US 278 Corridor Improvements

Hilton Head Island – US 278 Gateway Corridor Committee Meeting
December 11, 2019

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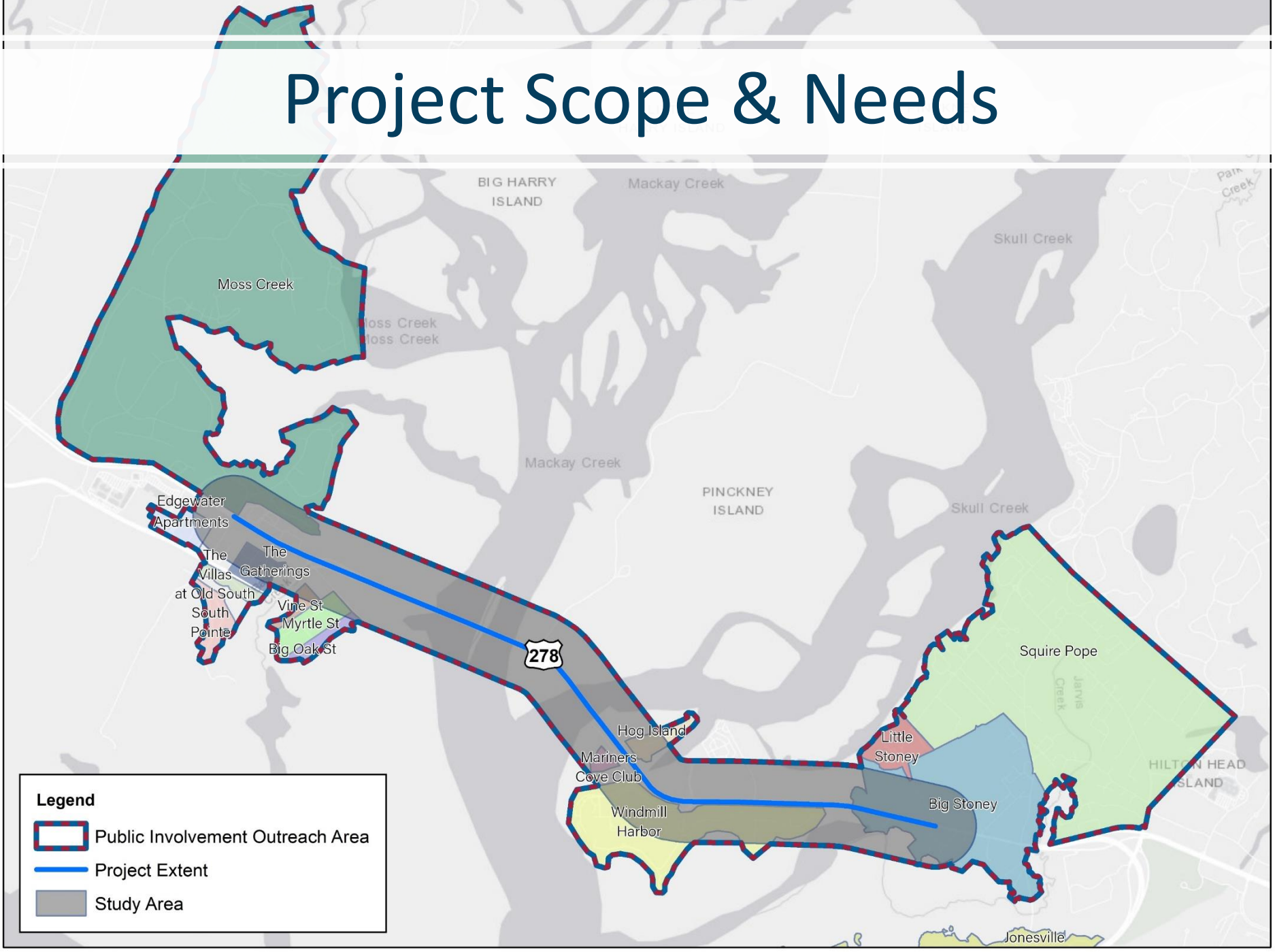
Project Scope & Needs



Purpose & Need

The purpose of this project is to **address structural deficiencies** at the existing eastbound Mackay Creek bridge, as well as **increase capacity** and **reduce congestion** along US 278 from Moss Creek Drive to Spanish Wells Road.

Structural Deficiencies | **Capacity** | **Congestion**

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THE DEVELOPMENT PROCESS FOR HIGHWAYS

This graphic demonstrates the general project development process for planning and building highways.

*Process depicted on this graphic is for projects being developed under an Environmental Assessment or Environmental Impact Statement; smaller projects developed under a Categorical Exclusion do not require a Public Hearing.

Today's Agenda

- Overview of Traffic Analysis
- Engineering-Level Traffic Analysis
  - *Mainline Volume Analysis*
  - *Intersection Analysis*
  - *Safety Analysis*
- Alternatives Comparison
- Next Steps

Note: The information contained within this presentation is representative of the project data available at the time the presentation was developed and is subject to change.

Traffic Analysis

Planning-Level

For Environmental Analysis & Development of Alternatives

- Purpose and Need
- Development of Alternatives
- Evaluation of Alternatives
- Concept Plans for Recommended Preferred Alternative

Engineering-Level

For Final Design of the Recommended Preferred Alternative

- Mainline Capacity
- Intersection Design
- Access Management
- Traffic Operations and Signalization
- Wayfinding

Traffic Analysis

Data Collection

Existing Geometry

- Segment number of lanes
- Intersection configuration & traffic control
- Posted speed limits

Traffic Volumes

INRIX Speed Data

Historical AADT from SCDOT

5-Year Crash History

Signal Timings

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Traffic Analysis

Data Collection

- Existing Geometry
- **Traffic Volumes**
  - Over 24-hour period (Segments)
  - Peak Periods: AM, Mid-day, PM (intersections)
- INRIX Speed Data
- SCDOT Historical AADT
- 5-Year Crash History
- Signal Timings

