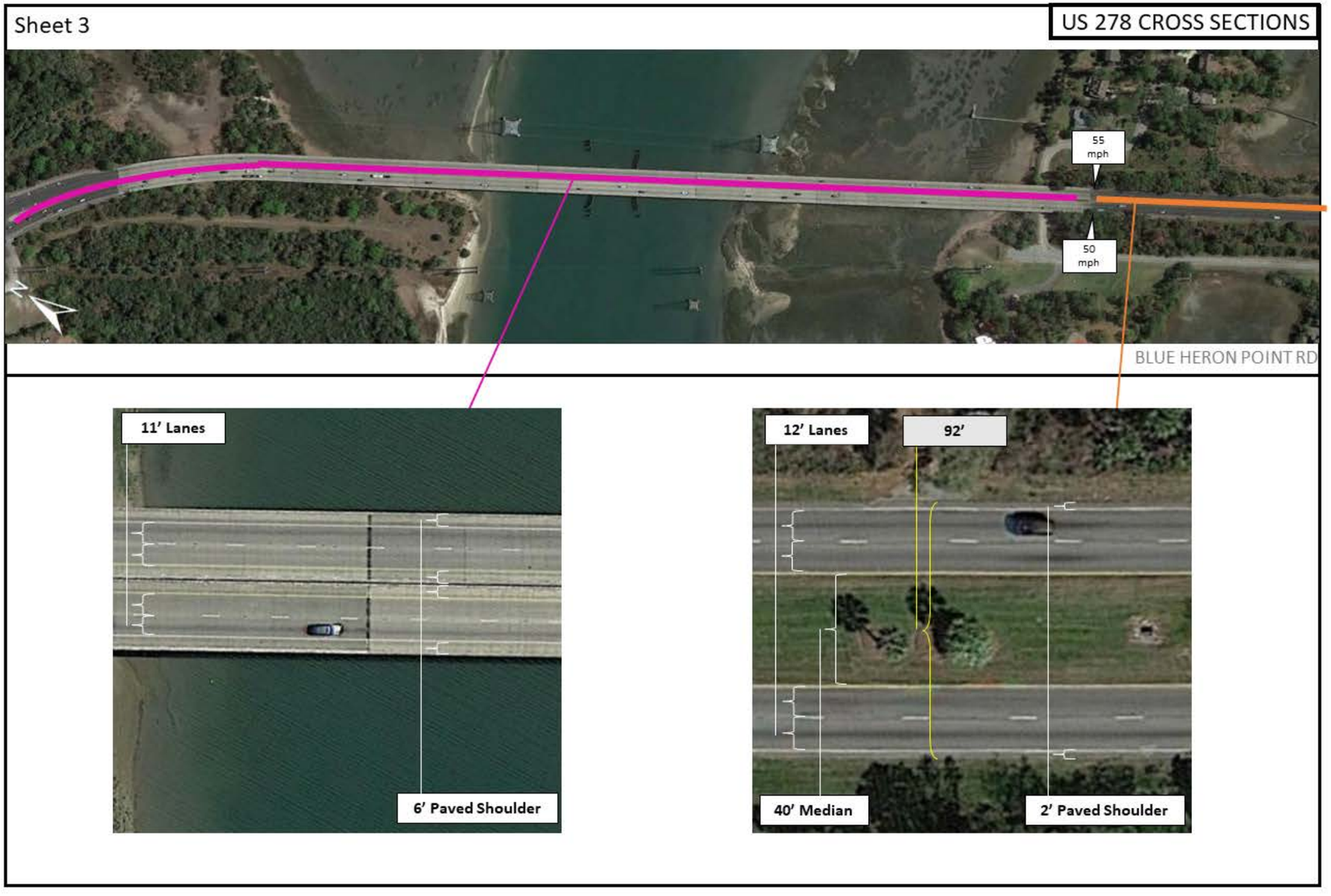


Figure 11: US 278 Cross Sections, Sheet 4

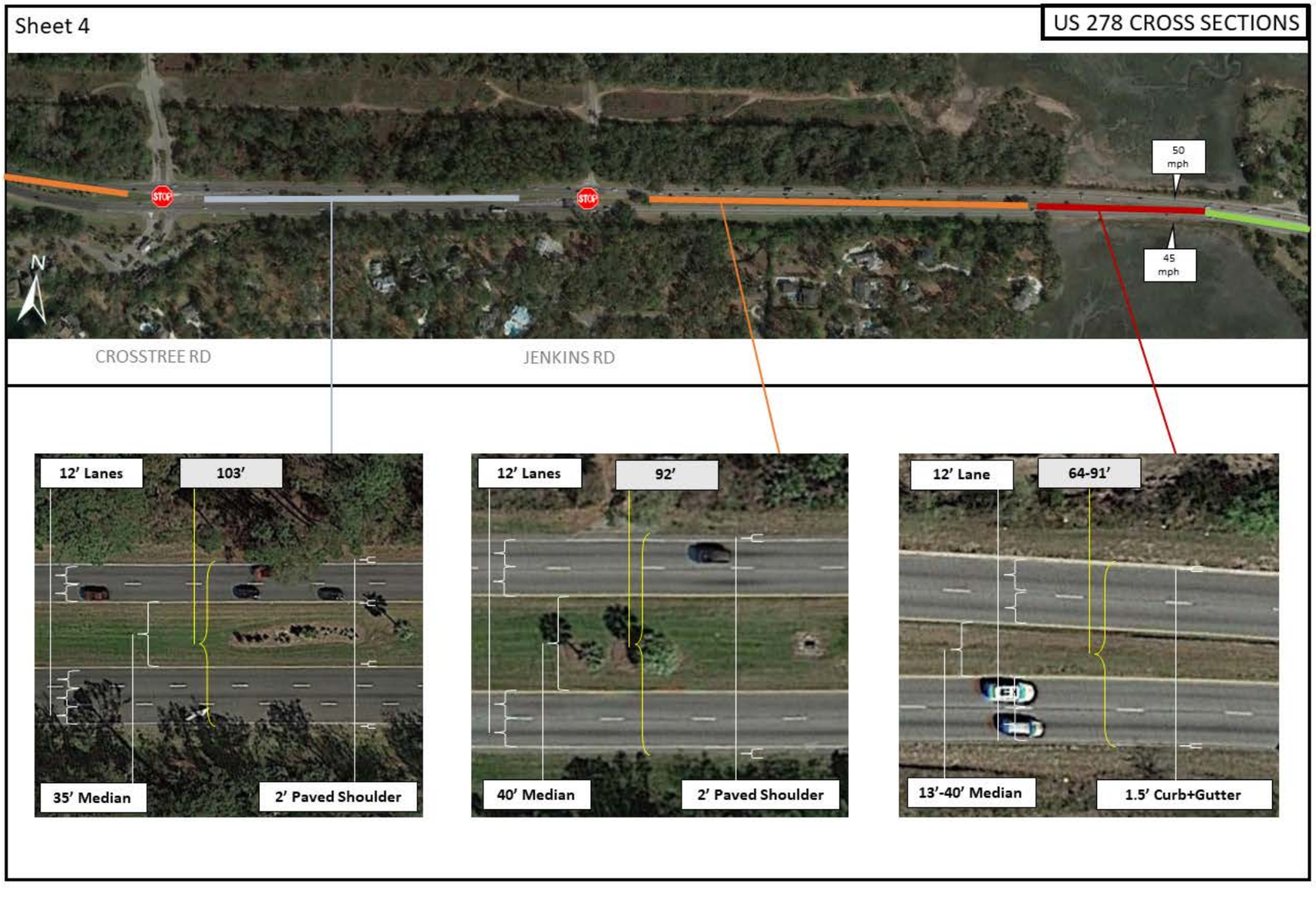


Figure 12: US 278 Cross Sections, Sheet 5

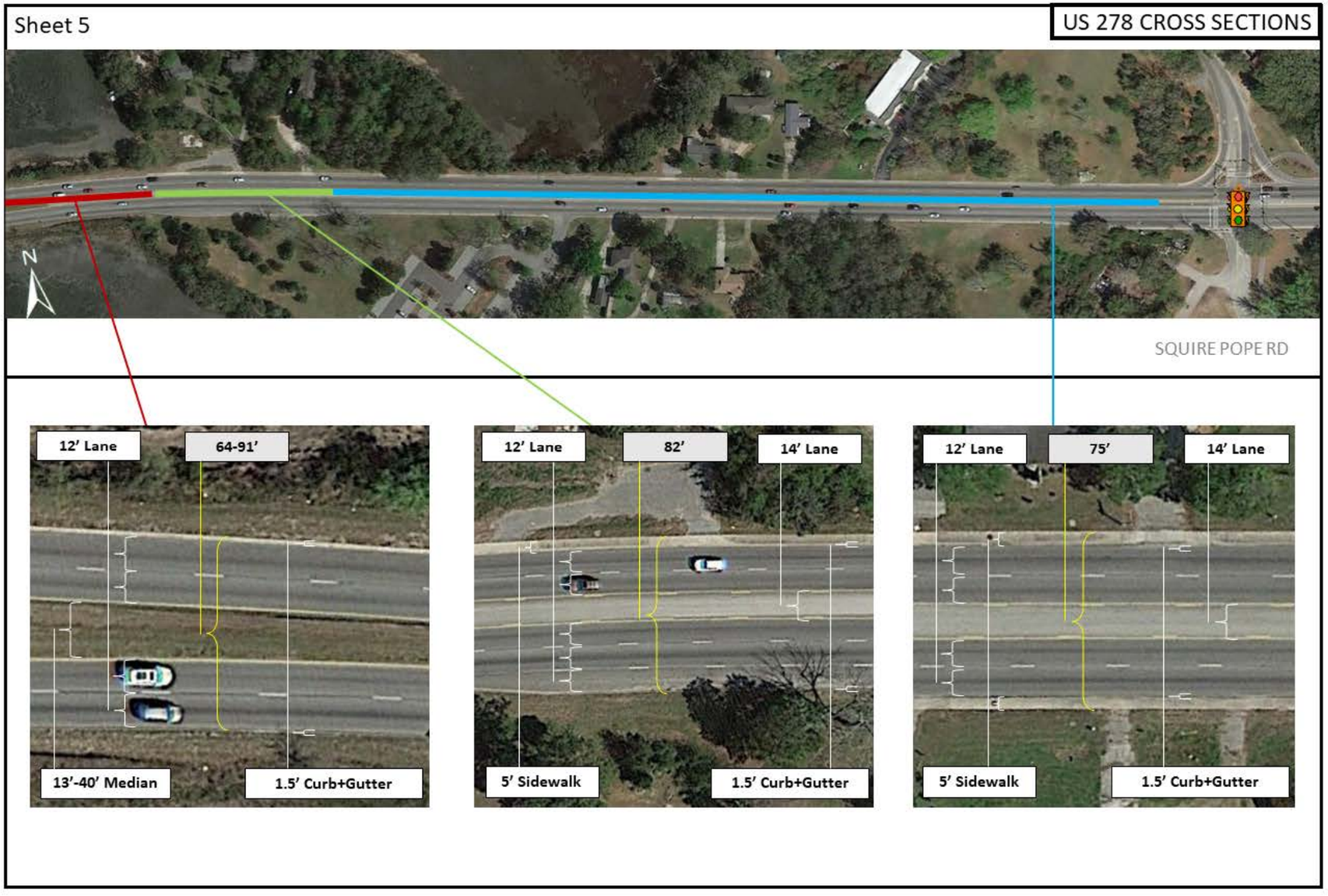
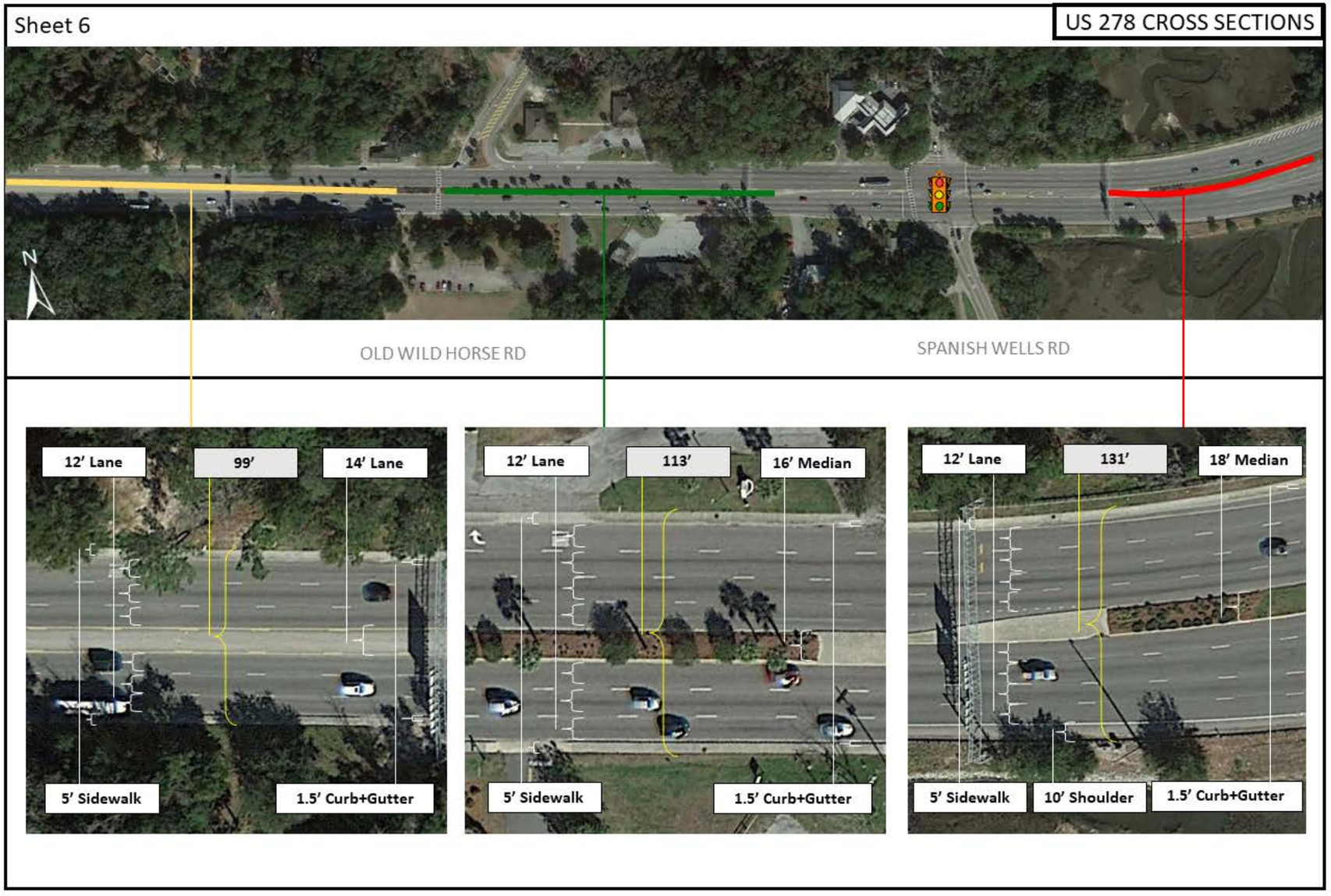


Figure 13: US 278 Cross Sections, Sheet 6



2.1.2 Intersection Geometries and Traffic Control

The US 278 study area is bounded on either end by a signalized intersection. The study begins on the western end at the Moss Creek Drive intersection and ends in the east at Wild Horse Road/Spanish Wells Road. The intersection geometries and traffic control types are depicted in **Figure 14**.

- **Moss Creek Road Intersection:**
  - Northbound – Exclusive left turn lane, exclusive right turn lane, one through lane
  - Southbound – Exclusive left turn lane, channelized right turn lane, one through lane
  - Eastbound – Exclusive left turn lane, three through lanes with shared right lane
  - Westbound – Exclusive left turn lane, three through lanes, channelized right turn lane

- **Squire Pope Road Intersection:**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, channelized right turn lane, one through lane
  - Eastbound – Exclusive left turn lane, three through lanes with shared right lane
  - Westbound – Exclusive left turn lane, two through lanes, channelized right turn lane

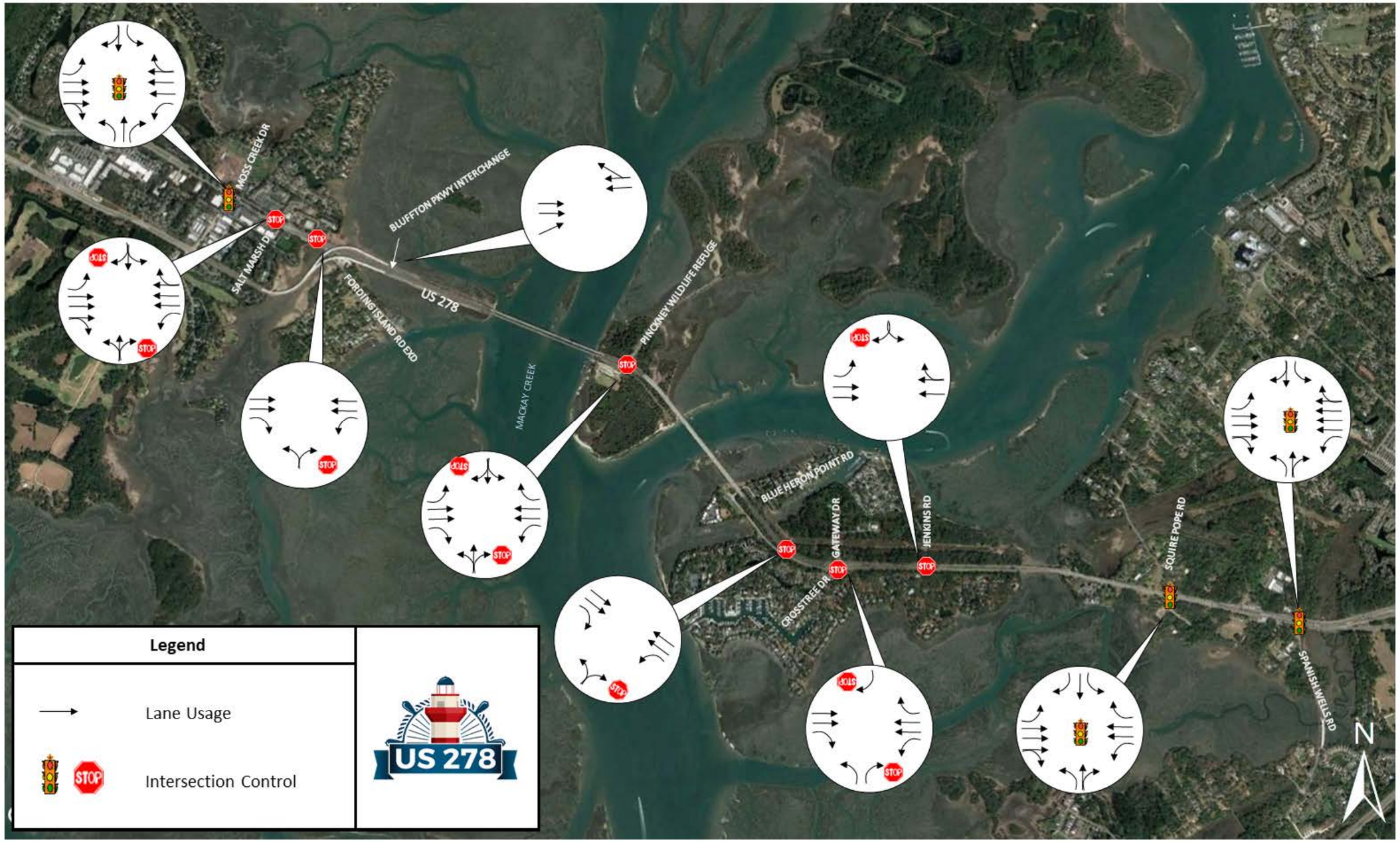
- **Wild Horse Road/Spanish Wells Road Intersection:**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, shared through/right lane
  - Westbound – Exclusive left turn lane, three through lanes, shared through/right lane

The remaining intersections along the corridor are unsignalized.

2.2 Speed Limits

The posted speed limit varies along US 278 within the project area. From Moss Creek Drive to the Bluffton Parkway ramps, the speed limit is 45 mph. The speed limit increases to 55 mph across the bridges and then decreases to 50 mph at Blue Heron Point Road. The speed limit decreases again to 45 mph between Jenkins Road and Squire Pope Road where the grass median transitions into a two way left turn lane.

Figure 14: 2018 Existing Geometric Layout



3.0 EXISTING PEAK HOUR TRAFFIC VOLUMES

3.1 DAILY VOLUMES

Daily volumes along US 278 were collected via several sources, which are discussed in detail below. These volumes were compared against one another to ensure the data from each source is appropriate.

3.1.1 24-hour Video Counts – CDM Smith

CDM Smith collected 24-hour counts at three locations along US 278 on May 30, 2018. The locations of these counts and the volumes observed for this day are shown in **Figure 15**.

3.1.2 Automatic Traffic Recorders (ATR) Station 035

SCDOT maintains over 160 continuous count stations, or Automatic Traffic Recorders (ATR), that provide near real-time traffic count information by collecting traffic counts through permanent sensors in the roadway. ATR Station 035 is located on US 278 just east of the Pinckney Wildlife Refuge intersection. The ATR Station is also shown in **Figure 15**. CDM Smith reviewed the daily volumes at this count station for the period between December 1, 2017 and November 30, 2018. These volumes were ranked from highest to lowest to find the 30th highest volume hour to calculate the appropriate design hour.

3.1.3 SCDOT Daily Volumes

CDM Smith also reviewed the estimated AADTs from the 10 nearby SCDOT count stations for the years 2009-2017.

3.2 RAW TURNING MOVEMENT COUNTS

Turning movement counts were collected during the AM and PM peak hours on August 8, 2018 at the eight study area intersections. **Figure 16** shows these raw counts. It should be noted that the intersection volumes for Wild Horse Road/Spanish Wells Road were derived from a previous study done for the corridor east of Squire Pope Road.

3.3 PEAK HOUR DETERMINATION

The peak hour was determined from the turning movement counts. Not all of the nine intersection counts showed the exact same AM and PM peak hour; therefore, the hour in which the total volumes across all intersections was the highest was deemed the peak hour. It was found that the AM peak hour occurred between 7:30-8:30 AM and the PM peak hour was 4:30-5:30 PM.

3.4 DESIGN HOUR METHODOLOGY (COMMUTER PEAK HOUR)

The American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Design Standards Interstate System, 5th Edition* (January 2005), indicates that the Design Hour Standard practice in urban and rural areas is to establish highway design volumes based on an hour between the 30th and 100th highest hour of the year for the roadway design. The highest hourly volumes were ranked for each hour for every day in the calendar year between December 1, 2017 and November 30, 2018. The off-peak hours were then filtered out in an effort to provide a more meaningful design hour volume for normal commuter traffic. The hours ranked were the AM peak hours (7:00-9:00) and PM peak hours (4:00-6:00). Due to Hilton Head Island being a desirable tourist destination, all hours during the summer months between June and August were also ranked to ensure the tourist traffic was accounted for, especially the beach-bound trips during the mid-morning hours.

Table 2 displays count data for ATR Station 35 broken into AM and PM periods. The volumes were ranked based on the combined total of the eastbound and westbound approach. The table includes:

- The three highest AM (7:00-9:00) and PM (4:00-6:00) peak hour volumes (combined WB/EB) of the 12-month period
- The 30th and 100th highest AM and PM hour volumes (yellow highlight)
- The AM and PM peak hour EB/WB combined volumes, ranked accordingly, from August 8, 2018 when turning movement counts were collected (green highlight)
- The 30th highest summer hour (June-August) for AM and PM periods, which was then ranked accordingly (orange highlight)

Figure 15: Existing Daily Traffic on US 278

Figure 16: 2018 Existing Weekday Peak Hour Traffic

Table 2: Yearly Total Ranking for ATR Station 35 (Dec. 2017-Nov. 2018)

US-278 AM Peak Hours						
Date	Time	EB	WB	Total	Rank	Day of Week
4/6/2018	8:00 - 9:00	2939	1821	4760	1st	Friday
4/16/2018	8:00 - 9:00	2927	1764	4691	2nd	Monday
2/21/2017 *	8:00 - 9:00	2925	1741	4666	3rd	Tuesday
5/15/2018	7:00 - 8:00	3070	1451	4521	30th	Tuesday
2/2/2018	7:00 - 8:00	3050	1378	4428	100th	Friday
8/8/2018	7:30 - 8:30	2932	1449	4381	147th	Wednesday
6/5/2018	7:00 - 8:00	2997	1369	4366	159th	Tuesday
US-278 PM Peak Hours						
Date	Time	EB	WB	Total	Rank	Day of Week
4/5/2018	17:00 - 18:00	2415	3271	5686	1st	Thursday
4/5/2018	16:00 - 17:00	2533	3135	5668	2nd	Thursday
4/4/2018	16:00 - 17:00	2448	3197	5645	3rd	Wednesday
7/26/2018	17:00 - 18:00	2075	3295	5370	30th	Thursday
8/8/2018	16:30 - 17:30	2125	3042	5167	95th	Wednesday
6/6/2018	17:00 - 18:00	2025	3138	5163	97th	Wednesday
5/29/2018	17:00 - 18:00	1947	3213	5160	100th	Tuesday

Yellow - 30th and 100th highest AM and PM hour volume
Green - Turning Movement Count from August 8, 2018
Orange - 30th highest summer (June- August) hour, ranked accordingly

From **Table 2**, it is observed that there is little difference between the 30th and 100th highest hours for all data shown. Therefore, the August 8, 2018 volumes were adjusted to the 30th highest hour, not the 100th highest hour. A typical August Wednesday in 2018 generated the 147th highest AM hour and the 95th highest PM hour. The ATR Station 35 conversion factors to generate the 30th highest hour volumes were developed by dividing the 30th hour (yellow) by the turning count volume (green) and can be seen in **Table 3.** To provide a conservative design hour volume for both peak periods, a four percent factor was applied to the AM and PM peak hour turning movement volumes.

Table 3: Initial Design Hour Factor

Period	30th Highest Volume from ATR 035	Turning Movement Counts at Pinckney Wildlife Refuge	Factor
Total AM	4521	4381	103.20%
Total PM	5370	5167	103.93%

The turning movement counts for this project were conducted at the beginning of August 2018, which is considered to be a summer tourist month. CDM Smith examined traffic volumes from SCDOT's Traffic Polling and Analysis System for all hours in the typical summer months (May-August), assuming that the DHV might come from the summer timeframe. The PM peak 30th highest hour did fall on a summer day (July 26, 2018- see Table 2) and the PM peak hour almost always fell within the normal commuter peak hours from 4:00 to 6:00 PM, even in the summer months. However, the actual summer AM peak hour is typically later in the morning from 10:00 to 11:00 AM. Ultimately, the AM commuter peak was used as the AM DHV even though the true AM peak volumes occurred from 10:00 to 11:00. As seen in **Table 2**, the summer 30th highest volumes were consistently lower than the overall 30th ranked hours and the turning movement counts collected on August 8, 2018. Therefore, the traffic on US 278 was analyzed as a commuter corridor with typical weekday peaks rather than a tourist route with irregular peaks.

3.5 Design Hour Volumes

Figure 17 shows the design hour volumes used in the operational analysis. These volumes reflect the four percent modification factor and have been balanced throughout the corridor.

Figure 17: 2018 Design Traffic Volumes

4.0 EXISTING TRAFFIC OPERATIONS

4.1 SPEED DATA

The posted speed limits between Moss Creek Drive and Wild Horse Road/Spanish Wells Road range from 40 mph to 55 mph. The mainline actual speed data was acquired from INRIX for the days during May 2018 and August 1-15, 2018. The speeds were collected through drivers who have enabled the INRIX application to access the phone's location and calculate their driving speed. The data was filtered to show only the AM and PM peak hours. This data, in spreadsheet form, is provided in the Appendix and the results can be seen in **Figure 18** and **Figure 19**. The speeds are represented by colored lines which correspond to a speed range. The length of the line represents the starting and ending location of the INRIX data collection points. The INRIX data is supplemented with real-time traffic speed collected via the "Traffic Conditions" feature of Google Maps, shown in **Figure 20** and **Figure 21**. The Google application uses saved real-time information gathered from drivers using the Google Maps navigation system, Waze, Google Now, or other systems and builds a historical database. Additionally, Beaufort County has a system of ITMS traffic cameras that provide real-time traffic conditions along the corridor. The picture in **Figure 20** shows a typical morning peak hour with traffic forming eastbound and little traffic traveling westbound. Given these sources of speed data and traffic data, the peak hour traffic behavior is sufficiently depicted.

Figure 18: INRIX – AM Peak (7:30-8:30 AM)

Figure 19: INRIX – PM Peak (4:30-5:30 PM)

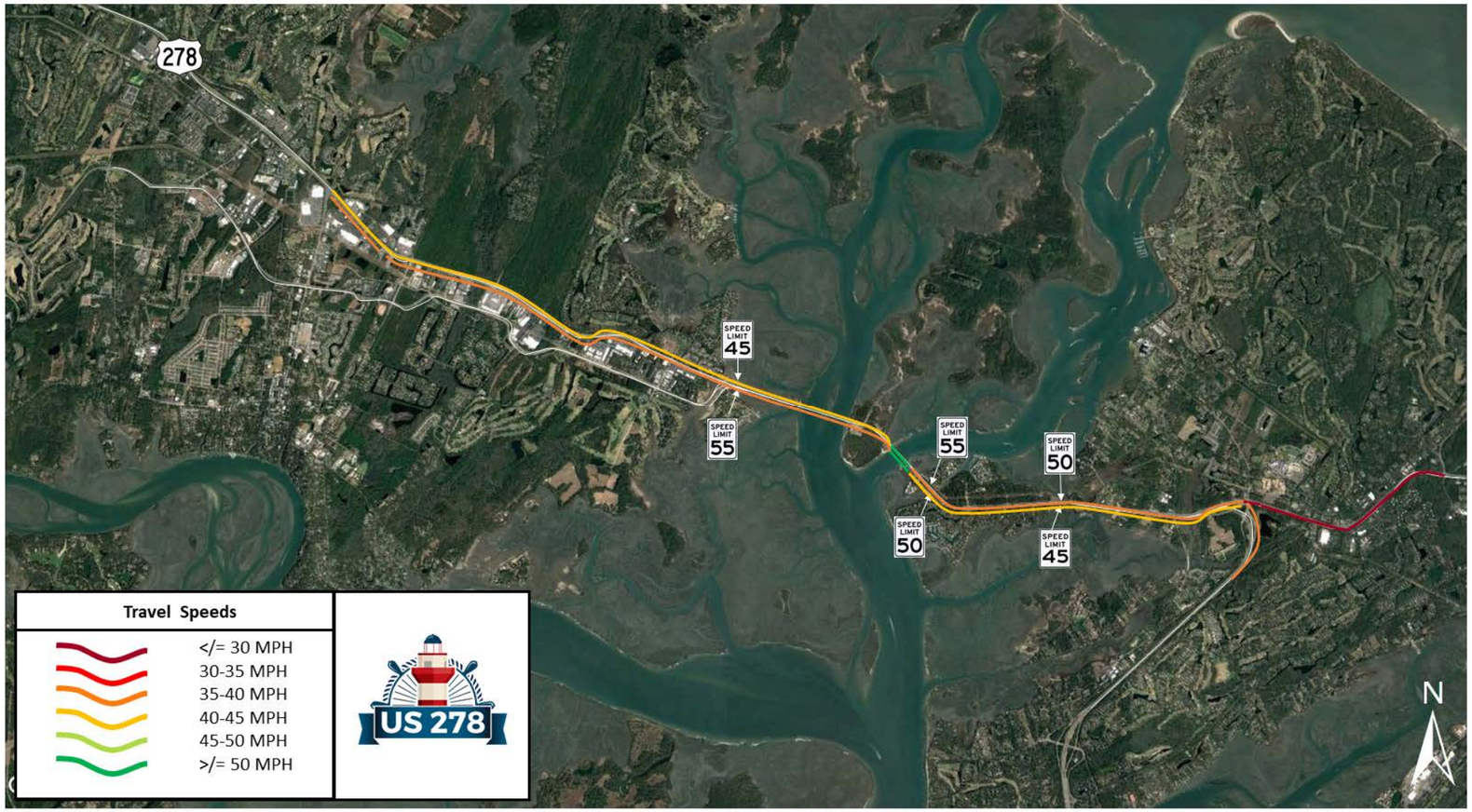


Figure 20: Google Maps Historical Traffic Conditions (AM Peak) with Screenshot of Beaufort County ITMS Traffic Camera 55

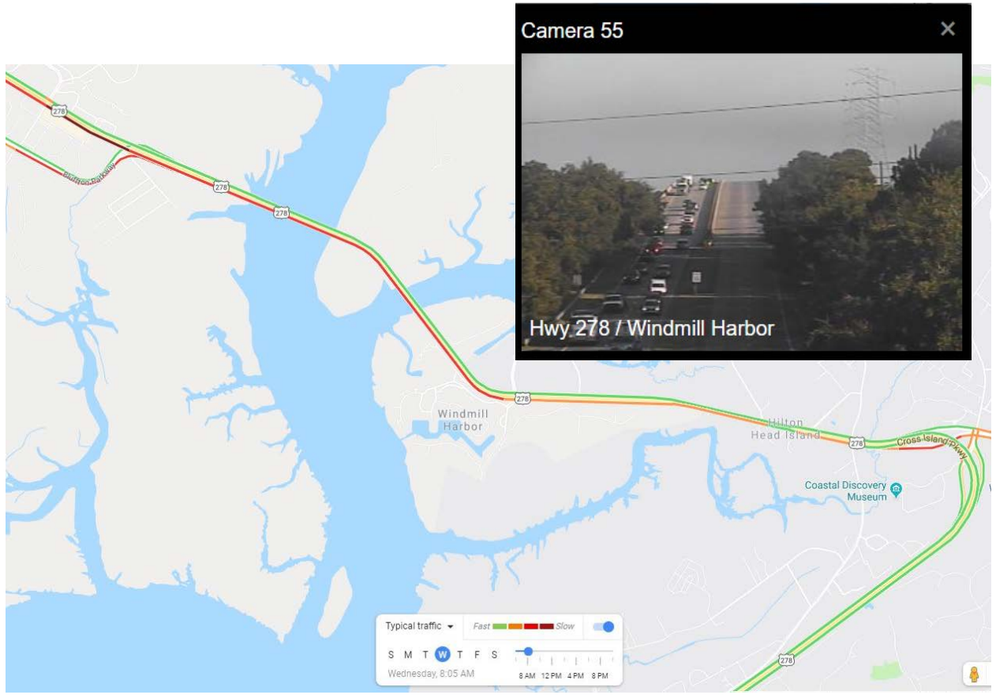
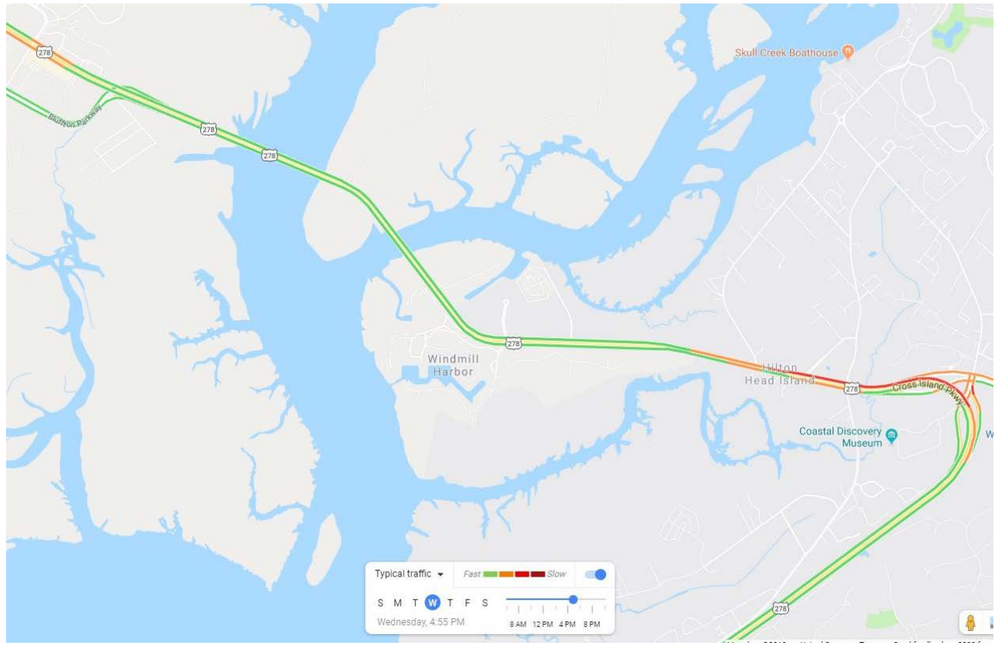


Figure 21: Google Maps Historical Traffic Conditions (PM Peak)



4.2 Percent Trucks

The percent trucks (trucks as a percentage of total traffic) were tabulated for every segment of US 278 that lies between intersections. The values ranged from 2.0%- 2.8% in the AM hours and from 0.9%-1.1% in the PM. The percentage generally decreases moving from west to east. An illustration of these values is shown in **Figure 22**. The daily truck percentages corresponding to the three 24-hour count locations along US 278 on May 30, 2018 are shown in **Figure 23**.

