

NEPA / Section 404 Merger Concurrence Point 1

Purpose and Need & Study Area Defined

Proposed Carolina Bays Parkway Extension from SC 9 in Horry County, South Carolina to US 17 Shallotte Bypass in Brunswick County, North Carolina

NCDOT Project R-5876

SCDOT Project P029554



March 19, 2019 | 1:00 p.m. – 3:30 p.m.

Southeastern Institute of Manufacturing and Technology (SiMT)

Florence-Darlington Technical College Campus

1951 Pisgah Road, Florence, South Carolina, 29501

NEPA/Section 404 Merger Meeting

Concurrence Point 1

Carolina Bays Parkway (SC 31) Extension from SC 9 in Horry County, South Carolina to US 17 Shallotte Bypass in Brunswick County, North Carolina



NCDOT Project R-5876
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March 19, 2019

Meeting Agenda

1. Sign-in and Introductions
2. Purpose of Meeting
3. Project Overview
4. Study Area
5. Purpose and Need
6. Concurrence Point 1 Signature Form Review
7. Next Steps

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1.0 INTRODUCTION

The North Carolina Department of Transportation (NCDOT) and South Carolina Department of Transportation (SCDOT) propose to extend Carolina Bays Parkway (SC-31) from its existing terminus at SC 9 in Horry County, South Carolina to US 17 Shallotte Bypass in Brunswick County, North Carolina. The project is a joint effort between the two states, with NCDOT serving as the lead for environmental review.

An Environmental Impact Statement (EIS) is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code 4321-4327), as codified in Title 40 of the Code of Federal Regulations Parts 1500-1508 and the North Carolina Environmental Policy Act (SEPA) of 1971, as amended (North Carolina General Statutes Article I Chapter 113A), as codified in the North Carolina Administrative Code, Title 1, Chapter 25.

2.0 PROPOSED ACTION

SCDOT State Transportation Improvement Program (STIP) Project P029554 proposes to extend Carolina Bays Parkway (SC 31) from its current terminus at SC 9 in Horry County, South Carolina to the North Carolina state line. NCDOT STIP Project R-5876 proposes to extend Carolina Bays Parkway from the South Carolina state line to US 17 Shallotte Bypass in Brunswick County, North Carolina. The proposed project, Carolina Bays Parkway Extension, is anticipated to involve the construction of a multilane, full control of access freeway, part on new location. The project vicinity is shown in Figure 1 in Appendix A.

Because the two projects represent one single and complete project they will be addressed in a single environmental document.

2.1 Purpose of the Proposed Action

The purpose of the project is to improve the transportation network in the study area by enhancing mobility and connectivity for traffic moving in and through the project area.

- Mobility refers to the movement of people or goods. Potential measures of performance for evaluating an improvement in mobility in the project area are travel time, travel speed and level of service (LOS). SCDOT has established the LOS goal of C for their state roads while NCDOT has established the target goal of LOS D for system level planning analysis.
- Connectivity refers to the density of connections in road networks and the directness of links. Potential measures of performance for evaluating improvements in connectivity are reduced travel times and enhanced route options for travelers, service providers, and the transport of goods.

2.2 Summary of Need for the Proposed Action

Traffic volumes on area roadways in the project area are expected to increase considerably by 2040. Average annual daily traffic volumes and average summer weekday traffic volumes at existing intersections and along existing roads in the study area will increase by 25 percent or more in several locations from the 2016 base conditions. Roadway capacity analyses show that many intersections and roadway segments in the study area would either approach or exceed the roadway capacity limits in 2040.

The population within Horry and Brunswick counties has steadily increased along with the number of tourists to the area. Tourists and visitors are important to the economic vitality of both states' coastal counties. U.S. Census Bureau statistics indicate countywide growth rates between 2000 and 2010 were 37 percent in Horry County and 46.9 percent in Brunswick County. Both counties are expected to continue to experience high growth rates through the year 2035. Growth in population, tourism, and supporting services has resulted in an increase in mixed-purpose traffic on area roads.