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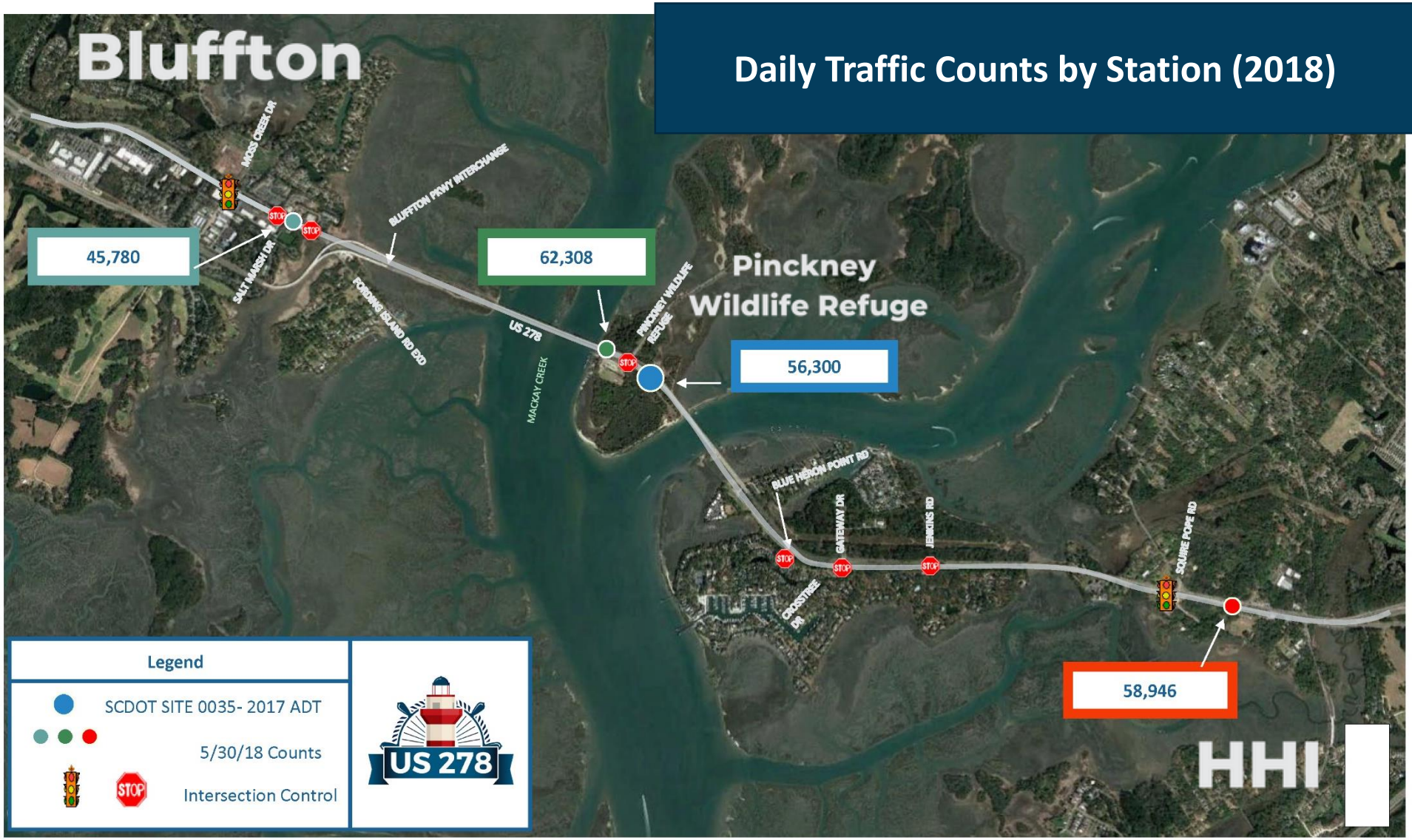
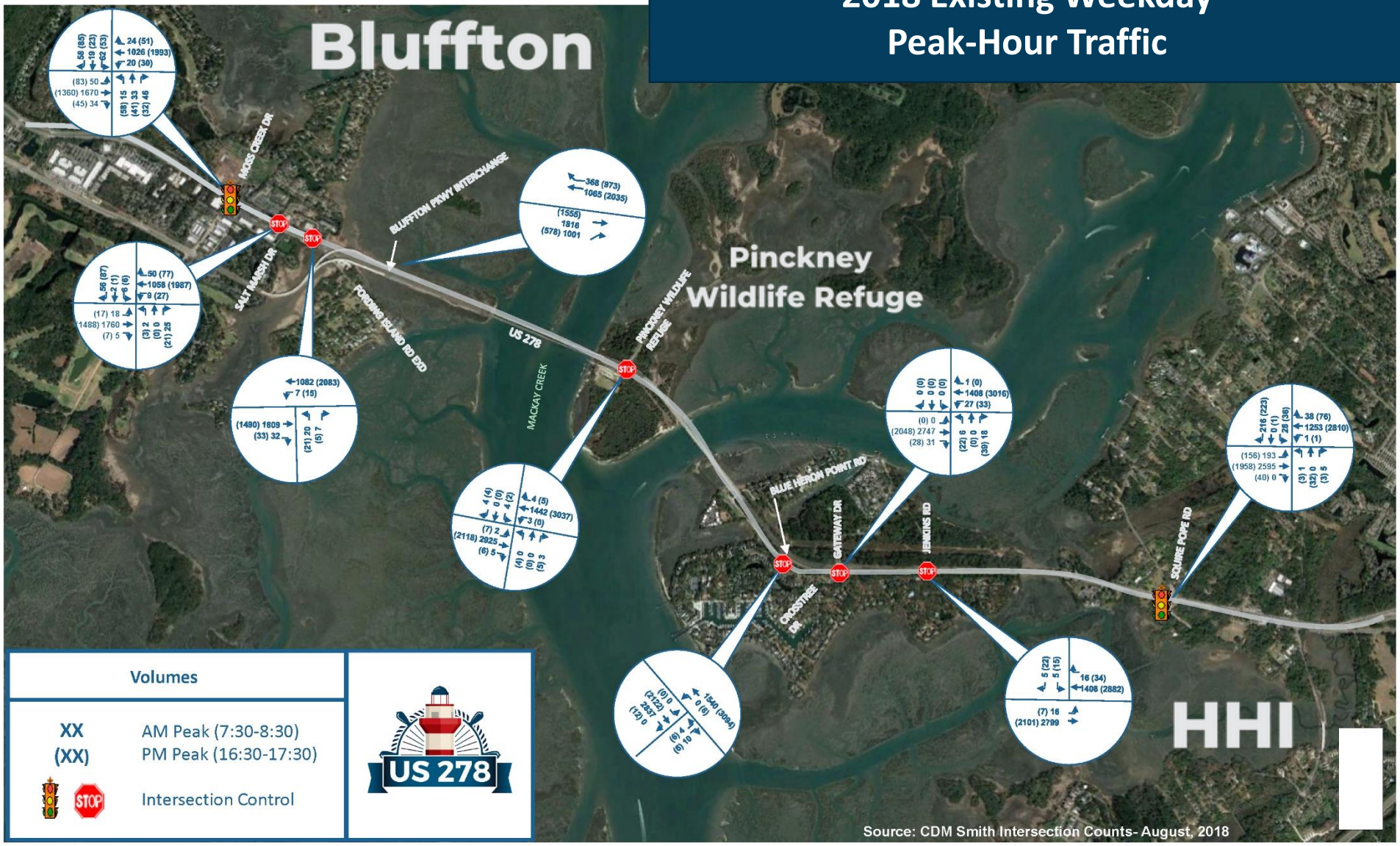
Daily Traffic Counts by Station (2018)



2018 Existing Weekday Peak-Hour Traffic



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Traffic Analysis

Data Collection

- Existing Geometry
- Traffic Volumes
- **INRIX Speed Data**
- SCDOT Historical AADT
- 5-Year Crash History
- Signal Timings

	AM	PM
OBSERVED SPEED	30-35	35-45
	Eastbound	Both Directions

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Traffic Analysis

Data Collection

- Existing Geometry
- Traffic Volumes
- INRIX Speed Data
- **SCDOT Historical Average Annual Daily Traffic (AADT)**
- 5-Year Crash History
- Signal Timings

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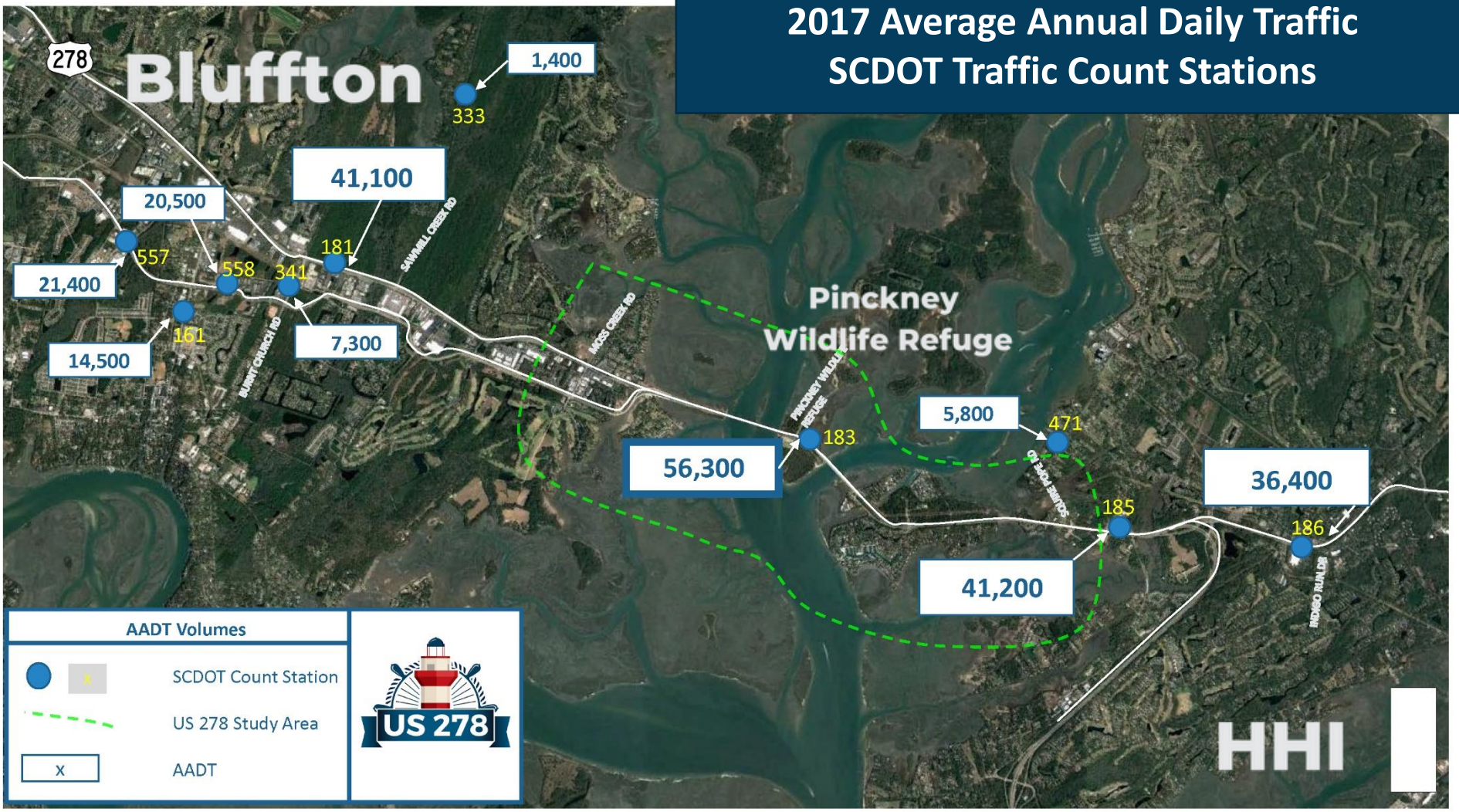
2017 Average Annual Daily Traffic
SCDOT Traffic Count Stations