4.3 Directional Distributions

The directional distributions for each segment were calculated by using the turning movement count volumes from August 8, 2018 for each cross street. The inbound and outbound values of both intersections were averaged to create an average eastbound and westbound volume for every segment, and therefore obtain the average directional distribution between all intersections along the project length. The results can be seen on **Figure 24.** The corridor, while in a tourist generating area, demonstrates typical commuter distribution patterns. There is a heavy inbound (eastbound) pattern in the AM and a heavy outbound (westbound) pattern in the PM period.

Figure 22: Truck Percentages by Segment

Figure 23: Daily Truck Percentages

Figure 24: Peak Hour Directional Distribution by Segment

5.0 CRASH ANALYSIS

5.1 Overall Crash Statistics

In the five-and-a-half-year period between January 1, 2013 to June 30, 2018, 797 crashes (145 per year or 1 every 2.5 days) were recorded on the 4-mile stretch of US-278 between Moss Creek Drive and Wild Horse Road/Spanish Wells Road. With respect to the severity of the crashes, 74.9% were considered property damage only crashes, 24.6% were injury crashes, and 0.5% were fatal. **Figure 25** illustrates the location of the crashes with respect to severity. The most common types of crashes were: rear end (58.6%), angle (18.8%) and single vehicle crashes (10.8%). **Figure 26** shows the crashes by crash type. It is evident from this figure that the angle crashes are clustered around the intersections. Typical peak commuting hours (7:00-9:00, 4:00-6:00 PM) accounted for 41% of all crashes. The AM peak hours accounted for 19% while the PM contributed 22%. The locations of the crashes during the AM and PM peak hours are shown in **Figure 27**. A summary of the data is available in **Table 4.**

Table 4: US 278 Crash Statistics

Type of Crash							TOTAL
Angle	Head On	Single Vehicle	Rear End	Sideswipe Opposite Dir	Sideswipe Same Dir	Other	
150	10	86	467	3	77	4	**797**
18.7%	1.3%	10.8%	58.6%	0.4%	9.7%	0.5%	**100%**

Severity of Crash			TOTAL
Property Damage Only	Injury	Fatality	
597	196	4	**797**
74.9%	24.6%	0.5%	**100%**

5.2 Fatal Crashes

There were three fatal crashes within the project limits and aforementioned time period. Two of these involved pedestrians between Moss Creek Drive and Salt Marsh Drive which occurred two weeks apart between the end of September and early October of 2014. The crashes did not occur at pedestrian crosswalks and both occurred between 8:00 PM and 9:00 PM. Street lights were not illuminated during either of these incidents. Since Moss Creek Drive is the only signalized intersection in this area, pedestrians cross US 278 at unmarked mid-block locations. Signalizing Salt Marsh Drive and providing crosswalks and other pedestrian features is a possible mitigation tactic to create a safer walking environment. The third fatal crash was an angle crash at the Pinckney Wildlife Refuge unsignalized intersection. The probable cause identified in the crash report was driving too fast for the conditions.

5.3 Intersection Angle Crashes

There are significant clusters of crashes at the three signalized intersections (Moss Creek Drive, Squire Pope Road, and Wild Horse Road/Spanish Wells Road) as well as one of the unsignalized intersections (Salt Marsh Drive). These clusters are apparent in **Figure 28**. Along with the expected rear end crashes, there is a concentration of angle crashes at these intersections, which should be preventable with proper signalization. The following describes the observed crashes at each high crash intersection and mitigation techniques for reducing crashes at these intersections.

5.3.1 Moss Creek Drive & Salt Marsh Drive

Figure 29 shows the crash types between Moss Creak Drive and Salt Marsh Drive. As expected, there are many rear end crashes approaching the signal at Moss Creek Drive; however, there are approximately eight crashes located within the influence area of the intersection. By adding protective only left turn phasing in lieu of protected plus permissive phasing to the minor street approaches, an added level of protection could help to reduce those angle crashes.

The Salt Marsh Drive intersection is currently unsignalized and shows approximately 20 angle crashes during the study period. This number of angle crashes is noticeably high, indicating that a signal may be appropriate here. A preliminary signal warrant analysis was performed at this intersection and the findings are presented in the following section.

5.3.2 Squire Pope Road

Figure 30 shows the crash types at the intersection of Squire Pope Road. According to the crash data, there have been 20 angle crashes at the intersection during the study period. The existing left turn phasing along US 278 is protected plus permissive and permissive only for the minor street. A possible safety improvement to mitigate the angle crashes is to implement a protected only left turn phase for the mainline. The minor street could benefit from a protected plus permissive left turn phase.

Figure 25: US 278 Crashes by Severity

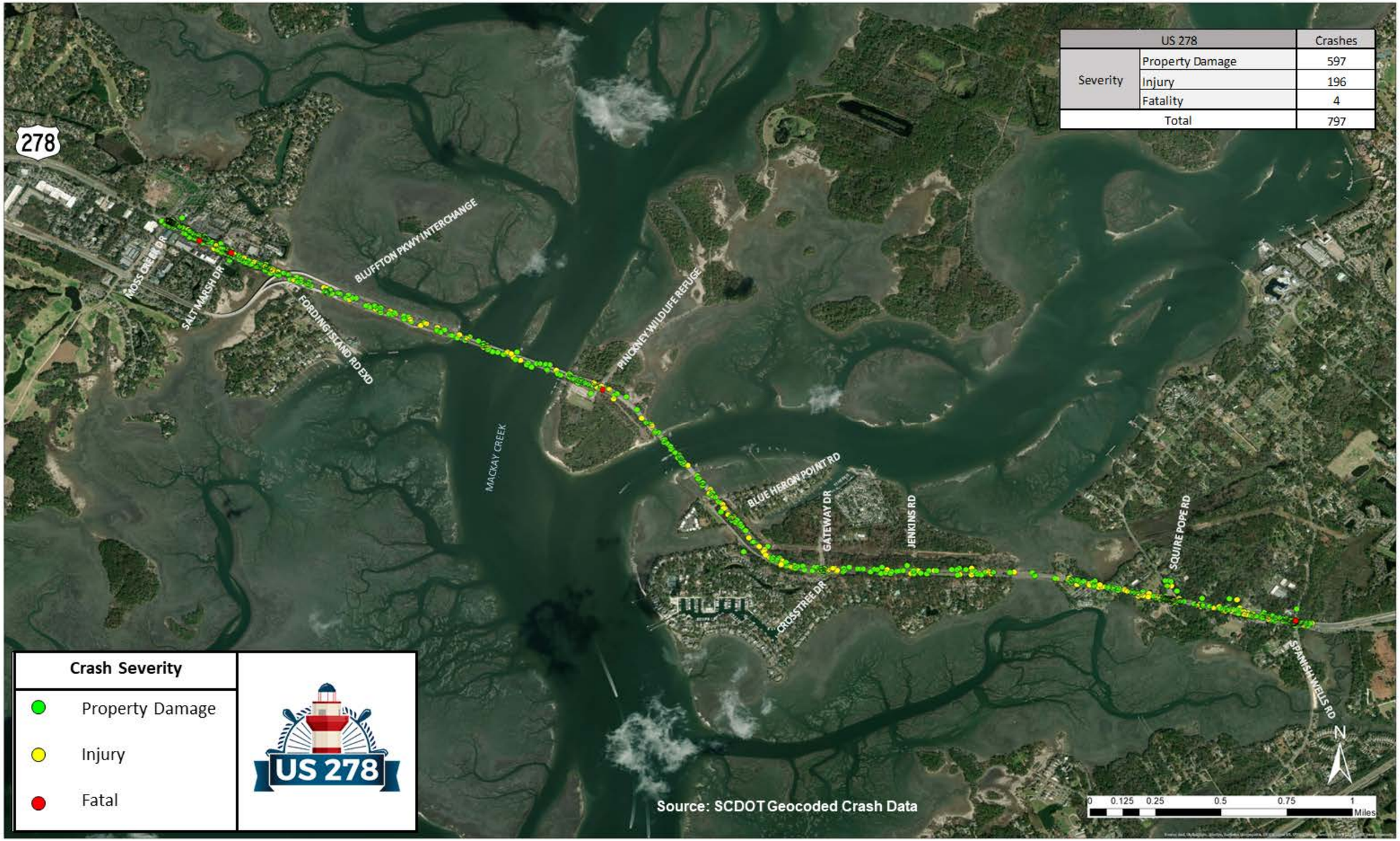


Figure 26: US 278 Crashes by Type

Figure 27: US 278 Crashes During Peak Hour

US 278		Crashes
Peak Hour	AM	151
	PM	176
Total		327

US 278		Crashes
Totals	Peak Hour	327
	All Hours	797

Figure 28: Crash Density – All Crashes

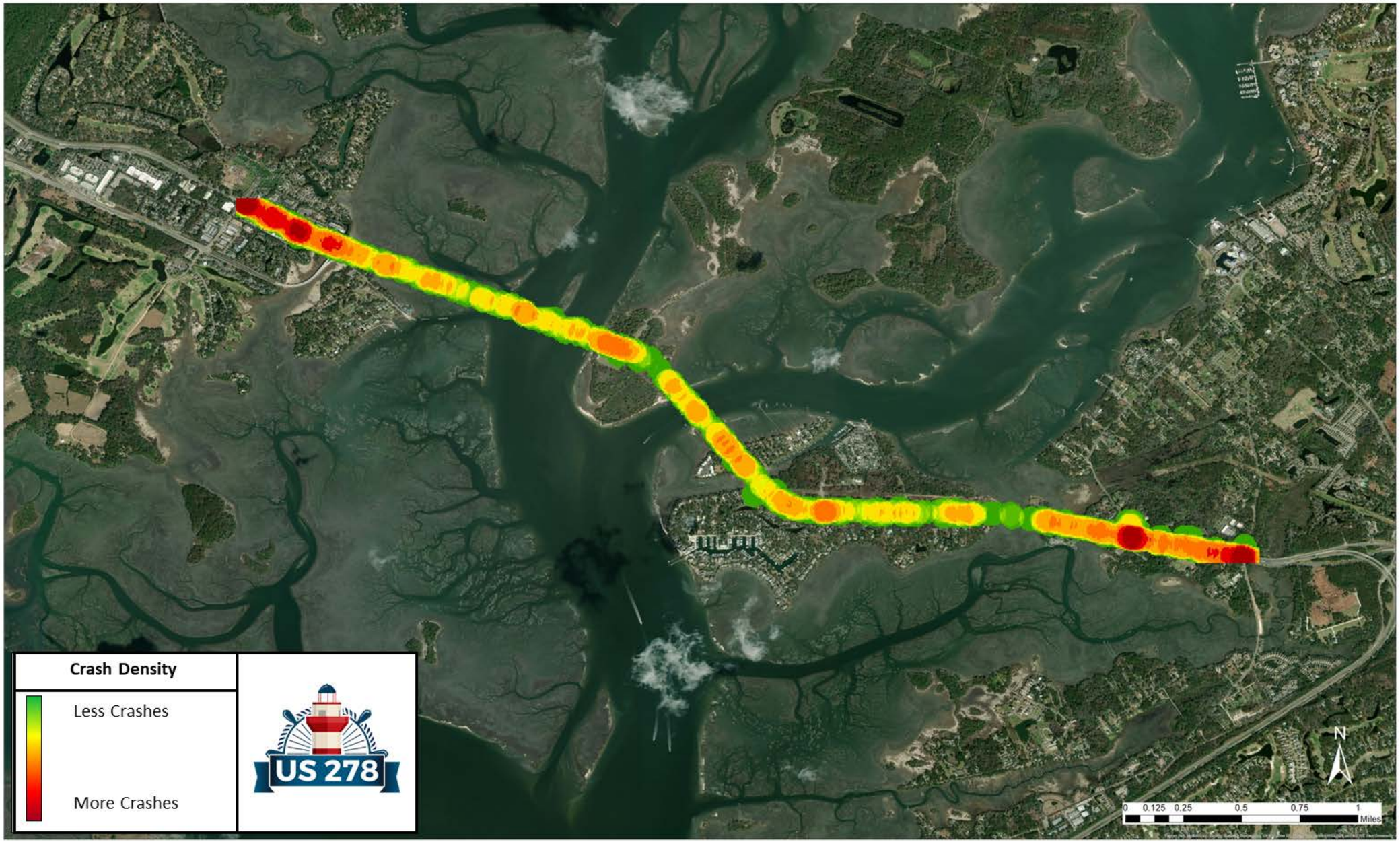


Figure 29: Type of Crash: Moss Creek Drive to Salt Marsh Drive

Figure 30: Type of Crash: Squire Pope Road

5.3.3 Wild Horse Road/Spanish Wells Road

Figure 31 shows the crash types at the Wild Horse Road/Spanish Wells Road intersection. There have been 22 angle crashes within the influence area of this intersection as reported during the study period. The mainline left turn phasing is currently protected only; however, the minor street approaches have a permissive only left turn phase. The minor street could benefit from a protected only or a protected plus permissive left turn phase.

5.4 Signal Warrant – Salt Marsh Drive

As mentioned above, because so many angle crashes occurred at Salt Marsh Drive, it was thought that a signal would provide a safer condition than is present today and reduce the number of angle crashes. The Manual on Uniform Traffic Control Devices (MUTCD) signal warrant was performed according to Section 4C.08 Warrant 7, Crash Experience.

The MUTCD Warrant states:

> ***Section 4C.08 Warrant 7, Crash Experience***
>
> *Support:*
>
> *The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.*
>
> *Standard:*
>
> *The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:*
>
> 1. *Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and*
> 2. *Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and*
> 3. *For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours evaluated.*

Criterion 1 cannot be confirmed or disproven and will require further analysis.

Of the 37 crashes at this intersection, 20 are considered avoidable via a signal according to Criterion 2. Those 20 are listed in **Table 5**.

From **Table 5**, one can conclude that Criterion 2 is met. In 2016, there were 7 crashes that are susceptible to correction by a traffic signal. That number exceeds the threshold of 5 of such crashes in any 12-month period, as stated in the warrant.

Table 5: Avoidable Crashes at Salt Marsh Drive

Crash Number	Crash FID	Date	Crash Type
1	115	2/26/2013	Angle
2	134	8/2/2013	Angle
3	128	10/24/2013	Angle
4	111	6/26/2014	Angle
5	121	9/30/2014	Angle
6	136	5/6/2015	Angle
7	118	6/16/2015	Angle
8	109	11/18/2015	Angle
9	117	12/6/2015	Angle
10	**122**	**4/2/2016**	**Angle**
11	**116**	**5/13/2016**	**Angle**
12	**137**	**6/20/2016**	**Angle**
13	**120**	**7/2/2016**	**Angle**
14	**133**	**7/10/2016**	**Angle**
15	**126**	**10/29/2016**	**Angle**
16	**140**	**11/22/2016**	**Angle**
17	**132**	**12/28/2016**	**Angle**
18	123	10/5/2017	Angle
19	114	11/2/2017	Angle
20	112	1/10/2018	Angle

Criterion 3 has three conditions; A, B, and C, in which only one needs to be met. Condition A requires the combined major street volume to exceed the corresponding volume of 480 vehicles per hour (vph) and the greater of the two minor street's approach volume to exceed 120 vph for any 8 hours in an average day. The condition A volumes can be seen highlighted in yellow on **Table 6**. The volumes, taken from CDM Smith turning movement counts, are shown in **Table 7.** From the table, it is evident that condition A is not met. Condition B requires the major and minor street volumes to exceed the numbers highlighted in green in **Table 6**, which are 720 and 60 for the major and minor streets, respectively. As seen in the table, condition B is satisfied.

Figure 31: Type of Crash: Wild Horse Road/ Spanish Wells Road

Table 6: Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112
Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Source: Manual on Uniform Traffic Control Devices (MUTCD)

Table 7: MUTCD Criterion 3 Warrant Analysis

Hour (8/8/18)	Major Street Volume (Combined EB/WB)	Minor Street Volume (SB)	Condition A Met? (Major/Minor)	Condition B Met? (Major/Minor)
7:00- 8:00	2906	61	Y/N	Y/Y
8:00- 9:00	2800	73	Y/N	Y/Y
11:00-12:00	2843	73	Y/N	Y/Y
12:00-13:00	2924	73	Y/N	Y/Y
13:00- 14:00	2983	65	Y/N	Y/Y
15:00- 16:00	3338	73	Y/N	Y/Y
16:00-17:00	3593	107	Y/N	Y/Y
17:00-18:00	3446	84	Y/N	Y/Y

At this time, due to satisfying Criteria 2 and 3, a traffic signal is recommended to reduce angle crashes at this location; however, further monitoring of crashes and traffic volumes should be performed to determine when a signal is warranted.

6.0 EXISTING TRAFFIC ANALYSIS

6.1 INTERSECTION LEVEL OF SERVICE

Intersection level of service (LOS) is defined in terms of average delay per vehicle, which is measured based on variables such as signal phasing, cycle length, and intersection volumes with respect to capacity. **Table 8** shows the LOS criteria for signalized intersections, as described in the Highway Capacity Manual. **Table 9** shows the LOS criteria for unsignalized intersections.

Table 8: Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (sec/vehicle)	General Description
A	< 10	Free Flow
B	> 10-20	Stable flow (slight delays)
C	> 20-35	Stable flow (acceptable delays)
D	> 35-55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	> 55-80	Unstable flow (intolerable delays)
F	> 80	Forced flow (jammed)

Table 9: Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (sec/vehicle)
A	0-10
B	> 10-15
C	> 15-25
D	> 25-35
E	> 35-50
F	> 50

6.1.1 2018 Existing Intersection Level of Service

The existing geometry, traffic volumes, and signal timings were entered into Synchro to assess the current levels of service experienced at each intersection. **Figure 32** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 10** summarizes the worst movements at each unsignalized intersection and the overall level of service at the signalized intersections.

Table 10: 2018 Intersection Level of Service

Intersection	2018 Existing					
	AM			PM		
	Movement	LOS	Delay	Movement	LOS	Delay
Moss Creek Road	Overall	B	19.6	Overall	C	21.6
Salt Marsh Drive*	SBL	F	215.5	EBL	F	64.5
Fording Island Road*	NBL	F	+	NBL	F	+
Pinckney Wildlife Refuge*	NBL	F	+	NBL	F	+
Blue Heron Point Road*	NEL	F	+	NEL	F	+
Crosstree Drive/ Gateway Drive*	NBL	F	+	NBL	F	+
Jenkins Road*	SBL	F	199.0	SBL	F	+
Squire Pope Road	Overall	A	6.7	Overall	F	87.9
Wild Horse Road/ Spanish Wells Road	Overall	B	14.3	Overall	D	46.8

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.
** Unsignalized intersection- the movement with most severe LOS is included*

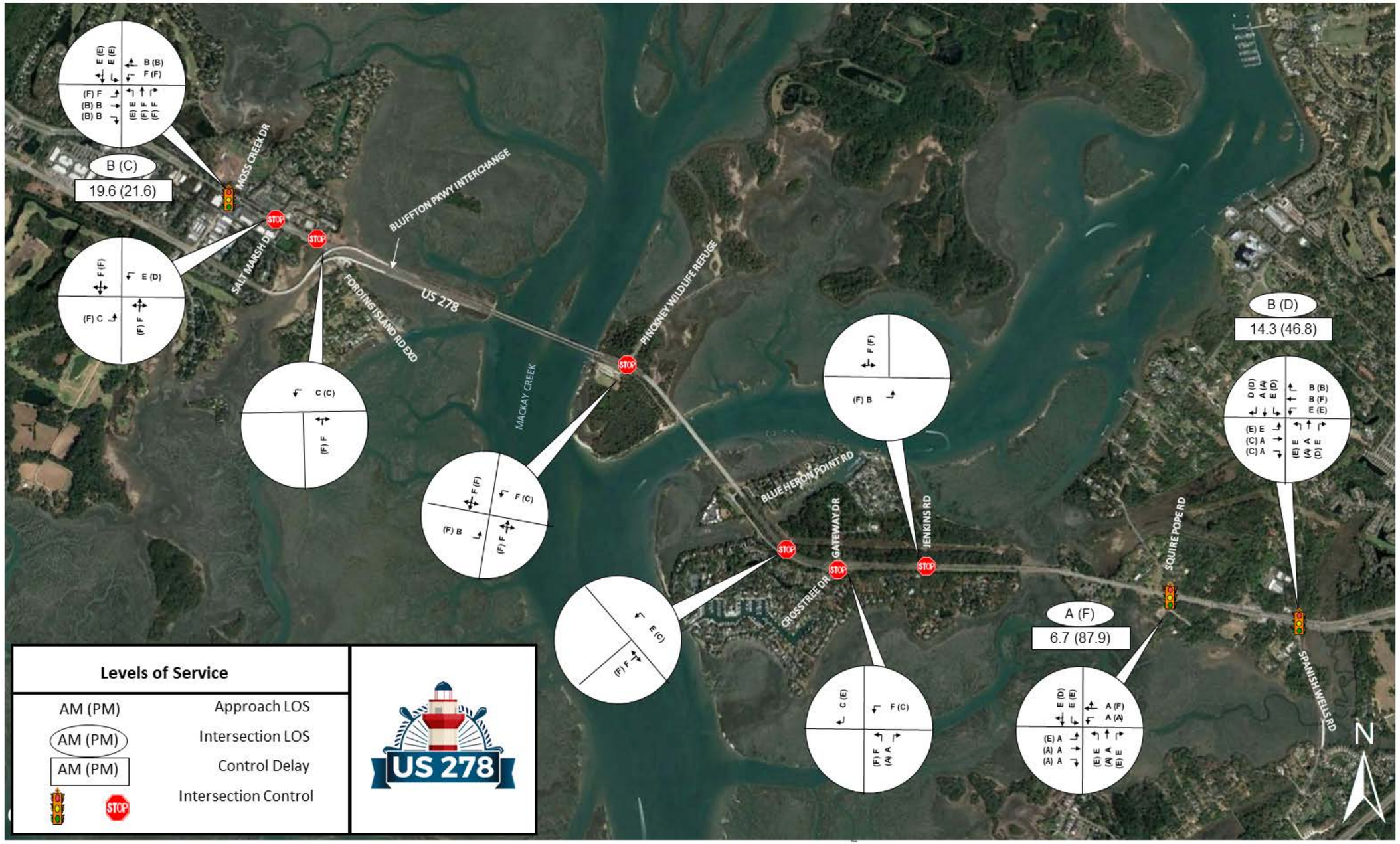
The existing analysis shows that, in general, the signalized interesections are operating at acceptable levels of service. The Squire Pope Road intersection operates at an overall LOS F in the PM peak hour. The unsignalized intersections show that the majority of the opposed movements operate at LOS F in both the AM and PM peak hours. Although many of the left turn movements have very low volumes, the delay experienced is excessive due to the US 278 through volumes.

6.2 SEGMENT LEVEL OF SERVICE

Along with intersection level of service, another important aspect to consider is how the segments between the intersections are accommodating traffic volumes. This segment of US 278 most closely operates as a multilane highway as described in the Highway Capacity Manual 2010 (HCM). The HCM states:

> *In general, uninterrupted flow may exist on a multilane highway if there are 2 miles or more between traffic signals…Many multilane highways will have periodic signalized intersections, even if the average signal spacing is well over 2 miles. In such cases, the multilane highway segments that are more than 2 miles away from any signalized intersections are analyzed by using the multilane highway methodology and isolated signalized intersections should be analyzed using the signalized intersection methodology.*

Figure 32: 2018 Design Hour Traffic Intersection Levels of Service



While level of service for intersections is based on the average delay of vehicles, the level of service for uninterrupted segments is based on the density of traffic, measured in passenger cars per mile per lane. **Table 11** lists the LOS thresholds for an uninterrupted flow facility, referenced from the HCM.

Table 11: Level of Service Thresholds for Uninterrupted Flow Facilities

LOS	Free Flow Speed-FFS (mph)	Density (pc/mi/ln)
A	All	> 0-11
B	All	> 11-18
C	All	> 18-26
D	All	> 26-35
E	60	> 35-40
	55	> 35-41
	50	> 35-43
	45	> 35-45
F	Demand Exceeds Capacity	
	60	> 40
	55	> 41
	50	> 43
	45	> 45

The Bluffton Parkway interchange introduces a ramp segment that needs to be analyzed separate from the multilane highway and intersections. Ramps are designed to permit relatively high-speed merging and diverging maneuvers while limiting the disruption to the main traffic stream. The elements measured in determining ramp operations are the length and type of acceleration and deceleration lanes, the free-flow speed of the ramp and freeway segment, and the proximity of other ramps. The LOS criteria for the merge and diverge segments are listed in **Table 12**.

Table 12: Level of Service Thresholds for Merge and Diverge Areas

LOS	Density (pc/mi/ln)	Comments
A	< 10	Unrestricted operations
B	> 10-20	Merging and diverging maneuvers noticeable to drivers
C	> 20-28	Influence area speeds begin to decline
D	> 28-35	Influence area turbulence becomes intrusive
E	> 35	Turbulence felt by virtually all drivers
F	Demand exceeds capacity	Ramp and freeway queues form

6.2.1 2018 Existing Segment Level of Service

As mentioned above, this portion of US 278 operates like an uninterrupted multilane highway. The multilane highway function of the Highway Capacity Software (HCS) was used to assess the segment level of service for the existing conditions. **Figure 33** through **Figure 36** illustrate the segmentation of the corridor and the resulting levels of service. The segment LOS is also summarized in **Table 13**.

Table 13: 2018 Segment Level of Service

Segment	Eastbound		Westbound	
	AM	PM	AM	PM
Moss Creek Drive to Salt Marsh Drive	B	B	A	B
Salt Marsh Drive to Bluffton Parkway	C	C	B	D
Bluffton Parkway to Pinckney Wildlife Refuge	E	D	C	E
Pinckney Wildlife Refuge to Blue Heron Point Road	E	C	C	D
Blue Heron Point Road to Jenkins Road	E	D	C	E
Jenkins Road to Squire Pope Road	E	C	C	E

According to the HCM, a ramp that connects to a multilane highway may be classified as a freeway ramp for analysis purposes. As shown in **Figure 33** and **Figure 34,** the Bluffton Parkway on- and off-ramps were analyzed separately as a merge and diverge condition in HCS. This analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM. The off-ramp operates at LOS A in the AM and LOS C in the PM.

The analysis reflects the existing traffic congestion between the Bluffton Parkway interchange and Squire Pope Road. The eastbound direction shows a LOS E in the AM and the westbound direction shows a LOS E in the PM.