Traffic Analysis

Data Collection

- Existing Geometry
- Traffic Volumes
- INRIX Speed Data
- SCDOT Historical AADT
- **5-Year Crash History**
- Signal Timings

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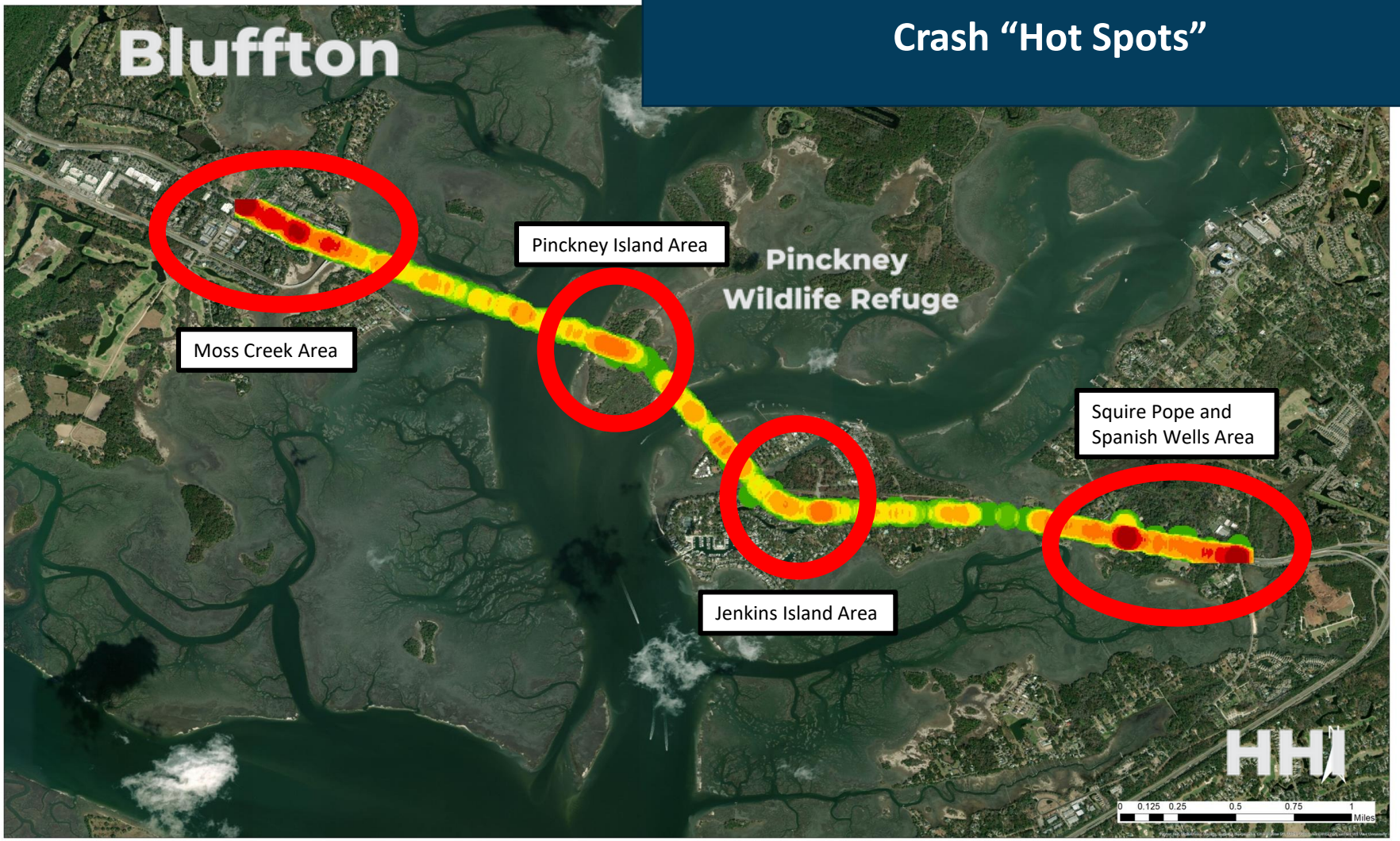
Crash "Hot Spots"



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Traffic Analysis

Data Collection

- Existing Geometry
- Traffic Volumes
- INRIX Speed Data
- SCDOT Historical AADT
- 5-Year Crash History
- **Signal Timings**

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Engineering-Level Traffic Analysis

Software

- Analysis is based on Highway Capacity Manual (Industry Guidelines)
- Segment Analysis – HCS7
- Intersection Analysis – Synchro10

Design Volume

- Design Hour Standard Practice: establish highway design volumes based on an hour between the 30th and 100th highest hour of the year

  American Association of State Highway and Transportation Officials (AASHTO)

Design Hour Volume Development

- **Continuous Count Station ATR 35 on US 278**
- **Yellow: 30th & 100th highest AM & PM hours**
- **Green: AM & PM peak hour from turning movement count date**
- **Orange: 30th highest Summer AM & PM hours**

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

Mainline Volume Analysis

How to Determine Number of Lanes Needed

High-Level: Use Generalized Level of Service Volume Tables:

DAILY

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
2	Undivided	8,600	17,000	24,200	33,300
4	Divided	36,700	51,800	65,600	72,600
6	Divided	55,000	77,700	98,300	108,800

INTERRUPTED FLOW FACILITIES

STATE SIGNALIZED ARTERIALS

Class I (40 mph or higher posted speed limit)

Lanes	Median	B	C	D	E
2	Undivided	*	16,800	17,700	**
4	Divided	*	37,900	39,800	**
6	Divided	*	58,400	59,900	**
8	Divided	*	78,800	80,100	**

PEAK HOUR

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
1	Undivided	420	840	1,190	1,640
2	Divided	1,810	2,560	3,240	3,590
3	Divided	2,720	3,840	4,860	5,380

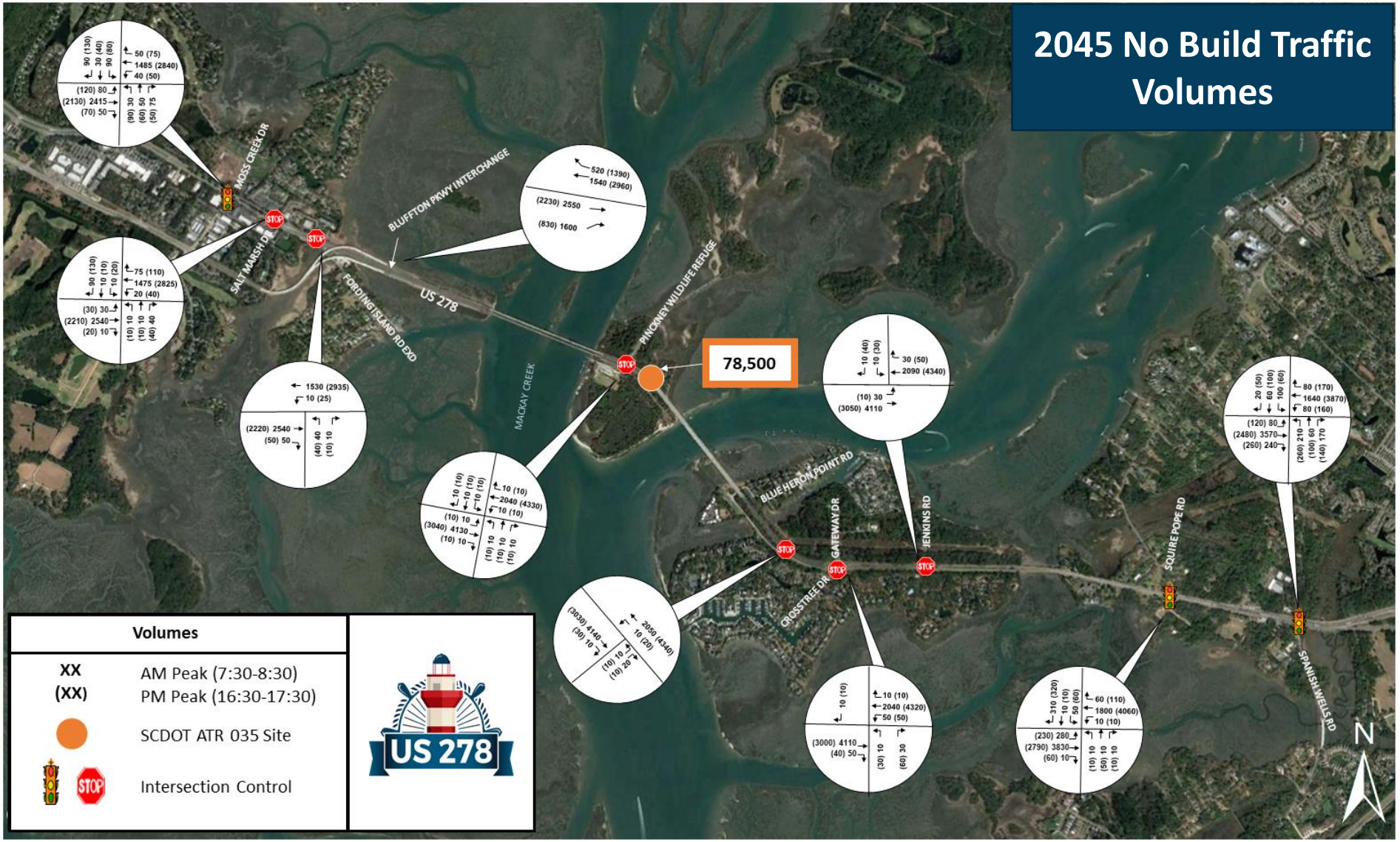
INTERRUPTED FLOW FACILITIES

STATE SIGNALIZED ARTERIALS

Class I (40 mph or higher posted speed limit)

Lanes	Median	B	C	D	E
1	Undivided	*	830	880	**
2	Divided	*	1,910	2,000	**
3	Divided	*	2,940	3,020	**
4	Divided	*	3,970	4,040	**

2045 No Build Traffic Volumes



UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
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6	Divided	55,000	77,700	98,300	108,800

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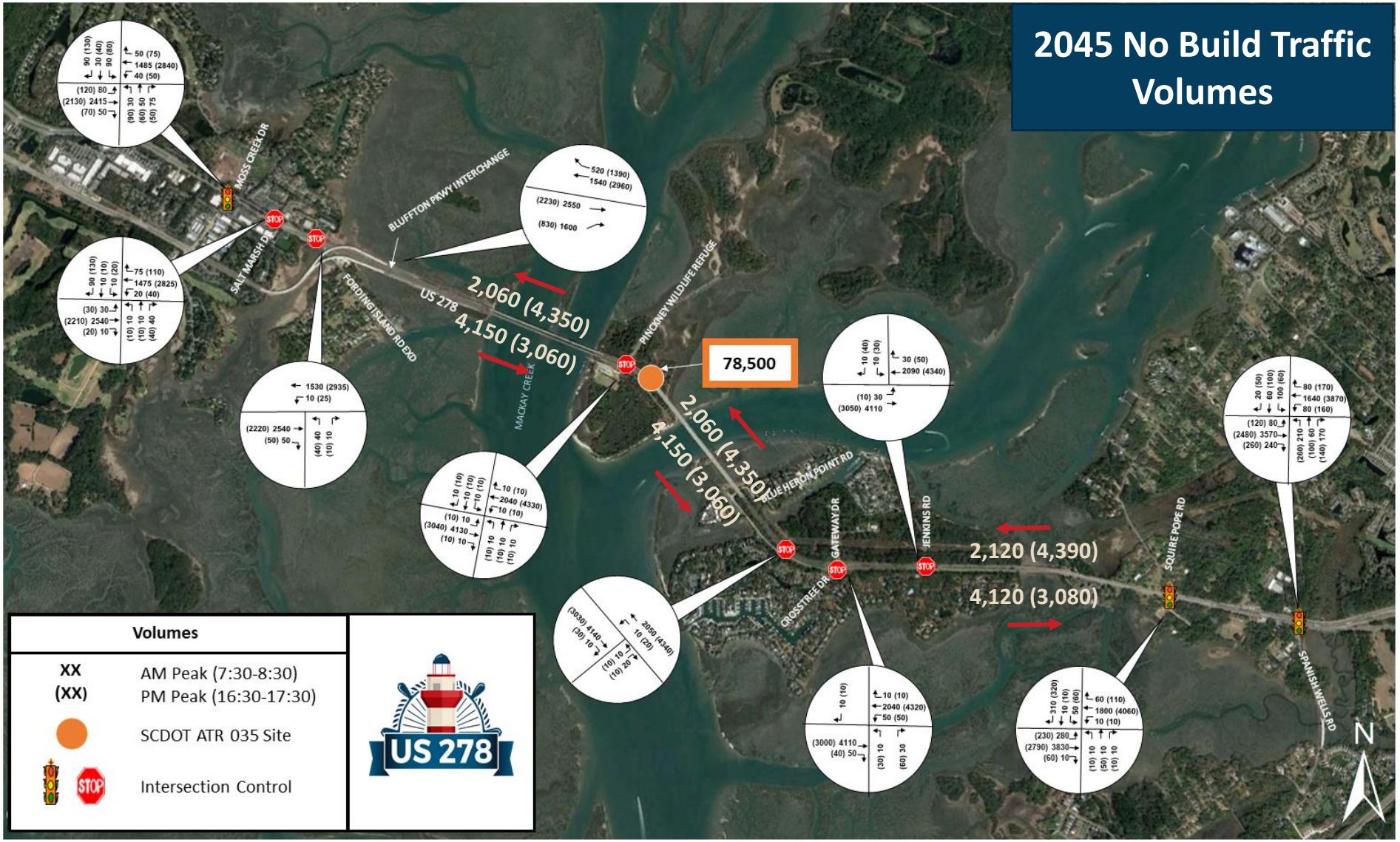
2045 No Build Traffic Volumes



UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
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Mainline Volume Analysis

Will a Reversible Lane Work?

AM Peak:

- 4,150 eastbound: Need 3 eastbound lanes to maintain LOS D
- 2,120 westbound: Need 2 westbound lanes to maintain LOS C

PM Peak:

- 4,390 westbound : Need 3 westbound lanes to maintain LOS D
- 3,080 eastbound: Need 2 eastbound lanes to maintain LOS D

PEAK HOUR

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
1	Undivided	420	840	1,190	1,640
2	Divided	1,810	2,560	3,240	3,590
3	Divided	2,720	3,840	4,860	5,380

Mainline Volume Analysis

Will a Reversible Lane Work by Segment?

HCS Analysis Results

Between Bluffton Parkway and Pinckney Wildlife Refuge:

AM Peak

- Eastbound – LOS D
- Westbound – LOS C

PM Peak

- Eastbound – LOS E
- Westbound LOS E

Between Pinckney Wildlife Refuge and Blue Heron Point Rd:

AM Peak

- Eastbound – LOS D
- Westbound – LOS C

PM Peak

- Eastbound – LOS D
- Westbound LOS D

Intersection Analysis

What do we measure?

- Directional Delay (seconds)
- Level of Service (LOS)
- Volume/Capacity Ratio
- Queue Lengths

LOS	Delay (seconds)
A	< 10
B	10 – 20
C	20 – 35
D	35 – 55
E	55 – 80
F	> 80

Preliminary Intersection Analysis

Intersection	2018 Existing		2045 No Build		2045 RAS 1-4		2045 RAs 5-6	
	AM	PM	AM	PM	AM	PM	AM	PM
Moss Creek Road	B	C	C	C	C	C	C	C
Salt Marsh Drive	F *	F *	F *	F *	A	A	A	A
Fording Island Road	F *	F *	F *	F *	A	A	A	A
Pinckney Wildlife Refuge	F *	F *	F *	F *	F *	F *	F *	F *
Blue Heron Point Road	F *	F *	F *	F *	D	C	-	-
Crosstree Drive/Gateway Drive	F *	F *	F *	F *	F *	F *	D	E
Jenkins Road	F *	F *	F *	F *	D *	F *	-	-
Squire Pope Road	A	F	C	F	D	E	C	C
Wild Horse Road/Spanish Wells Road	B	D	C	F	C	E	D	E

- Denotes unsignalized intersection

Note: The projected levels of service (LOS) provided in this graphic are not representative of the final design. Refinements to improve the performance of the reasonable alternatives are in progress at this time with the goal to achieve acceptable LOS (D or above).