Figure 33: 2018 Existing AM Segment Level of Service

Figure 34: 2018 Existing PM Segment Level of Service

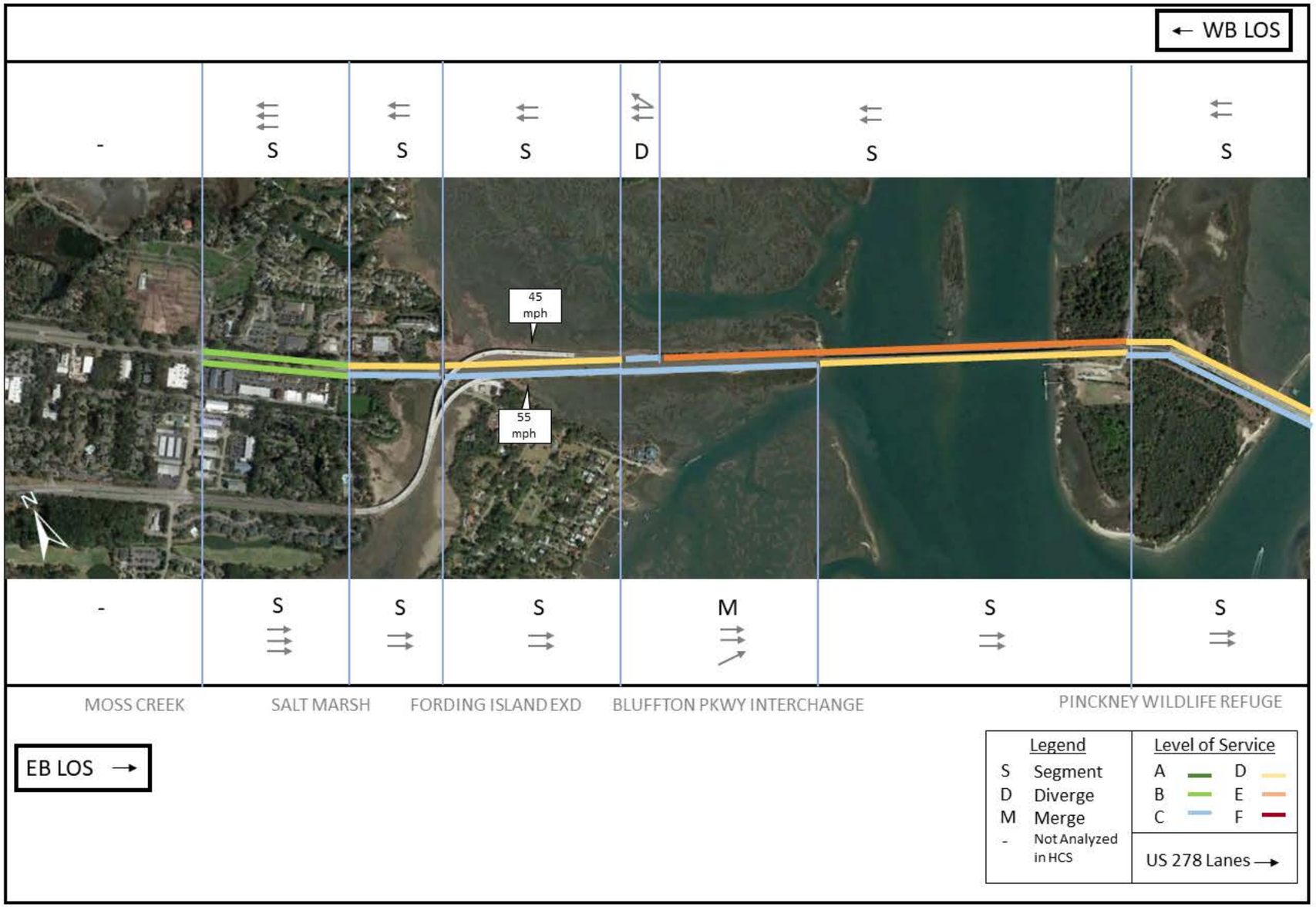


Figure 35: 2018 Existing AM Segment Level of Service

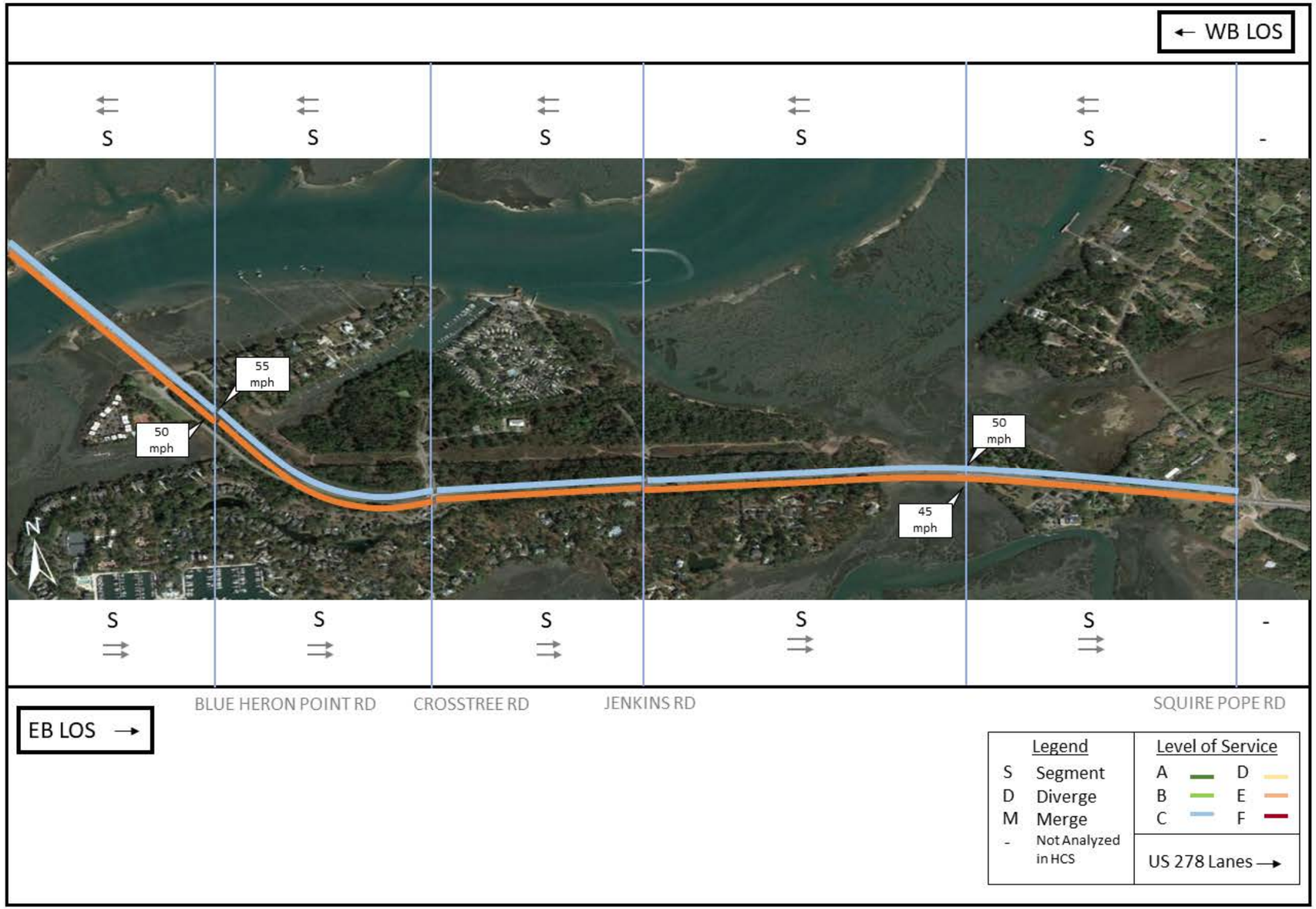
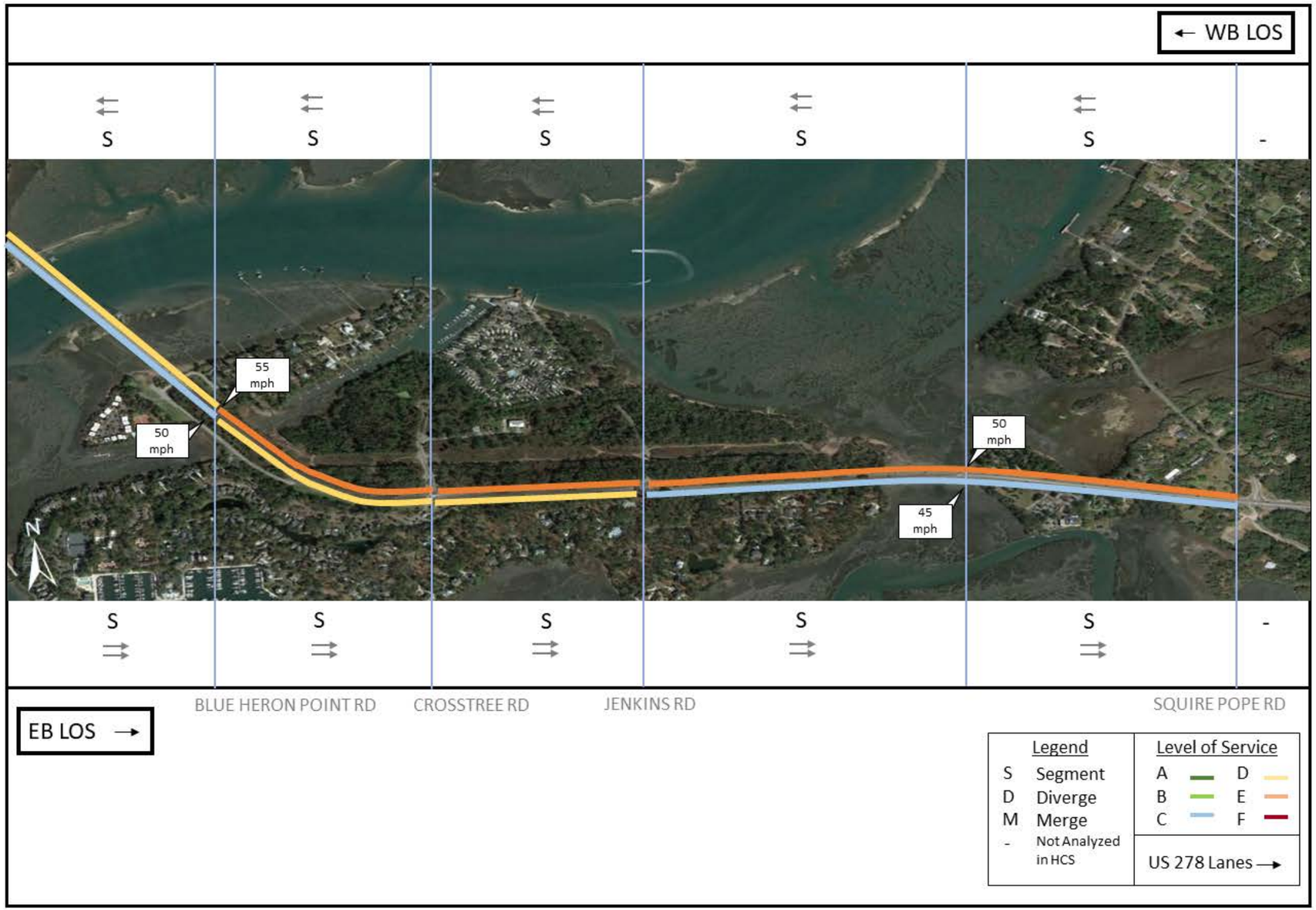


Figure 36: 2018 Existing PM Segment Level of Service



7.0 FUTURE TRAFFIC VOLUMES (2025 & 2045)

7.1 HISTORICAL GROWTH RATES

As mentioned above, part of the data collection efforts for this project included gathering historical traffic volumes from the SCDOT traffic count stations near the study area. **Figure 4** shows the locations of the count stations in the vicinity of the project area and the 2017 AADT for each station. The volumes from 2009 to 2017 were analyzed and a trendline was used to calculate the growth rate at each station. Six of the ten stations showed a positive trend in traffic volumes; however, the following locations showed a general reduction in volumes for the time period in which data were available:

- US 278 between Trimblestone Road and Sawmill Creek Road (west of the project area)
- US 278 between Wild Horse Road and Cross Island Parkway (east of the project area)
- Burnt Church Road (west of the project area)
- Sawmill Creek Road (northwest of the project area)

Table 14 shows the observed average annual growth rates for the count stations located along US 278.

Table 14: Historical Growth Rates from SCDOT Study Area Count Stations

Roadway	Station	Average Annual Growth Rate (2009-2017)
US 278 between Trimblestone Road and Sawmill Creek Road	181	-3.6%
US 278 between Bluffton Parkway and Pinckney Wildlife Refuge	183	2.3%
US 278 between Wild Horse Road and Cross Island Parkway	185	-0.9%
US 278 between Pembroke Drive and Central Avenue	186	1.25%

As seen in **Table 14**, the average growth rate observed at Station 183 is greater than two percent for this time period, but it is not feasible to assume that growth will continue at such a high rate through 2045.

7.2 MODEL GROWTH RATES

Although understanding how traffic volumes have increased over the most recent several years is beneficial to understanding the current environment, historical growth trends cannot capture future growth opportunities; therefore, the Lowcountry Area Transportation Study (LATS) Regional Travel Demand Model was utilized to help estimate future traffic conditions along US 278 and the surrounding roadways. When looking at a particular corridor in detail within an entire region, adjustments need to be made to the model to most accurately reflect recent trends in traffic volumes within that targeted project area.

The LATS Model is calibrated against 2010 conditions; however, when the modeled 2040 volumes were compared to existing 2017 volumes, the future volumes were lower than existing. When this occurs, it is evident that the model needs further adjustments to provide a more realistic forecast for the study area. The following adjustments were made to the model:

- Removed tolls from the forecast year for the Hilton Head Toll Roads because the tolls will be retired by then.
- For roads with 2040 modeled volumes less than known 2017 SCDOT AADT count volumes, a trip table adjustment was made to ensure the 2040 volumes were higher than the 2017 AADT.
- Adjusted Speeds on roads that were under assigning after 2040 trip table adjustments

After looking at other recent studies, such as the Hilton Head Beach Parking Study, it was determined that these adjustments provided consistent volumes for the future. For the US 278 corridor, a 2040 volume of 65,621 was established, resulting in an annual growth rate of 1.19%. It should be noted that it is typical practice to use the regional model to determine future growth rates rather than the forecasted future volumes. The future volumes forecasted by the model are used as a tool to check the reasonableness of the model. The 1.19% was applied to existing volumes to forecast the 2025 and 2045 turning movement and segment volumes.

7.3 FORECASTED VOLUMES

The future volumes were developed by applying the annual compounded growth rate (1.19%) for the specified number of years to the existing design hour turning movement counts. The 2025 No Build volumes are shown in **Figure 37.** The 2045 No Build volumes are shown in **Figure 38.**

Figure 37: 2025 No Build Traffic Volumes

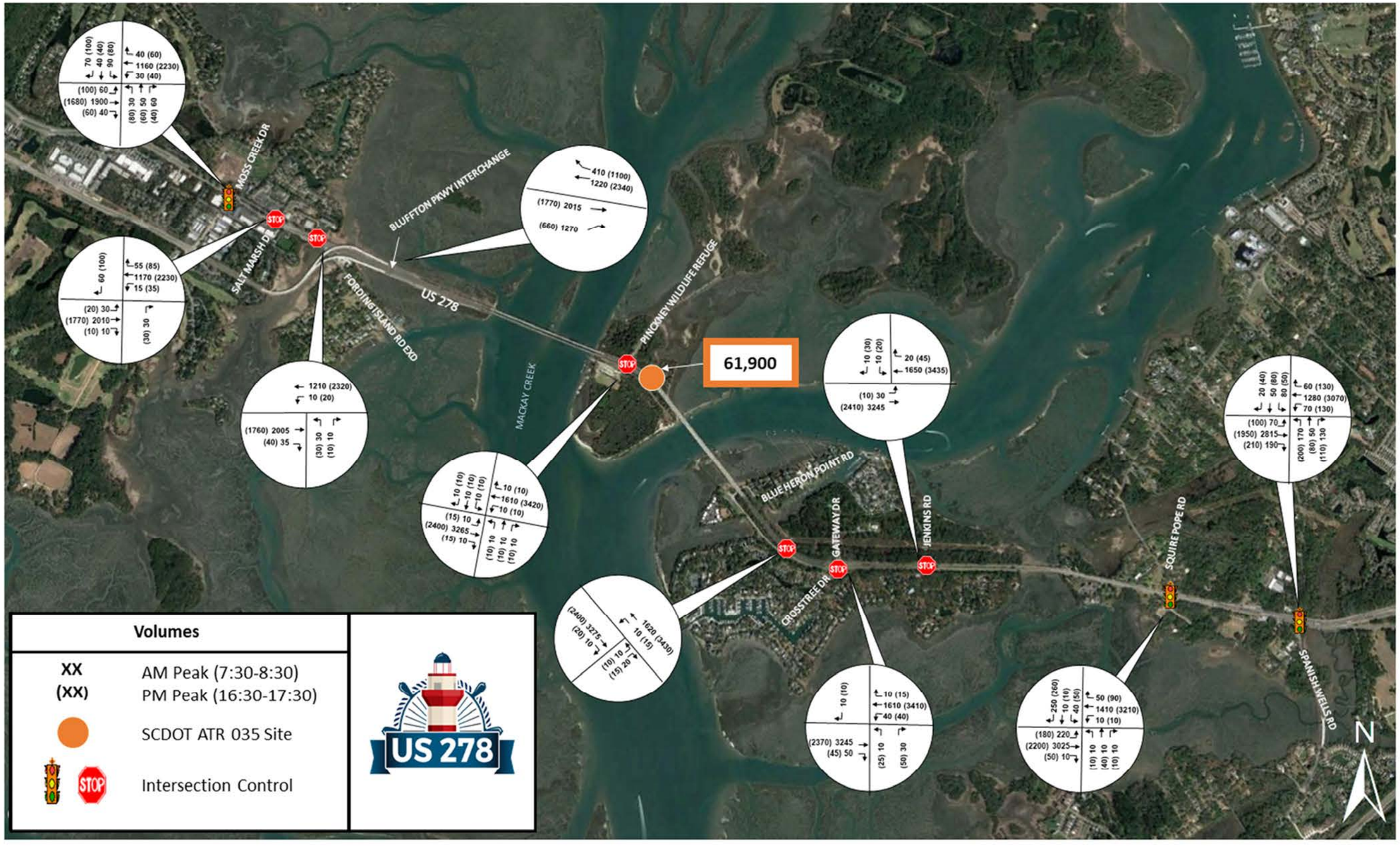
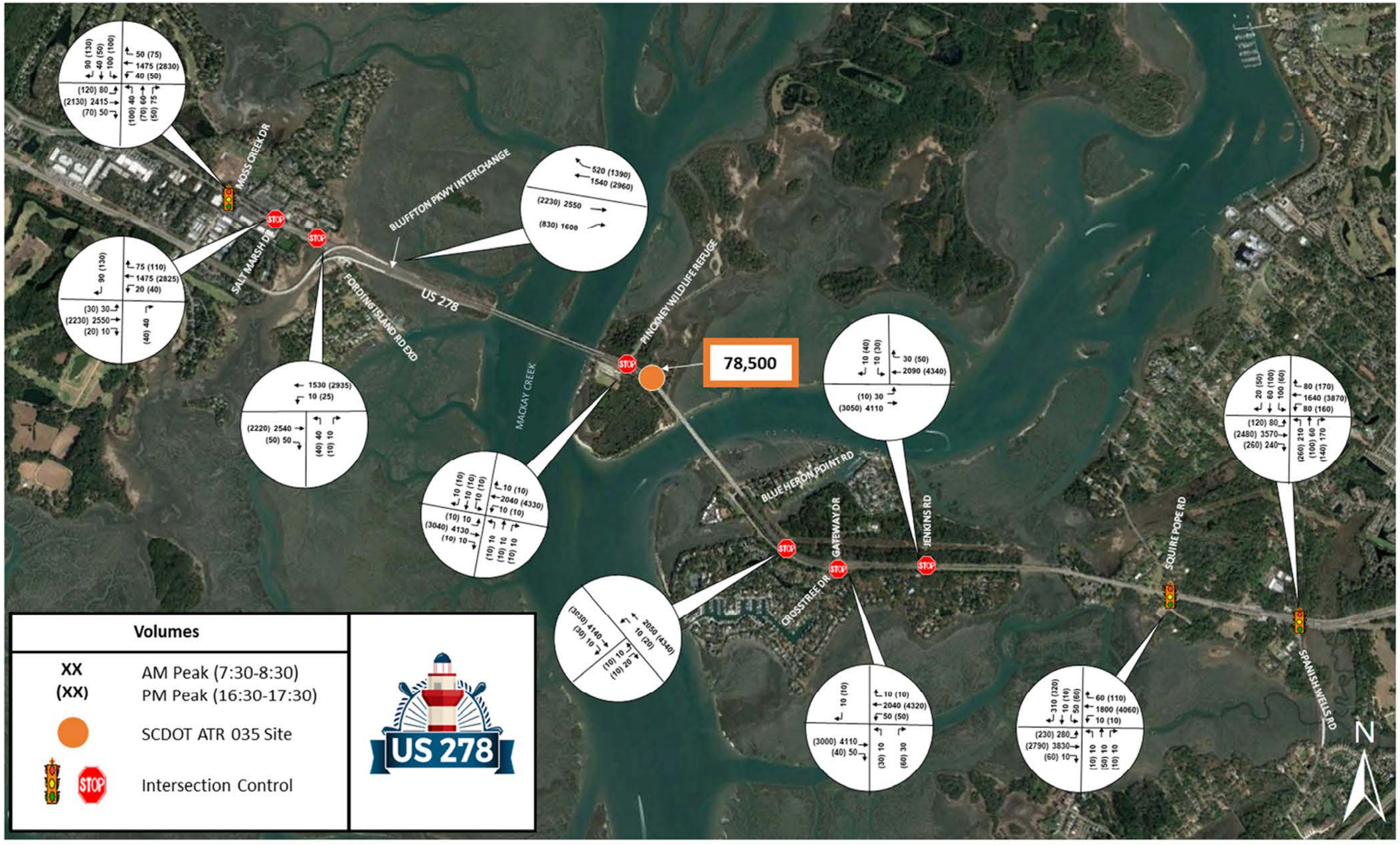


Figure 38: 2045 No Build Traffic Volumes



8.0 FUTURE NO BUILD TRAFFIC ANALYSIS

The US 278 corridor was analyzed assuming no improvements for the interim year (2025) and the design year (2045). The geometric safety recommendations for Salt Marsh Drive, provided in the "US 278 Traffic Engineering Report" submitted to SCDOT in June 2019 by Stantec Consulting Services, Inc., were also assumed for the No Build scenarios. By analyzing the expected future volumes on the existing facility, the most critical capacity issues that will occur regardless of corridor improvements can be identified.

8.1 NO BUILD SCENARIO – 2025

The 2025 No Build scenario assumes the existing geometry, which is depicted in **Figure 39**. **Figure 40** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 15** summarizes the worst movements at each unsignalized intersection and the overall intersection level of service for the signalized intersections.

The analysis shows that the signalized interesections are operating at acceptable levels of service (LOS E or below); however, the Squire Pope Road intersection shows an overall delay of 79.7 seconds, which is just below the LOS F threshold of 80 seconds. The unsignalized intersections show that the majority of the opposed movements operate at LOS F in both the AM and PM peak hours. As explained in the existing analysis, although many of the left turn movements have very low volumes, the delay experienced is excessive due to the US 278 through volumes.

Table 15: 2025 No Build Intersection Level of Service

2025 No Build						
Intersection	AM			PM		
	Movement	LOS	Delay	Movement	LOS	Delay
Moss Creek Road	Overall	C	20.0	Overall	C	22.6
Salt Marsh Drive*	WBL	E	48.4	SBR	F	89.2
Fording Island Road*	NBL	F	+	NBL	F	+
Pinckney Wildlife Refuge*	SBL	F	+	SBL	F	112
Blue Heron Point Road*	NEL	F	+	NEL	F	+
Crosstree Drive/ Gateway Drive*	NBL	F	+	NBL	F	+
Jenkins Road*	SBL	F	+	SBL	F	201.6
Squire Pope Road	Overall	A	8.2	Overall	E	79.7
Wild Horse Road/ Spanish Wells Road	Overall	B	14.1	Overall	D	49.5

+ Results are producing unreasonably long delays, that are often greater than 360 seconds, but the values are not shown due to software limitations.

* Unsignalized intersection- the movement with most severe LOS is included

Figure 41 through **Figure 44** illustrate the segmentation of the corridor and the resulting levels of service. The segment LOS is also summarized in **Table 16**. The analysis is similar to the existing condition, with an LOS E in the eastbound direction in the AM and an LOS F in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM. The off-ramp operates at LOS B in the AM and LOS C in the PM.

Table 16: 2025 No Build Segment Level of Service

Segment	Eastbound		Westbound	
	AM	PM	AM	PM
Moss Creek Drive to Salt Marsh Drive	B	B	A	C
Salt Marsh Drive to Bluffton Parkway	C	C	B	D
Bluffton Parkway to Squire Pope Road	E	D	C	F

8.2 NO BUILD SCENARIO – 2045 EXCLUDING THE JENKINS ISLAND SUPERSTREET

The 2045 No Build scenario assumes the existing geometry, as shown in **Figure 39** and the 2045 volumes. **Figure 45** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 17** summarizes the worst movements at each unsignalized intersection and the overall intersection level of service at the signalized intersections.

As expected, the 2045 analysis shows that the signalized interesections are starting to degrade as more vehicles are present on the roadways. Without providing additional through or turning lanes, the signalized intersections will operate at LOS C or worse. In the PM peak hour, Squire Pope Road and Wild Horse Road/Spanish Wells Road both show LOS F. The unsignalized intersections show an increase in the already excessive delays as the volumes on US 278 increase.

Table 17: 2045 No Build Intersection Level of Service

2045 No Build						
Intersection	AM			PM		
	Movement	LOS	Delay	Movement	LOS	Delay
Moss Creek Road	Overall	C	24.6	Overall	C	29.5
Salt Marsh Drive*	WBL	F	127.5	SBR	F	+
Fording Island Road*	NBL	F	+	NBL	F	+
Pinckney Wildlife Refuge*	NBL	F	315.6	SBL	F	+
Blue Heron Point Road*	NEL	F	315.6	NWL	F	63.1
Crosstree Drive/Gateway Drive*	NBL	F	+	NBL	F	+
Jenkins Road*	SBL	F	+	SBL	F	+
Squire Pope Road	Overall	C	21.9	Overall	F	166.5
Wild Horse Road/ Spanish Wells Road	Overall	C	34.5	Overall	F	118.8

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.

** Unsignalized intersection- the movement with most severe LOS is included*

Figure 39: No Build Geometric Layout

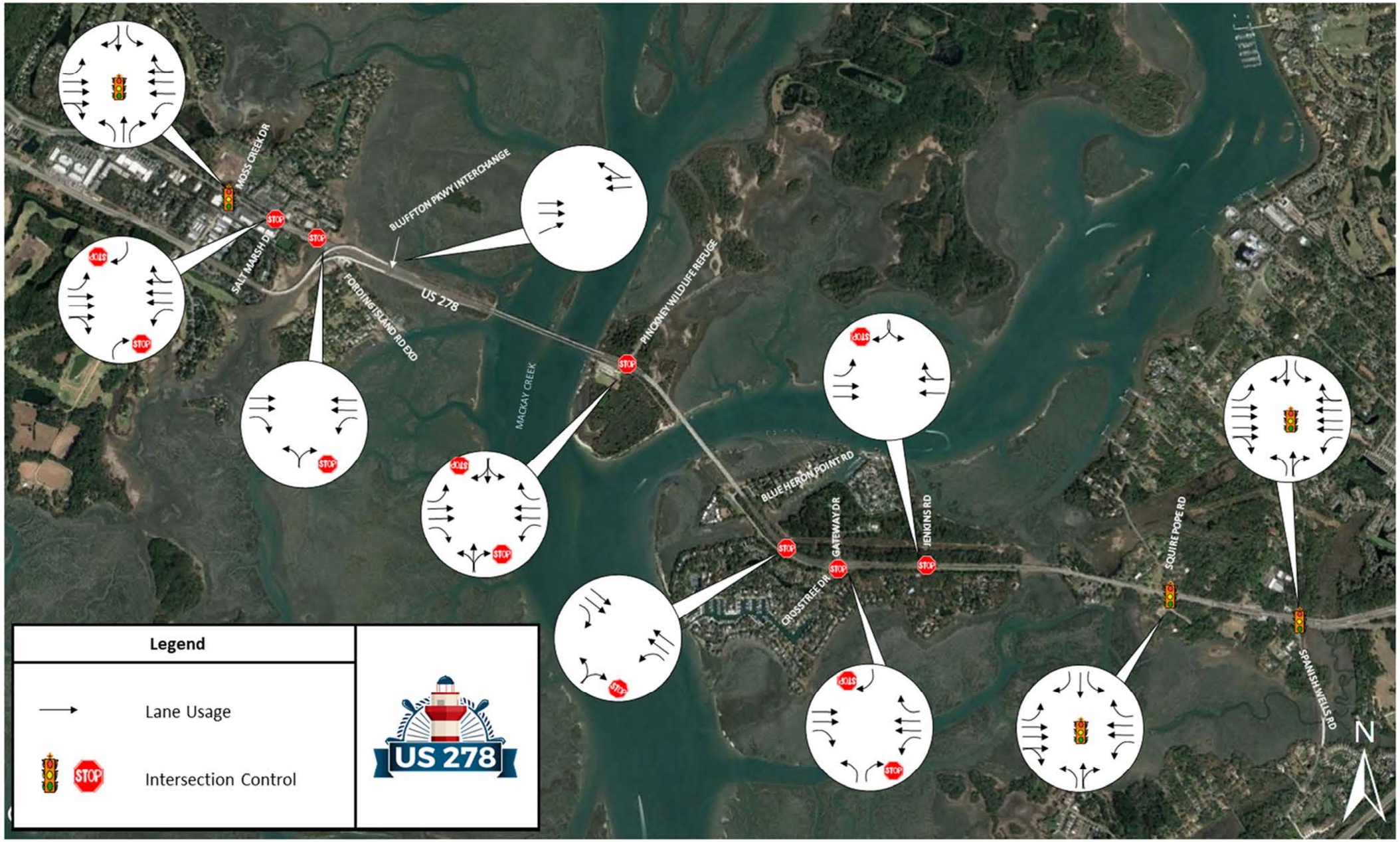


Figure 40: 2025 No Build Intersection Levels of Service (Excluding Jenkins Island Superstreet)