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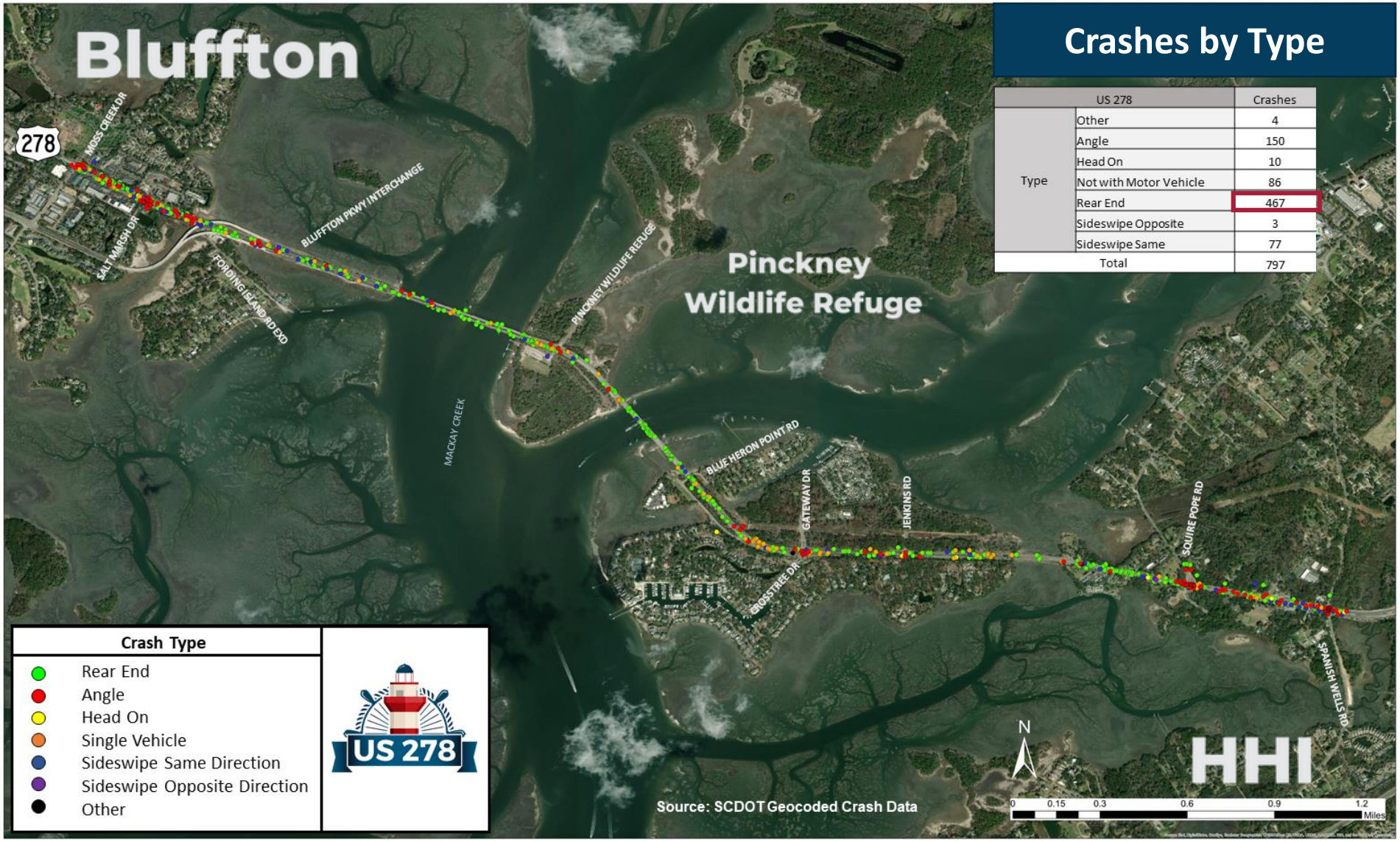
Safety Analysis

How do we analyze crashes?

- Total Number of Crashes
- Types of Crashes
  - *Angle, Head On, Single Vehicle, Rear End, Sideswipe*
- Severity of Crashes
  - *Property Damage Only, Injury, Fatality*
- Crashes During the Peak Hours
- Location or Clustering of Crashes
- Involvement with Pedestrians or Bicyclists



Crashes by Type

US 278		Crashes
Type	Other	4
	Angle	150
	Head On	10
	Not with Motor Vehicle	86
	Rear End	467
	Sideswipe Opposite	3
	Sideswipe Same	77
Total		797

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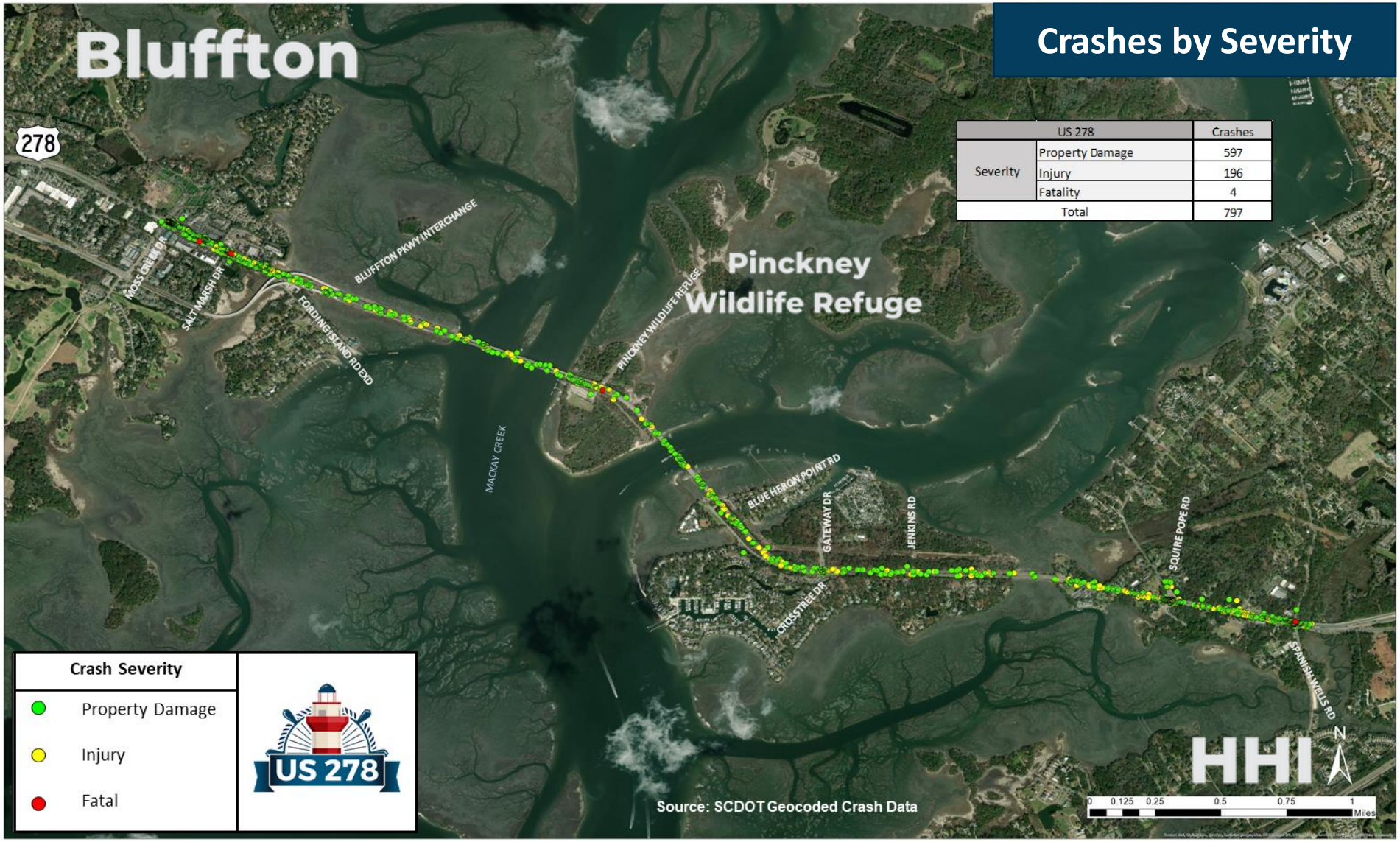
Crashes by Severity