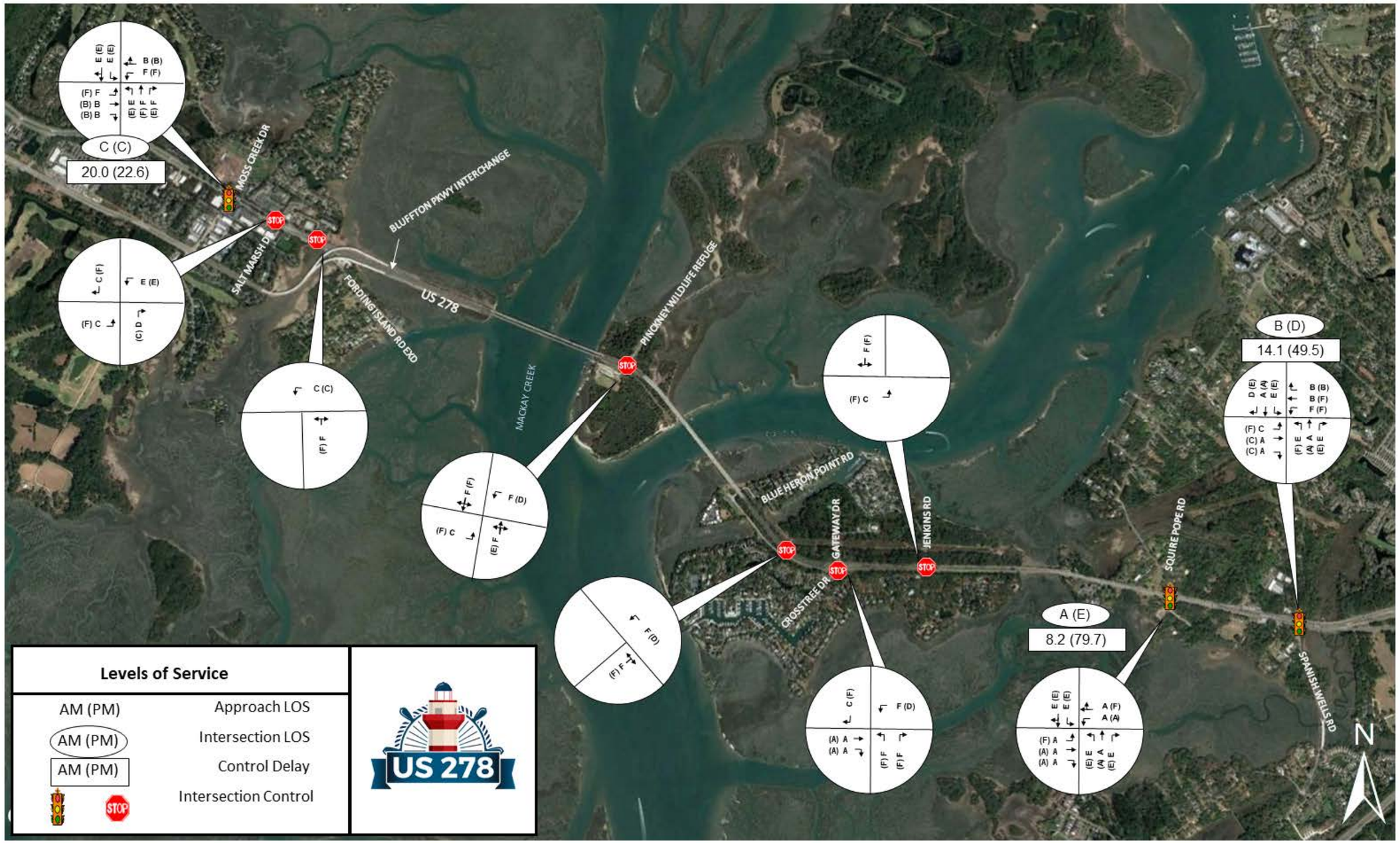


Figure 41: 2025 No Build AM Segment Level of Service

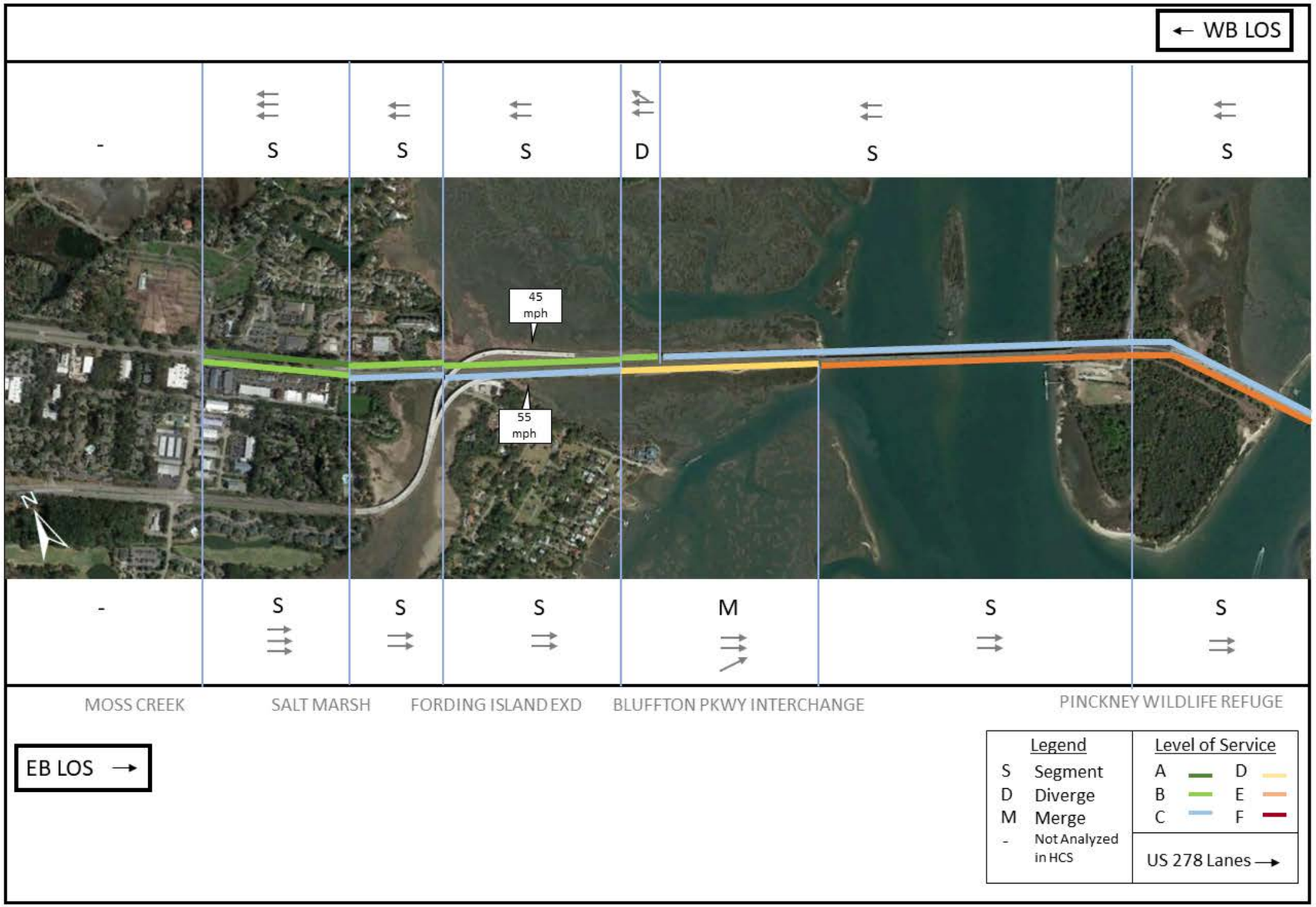


Figure 42: 2025 No Build PM Segment Level of Service

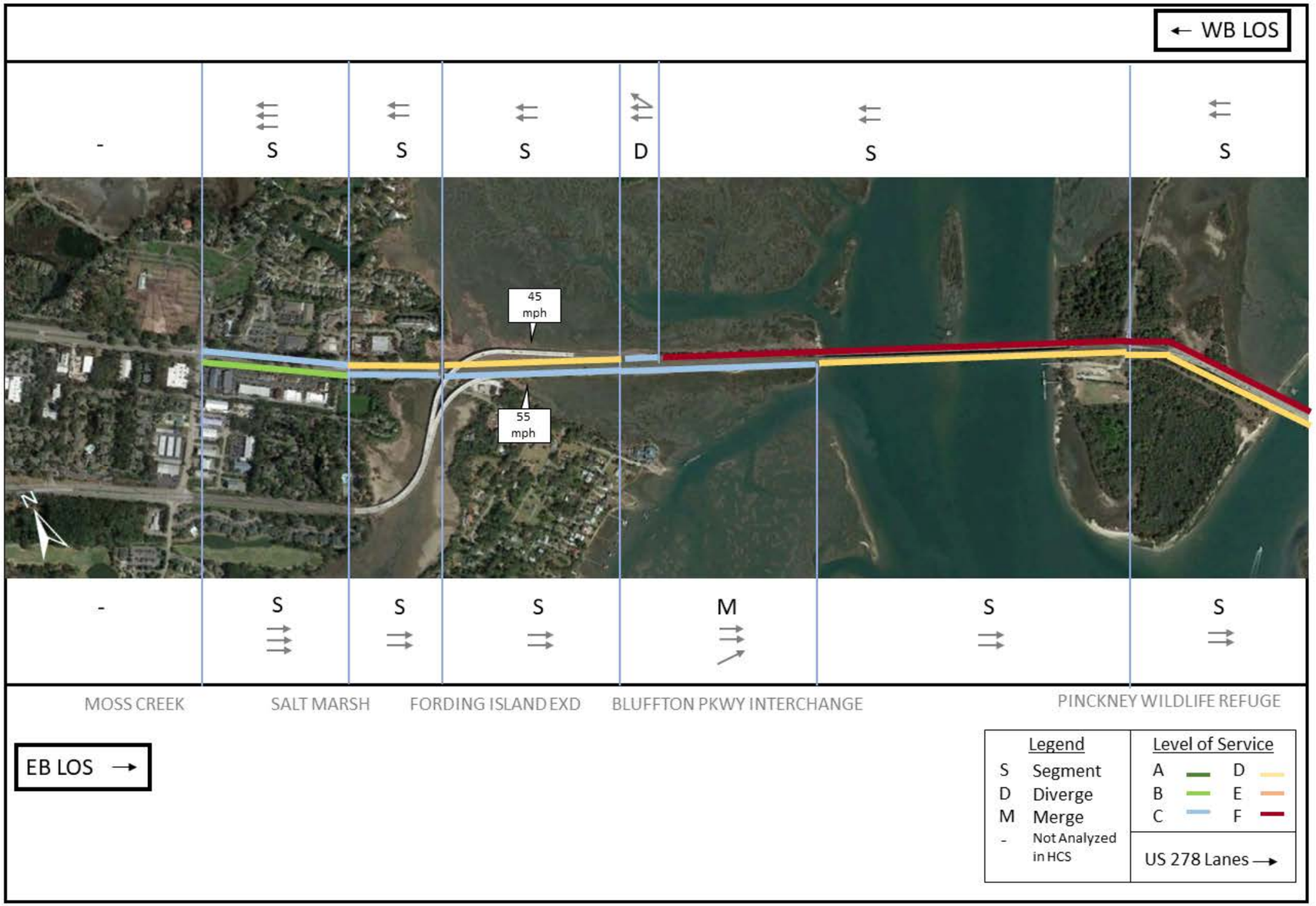


Figure 43: 2025 No Build AM Segment Level of Service

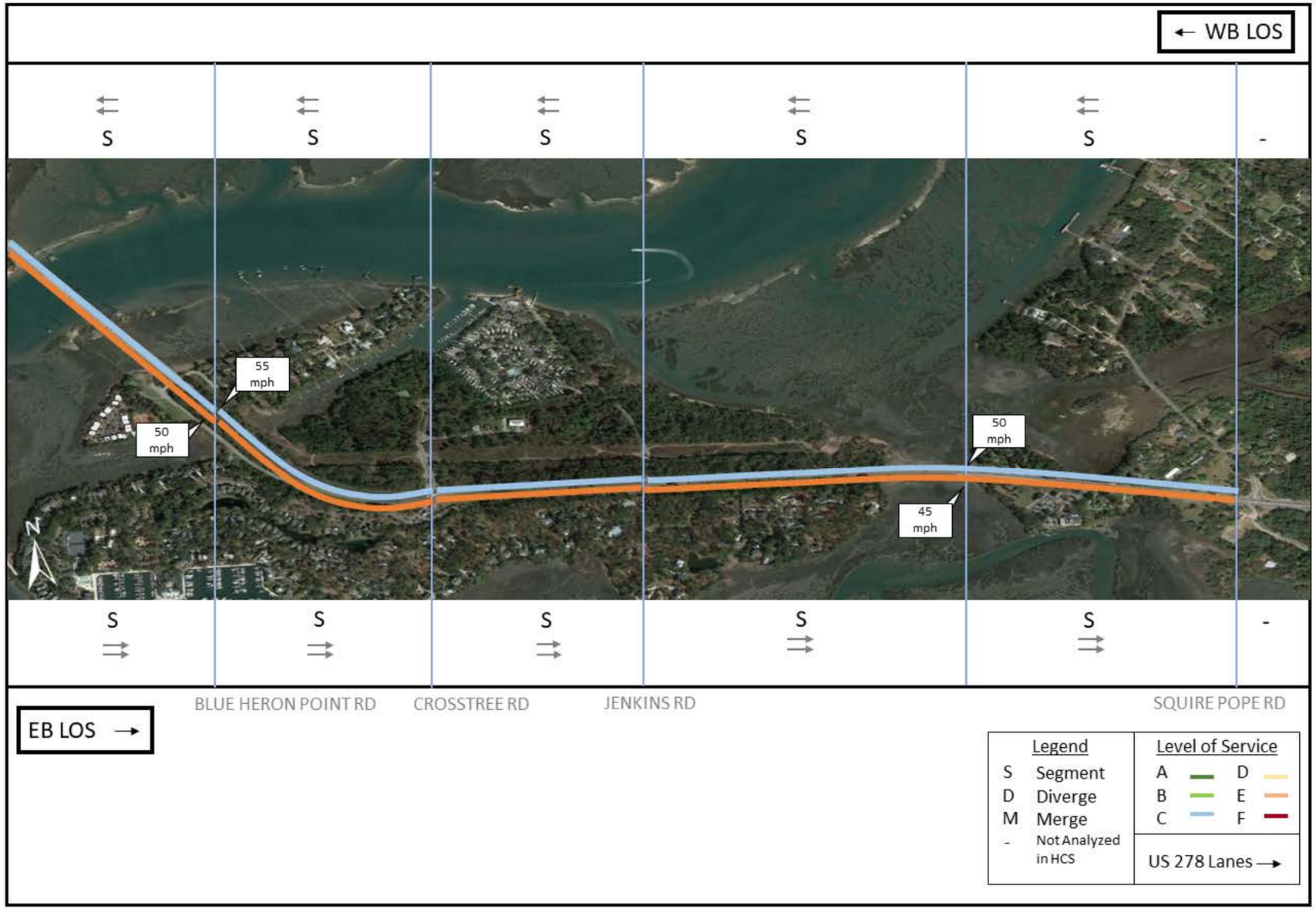


Figure 44: 2025 No Build PM Segment Level of Service

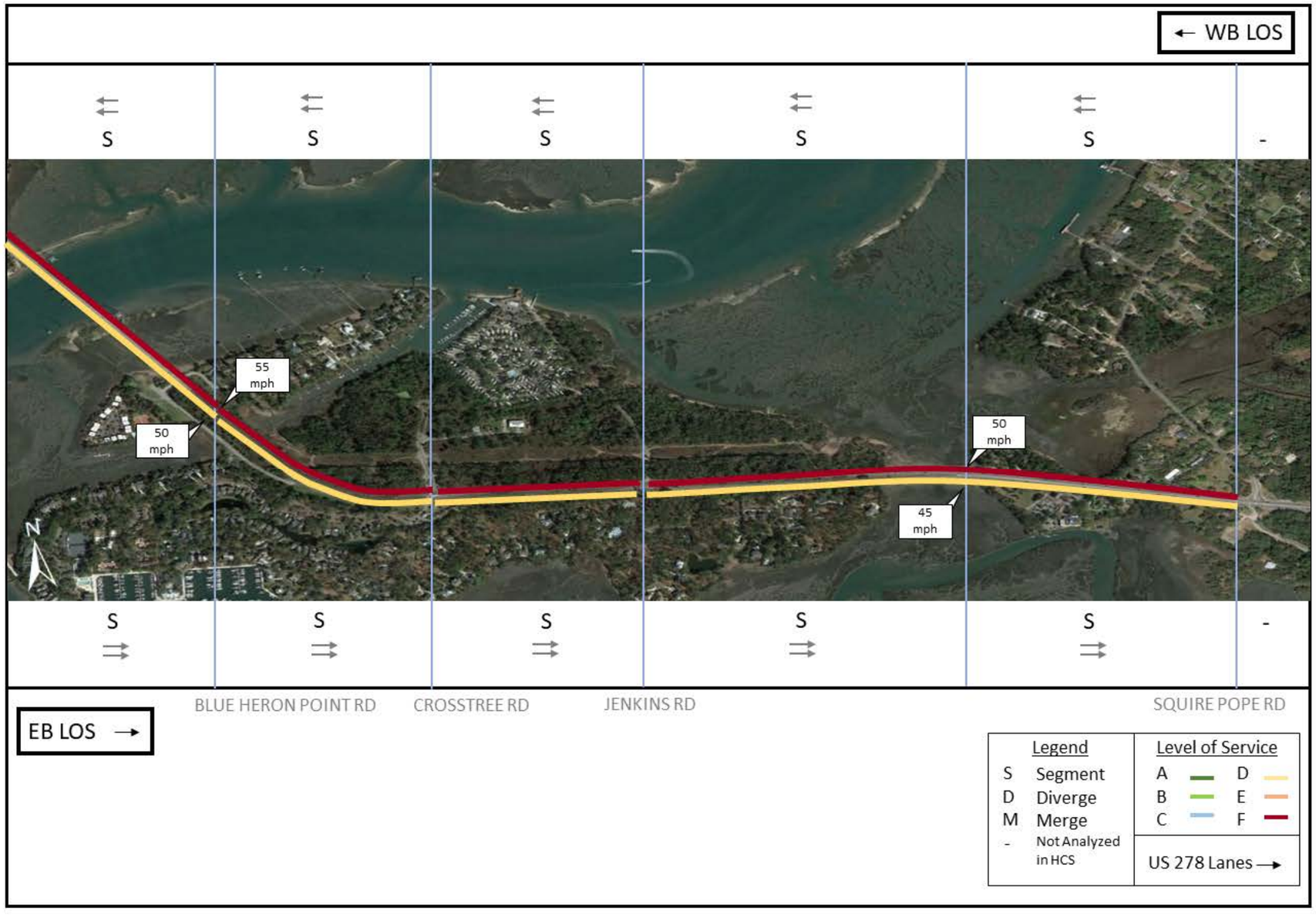


Figure 45: 2045 No Build Intersection Levels of Service

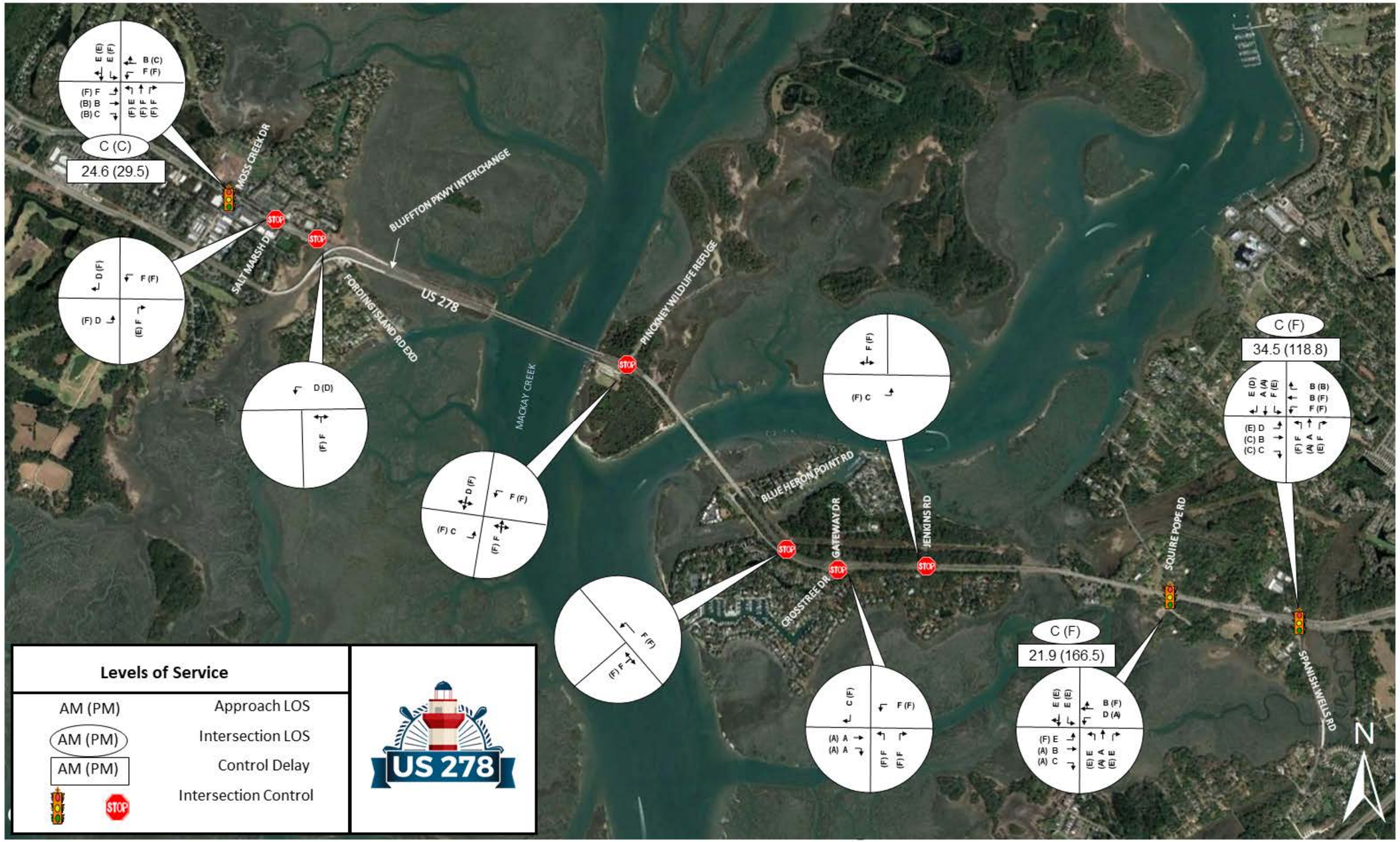


Figure 46 through **Figure 49** illustrate the segmentation of the corridor and the resulting levels of service. The segment LOS is also summarized in **Table 18**. The analysis shows the degradation in the capacity of the corridor. US 278 is expected to operate as LOS F in the eastbound direction in the AM and LOS F in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS E in the AM and LOS D in the PM. The off-ramp operates at LOS B in the AM and LOS D in the PM.

Table 18*:* 2045 No Build Segment Level of Service (Excludes Jenkins Island Superstreet

Segment	Eastbound		Westbound	
	AM	PM	AM	PM
Moss Creek Drive to Salt Marsh Drive	C	B	B	B
Salt Marsh Drive to Fording Island Road	C	C	B	D
Fording Island Road to Bluffton Parkway	D	D	C	E
Bluffton Parkway to Pinckney Wildlife Refuge	F	E	C	F
Pinckney Wildlife Refuge to Squire Pope Road	F	D	C	F

8.3 No Build with Jenkins Island Superstreet – 2045

The Jenkins Island Superstreet design was analyzed as part of the 2045 No Build condition, assuming it would be in place before the remaining widening of US 278. For this analysis, 2045 intersection volumes were reassigned according to existing traffic movements and left turns were eliminated from Blue Heron Point Road, Crosstree Drive/Gateway Drive, and Jenkins Road. The U-turn signals at Blue Heron Point Road and east of Jenkins Road were assumed to be in place. **Figure 50** shows the geometric configurations assumed for this analysis. **Figure 51** shows the intersection turning movement volumes for this scenario.

Figure 52 shows the level of service for each movement and the overall level of service and delay for the signalized intersections. Table **19** summarizes intersection levels of service within the impact area of the Jenkins Island Superstreet project. All other intersections operate the same as in the 2045 No Build condition.

Table 19*:* 2045 No Build + Intersection Level of Service (Includes Jenkins Island Superstreet)

Intersection	2045 No Build +					
	AM			PM		
	Movement	LOS	Delay	Movement	LOS	Delay
Blue Heron Point Road	Overall	C	34.3	Overall	C	26.7
Crosstree Drive/ Gateway Drive*	NBR	F	+	NBR	F	302.8
Jenkins Road*	SBR	D	31.6	SBR	F	+
Jenkins Island U-Turn	Overall	A	2.9	Overall	B	19.6

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.

* Unsignalized intersection- the movement with most severe LOS is included

The Superstreet configuration results in significantly high delays in the PM peak hour for the side road traffic turning onto US 278. The Superstreet design was developed as a means to aid drivers trying to make a left turn from the side roads onto US 278 because the volumes on the mainline make it difficult to make this maneuver; however, in the 2045 condition when volumes are higher, the right turning vehicles will also experience difficulties in finding a gap along US 278.

Because the Jenkins Island Superstreet project includes adding two new signals at Blue Heron Point Road and east of Jenkins Road, US 278 will transform into an interrupted flow facility and thus the multilane highway segment level of service analysis will no longer apply to this area.

Figure 46: 2045 No Build Segment Levels of Service (Excluding Jenkins Island Superstreet)

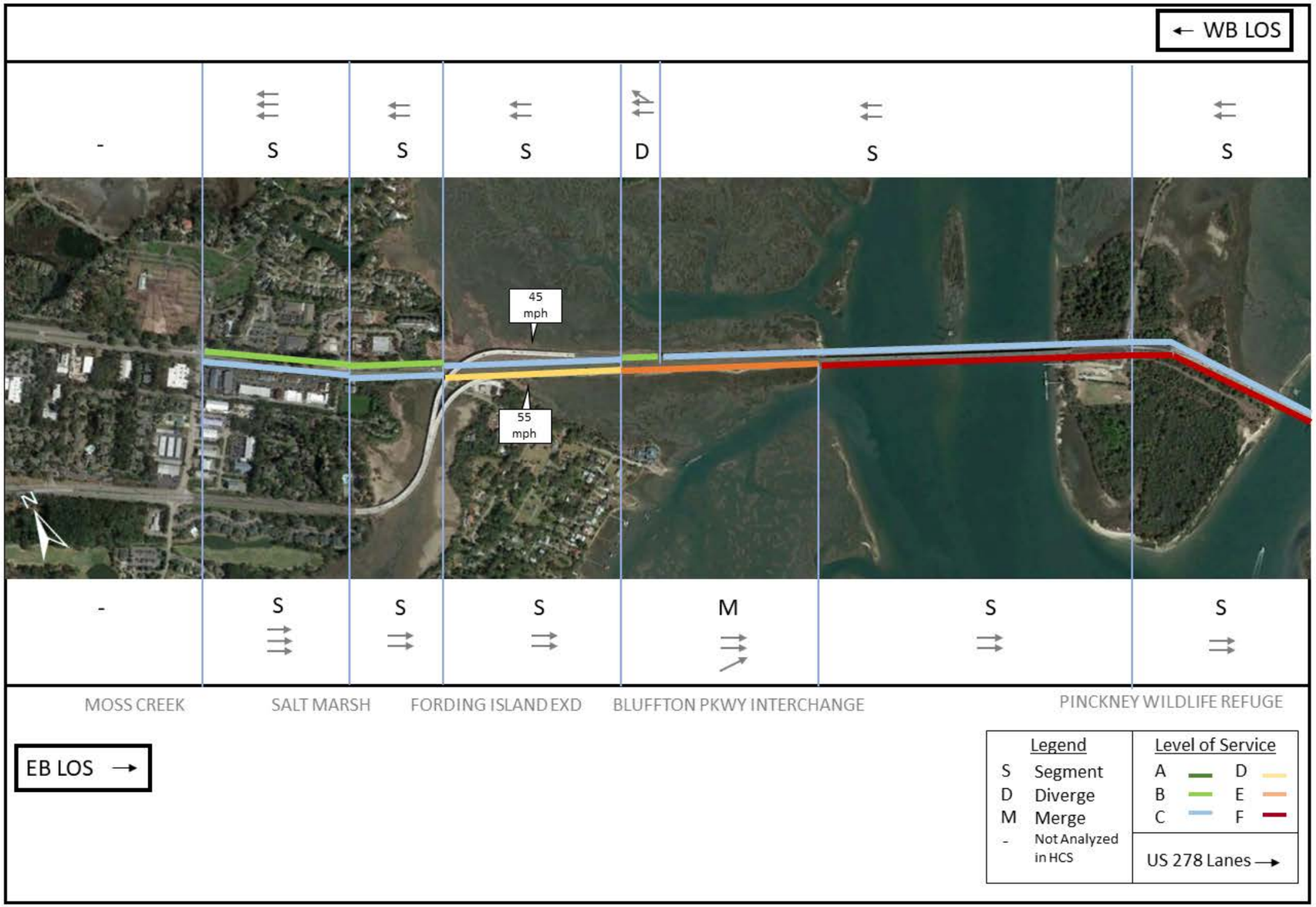


Figure 47: 2045 No Build Segment Levels of Service (Excluding Jenkins Island Superstreet)

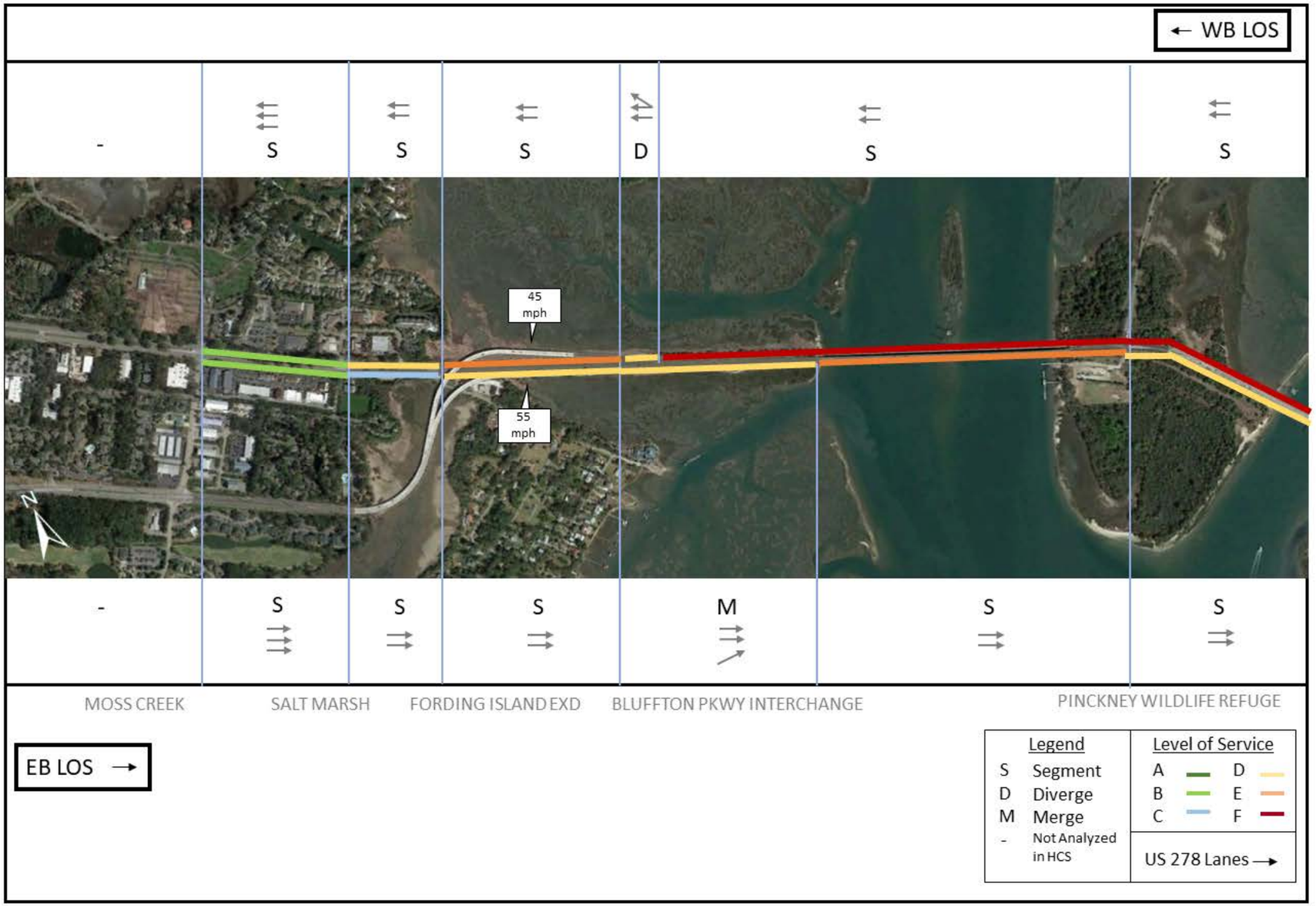


Figure 48: 2045 No Build Segment Levels of Service (Excluding Jenkins Island Superstreet)

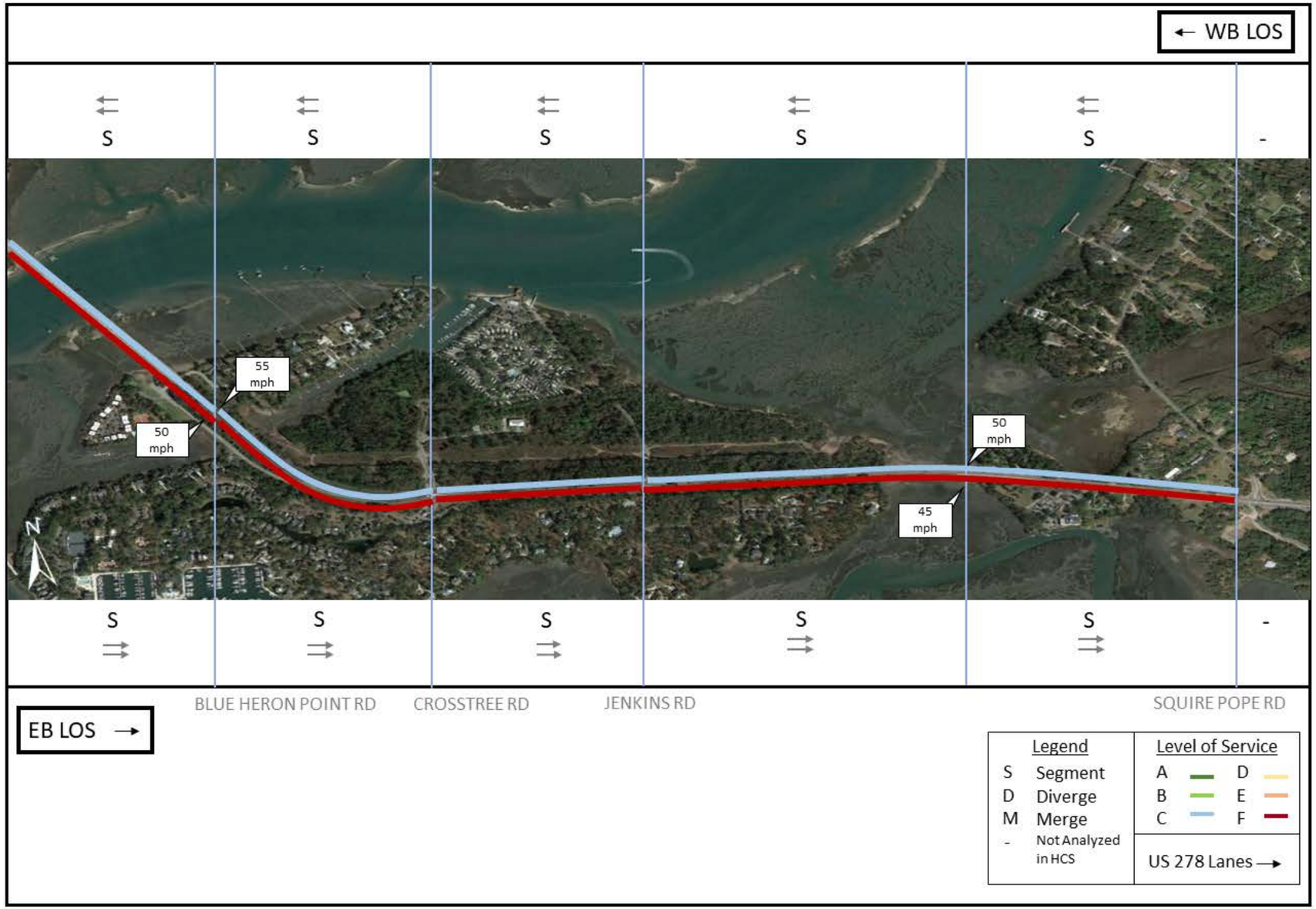


Figure 49: 2045 No Build Segment Levels of Service (Excluding Jenkins Island Superstreet)

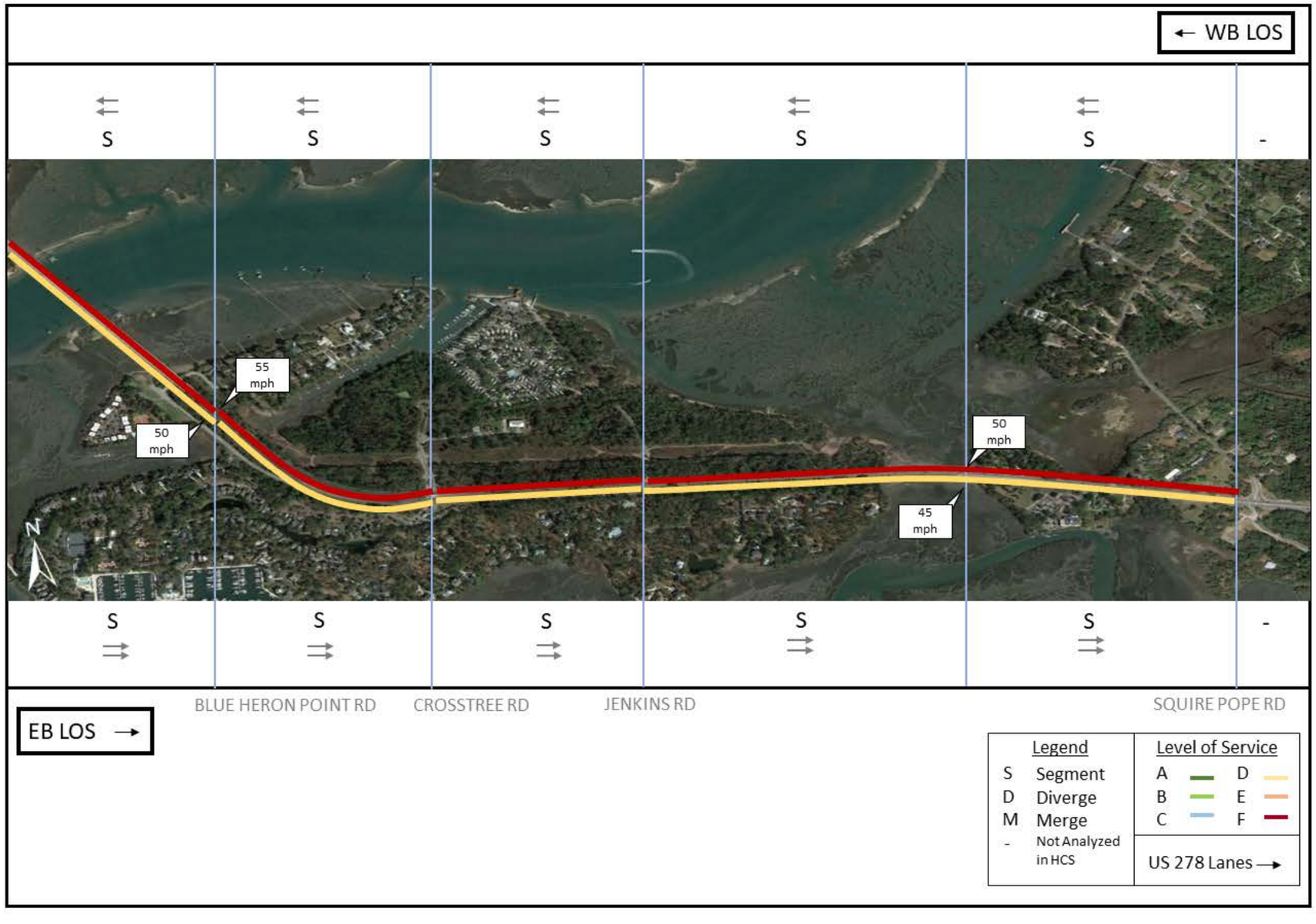


Figure 50: 2045 No Build Plus Geometric Layout (Includes Jenkins Island Superstreet)

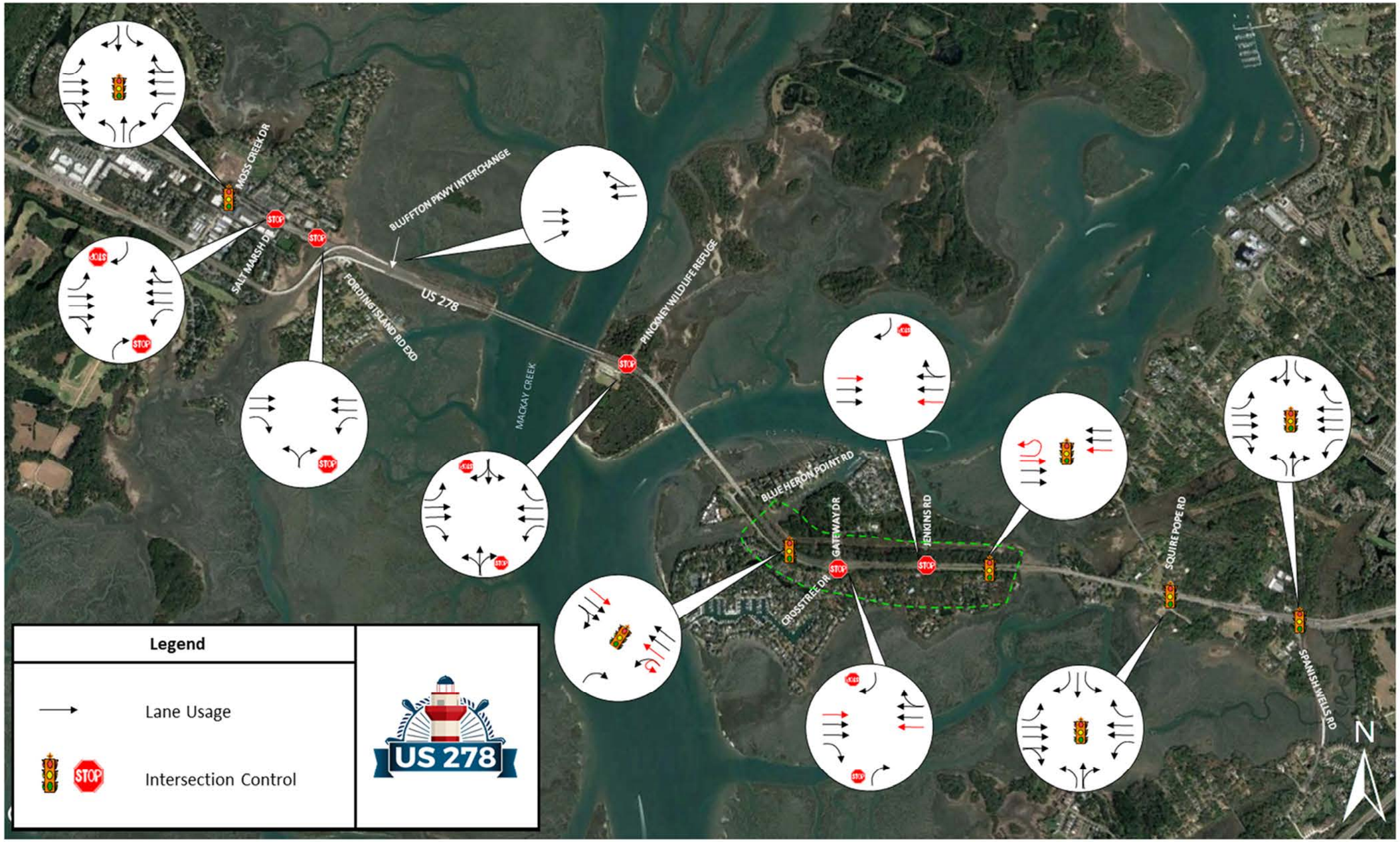
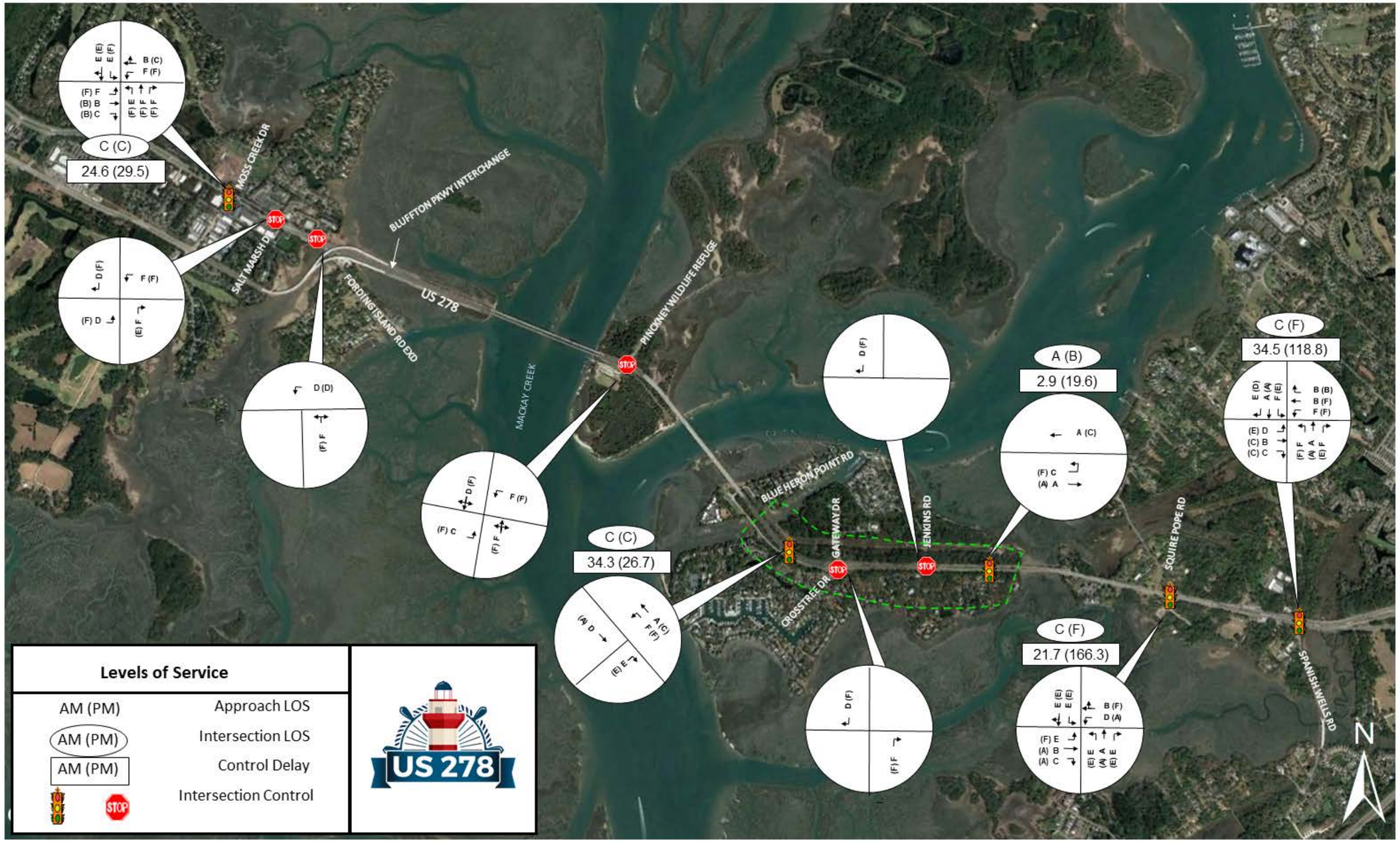


Figure 51: 2045 No Build Plus Traffic Volumes (Includes Jenkins Island Superstreet)

Figure 52: 2045 No Build Plus Intersection Levels of Service (Includes Jenkins Island Superstreet)



9.0 FUTURE BUILD TRAFFIC ANALYSIS (2045)

Proposed improvements along US 278 from Moss Creek Drive to Wild Horse Road/Spanish Wells Road call for the addition of two mainline lanes (one in the eastbound direction and one in the westbound direction) to increase capacity, improve traffic operations and enhance safety. Additional improvements include the replacement of the eastbound bridge over Mackay Creek, the addition of a 10-foot multiuse lane, sidewalks, and intersection improvements. Examples of intersection improvements include realignment, increased storage capacity at turn lanes, and new signals or modifications to existing signals as required by traffic analysis. Several alignment alternatives were considered along the corridor, six of which were selected as reasonable alternatives based on predefined criteria. The following sections detail each reasonable alternative and the corresponding traffic analysis for each.

It should be noted that the following design elements are consistent among all 6 reasonable alternatives.

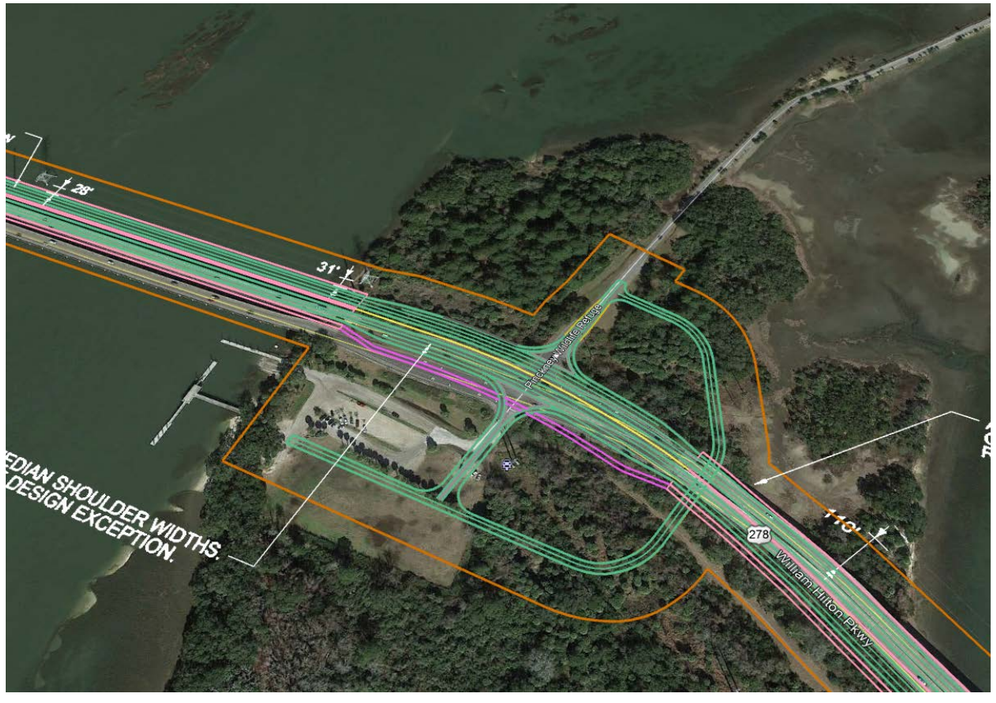
1. Between the intersections of Moss Creek Drive and Salt Marsh Drive, no roadway widening will be required since the existing typical section consists of three eastbound lanes and three westbound lanes. A 10-foot paved multiuse path will be added on the south side and a 5-foot sidewalk will be added on the north side of US 278.
2. The safety improvement recommendations provided by Stantec were included at the Salt Marsh Drive intersection. Salt Marsh Drive northbound and southbound through movements and left turns will access US 278 via Moss Creek Drive. While neither of these intersections are expected to have the traffic volumes to warrant signals in the design year, the Salt Marsh Drive intersection currently meets the MUTCD Crash Warrant. A signal is recommended at the Fording Island Road intersection to alleviate the excessive delays expected for the side road traffic. A signal at Salt Marsh Drive may provide the necessary gaps for vehicles entering US 278 from Fording Island Road; however, due to limitations in the Synchro software, these impacts cannot be modeled. It is recommended that further monitoring of these intersections be performed in the future to assess possible warranting of a signal.
3. A multiuse path will be located on the south side of US 278 from Moss Creek Drive to Blue Heron Point Road and on the north side of US 278 from Blue Heron Point Road to Wild Horse Road/Spanish Wells Road.
4. The Jenkins Island Superstreet design is assumed to be in place.
5. In all six reasonable alternatives, the eastbound bridge over Mackay Creek will be replaced.
6. Access to the Pinckney Wildlife Refuge will be right-in/right-out via a modified interchange.

9.1 REASONABLE ALTERNATIVE 1

New Eastbound Alignment over Mackay Creek

From just east of the Bluffton Parkway ramps to Pinckney Island, a new three-lane eastbound Mackay Creek Bridge will be constructed south of the existing eastbound bridge. The existing eastbound bridge will be removed. The westbound Mackay Creek Bridge will be rehabilitated and widened to the south, if feasible. At the Pinckney Wildlife Refuge entrance, a new right-in/right-out interchange will be constructed to allow for full access to the island and boat ramp, as shown in **Figure 53**. The existing boat ramp, which will be impacted by the proposed alignment, will be relocated south of the fishing dock. From Pinckney Island to Jenkins Island, the existing eastbound and westbound bridges over Skull Creek will be rehabilitated and widened to the south. The new alignment will tie into the Jenkins Island Superstreet project. From the east end of Jenkins Island causeway to the end of the project at Wild Horse Road/Spanish Wells Road, the road will be widened symmetrically from the centerline.

Figure 53: Pinckney Wildlife Refuge Interchange (included in all Reasonable Alternatives)



Along with the improvements detailed above, the following intersection configurations are proposed:

- **Squire Pope Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Shared through/left turn lane, channelized right turn lane
  - Eastbound – Exclusive dual left turn lanes, three through lanes, exclusive right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, channelized right turn lane

- **Wild Horse Road/Spanish Wells Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, shared through/right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, shared through/right turn lane

The proposed geometry is shown in **Figure 54**. The additional lanes and intersection improvements are highlighted in red.

9.1.1 Intersection Level of Service

The 2045 Reasonable Alternative 1 volumes are shown in **Figure 55**. **Figure 56** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 20** summarizes the worst movements at each unsignalized intersection.

In the No Build analysis, the Squire Pope Road and Wild Horse Road/Spanish Wells Road intersections experience LOS F in the PM peak hour. The proposed lane configurations result in LOS E for the PM peak hours at both intersections.

Table 20: 2045 Build – Reasonable Alternative 1 Intersection Level of Service

2045 Build – Reasonable Alternative 1							
Intersection		AM			PM		
		Movement	LOS	Delay	Movement	LOS	Delay
	Moss Creek Road	Overall	C	24.6	Overall	C	29.5
	Salt Marsh Drive*	WBL	F	127.5	SBR	F	+
	Fording Island Road*	NBL	F	+	NBL	F	+
	Pinckney Wildlife Refuge **	EB off-ramp	C	N/A	WB off-ramp	D	N/A
Jenkins Island Superstreet	Blue Heron Point Road*	Overall	D	39.4	Overall	C	24.6
	Crosstree Drive/Gateway Drive*	NBR	F	+	NBR	F	302.8
	Jenkins Road*	SBR	D	31.6	SBR	F	+
	Jenkins Island U-turn	Overall	A	2.9	Overall	B	19.6
	Squire Pope Road	Overall	D	51.5	Overall	E	71.9
	Wild Horse Road/ Spanish Wells Road	Overall	C	31.2	Overall	E	76.0

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.
*** Intersection analyzed as interchange with HCS software*
** Unsignalized intersection- the movement with most severe LOS is included*

9.1.2 Segment Level of Service

Figure 57 through **Figure 60** illustrate the segmentation of the corridor and the resulting levels of service for the 2045 Build- Reasonable Alternative 1 analyses. The segment LOS is also summarized in **Table 21.**

The analysis shows an improvement in the level of service along the corridor with the addition of one lane in each direction. US 278 is expected to operate as LOS D in the eastbound direction in the AM and LOS E in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM. The off-ramp operates at LOS B in the AM and LOS C in the PM.

Table 21: 2045 Build – Reasonable Alternative 1 Segment Level of Service

Segment	Eastbound		Westbound	
	AM	PM	AM	PM
Fording Island Road to Bluffton Parkway	C	C	B	C
Bluffton Parkway to Pinckney Wildlife Refuge	D	C	B	E
Pinckney Wildlife Refuge to Blue Heron Point Road	D	C	B	D

Figure 54: 2045 Reasonable Alternative 1 Geometric Layout

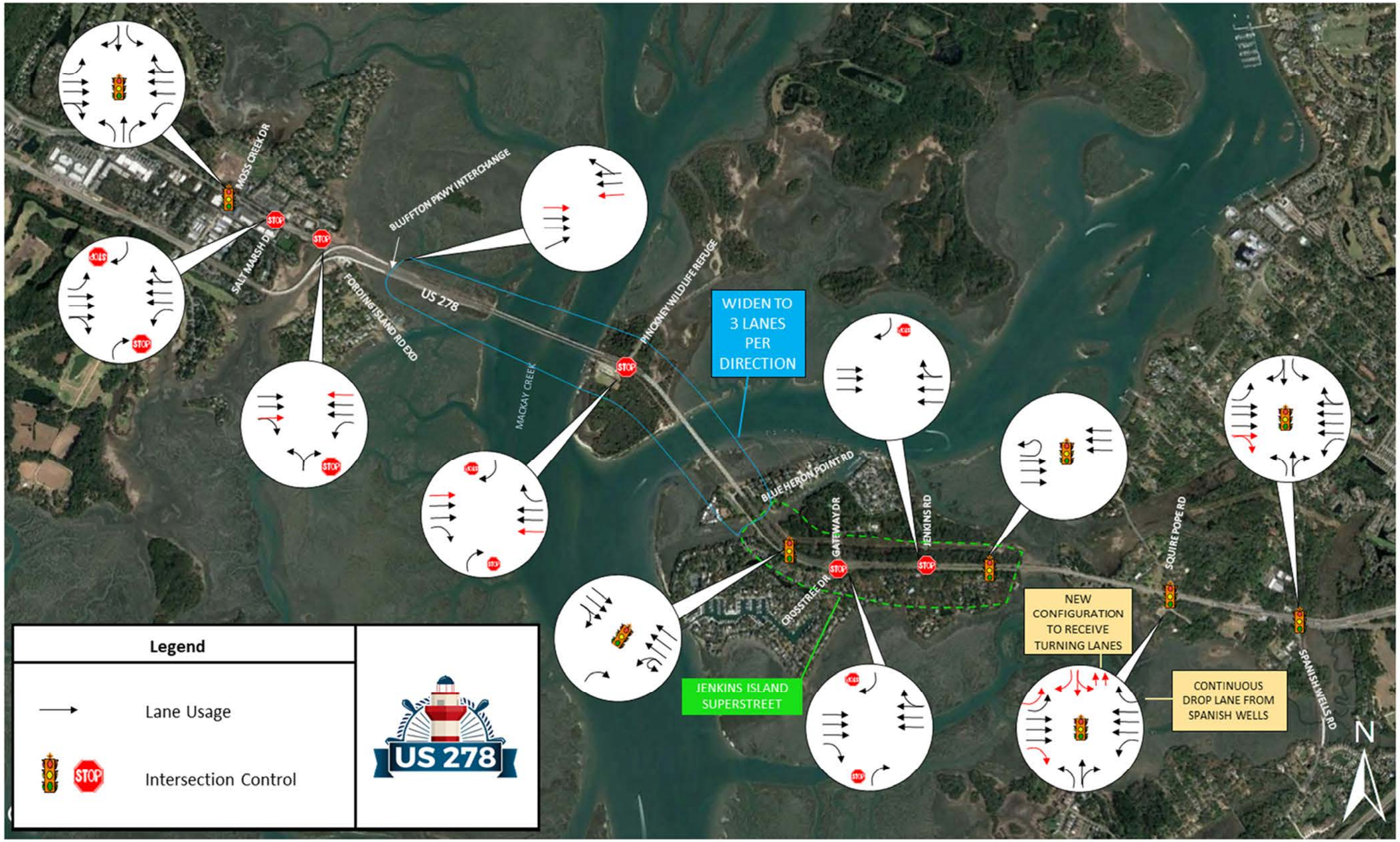


Figure 55: 2045 Reasonable Alternative 1 Traffic Volumes

Figure 56: 2045 Reasonable Alternative 1 Intersection Levels of Service

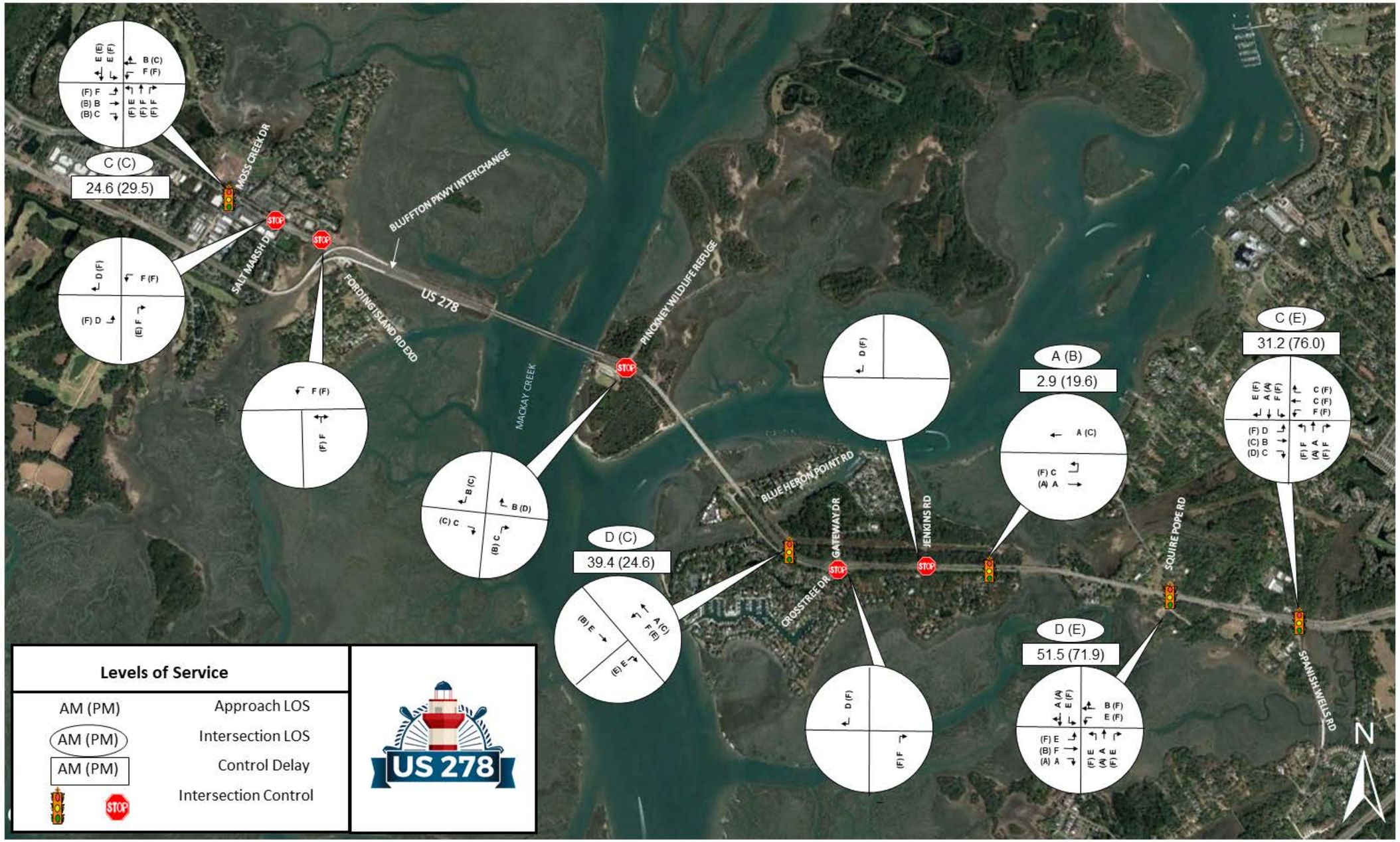


Figure 57: 2045 Build- Reasonable Alternative 1 AM Segment Level of Service

Figure 58: 2045 Build- Reasonable Alternative 1 PM Segment Level of Service

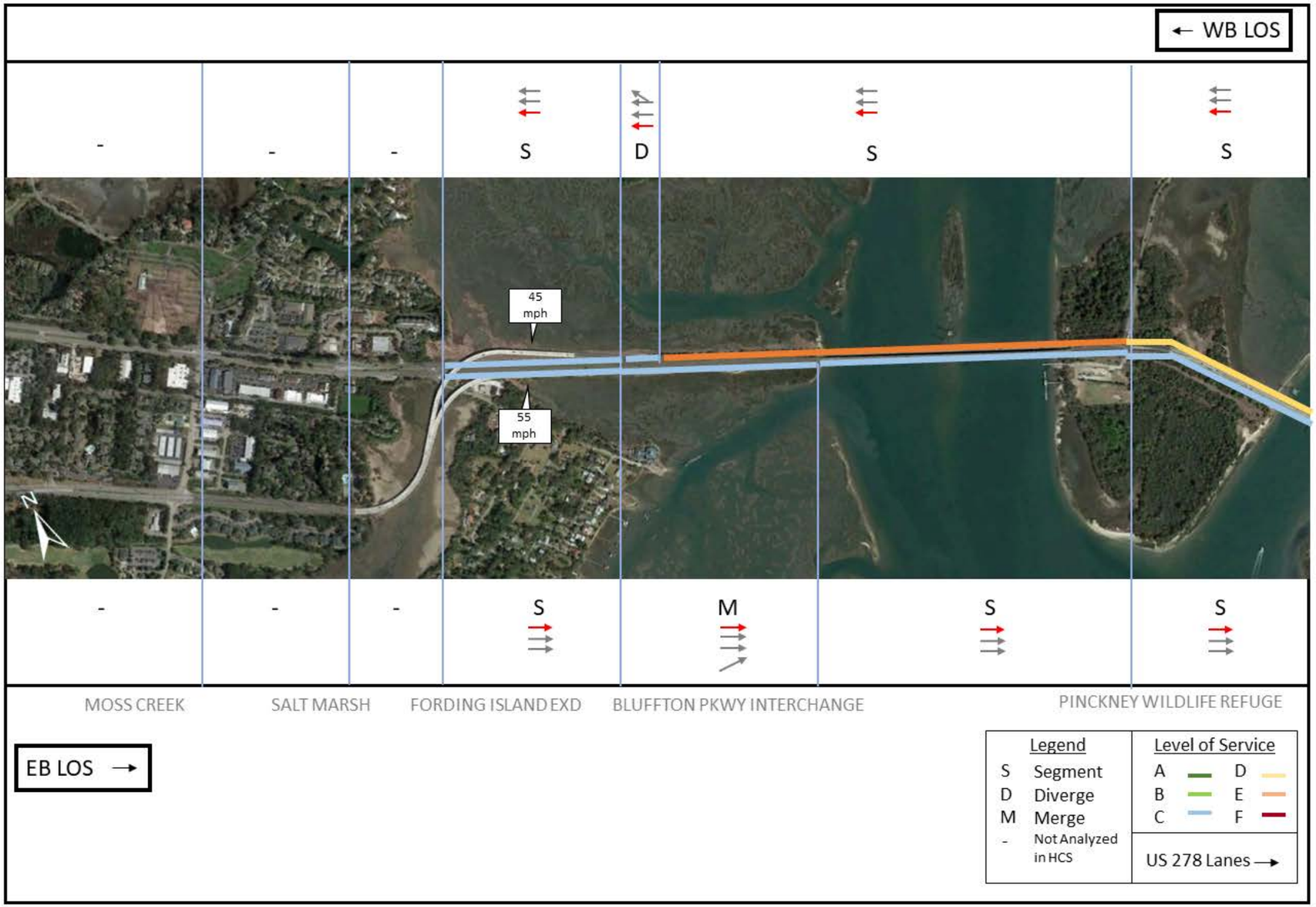


Figure 59: 2045 Build- Reasonable Alternative 1 AM Segment Level of Service

Figure 60: 2045 Build- Reasonable Alternative 1 PM Segment Level of Service

9.2 Reasonable Alternative 2

New Westbound Alignment over Mackay Creek

From just east of the Bluffton Parkway ramps to Pinckney Island, a new three-lane westbound Mackay Creek Bridge will be constructed north of the existing westbound bridge. The existing eastbound bridge will be removed. The westbound Mackay Creek Bridge will be rehabilitated and widened on both sides, if feasible, to accommodate three lanes, shoulders, sidewalks, and a multiuse path. At the Pinckney Wildlife Refuge entrance, a new right-in/right-out interchange will be constructed to allow for full access to the island and boat ramp. From Pinckney Island to Jenkins Island, the existing eastbound and westbound bridges over Skull Creek will be rehabilitated and widened to the south. The new alignment will tie into the Jenkins Island Superstreet project. From the east end of Jenkins Island causeway to the end of the project at Wild Horse Road/Spanish Wells Road, the road will be widened symmetrically from the centerline.

Along with the improvements detailed above, the following intersection configurations are proposed:

- **Squire Pope Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Shared through/left turn lane, channelized right turn lane
  - Eastbound – Exclusive dual left turn lanes, three through lanes, exclusive right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, channelized right turn lane
- **Wild Horse Road/Spanish Wells Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, shared through/right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, shared through/right turn lane

The proposed geometry is shown in **Figure 61.** The additional lanes and intersection improvements are highlighted in red.

9.2.1 Intersection Level of Service

The 2045 Reasonable Alternative 2 volumes are shown in **Figure 62**. **Figure 63** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 22** summarizes the worst movements at each unsignalized intersection.

Reasonable Alternative 2 operates the same as Reasonable Alternative 1. Although widening of US 278 occurs in different manners, the intersection geometries are the same throughout the two alternatives.

Table 22: 2045 Build – Reasonable Alternative 2 Intersection Level of Service

2045 Build – Reasonable Alternative 2							
Intersection		AM			PM		
		Movement	LOS	Delay	Movement	LOS	Delay
Moss Creek Road		Overall	C	24.6	Overall	C	29.5
Salt Marsh Drive*		WBL	F	127.5	SBR	F	+
Fording Island Road*		NBL	F	+	NBL	F	+
Pinckney Wildlife Refuge **		EB off-ramp	C	N/A	WB off-ramp	D	N/A
Jenkins Island Superstreet	Blue Heron Point Road	Overall	D	39.4	Overall	C	24.6
	Crosstree Drive/Gateway Drive*	NBR	F	+	NBR	F	302.8
	Jenkins Road*	SBR	D	31.6	SBR	F	+
	Jenkins Island U-turn	Overall	A	2.9	Overall	B	19.6
Squire Pope Road		Overall	D	51.5	Overall	E	71.9
Wild Horse Road/ Spanish Wells Road		Overall	C	31.2	Overall	E	76.0

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.
*** Intersection analyzed as interchange with HCS software*
* Unsignalized intersection- the movement with most severe LOS is included

9.2.2 Segment Level of Service

The segment level of service for Reasonable Alternative 3 is the same as Reasonable Alternative 2 because the roadway cross section and volumes are consistent between the two concepts. The analysis shows an improvement in the level of service along the corridor with the addition of one lane in each direction. US 278 is expected to operate as LOS D in the eastbound direction in the AM and LOS E in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM peak. The off-ramp operates at LOS B in the AM and LOS C in the PM.

Figure 61: 2045 Reasonable Alternative 2 Geometric Layout

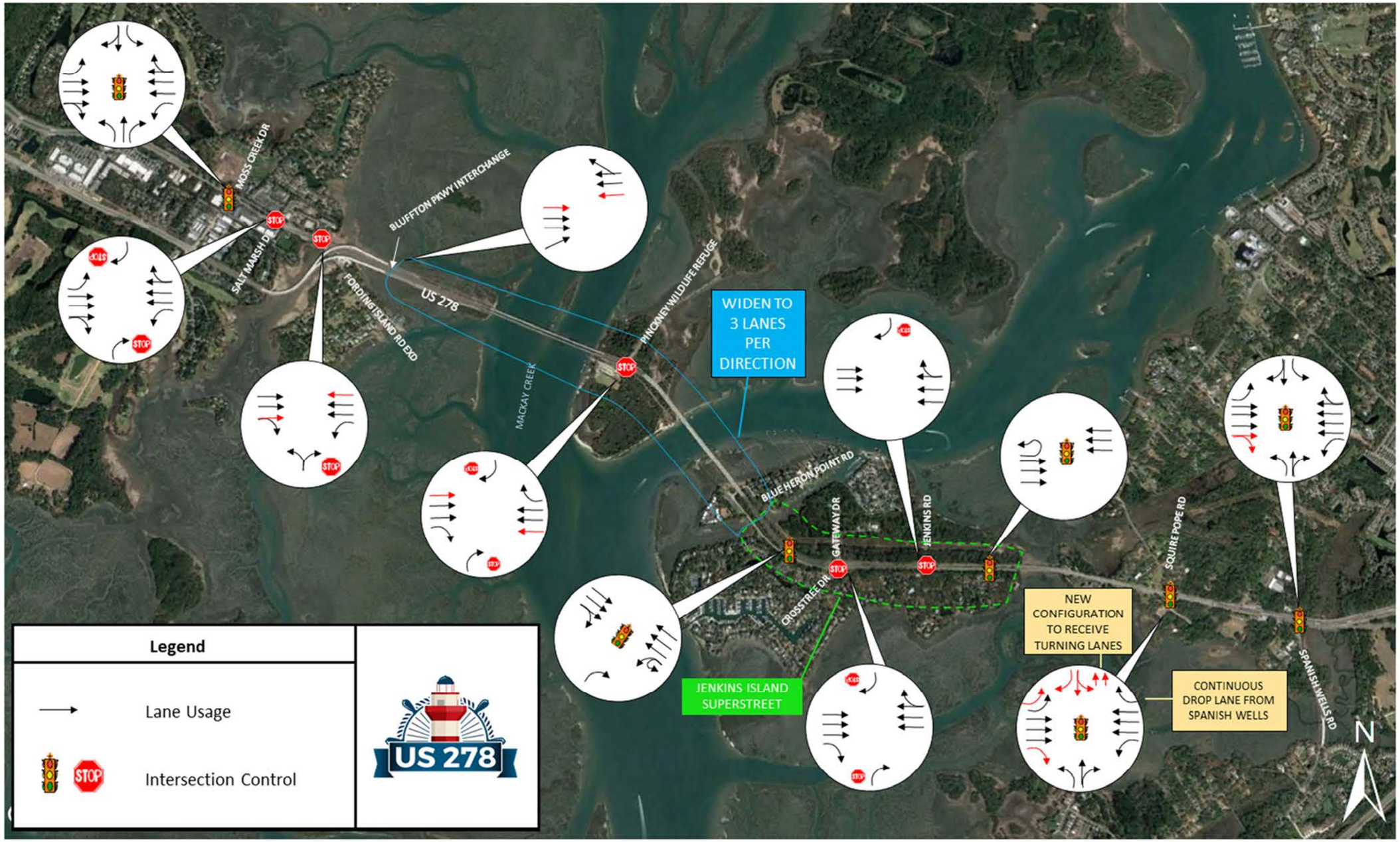
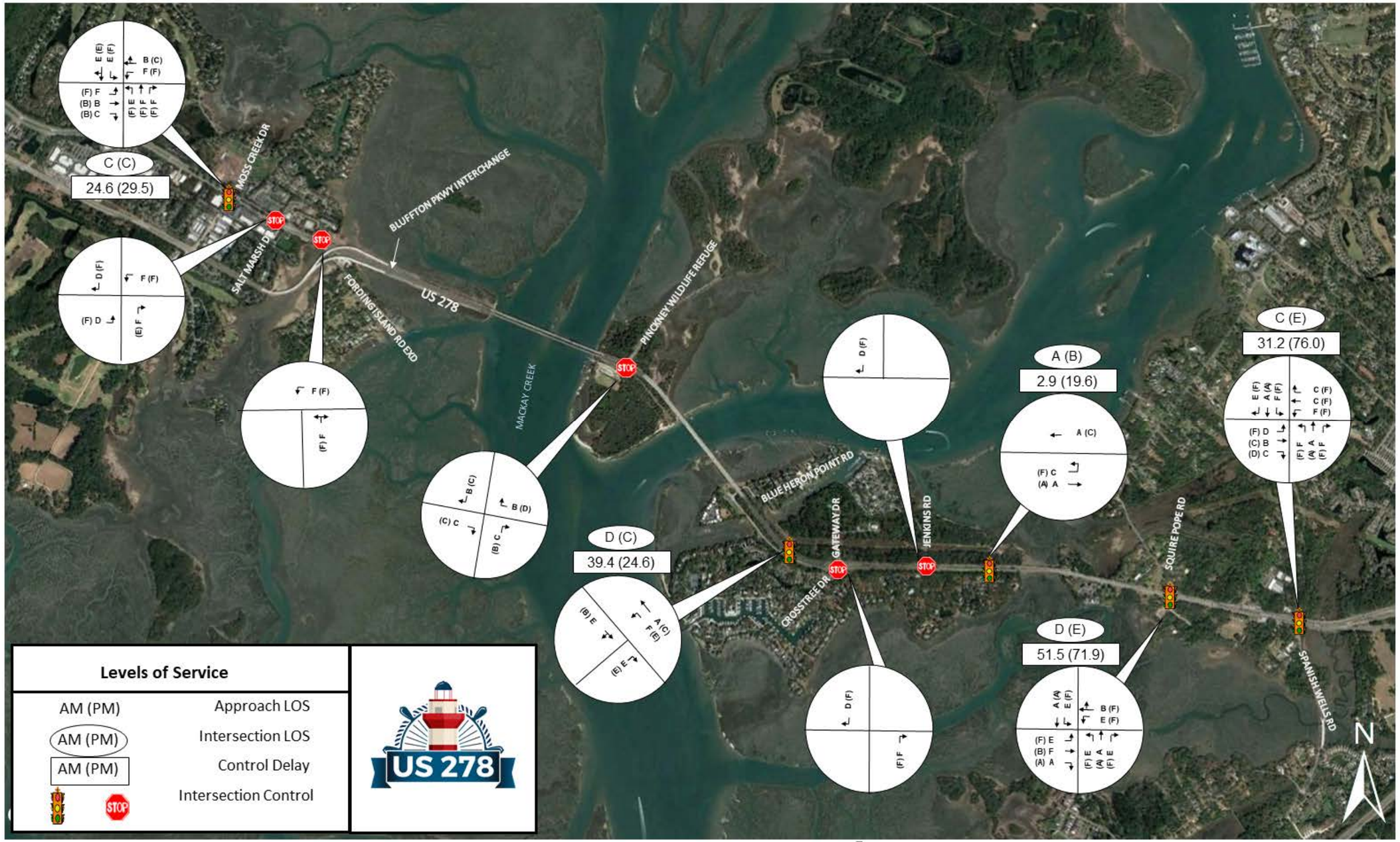


Figure 62: 2045 Reasonable Alternative 2 Traffic Volumes

Figure 63: 2045 Reasonable Alternative 2 Intersection Levels of Service



9.3 Reasonable Alternative 3

New Three-Lane Eastbound Lifeline Alignment

From just east of the Bluffton Parkway ramps to Pinckney Island, a new three-lane eastbound Mackay Creek Bridge will be constructed south of the existing eastbound bridge. This "lifeline" alignment provides enough width to accommodate three lanes of travel during normal conditions; however, if a seismic event occurs that renders one bridge unusable, the lanes can be converted to allow two-way traffic with two lanes in either direction. The existing eastbound bridge will be removed. The westbound Mackay Creek Bridge will be rehabilitated and widened to the south, if feasible. At the Pinckney Wildlife Refuge entrance, a new right-in/right-out interchange will be constructed to allow for full access to the island and boat ramp. The existing boat ramp, which will be impacted by the proposed alignment, will be relocated south of the fishing dock. From Pinckney Island to Jenkins Island, a new three-lane eastbound Skull Creek Bridge will be constructed south of the existing bridge. The existing eastbound and westbound bridges over Skull Creek will be rehabilitated and converted to the new westbound bridge. The new alignment will tie into the Jenkins Island Superstreet project. From the east end of Jenkins Island causeway to the end of the project at Wild Horse Road/Spanish Wells Road, the road will be widened symmetrically from the centerline.