US 278		Crashes
Severity	Property Damage	597
	Injury	196
	Fatality	4
Total		797

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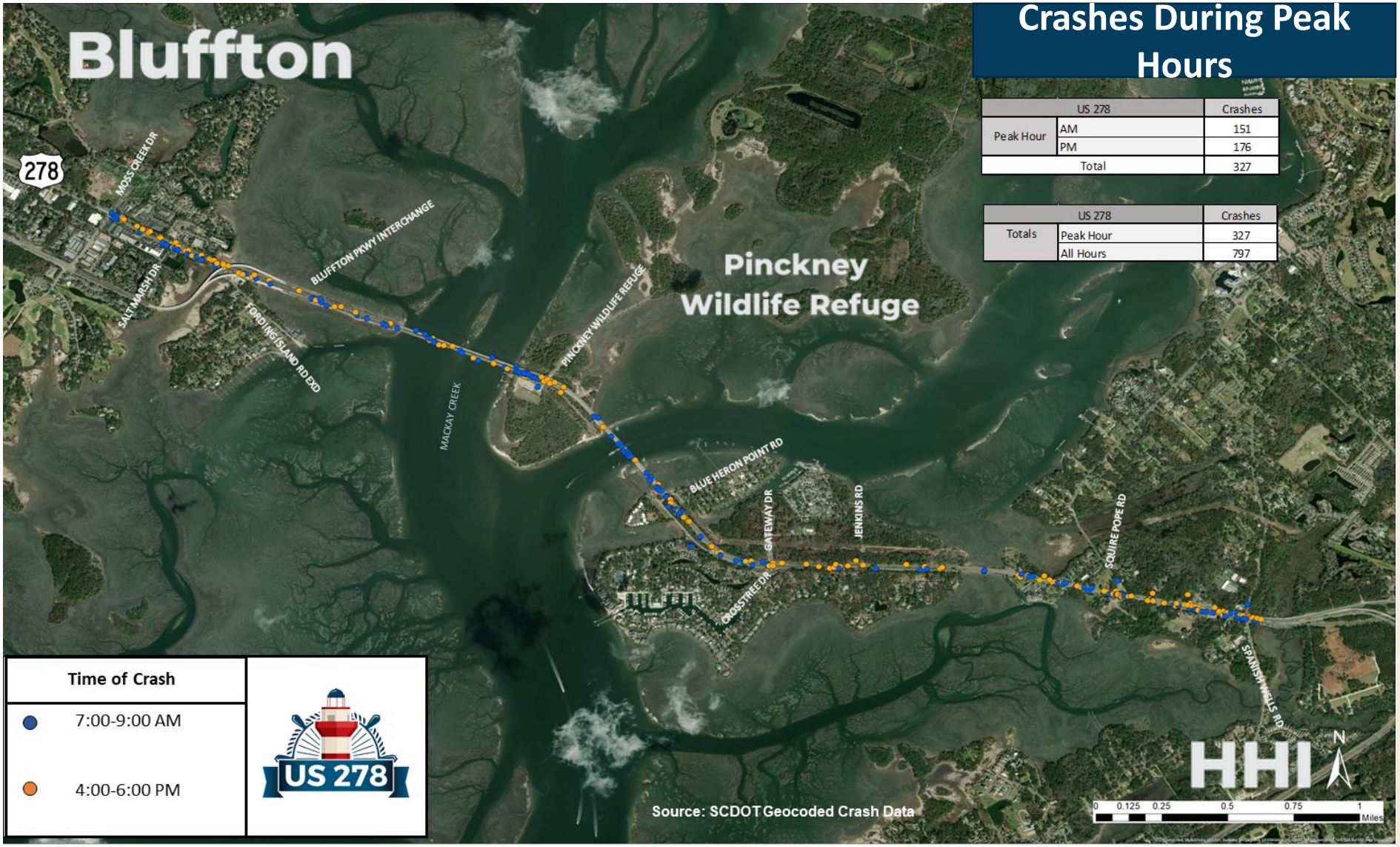
Crashes During Peak Hours

US 278		Crashes
Peak Hour	AM	151
	PM	176
Total		327

US 278		Crashes
Totals	Peak Hour	327
	All Hours	797



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Alternatives Analysis

6 Reasonable Alternatives each consisting of the following:

- Between Moss Creek Drive and Salt Marsh Drive
  - *No widening*
  - *10-foot paved multiuse path on south side of US 278*
  - *5-foot sidewalk on north side of US 278 (optional)*
- Multiuse path located on south side from Moss Creek Drive to Blue Heron Point Road and on north side from Blue Heron Point Road to Wild Horse Road/Spanish Wells Road
- Jenkins Island Superstreet is assumed
- Eastbound bridge over Mackay Creek will be replaced
- Access to Pinckney Wildlife Refuge will be right-in/right-out

Reasonable Alternatives – Preliminary Intersection LOS

Intersection	2045 No Build		2045 Reasonable Alternatives 1-4	
	AM	PM	AM	PM
Pinckney Wildlife Refuge	F *	F *	F *	F *
Blue Heron Point Road	F *	F *	D	C
Crosstree Drive/Gateway Drive	F *	F *	F *	F *
Jenkins Road	F *	F *	D *	F *
Squire Pope Road	C	F	D	E
Wild Horse Road/Spanish Wells Road	C	F	C	E

- Denotes unsignalized intersection

Note: The projected levels of service (LOS) provided in this graphic are not representative of the final design. Refinements to improve the performance of the reasonable alternatives are in progress at this time with the goal to achieve acceptable LOS (D or above).

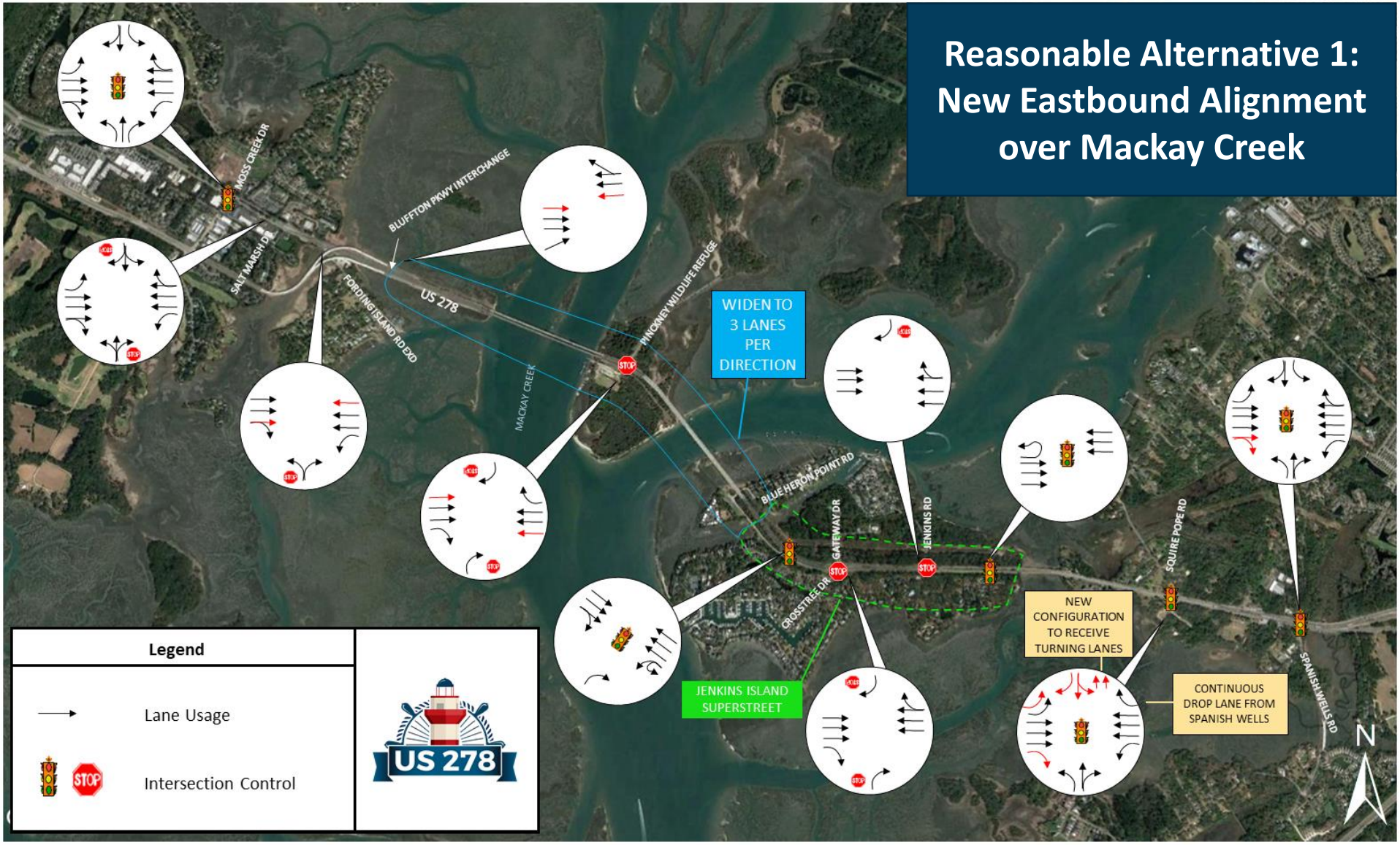
Reasonable Alternatives – Preliminary Intersection LOS

Intersection	2045 No Build		2045 Reasonable Alternatives 5-6	
	AM	PM	AM	PM
Pinckney Wildlife Refuge	F *	F *	F *	F *
Blue Heron Point Road	F *	F *	-	-
Crosstree Drive/Gateway Drive	F *	F *	D	E
Jenkins Road	F *	F *	-	-
Squire Pope Road	C	F	C	C
Wild Horse Road/Spanish Wells Road	C	F	D	E

- Denotes unsignalized intersection

Note: The projected levels of service (LOS) provided in this graphic are not representative of the final design. Refinements to improve the performance of the reasonable alternatives are in progress at this time with the goal to achieve acceptable LOS (D or above).