Along with the improvements detailed above, the following intersection configurations are proposed:

- **Squire Pope Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Shared through/left turn lane, channelized right turn lane
  - Eastbound – Exclusive dual left turn lanes, three through lanes, exclusive right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, channelized right turn lane

- **Wild Horse Road/Spanish Wells Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, shared through/right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, shared through/right turn lane

The proposed geometry is shown in **Figure 64.** The additional lanes and intersection improvements are highlighted in red.

9.3.1 Intersection Level of Service

The 2045 Reasonable Alternative 3 volumes are shown in **Figure 65**. Figure **66** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 23** summarizes the worst movements at each unsignalized intersection.

Reasonable Alternative 3 is expected to operate the same as Reasonable Alternatives 1 and 2. Although widening of US 278 occurs in different manners, the intersection geometries are the same throughout the two alternatives. The analysis anticipates all signalized intersections to operate at LOS E or better in both the AM and PM.

Table 23: 2045 Build – Reasonable Alternative 3 Intersection Level of Service

		2045 Build – Reasonable Alternative 3					
Intersection		AM			PM		
		Movement	LOS	Delay	Movement	LOS	Delay
Moss Creek Road		Overall	C	24.6	Overall	C	29.5
Salt Marsh Drive*		WBL	F	127.5	SBR	F	+
Fording Island Road*		NBL	F	+	NBL	F	+
Pinckney Wildlife Refuge **		EB off-ramp	C	N/A	WB off-ramp	D	N/A
Jenkins Island Superstreet	Blue Heron Point Road	Overall	D	39.4	Overall	C	24.6
	Crosstree Drive/Gateway Drive*	NBR	F	+	NBR	F	302.8
	Jenkins Road*	SBR	D	31.6	SBR	F	+
	Jenkins Island U-turn	Overall	A	2.9	Overall	B	19.6
Squire Pope Road		Overall	D	51.5	Overall	E	71.9
Wild Horse Road/ Spanish Wells Road		Overall	C	31.2	Overall	E	76.0

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.
*** Intersection analyzed as interchange with HCS software*
** Unsignalized intersection- the movement with most severe LOS is included*

9.3.2 Segment Level of Service

The segment level of service for Reasonable Alternative 3 is the same as Reasonable Alternatives 1 and 2 because the roadway cross section and volumes are consistent between the two concepts. The analysis shows an improvement in the level of service along the corridor with the addition of one lane in each direction. US 278 is expected to operate as LOS D in the eastbound direction in the AM and LOS E in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM. The off-ramp operates at LOS B in the AM and LOS C in the PM.

Figure 64: 2045 Reasonable Alternative 3 Geometric Layout

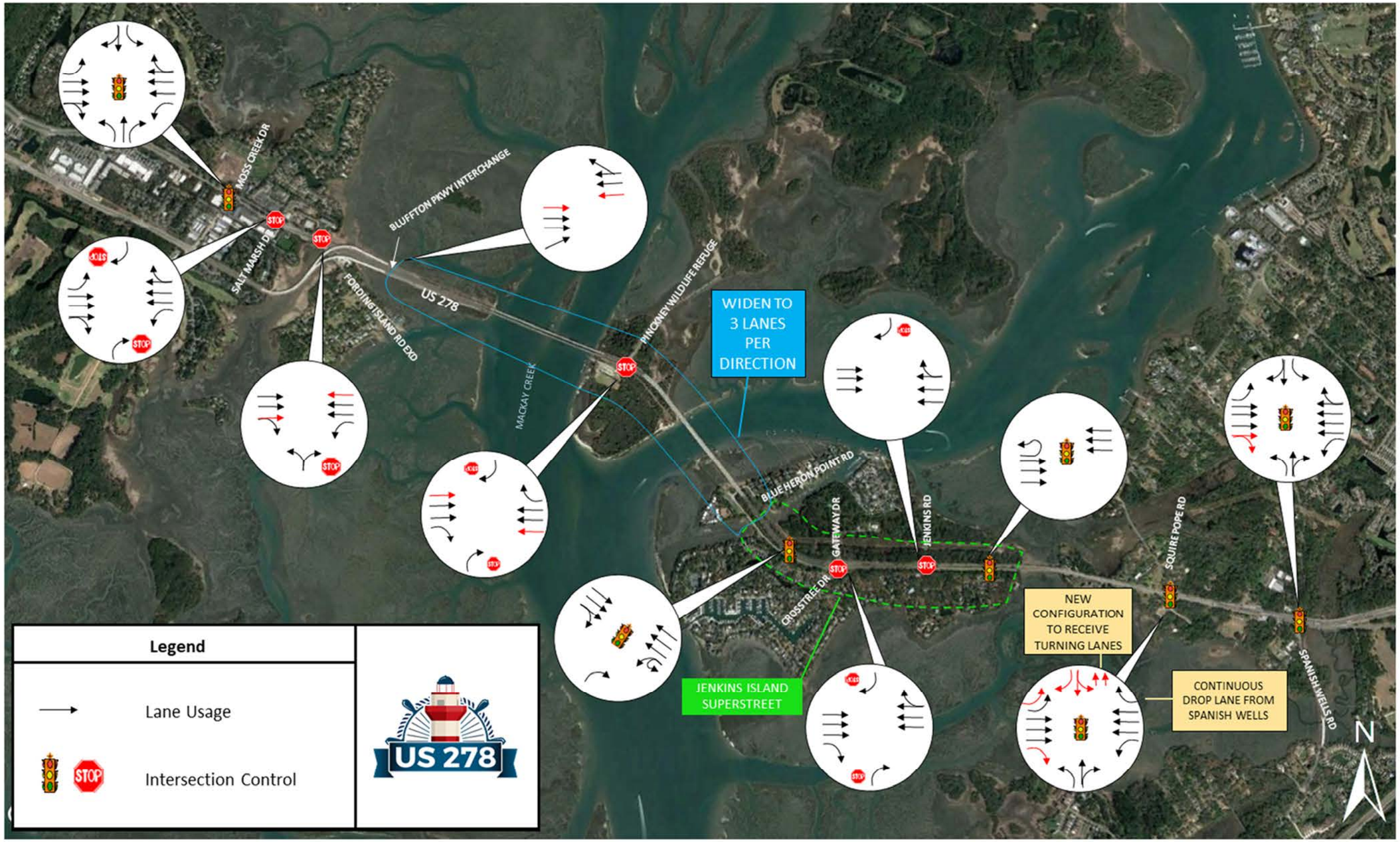
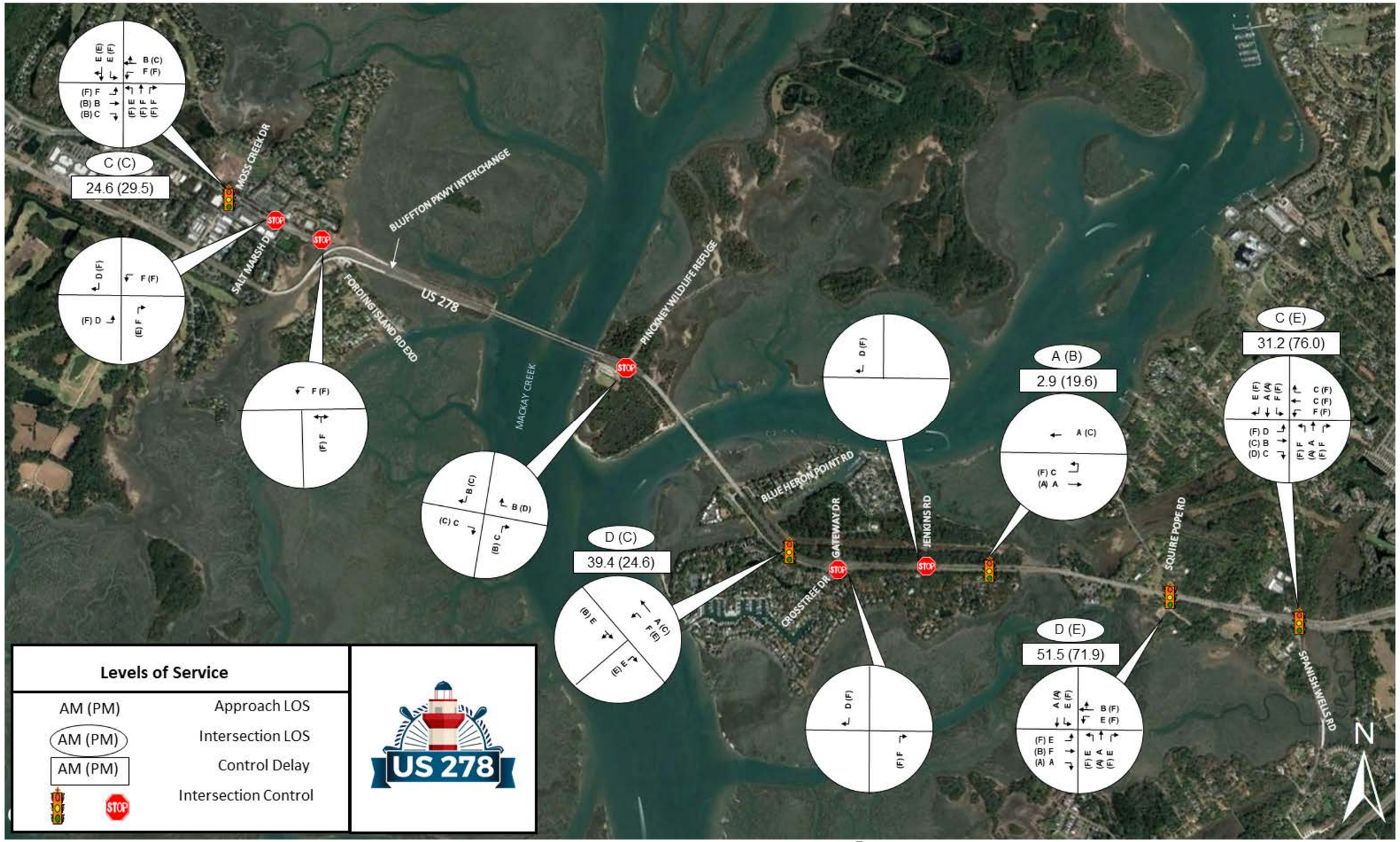


Figure 65: 2045 Reasonable Alternative 3 Traffic Volumes

Figure 66: 2045 Reasonable Alternative 3 Intersection Levels of Service

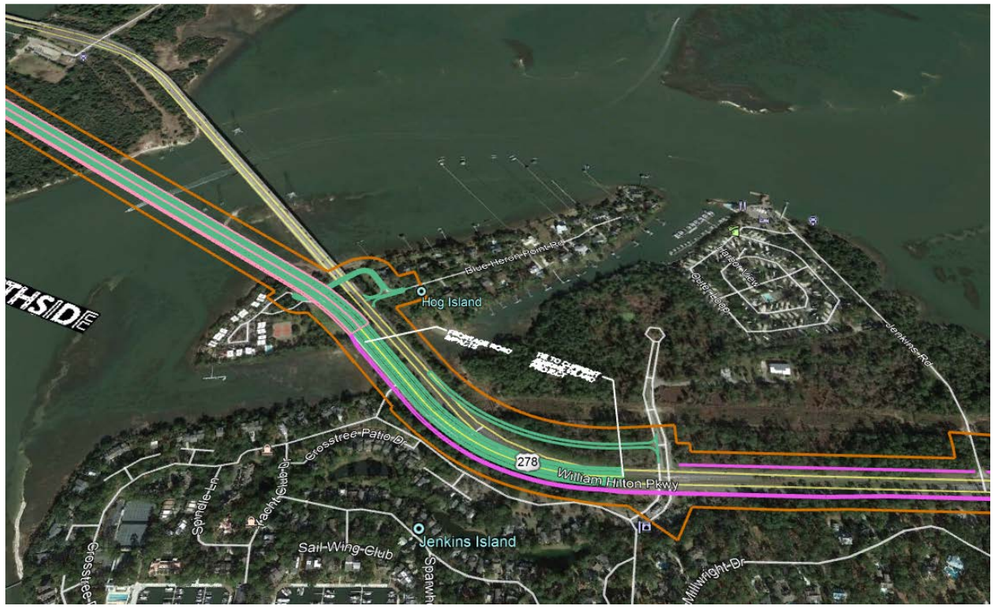


9.4 Reasonable Alternative 4

New Six-Lane Alignment South

From just east of the Bluffton Parkway ramps to Hog Island, a new six-lane bridge over Mackay Creek, Pinckney Island, and Skull Creek will be constructed south of the existing alignment. The existing alignment within these limits will be removed. At the Pinckney Wildlife Refuge entrance, a new right-in/right-out glorified interchange will be constructed to allow for full access to the island and boat ramp. The new alignment will tie into the Jenkins Island Superstreet project. Blue Heron Point Road will be relocated to the north side of US 278 and will tie into Gateway Drive as shown in **Figure 67**. From the east end of Jenkins Island causeway to the end of the project at Wild Horse Road/Spanish Wells Road, the road will be widened symmetrically from the centerline.

Figure 67: Relocation of Blue Heron Point Road



Along with the improvements detailed above, the following intersection configurations are proposed:

- **Squire Pope Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Shared through/left turn lane, channelized right turn lane
  - Eastbound – Exclusive dual left turn lanes, three through lanes, exclusive right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, channelized right turn lane
- **Wild Horse Road/Spanish Wells Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, shared through/right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, shared through/right turn lane

The proposed geometry is shown in **Figure 68.** The additional lanes and intersection improvements are highlighted in red.

9.4.1 Intersection Level of Service

The 2045 Reasonable Alternative 4 volumes are shown in **Figure 69**. **Figure 70** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 24** summarizes the worst movements at each unsignalized intersection.

Reasonable Alternative 4 is expected to operate the same as Reasonable Alternatives 2 and 3, with the exception of the Crosstree Drive/Gateway Drive intersection, which is anticipated to be signalized. The volumes assigned to Blue Heron Point Road in Reasonable Alternatives 1-3 were reassigned to Crosstree Drive/Gateway Drive.

The levels of service remain the same or better in Reasonable Alternative 4 than in the previous alternatives. The analysis anticipates all signalized intersections to operate at LOS E or better in both the AM and PM.

Table 24: 2045 Build – Reasonable Alternative 4 Intersection Level of Service

2045 Build – Reasonable Alternative 4							
Intersection		AM			PM		
		Movement	LOS	Delay	Movement	LOS	Delay
	Moss Creek Road	Overall	C	24.6	Overall	C	29.5
	Salt Marsh Drive*	WBL	F	127.5	SBR	F	+
	Fording Island Road*	NBL	F	+	NBL	F	+
	Pinckney Wildlife Refuge **	EB off-ramp	C	N/A	WB off-ramp	D	N/A
Jenkins Island Superstreet	Crosstree Drive/ Gateway Drive	Overall	E	60.0	Overall	D	35.8
	Jenkins Road*	SBR	D	31.2	SBR	F	+
	Jenkins Island U-turn	Overall	A	2.6	Overall	B	15.9
	Squire Pope Road	Overall	D	51.5	Overall	E	71.9
	Wild Horse Road/ Spanish Wells Road	Overall	C	31.8	Overall	E	76.2

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.
*** Intersection analyzed as interchange with HCS software*
** Unsignalized intersection- the movement with most severe LOS is included*

Figure 68: 2045 Reasonable Alternative 4 Geometric Layout

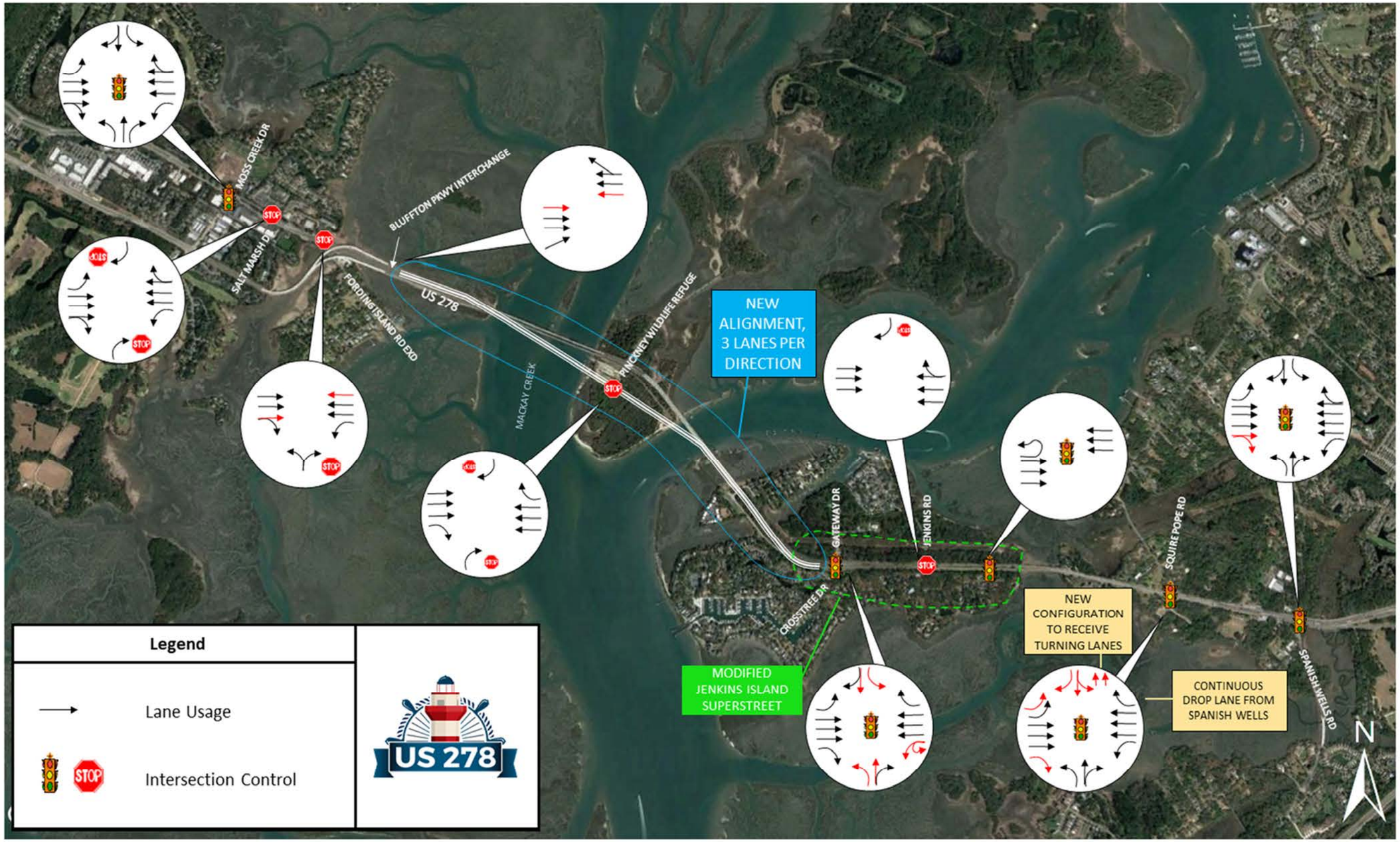


Figure 69: 2045 Reasonable Alternative 4 Traffic Volumes

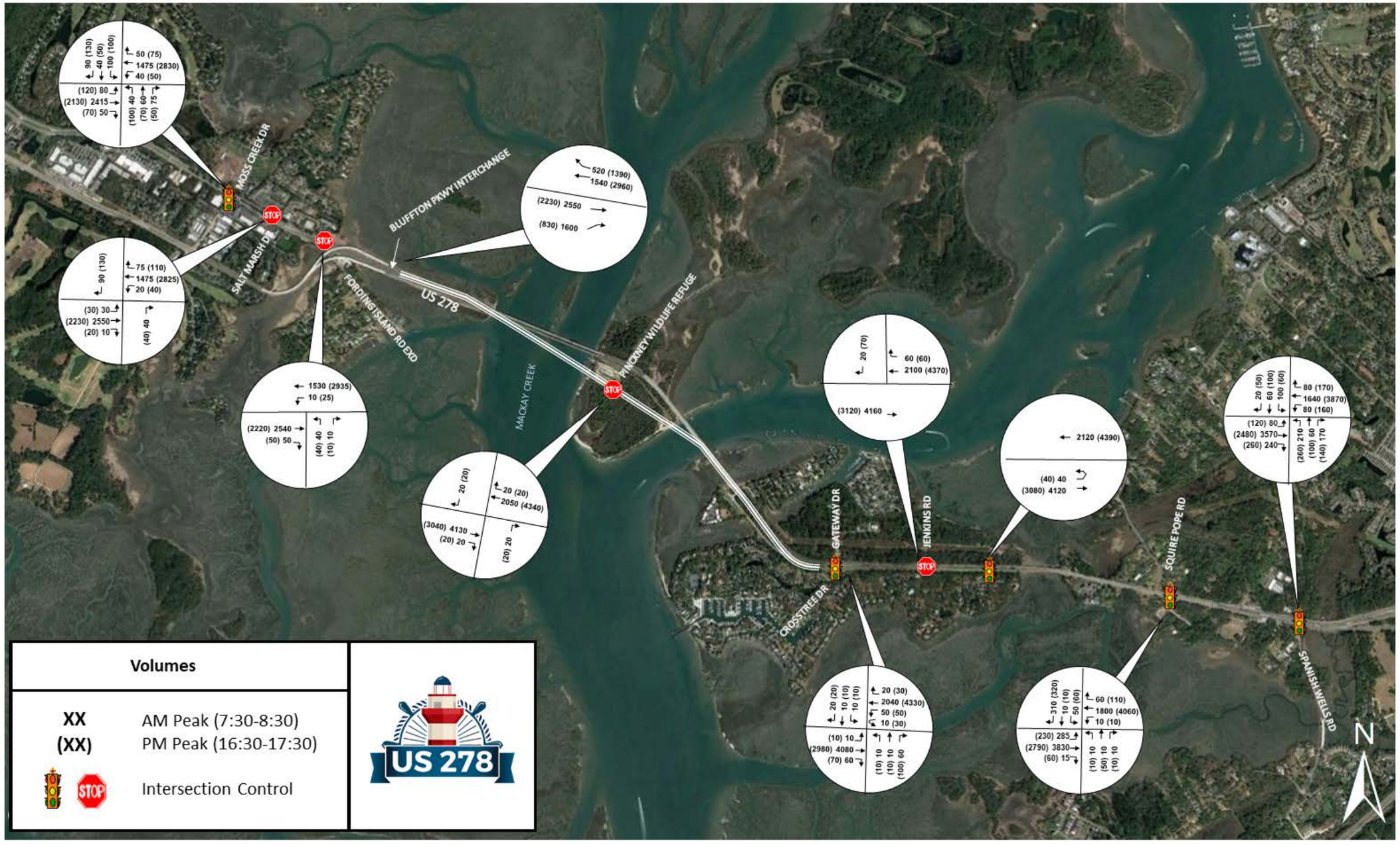
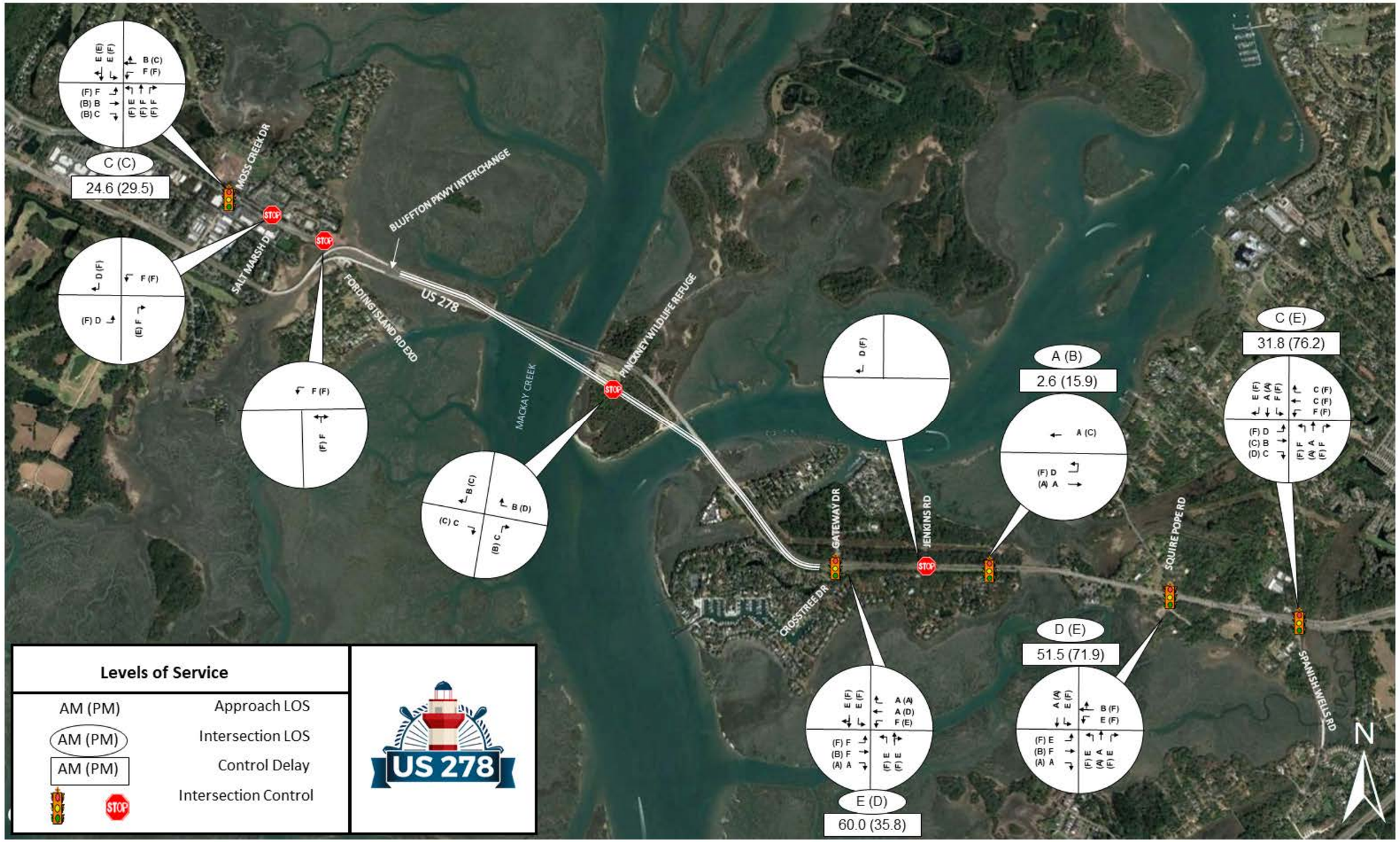


Figure 70: 2045 Reasonable Alternative 4 Intersection Levels of Service



9.4.2 Segment Level of Service

The segment level of service for Reasonable Alternative 4 is the same as Reasonable Alternatives 1-3 because the roadway cross section and volumes are consistent between the two concepts. The analysis shows an improvement in the level of service along the corridor with the addition of one lane in each direction. US 278 is expected to operate as LOS D in the eastbound direction in the AM and LOS E in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM. The off-ramp operates at LOS B in the AM and LOS C in the PM.

9.5 Reasonable Alternative 5

New Three-Lane Eastbound Lifeline Alignment and Realignment of US 278 on Jenkins Island

From just east of the Bluffton Parkway ramps to Pinckney Island, a new three-lane eastbound Mackay Creek bridge will be constructed south of the existing alignment. This "lifeline" alignment provides enough width to accommodate three lanes of travel during normal conditions; however, if a seismic event occurs that renders one bridge unusable, the lanes can be converted to allow two-way traffic with two lanes in either direction. The existing eastbound bridge will be removed. The westbound Mackay Creek Bridge will be rehabilitated and widened to the south, if feasible. At the Pinckney Wildlife Refuge entrance, a new right-in/right-out glorified interchange will be constructed to allow for full access to the island and boat ramp. The existing boat ramp, which will be impacted by the proposed alignment, will be relocated south of the fishing dock. From Pinckney Island to Jenkins Island, a new three-lane eastbound Skull Creek bridge will be constructed south of the existing bridge. The existing eastbound and westbound bridges over Skull Creek will be rehabilitated and converted into the new westbound bridge. From the east end of Skull Creek to Squire Pope Road, US 278 will be realigned to the north of existing US 278 and will traverse through the existing transmission line easement. Once the alignment crosses over Squire Pope Road, the alignment will turn right to tie in with the Wild Horse Road/Spanish Wells Road intersection at the end of the project. At-grade intersections will be provided at Crosstree Drive/Gateway Drive, Old Wild Horse Road, and Wild Horse Road/Spanish Wells Road. Jenkins Road and Squire Pope Road will be grade-separated. The existing US 278 within the relocated section will be converted to a local road.

Along with the improvements detailed above, the following intersection configurations are proposed:

- **Crosstree Drive/Gateway Drive**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, exclusive right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, exclusive right turn lane
- **Old Wild Horse Road**
  - Northeastbound (Old Wild Horse Road) – Exclusive dual left turn lanes, shared through/right turn lane
  - Southwestbound (Old Wild Horse Road) – Exclusive left turn lane, shared through/right turn lane
  - Southeastbound (US 278) – Exclusive left turn lane, three through lanes, exclusive dual right turn lanes
  - Northwestbound (US 278) – Exclusive dual left turn lanes, three through lanes, exclusive right turn lane
- **Wild Horse Road/Spanish Wells Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, shared through/right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, shared through/right turn lane

The proposed geometry is shown in **Figure 71.** The additional lanes and intersection improvements are highlighted in red.

9.5.1 Intersection Level of Service

The 2045 Reasonable Alternative 5 volumes are shown in Figure **72**. **Figure 73** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. Table **25** summarizes the overall levels of service for the signalized intersections and the worst movements at each unsignalized intersection.

In Reasonable Alternative 5the analysis anticipates all signalized intersections to operate at LOS E or better in both the AM and PM.

Table 25*:* 2045 Build – Reasonable Alternative 5 Intersection Level of Service

2045 Build – Reasonable Alternative 5						
Intersection	AM			PM		
	Movement	LOS	Delay	Movement	LOS	Delay
Moss Creek Road	Overall	C	24.6	Overall	C	29.5
Salt Marsh Drive*	WBL	F	127.5	SBR	F	+
Fording Island Road*	NBL	F	+	NBL	F	+
Pinckney Wildlife Refuge **	EB off-ramp	C	N/A	WB off-ramp	D	N/A
Crosstree Drive/Gateway Drive	Overall	D	54.8	Overall	E	60.8
Old Wild Horse Road	Overall	E	59.8	Overall	D	53.2
Squire Pope Road	Overall	C	22.0	Overall	C	20.6
Wild Horse Road/Spanish Wells Road	Overall	D	40.2	Overall	E	71.2

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.
*** Intersection analyzed as interchange with HCS software*
** Unsignalized intersection- the movement with most severe LOS is included*

Figure 71: 2045 Reasonable Alternative 5 Geometric Layout

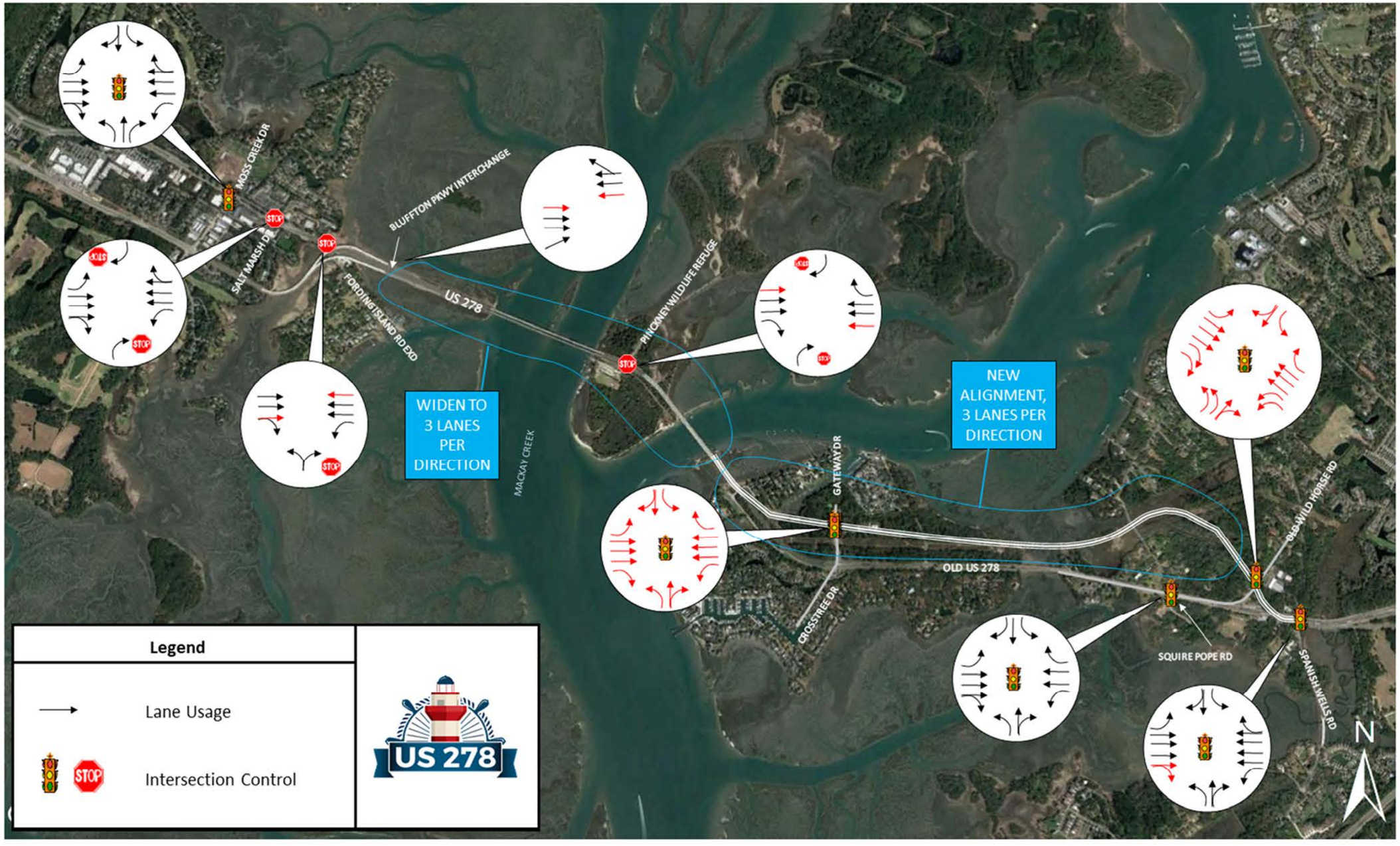


Figure 72: 2045 Reasonable Alternative 5 Traffic Volumes

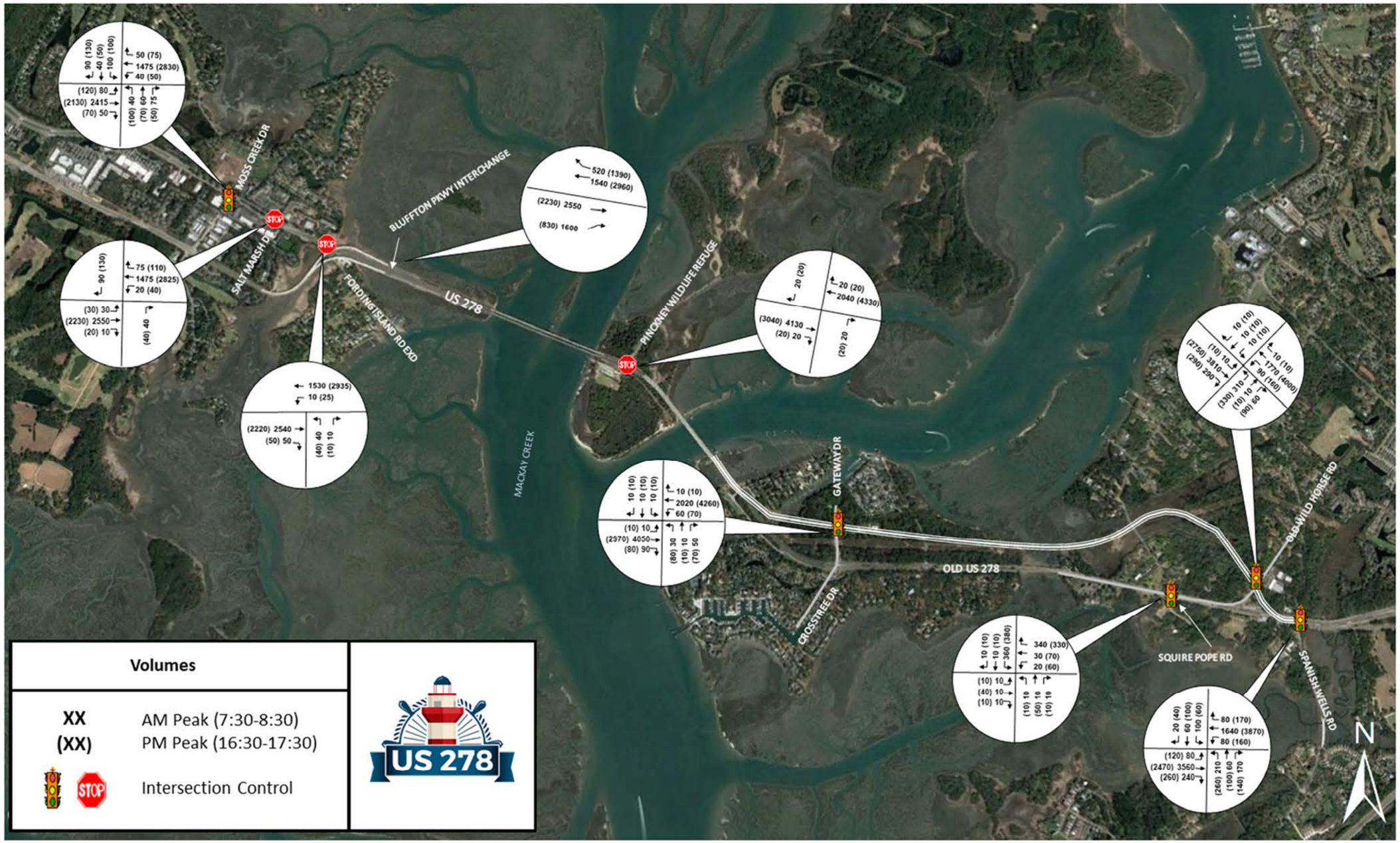
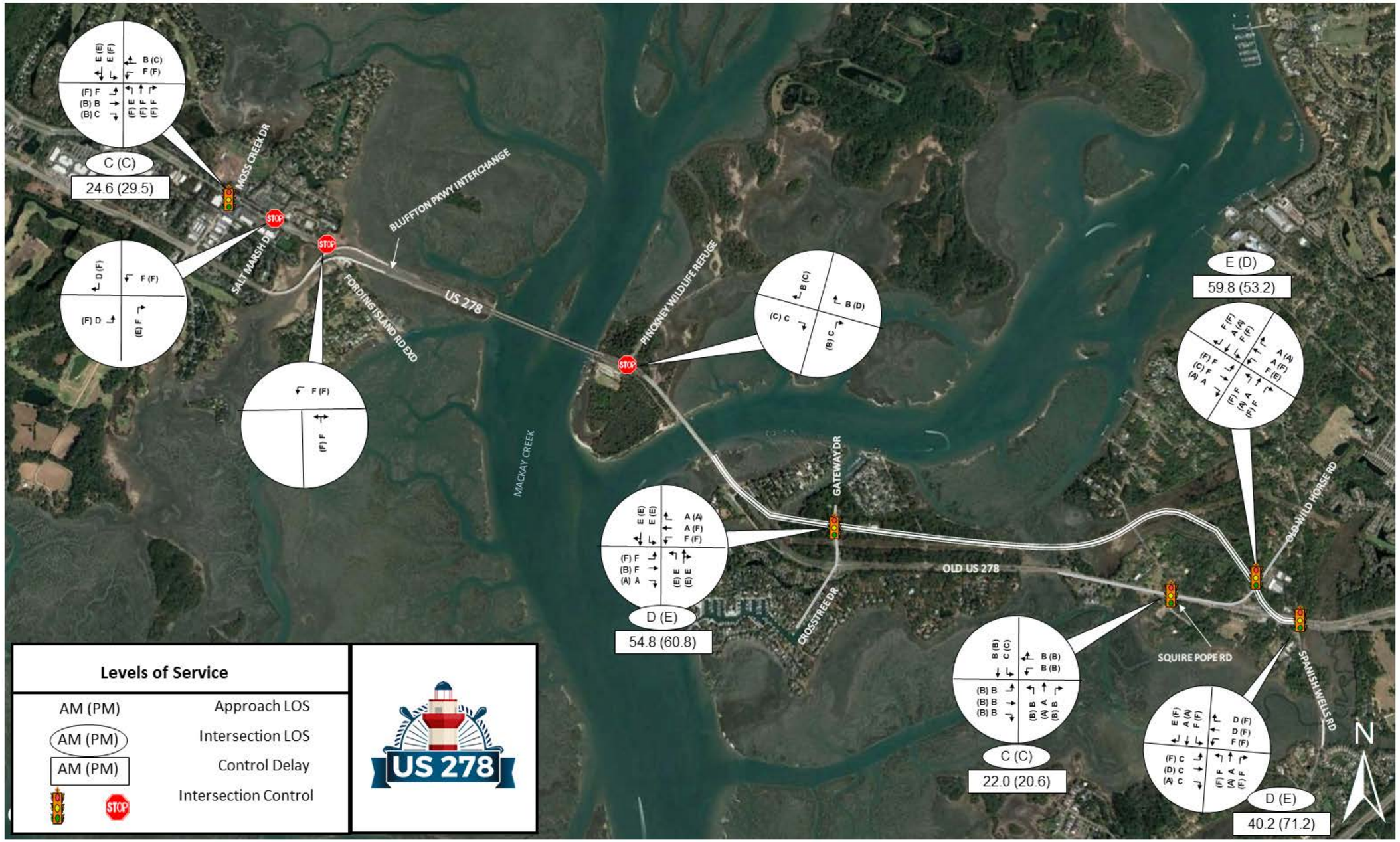


Figure 73: 2045 Reasonable Alternative 5 Intersection Levels of Service



9.5.2 Segment Level of Service

The segment level of service for Reasonable Alternative 5 is the same as Reasonable Alternatives 1-4 because the roadway cross section and volumes are consistent between the Bluffton Parkway and the first signalized intersection. The analysis shows an improvement in the level of service along the corridor with the addition of one lane in each direction. US 278 is expected to operate as LOS D in the eastbound direction in the AM and LOS E in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM. The off-ramp operates at LOS B in the AM and LOS C in the PM.

9.6 Reasonable Alternative 6

New Six-Lane Alignment South and Realignment of US 278 on Jenkins Island

From just east of the Bluffton Parkway ramps to Hog Island, a new six-lane bridge over Mackay Creek, Pinckney Island, and Skull Creek will be constructed south of the existing alignment. The existing alignment within these limits will be removed. At the Pinckney Wildlife Refuge entrance, a new right-in/right-out glorified interchange will be constructed to allow for full access to the island and boat ramp. From the east end of Skull Creek to Squire Pope Road, US 278 will be realigned to the north of existing US 278 and will traverse through the existing transmission line easement. Once the alignment crosses over Squire Pope Road, the alignment will turn right to tie in with the Wild Horse Road/Spanish Wells Road intersection at the end of the project. At-grade intersections will be provided at Crosstree Drive/Gateway Drive, Old Wild Horse Road, and Wild Horse Road/Spanish Wells Road. Jenkins Road and Squire Pope Road will be grade-separated. The existing US 278 within the relocated section will be converted to a local road.

Along with the improvements detailed above, the following intersection configurations are proposed:

- **Crosstree Drive/Gateway Drive**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, exclusive right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, exclusive right turn lane

- **Old Wild Horse Road**
  - Northeastbound (Old Wild Horse Road) – Exclusive dual left turn lanes, shared through/right turn lane
  - Southwestbound (Old Wild Horse Road) – Exclusive left turn lane, shared through/right turn lane
  - Southeastbound (US 278) – Exclusive left turn lane, three through lanes, exclusive dual right turn lanes
  - Northwestbound (US 278) – Exclusive dual left turn lanes, three through lanes, exclusive right turn lane

- **Wild Horse Road/Spanish Wells Road**
  - Northbound – Exclusive left turn lane, shared through/right turn lane
  - Southbound – Exclusive left turn lane, shared through/right turn lane
  - Eastbound – Exclusive left turn lane, three through lanes, shared through/right turn lane
  - Westbound – Exclusive left turn lane, three through lanes, shared through/right turn lane

The proposed geometry is shown in **Figure 74**. The additional lanes and intersection improvements are highlighted in red.

9.6.1 Intersection Level of Service

The 2045 Reasonable Alternative 6 volumes are shown in **Figure 75**. Figure **76** shows the level of service for each movement and the overall level of service and delay for the signalized intersections. **Table 26** summarizes the overall levels of service for the signalized intersections and the worst movements at each unsignalized intersection.

In Reasonable Alternative 6, the analysis anticipates all signalized intersections to operate at LOS E or better in both the AM and PM.

Table 26: 2045 Build – Reasonable Alternative 6 Intersection Level of Service

2045 Build – Reasonable Alternative 6						
Intersection	AM			PM		
	Movement	LOS	Delay	Movement	LOS	Delay
Moss Creek Road	Overall	C	24.6	Overall	C	29.5
Salt Marsh Drive*	WBL	F	127.5	SBR	F	+
Fording Island Road*	NBL	F	+	NBL	F	+
Pinckney Wildlife Refuge **	EB off-ramp	C	N/A	WB off-ramp	D	N/A
Crosstree Drive/Gateway Drive	Overall	D	54.8	Overall	E	60.8
Old Wild Horse Road	Overall	E	61.4	Overall	D	53.2
Squire Pope Road	Overall	C	22.0	Overall	C	20.6
Wild Horse Road/Spanish Wells Road	Overall	D	42.0	Overall	E	71.2

+ Results are producing unreasonably long delays that are often greater than 360 seconds, but the values are not shown due to software limitations.
*** Intersection analyzed as interchange with HCS software*
* Unsignalized intersection- the movement with most severe LOS is included

9.6.2 Segment Level of Service

The segment level of service for Reasonable Alternative 6 is the same as Reasonable Alternatives 1-5 because the roadway cross section and volumes are consistent between the Bluffton Parkway and the first signalized intersection. The analysis shows an improvement in the level of service along the corridor with the addition of one lane in each direction. US 278 is expected to operate as LOS D in the eastbound direction in the AM and LOS E in the westbound direction in the PM. The ramp analysis shows that the on-ramp operates at LOS D in the AM and LOS C in the PM. The off-ramp operates at LOS B in the AM and LOS C in the PM.

Figure 74: 2045 Reasonable Alternative 6 Geometric Layout

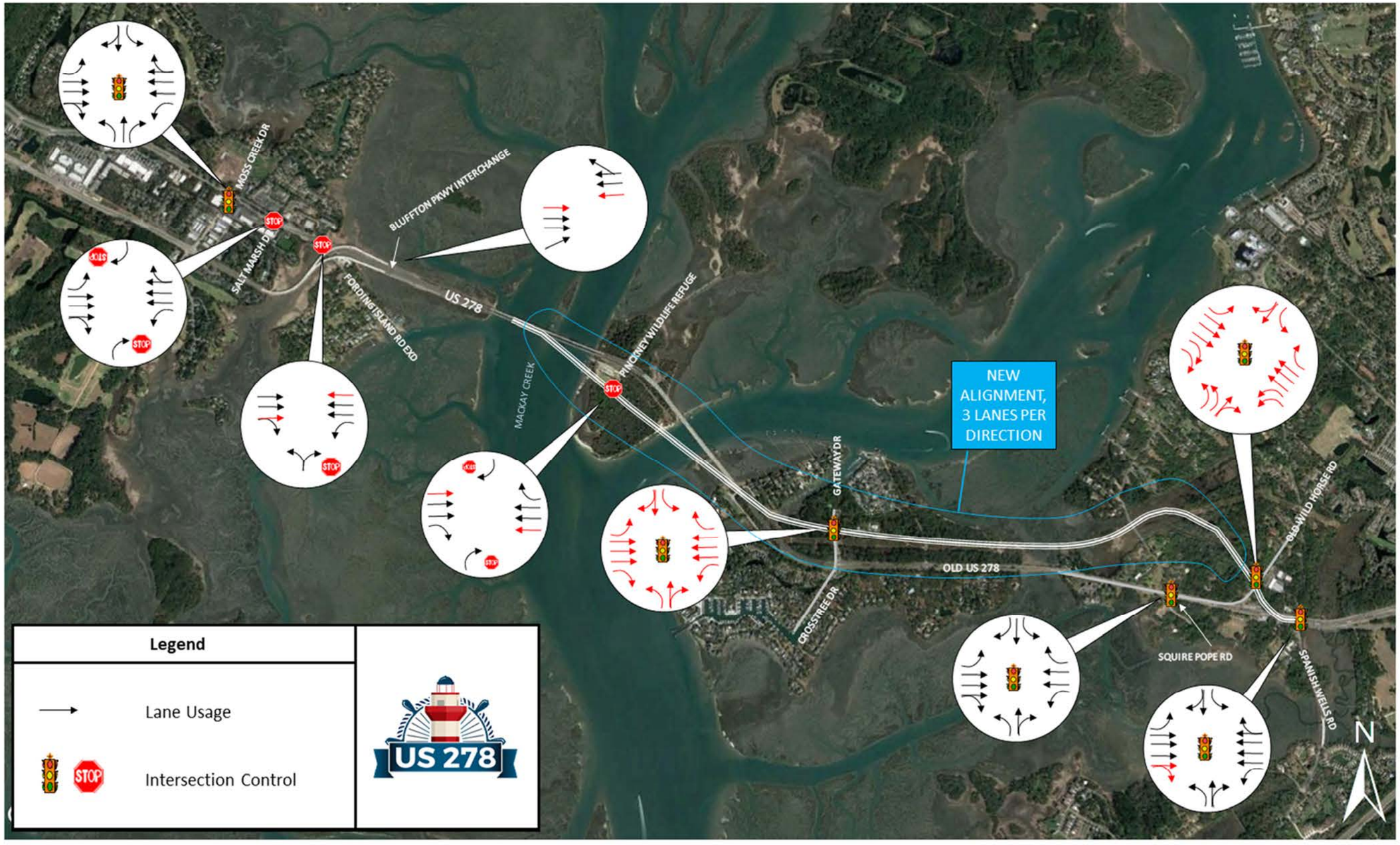


Figure 75: 2045 Reasonable Alternative 6 Traffic Volumes

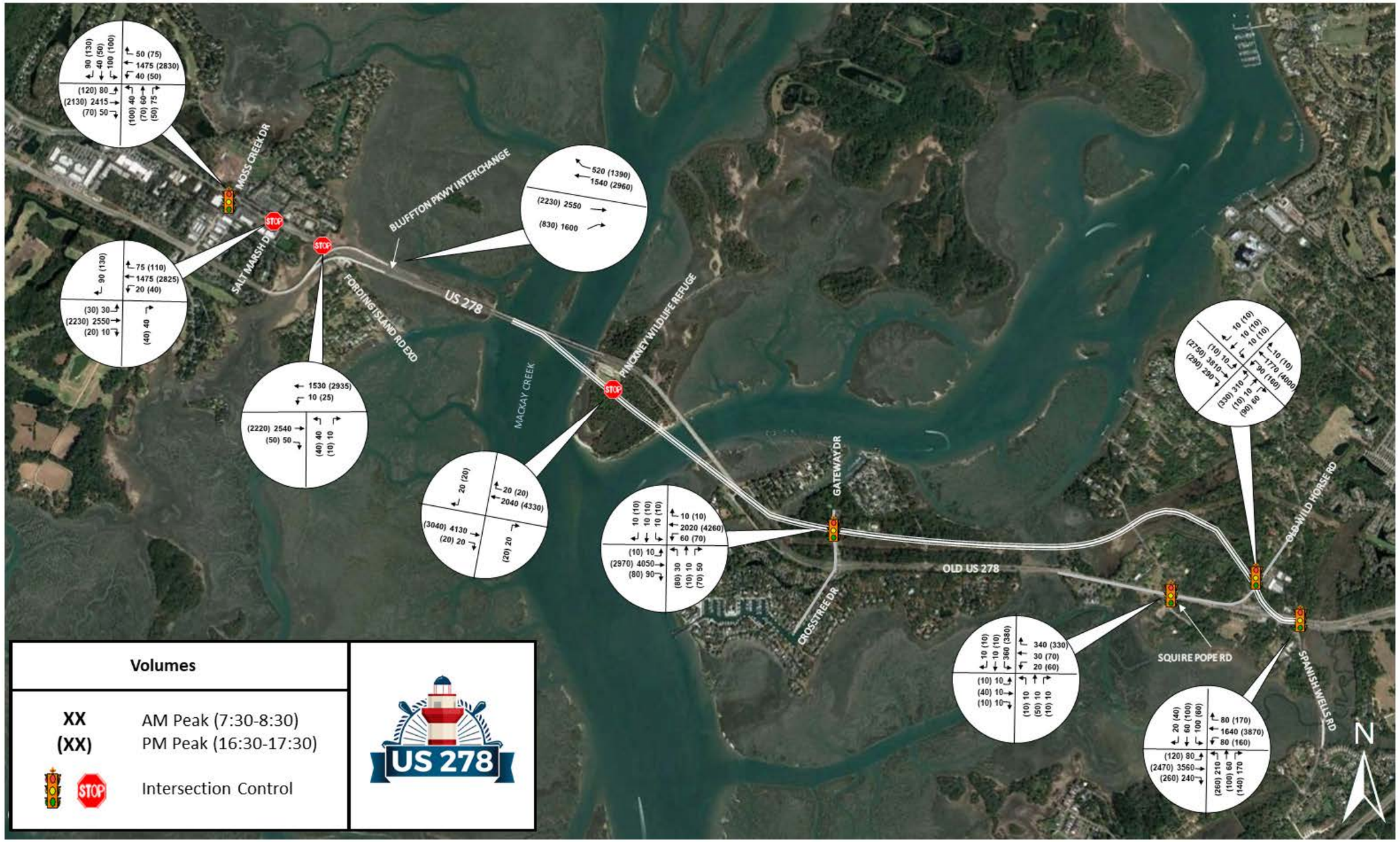
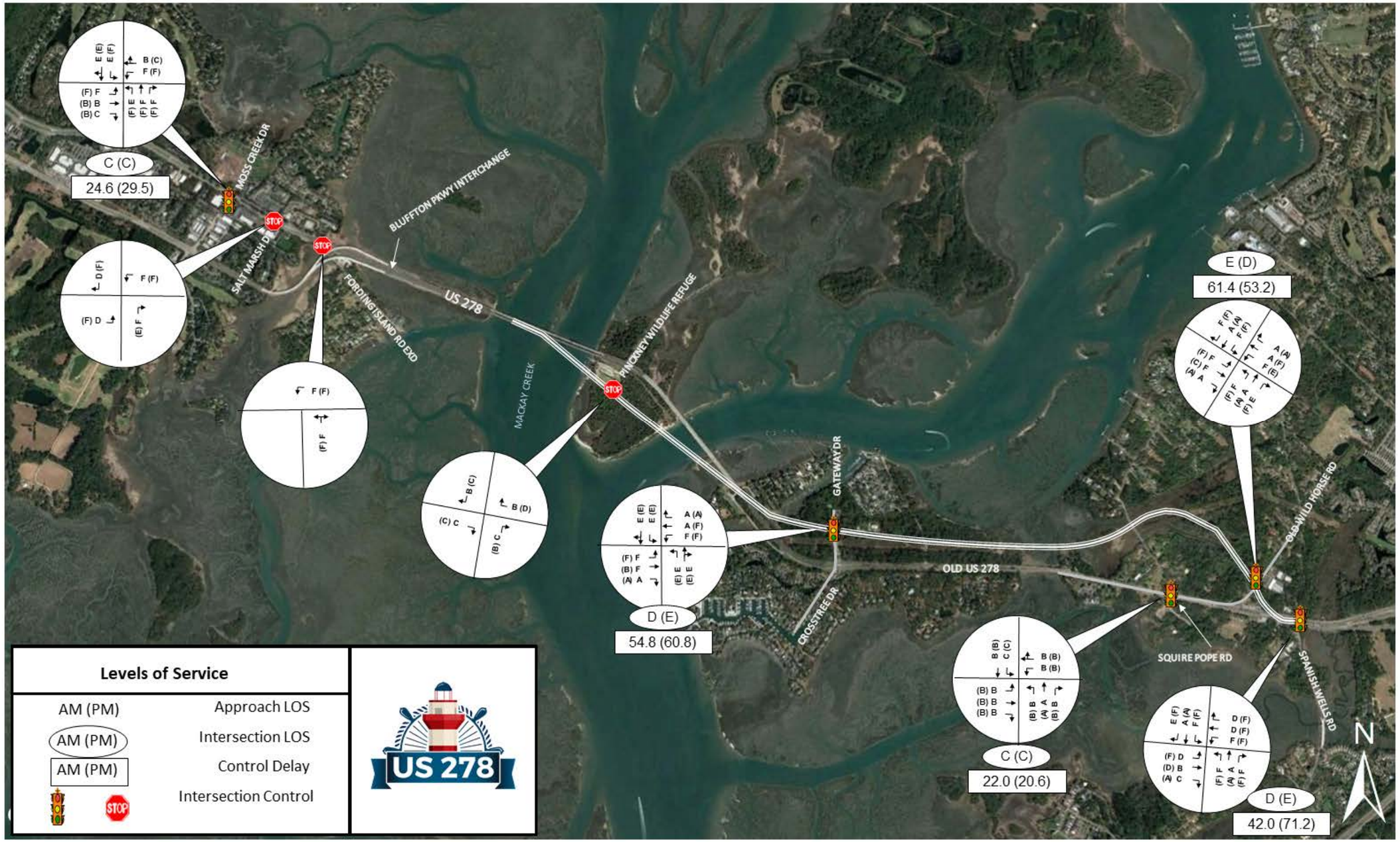


Figure 76: 2045 Reasonable Alternative 6 Intersection Levels of Service



9.7 Reversible Lane Scenario

A reversible lane scenario was run to assess whether a full widening of US 278 could be avoided to accommodate future traffic. Instead of two additional lanes, a reversible lane concept would require constructing only one additional lane. As seen in the 2045 No Build analysis without the Jenkins Island Superstreet, the peak hour peak directions are expected to exceed their capacities and operate at LOS F. The reversible lane scenario assumes one additional lane of widening that will be utilized during the AM peak hour for the eastbound traffic and during the PM peak hour for the westbound traffic. This scenario assumes the Jenkins Island Superstreet will be in place; therefore, the impacts of this alternative are limited to the segment of US 278 between Bluffton Parkway and Blue Heron Point Road.

Functional drawings were not developed for the reversible lane concept. Although the traffic analysis suggests that it will yield satisfactory level of service results, there would need to be analysis performed to determine how it would work operationally.

The proposed geometry is shown in **Figure 77** and **Figure 78.** The additional lanes are highlighted in red.

9.7.1 Intersection Level of Service

Figure 79 shows the level of service for each movement and the overall level of service and delay for the signalized intersections in the area where the reversible lane would be present. **Table 27** summarizes the overall levels of service for the signalized intersections and the worst movements at each unsignalized intersection within the reversible lane segment. The intersection levels of service are expected to remain the same as the 2045 No Build scenario.

Table 27: 2045 Build – Reversible Lane Intersection Level of Service

2045 Build – Reversible Lane						
Intersection	AM			PM		
	Movement	LOS	Delay	Movement	LOS	Delay
Pinckney Wildlife Refuge**	EB off-ramp	C	N/A	WB off-ramp	D	N/A
Blue Heron Point Road	Overall	C	34.3	Overall	C	26.7

*** Intersection analyzed as interchange with HCS software*

9.7.2 Segment Level of Service

The segment LOS for the Reversible Lane scenario is summarized in **Table 28**. The analysis shows that adding one lane in the critical direction would alleviate the anticipated congestion in 2045. In the 2045 No Build scenario, US 278 is expected to operate as LOS F in the eastbound direction in the AM and LOS F in the westbound direction in the PM. The additional lane improves this operation and shows LOS D or better in the AM critical direction and LOS E in the PM critical direction. The ramp analysis shows that the on-ramp operates at LOS E in the AM and LOS D in the PM. The off-ramp operates at LOS B in the AM and LOS D in the PM.