Reasonable Alternative 1: New Eastbound Alignment over Mackay Creek



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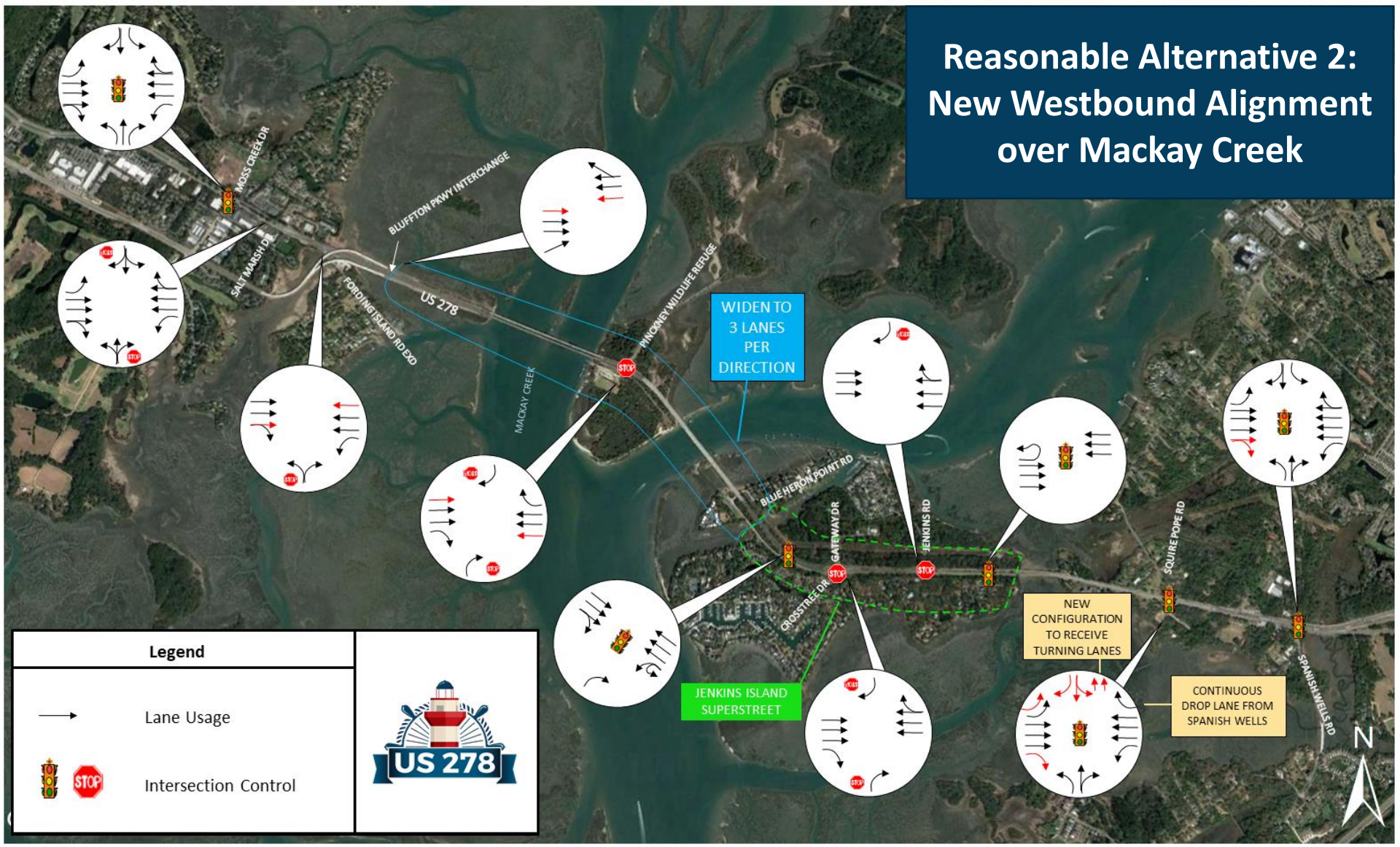
Reasonable Alternative 2: New Westbound Alignment over Mackay Creek



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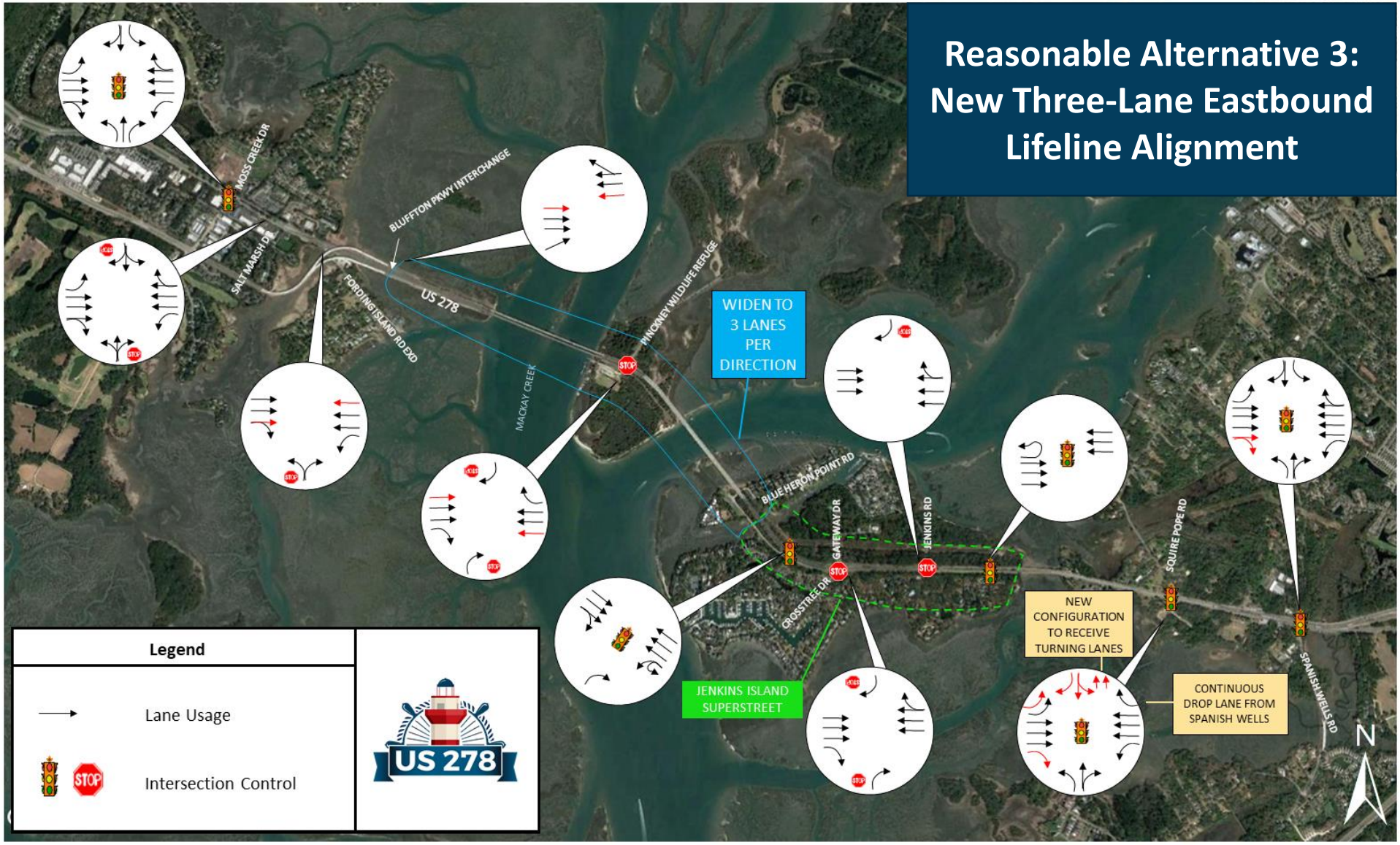
Reasonable Alternative 3: New Three-Lane Eastbound Lifeline Alignment