Table 28: 2045 Build – Reversible Lane Segment Level of Service

Segment	Eastbound		Westbound	
	AM	PM	AM	PM
Moss Creek Drive to Salt Marsh Drive	C	B	B	B
Salt Marsh Drive to Fording Island Road	C	C	B	D
Fording Island Road to Bluffton Parkway	D	D	C	E
Bluffton Parkway to Pinckney Wildlife Refuge	D	E	C	E
Pinckney Wildlife Refuge to Blue Heron Point Road	D	D	C	D

Figure 77: 2045 Reversible Lane Geometric Layout, Sheet 1

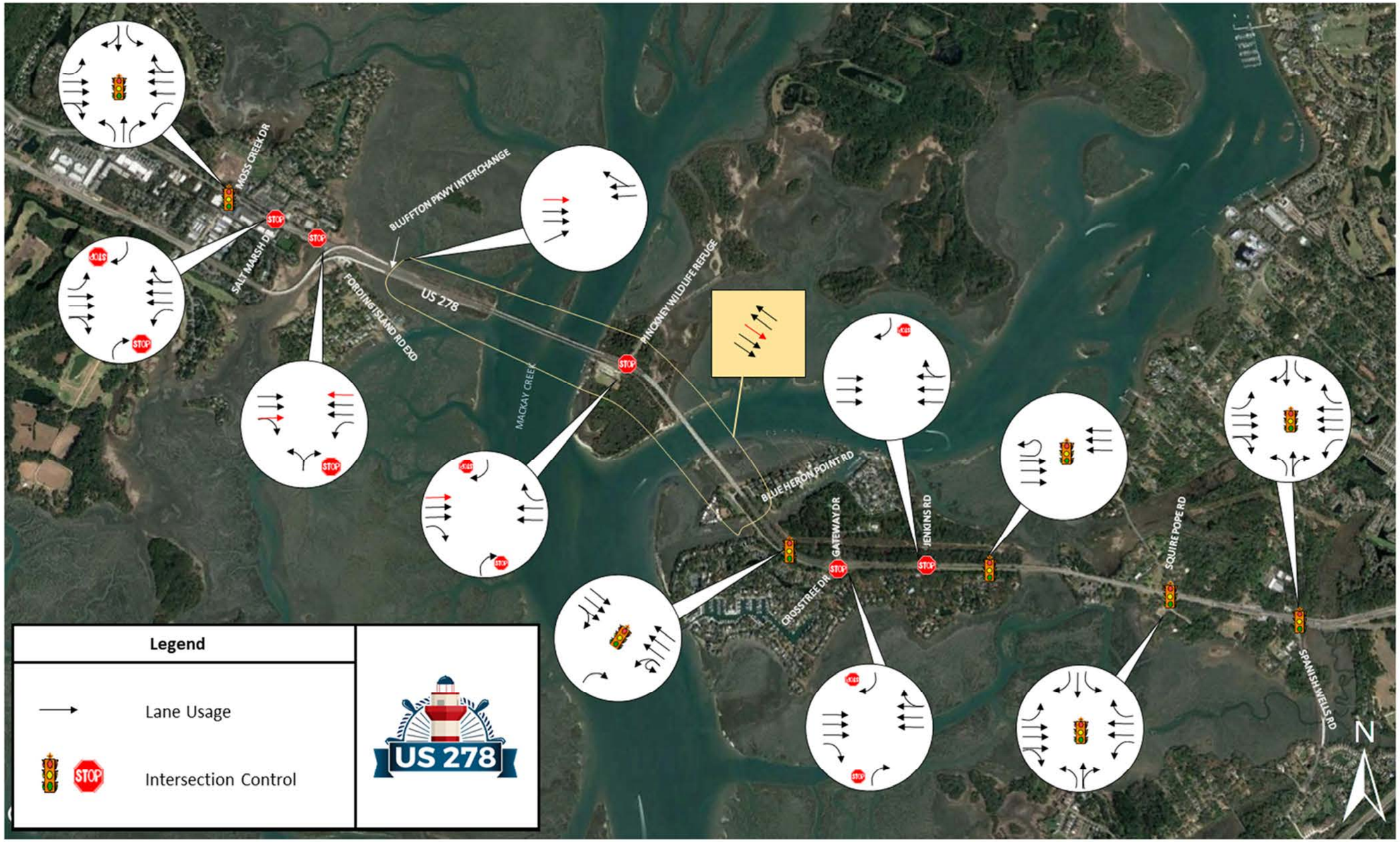


Figure 78: 2045 Reversible Lane Geometric Layout, Sheet 2

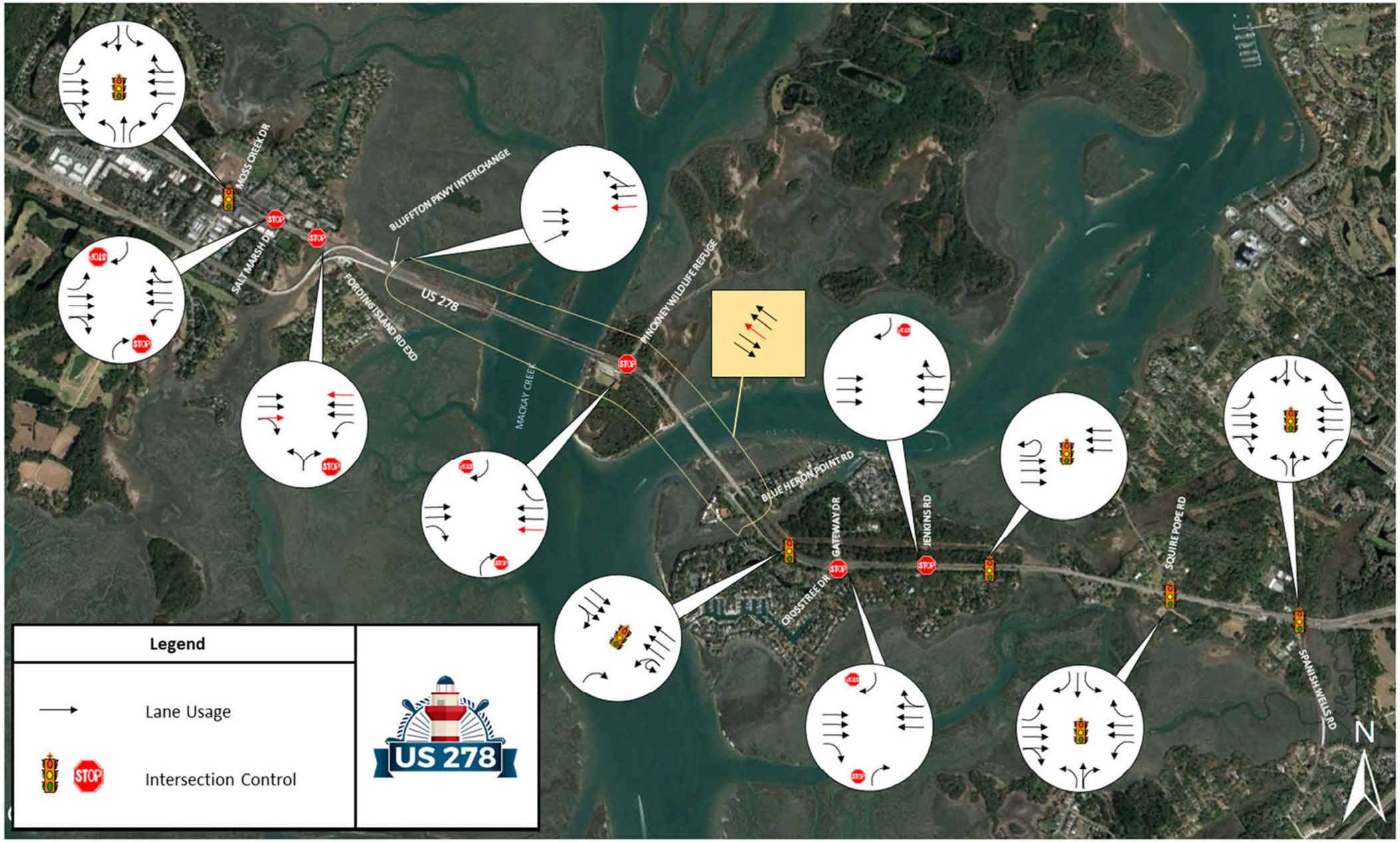
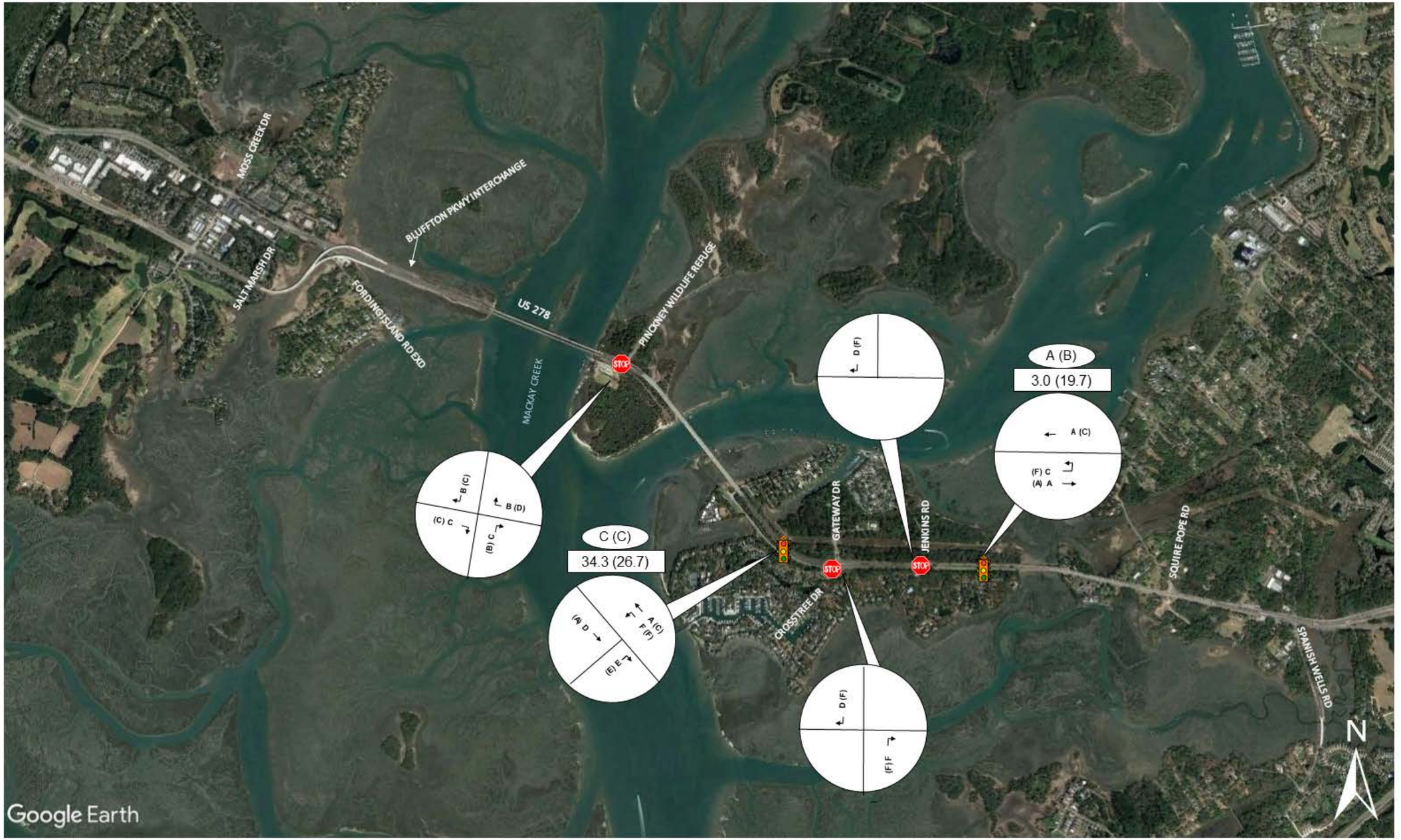


Figure 79: 2045 Reversible Lane Intersection Levels of Service



10.0 SUMMARY AND CONCLUSIONS

US 278, within the limits of this project, has segments with notably different roadway features including urban curb and gutter with traffic signals, freeway-type merge and diverge sections, uninterrupted multi-lane highway components, and interrupted rural-like sections with traffic signals. On both ends of this project, three lanes in each direction are provided, and in the middle section only two-lanes per direction exist. Bluffton Parkway marks one change in the characteristics along US 278 and it contributes a significant amount of traffic. In May 2018, CDM Smith recorded 62,300 vehicles per day on US 278 east of Bluffton Parkway.

The primary purpose of this traffic study was to quantify existing conditions and to project future traffic conditions for the purpose of confirming the number of lanes needed to meet 2045 traffic demand. This study also provided the information needed by roadway designers to evaluate the geometry needed at intersections, the need for new traffic signals, the length of turn lanes, and other traffic operational deficiencies that required special attention. Moreover, this study examined in detail the six reasonable alternatives being considered for design. The reversible lane is a reasonable alternative in terms of serving traffic, but a concept plan was not developed, hence it was not labeled as one of the reasonable alternatives being considered. It should be noted, that from a traffic engineering standpoint, some of the alternatives were not discernably different. For example, the manner in which the bridges over MacKay Creek are refurbished or replaced are of little concern for the purposes of this traffic study. Instead, it is enough to know that three-lanes per direction are going to be provided.

On both ends of this project, US 278 contains three-lanes per direction, so it stands to reason that it would likewise need to be three lanes per direction over Mackay Creek, and through Pinckney and Jenkins Islands. This study did confirm that three lanes per direction will meet the 2045 traffic level of service and mobility needs of 78,500 AADT along US 278. The following sections provide additional detail of the study findings.

Each of the six alternatives includes a 10-foot multiuse path constructed for the entire length of the project and a new 5-foot sidewalk on the north side of US 278 between Moss Creek Drive and Salt Marsh Drive. The traffic analysis was performed with the understanding that bike and pedestrian activity will occur on the multiuse path and proposed sidewalk on the west end of the project; therefore, the impact on traffic operations will be minimal.

10.1 EXISTING CONDITIONS

10.1.1 Design Hour

In a tourist area like Hilton Head Island and Beaufort County it is extremely important to identify an appropriate design hour. This study involved a close examination of ATR Station 35 on US 278 near the Pinckney Wildlife Refuge. Hourly 2018 SCDOT count data for the most recent 365-days were analyzed to determine the 30th highest AM and PM peak hours. The 30th highest AM peak hour occurred on Tuesday May 15, 2018 from 7:00 to 8:00 AM. The 30th highest PM peak hour occurred on Thursday July 26, 2018 from 5:00 to 6:00 PM. By using the relationship between the 30th highest hours and traffic counted by CDM Smith on August 8, 2018, a 4% factor was developed that was applied to the August 8, 2018 counts to bring them up to the 30th highest day. These adjusted turning movement counts became the existing Design Hour Volumes (DHV) and were the basis of all subsequent capacity analysis.

10.1.2 Existing Speeds and LOS

INRIX speed data collected in May and August 2018 suggest undesirable speeds through the project limits as well as west and east of the project limits. The average eastbound AM peak hour speed in May and between August 1-15, 2018 was 30-35 mph. The average westbound PM peak hour speed during that same approximately 6-weeks' time period was 35-40 mph. The speed limit on US 278 within the study area boundary is 45 mph, 50 mph, and 55 mph, depending on the location.

Two of the three signalized intersections are operating at an acceptable LOS today, but the Squire Pope Road intersection is operating at LOS F in the PM peak hour. The more significant problem on US 278 is that excessive delays occur at all the unsignalized stop controlled intersections, even though most of the volumes are moderate. In fact, in the Synchro analysis software, the modeled delays are extreme, suggesting that motorists need to accept small gaps to get into the US 278 traffic stream. Accepting a smaller than desirable gap creates unsafe conditions. All the stop-controlled intersections allow left turns from the side streets, and this movement is especially problematic, though motorists can elect to make it in two parts- crossing to the median, and then completing the turn into the traffic stream. The safety concerns associated with the existing conditions along Jenkins Island are being addressed with the Jenkins Island Superstreet concept, though CDM Smith has some concerns with this design. **Figure 80** and **Figure 81** depict a summary of existing 2018 AM and PM peak hour intersection and segment LOS.

10.1.3 Crashes

In the 5.5-year reporting period, there were 797 crashes in the study area limits with about 59% being rear end and about 19% being angle. Rear end crashes are typically less severe than any other type of crash. Almost 24% of the total crashes resulted in an injury and there were 4 fatalities, 2 of which involved pedestrians. Of the 797 crashes, 327, or about 41%, occurred in the peak ours.

Angle crashes at the Salt Marsh Drive intersection are of sufficient magnitude to meet the Crash Experience Warrant (Warrant 7) in the MUTCD. One of the four fatal crashes involved a pedestrian and was near the Salt Marsh Drive intersection.

Figure 80: US 278 2018 Existing AM Levels of Service Summary

Figure 81: US 278 2018 Existing PM Levels of Service Summary

At all the unsignalized intersections, there is a concentration of angle crashes, thereby supporting the safety concern the Jenkins Island Superstreet is addressing and that this study has identified excessive delays at unsignalized intersections resulting in motorists accepting unsafe gaps.

10.2 Future Traffic Projections

Year 2018 intersection AM and PM Design Hour Volumes were factored up by an annual rate of 1.19% to estimate year 2025 and 2045 Design hour Volumes. The annual growth rate was developed from an updated/adjusted version of the LATS model whereby CDM Smith removed tolls from the forecast, adjusted the trip table to ensure that 2040 volumes were higher than 2017 volumes, and adjusted speeds on under-assigning roads. The results of these adjustments were then independently checked against other growth rates in the vicinity of Hilton Head Island.

10.2.1 2025 No Build Conditions

As would be expected, conditions worsen in 2025 with steady traffic growth expected and no improvements in place. The unsignalized movements will continue to operate with long delays and side street motorists will be faced with accepting longer delays and/or shorter gaps to make turns onto US 278. **Figure 82** and **Figure 83** depict a summary of 2025 No Build AM and PM peak hour intersection and segment LOS.

10.2.2 2045 No Build Conditions

In 2045 a no build scenario will result in a PM peak hour LOS F at the Squire Pope Road and Wild Horse Road/Spanish Wells Road intersections. In the AM peak hour, these two intersections should operate at LOS C. The US 278 at Moss Creek Drive signalized intersection will continue to operate at an acceptable LOS. The vast majority of unsignalized movements from the side streets onto US 278 are expected to operate at LOS F with extremely long delays anticipated. **Figure 84** and **Figure 85** depict a summary of 2045 No Build AM and PM peak hour intersection and segment LOS.

10.2.3 Jenkins Island Superstreet

The Jenkins Island Superstreet concept calls for making the following changes on US 278:

- Widen US 278 to 3-lanes per direction
- Close the Crosstree Drive median opening
- Close the Jenkins Road median opening
- Signalize the Blue Heron Point Road intersection but prohibit the left turn movement from Blue Heron Point Road onto US 278. Allow westbound left turn movements from US 278 to Blue Heron Point Road and allow U-turns from westbound US 278. US 278 will have to be modified by adding a “bulb out” to accomplish the westbound U-turn movement.
- Install a U-turn traffic signal for eastbound US 278 just east of Jenkins Road.

These changes to US 278 on Jenkins Island will eliminate all left turn movements from the side streets onto US 278. The concern CDM Smith has with this concept is introducing two new traffic signals on US 278. CDM Smith also has concerns regarding the excessive delays the right-out movements from the side streets will experience. Acceleration lanes for the right turn movements like what the Superstreet Concept is proposing at Crosstree Drive would mitigate some of the excessive right-out delays expected in 2045.

The traffic study was conducted with the understanding that the Jenkins Island Superstreet project is committed. As such, CDM Smith developed a scenario called: 2045 No Build Plus (+) that includes the Jenkins Island Superstreet but no other road improvements. Consequently, CDM Smith conducted capacity analysis for the 2045 No Build + Alternative and all subsequent alternative capacity analysis includes the Jenkins Island Superstreet. **Figure 86** and **Figure 87** depict a summary of 2045 No Build + AM and PM peak hour intersection and segment LOS.

10.2.4 Alternatives Analysis - Year 2045 Design Year

Including the 2045 No Build + Alternative, which includes the Jenkins Island Superstreet, a total of 17 roadway improvement alternatives were analyzed. From that initial 17 alternatives, six were selected to advance through the functional design phase and they are labeled as Reasonable Alternative 1, Reasonable Alternative 2, Reasonable Alternative 3, Reasonable Alternative 4, Reasonable Alternative 5, and Reasonable Alternative 6. Each of these reasonable alternatives adds one lane per direction on US 278 between Bluffton Parkway and the Blue Heron Point Road. Four of the reasonable alternatives retain the Jenkins Island Superstreet concept and two propose new alignment on Jenkins Island, hence the Superstreet concept is not retained because the existing US 278 alignment becomes a local road.

An AM and PM peak hour LOS summary for Reasonable Alternatives 1-6 are shown in **Figure 88** through **Figure 99**. Because of the similarities between each alternative, they each produce similar traffic operation/LOS results. Each reasonable alternative calls for new traffic signals at Salt Marsh Drive and Fording Island Road Extension, and these new traffic signals should operate at a very good LOS in 2045. Each reasonable alternative has an interchange at the Pinckney Wildlife Refuge with unsignalized right-in and right-out movements. These right-in and right-out movements will operate with long delays as stop-controlled junctions, so CDM Smith recommends generous right turn radii and long acceleration lanes to mitigate the delays.

Figure 82: US 278 2025 No Build AM Levels of Service Summary (Excludes Jenkins Island Superstreet)

Figure 83: US 278 2025 No Build PM Levels of Service Summary (Excludes Jenkins Island Superstreet)

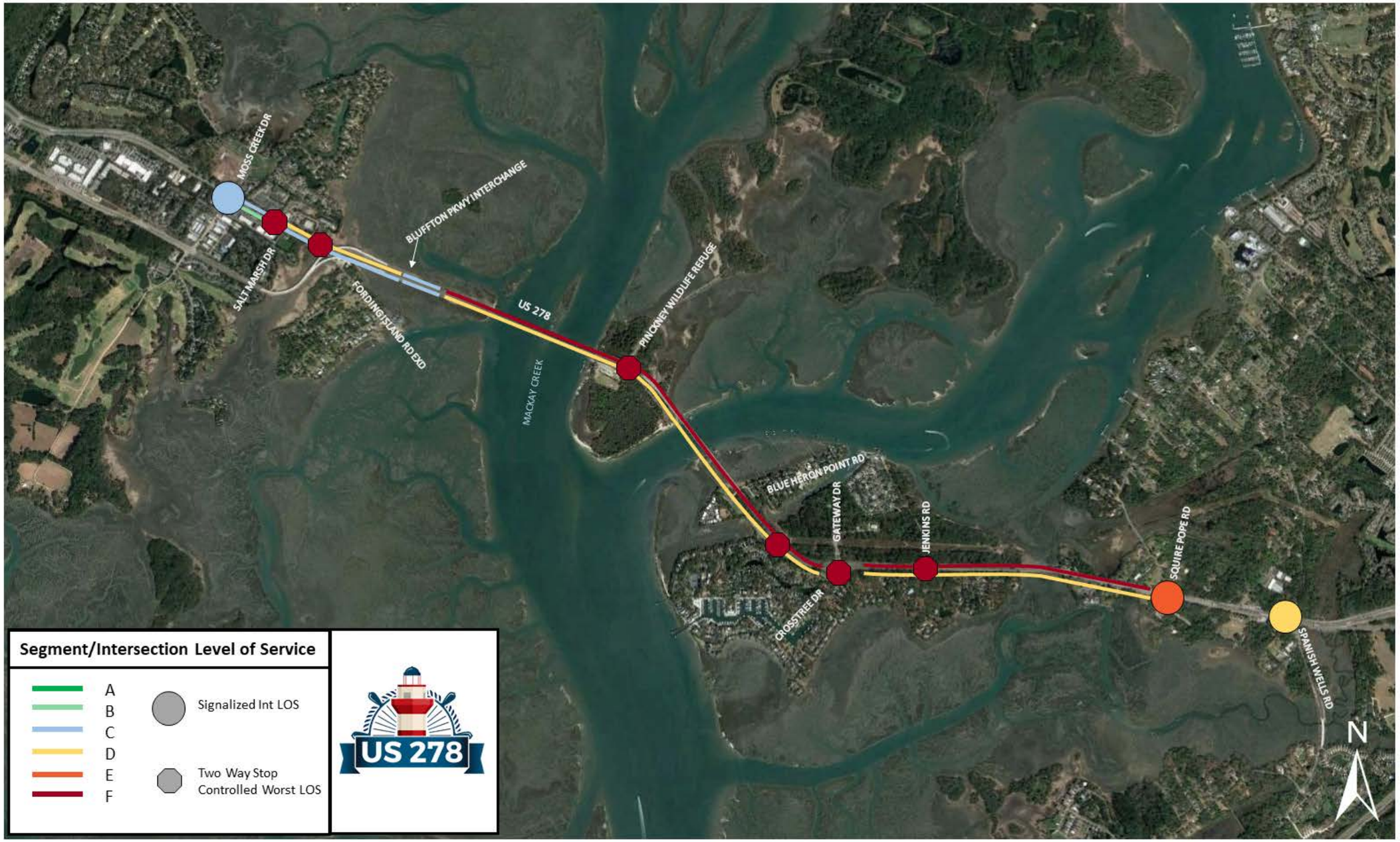


Figure 84: US 278 2045 No Build AM Levels of Service Summary (Excludes Jenkins Island Superstreet)

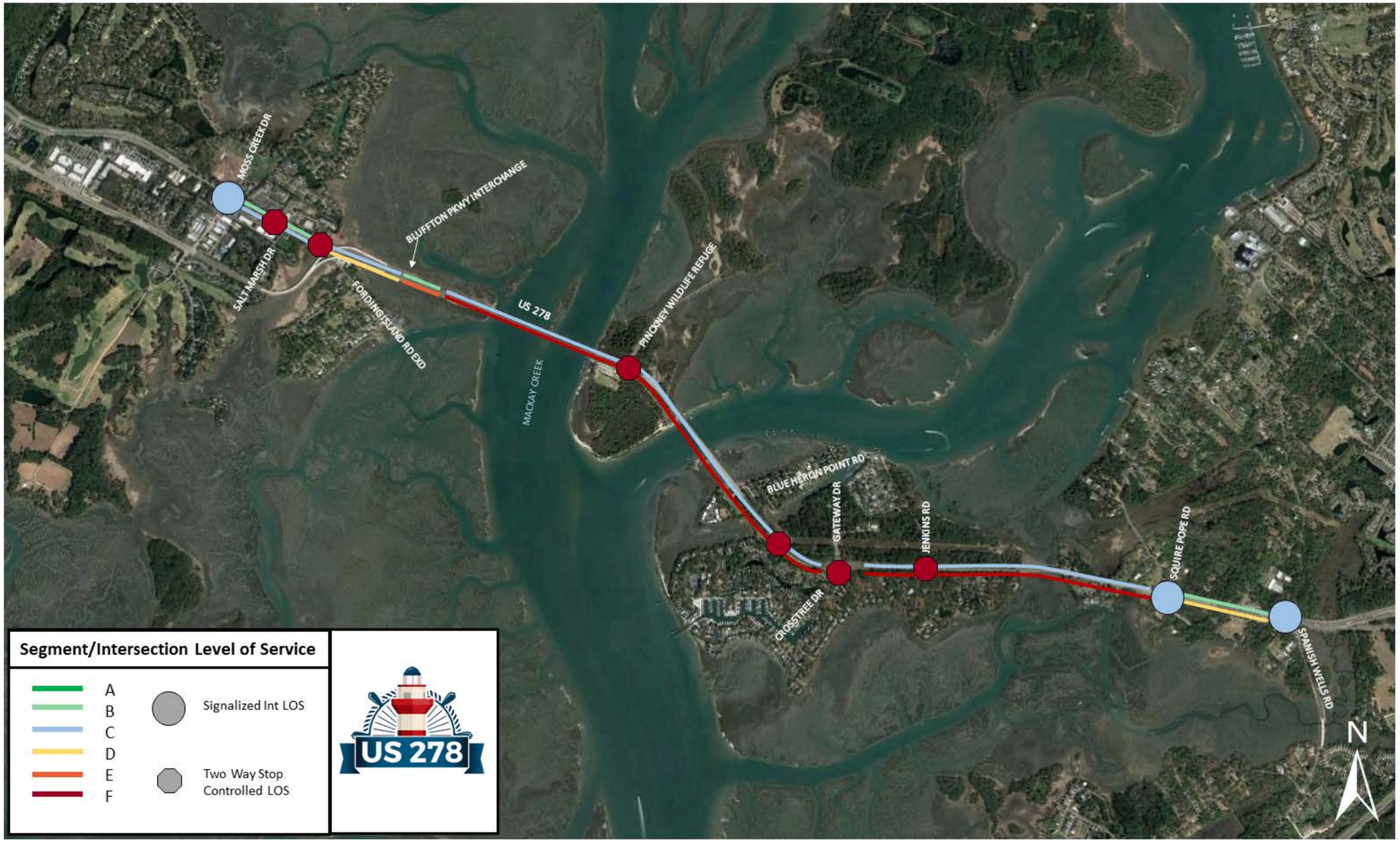


Figure 85: US 278 2045 No Build PM Levels of Service Summary (Excludes Jenkins Island Superstreet)

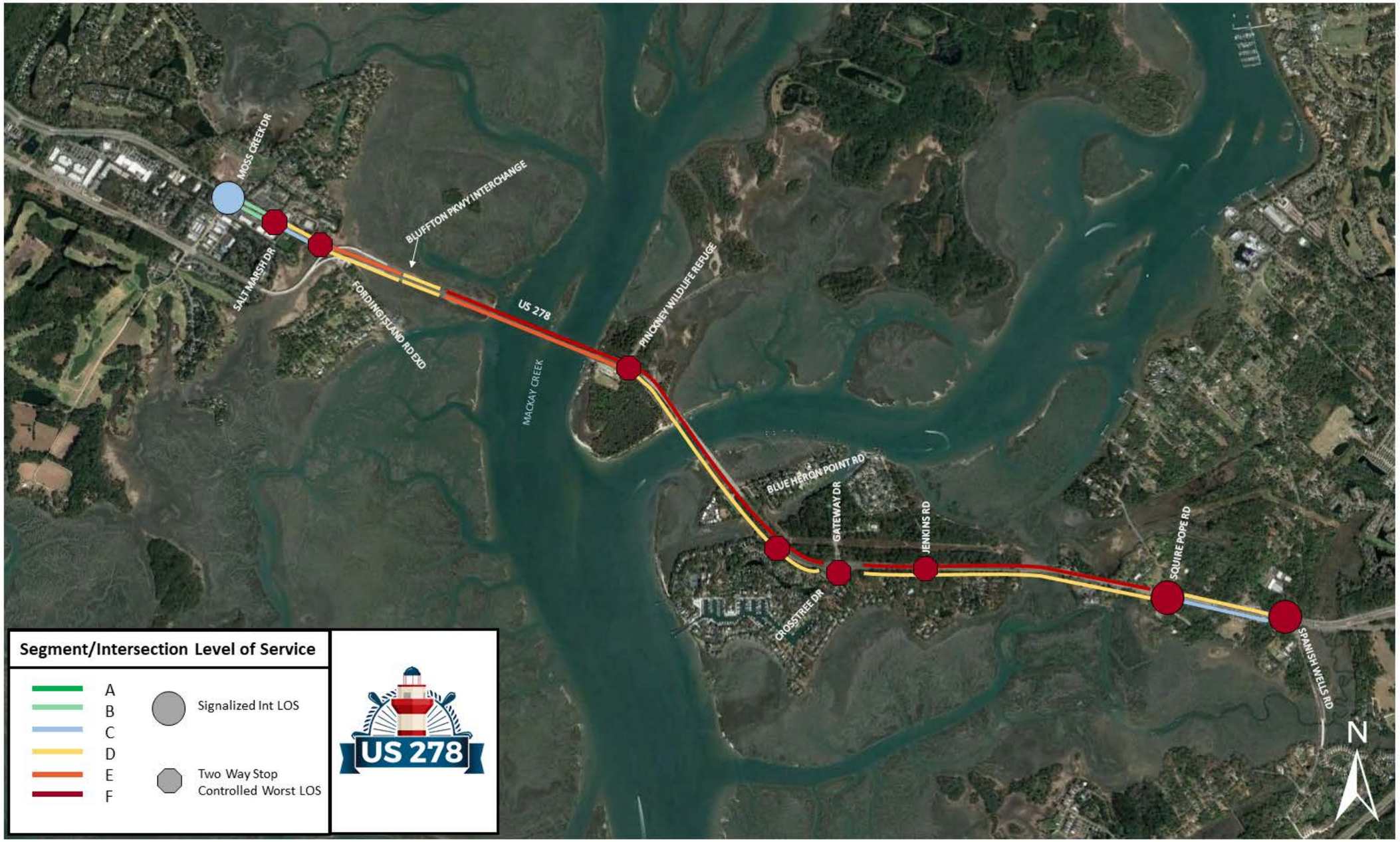


Figure 86: US 278 2045 No Build Plus AM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 87: US 278 2045 No Build Plus PM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 88: US 278 2045 Reasonable Alternative 1 AM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 89: US 278 2045 Reasonable Alternative 1 PM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 90: US 278 2045 Reasonable Alternative 2 AM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 91: US 278 2045 Reasonable Alternative 2 PM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 92: US 278 2045 Reasonable Alternative 3 AM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 93: US 278 2045 Reasonable Alternative 3 PM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 94: US 278 2045 Reasonable Alternative 4 AM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 95: US 278 2045 Reasonable Alternative 4 PM Levels of Service Summary (Includes Jenkins Island Superstreet)

Figure 96: US 278 2045 Reasonable Alternative 5 AM Levels of Service Summary

Figure 97: US 278 2045 Reasonable Alternative 5 PM Levels of Service Summary

Figure 98: US 278 2045 Reasonable Alternative 6 AM Levels of Service Summary

Figure 99: US 278 2045 Reasonable Alternative 6 PM Levels of Service Summary

In all six reasonable alternatives, westbound US 278 is projected to operate at LOS E in the afternoon peak from the Pinckney Wildlife Refuge interchange to Bluffton Parkway. Although a segment LOS E is not desirable, it is CDM Smith's opinion that it is acceptable given the uncertainties of projecting year 2045 traffic.

Reasonable Alternatives 1-3 retain the Superstreet concept in its entirety. Under normal stop-controlled operation, the right-out movements from Gateway Drive and Jenkins Road will operate with extremely long delays and/or motorists will accept unsafe gaps. CDM Smith recommends that all right-out movements from these two intersections have large radii and acceleration lanes like what is proposed by HDR, the Jenkins Island Superstreet consultant, for the eastbound right turn at Gateway Drive. The U-turn traffic signals proposed at Crosstree Drive/Gateway Drive and just east of Jenkins Road will operate at a very good LOS with delays being minimal. These two signalized intersections will not meet the volume traffic signal warrants, but they may be warranted from a crash history (Warrant 7- Crash Experience) or road network (Road Network Warrant 8) standpoint. While CDM Smith understands the safety reason for constructing the Superstreet, we have concerns about introducing two new traffic signals that will have small side-street volumes associated with them. Ideally, all Jenkins Island traffic would be concentrated at one full-movement signalized intersection, but this concept would require reconfiguring local roads. A separate tech memo was submitted to SCDOT describing the concerns with the Superstreet concept, which is provided in the Appendix.

Reasonable Alternative 4 retains the Superstreet concept to the extent that it can, but the new alignment south of the current alignment disturbs the proposed Blue Heron Point Road intersection, making it obsolete. For this alternative, CDM Smith proposes the Blue Heron Point traffic signal instead be located at Crosstree Drive/Gateway Drive.

Reasonable Alternatives 1-4 retain the Squire Pope Road and Spanish Wells Road signalized intersections but recommend additional lanes. Despite more lanes at these intersections, the analysis indicates PM peak hour LOS E conditions in 2045. Again, given the uncertainties associated with long term traffic projections, the anticipated LOS E conditions are acceptable.

Reasonable Alternatives 5 and 6 propose new alignment for US 278 across Jenkins Island up to Old Wild Horse Road. A new alignment is more expensive than widening the existing alignment, but the new road segment offers two advantages over widening the existing alignment of US 278:

- Some of existing US 278 can be repurposed since only local access will be needed. This local traffic can be accommodated with one lane per direction.
- The new alignment alternative mitigates the Jenkins Island Superstreet concerns that CDM Smith has regarding long delays and two new traffic signals.

The clear disadvantage of US 278 on new alignment across Jenkins Island is that the Superstreet becomes obsolete.

Even though functional plans were not developed for a reversible lane between Bluffton Parkway and Blue Heron Point Road that would include the Mackay Creek and Skull Creek bridges, CDM Smith nevertheless conducted traffic analysis in the spirit of thoroughness. The theory is that a reversible lane may save on construction cost because one less lane would be built. Because they propose completely new bridges on new alignment, Reasonable Alternatives 4 and 6 could be adapted to include a reversible lane so five instead of six total lanes would be built. The other reasonable alternatives could all also be modified to eliminate one traffic lane of construction.

In conclusion, the traffic analysis supports the proposal that one additional traffic lane in each direction is sufficient to meet the long-term traffic level of service and mobility needs of US 278. Some additional auxiliary lanes will be needed at the Squire Pope Road and Wild Horse Road/Spanish Wells Road intersections. CDM Smith is also proposing new traffic signals at the Salt Marsh Drive and Fording Island Road Extension intersections based on a combination of crashes, poor service levels, and the need to concentrate traffic in a few key locations. The exact timing of when to install the new traffic signals needs to be identified.

There is no clear-cut preferred alternative between the 6 reasonable alternatives in terms of the traffic operations and LOS. All 6 reasonable alternatives produce acceptable, but similar results. It should be noted that some isolated 2045 LOS E conditions were left unmitigated because the cost to mitigate them would have been high relative to the benefit the further improvement would yield. Because there was not a clear preferred alternative from a traffic engineering perspective, the selection of the preferred alternative will likely be based on other criteria such as constructability, cost, and impact to the environment.

APPENDICES

- APPENDIX A: RAW COUNTS
- APPENDIX B: SYNCHRO LOS
- APPENDIX C: HCS LOS
- APPENDIX D: INRIX DATA
- APPENDIX E: CRASH SPREADSHEETS
- APPENDIX F: CRASH HEAT MAPS
- APPENDIX G: JENKINS ISLAND SUPERSTREET MEMO_07082019