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Reasonable Alternative 4: New Six-Lane Alignment South

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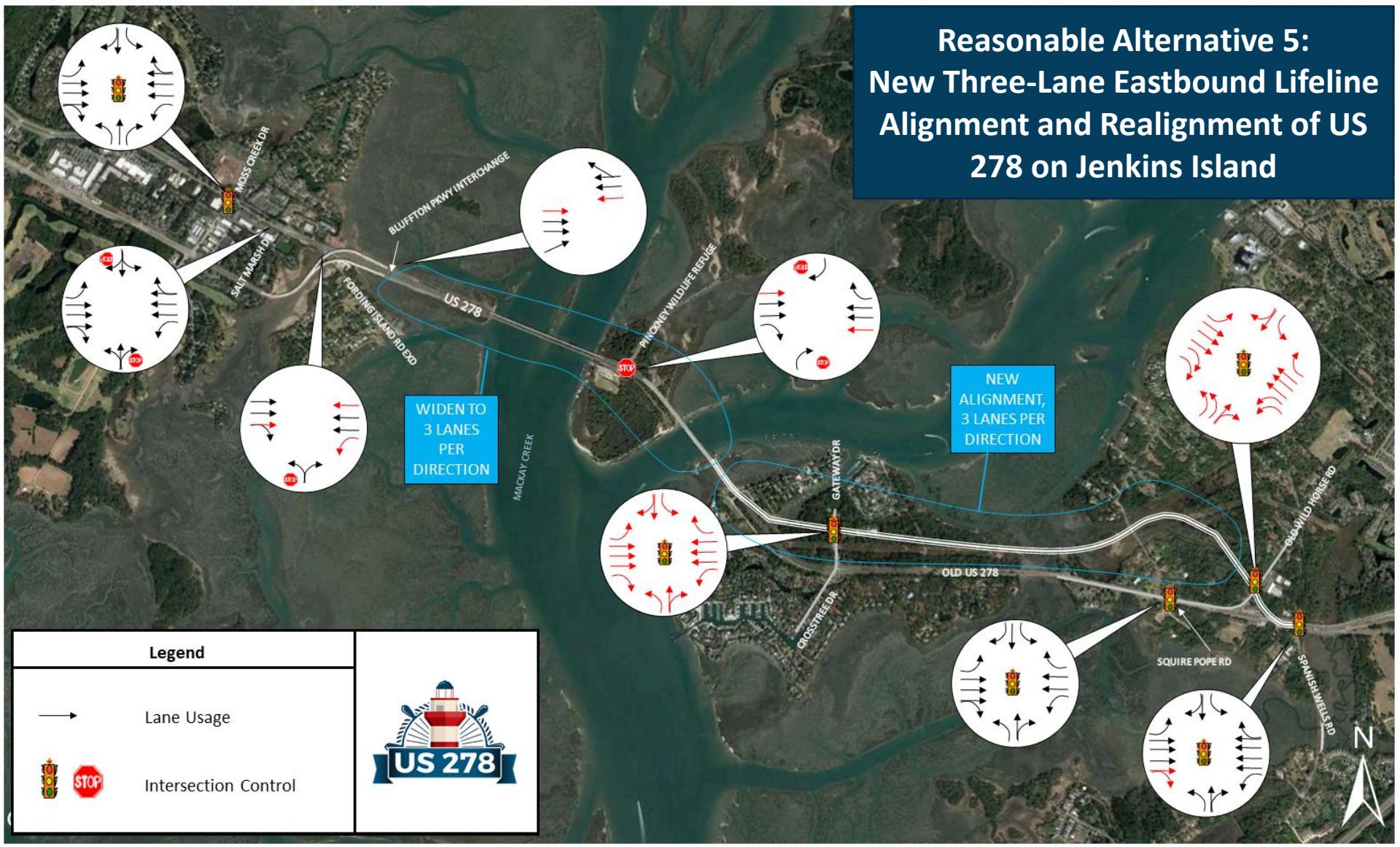
Reasonable Alternative 5: New Three-Lane Eastbound Lifeline Alignment and Realignment of US 278 on Jenkins Island



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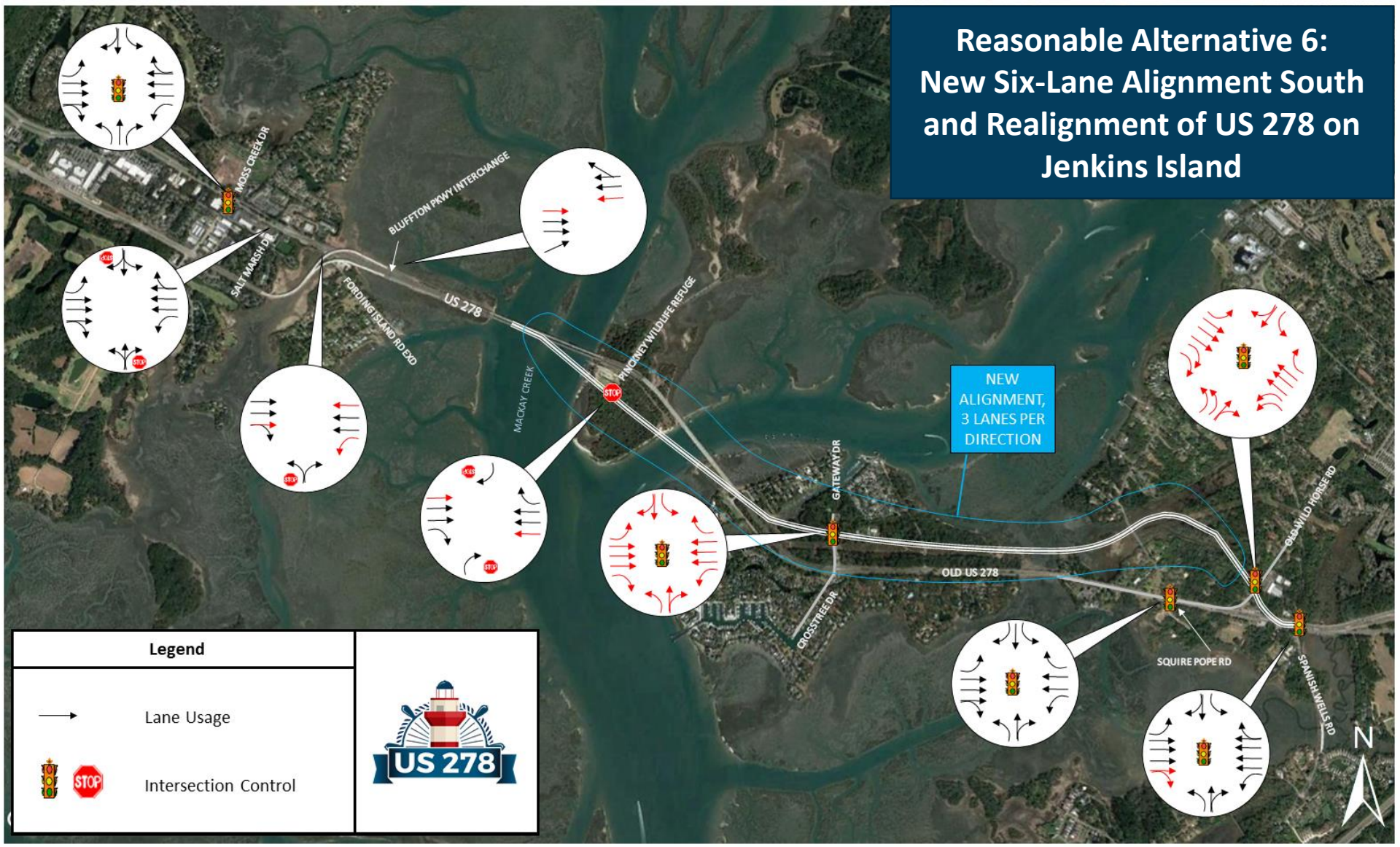
Reasonable Alternative 6: New Six-Lane Alignment South and Realignment of US 278 on Jenkins Island



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Traffic Next Steps…

- Input from Public Meetings and Comments
- Refinement of Alternatives – operational and design modifications
- Incorporate Wayfinding
- Final design of “Recommended Preferred” alternative

Contact

www.SCDOT278Corridor.com

info@SCDOT278Corridor.com

Facebook.com/SCDOT278Corridor

@SCDOT278Corridor

Craig Winn, PE, CFM
Project Manager
SCDOT

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