The proposed project is included in the 2040 Grand Strand Area Transportation Study (GSATS) Metropolitan Transportation Plan (MTP) new construction recommendations for South Carolina as the Extension of SC 31 (Carolina Bays Parkway) to US 17 in North Carolina (Hwy 57/NC 1303 improvements) and for North Carolina as a proposed new freeway from US 17 (Shallotte Bypass/Seaside) to the South Carolina state line. The GSATS 2018-2022 TIP includes the South Carolina portion of the proposed Carolina Bays Parkway Extension as its number one priority project.

The proposed project will improve mobility on existing roadways, benefiting both local and through traffic. This project will provide a more direct route for tourist and coastal truck traffic travelling through the area. As a result, existing transportation routes would be able to convey shorter local trips more efficiently. The proposed project will also provide additional capacity, improving level of service and mobility, on area roadways.

2.3 Potential Additional Benefits of the Project

Due to the higher than average crash rates along several roadways in the project area, the proposed project offers the potential to reduce the number and severity of vehicle crashes by providing an alternate route to travelers. Separating through traffic from the local traffic that is using the existing roadways to access schools, shopping and services, and residential areas will likely enhance safety.

By providing additional capacity and improving mobility in the project area, the proposed project offers the potential to support more efficient clearance times during emergency evacuations.

3.0 PROJECT DESCRIPTION

3.1 Project History

The concept for the Carolina Bays Parkway Extension dates back to the early 1990's. It has been included in various studies and plans prepared by entities in both North Carolina and South Carolina. In some instances Carolina Bays Parkway Extension was included as part of a larger project, while in others only a portion of the project was evaluated.

In South Carolina, various local government stakeholder groups and organizations began considering a major road improvement plan for the Grand Strand Region beginning in the 1980s. The *North-South Corridor, Horry County, South Carolina – Conceptual Route Plan* (1989) was prepared by the Waccamaw Regional Council of Governments in 1989 with funding from the Grand Strand Regional Tourism Program. The plan evaluated a north-south corridor west of the Intracoastal Waterway between SC 90 and SC 544. With a lack of funding and a number of other higher priority transportation projects in the region slowing progress on the North-South corridor, the Carolina Bays Task Force was formed out of local citizen and stakeholder support for the project. The *Carolina Bays Task Force Conceptual Criteria Report* (1991) was prepared, identifying the general extent and location of the future parkway: Phase I of the project would extend from SC 9/SC 90 to SC 544 with future phases extending southward to US 701 and/or US 17 near the City of Georgetown, and northward to the North Carolina state line. The *Carolina Bays Parkway Feasibility Study* (1993) was prepared at the recommendation of the Task Force report. The feasibility study resulted in expansion of the project limits to include the entire GSATS Metropolitan Planning Organization (MPO) boundary, which generally extended from Georgetown, SC to the North Carolina state line at the time, and concluded the future parkway would improve emergency evacuation and mobility in the region and would be a logical investment from a travel efficiency / economic standpoint. The Final Environmental Impact Statement (FEIS) was prepared in 1998, recommending an alignment that extends for approximately 30.2 miles along the mainline from US 17 just north of Glenn's Bay Road to SC 9. In 2001, SCDOT began considering a direct link into North Carolina and initiated a feasibility study of alternatives for the approximately five-mile section between SC 9 and the North Carolina state line.

The historically proposed I-74 corridor project in North Carolina (NCDOT project R-3436), extending from US 74/76 in Columbus County to the South Carolina state line in Brunswick County, was studied by NCDOT beginning in the 1990s. The original feasibility study for R-3436 was completed by NCDOT in 1997. In 2004, the

future I-74 corridor was adopted as a Strategic Highway Corridor (SHC) by the NC Board of Transportation. Following the SHC designation, NCDOT entered into a joint agreement with SCDOT to expand the limits of the Carolina Bays Parkway Extension Feasibility Study that was already underway into Brunswick County. Also following the SHC designation, NCDOT completed a re-evaluation of the original R-3436 Feasibility Study in 2005. The re-evaluation was updated a final time in 2007 for consistency with findings of the joint NCDOT-SCDOT *Carolina Bays Parkway Extension Feasibility Study Report* (2006) following its completion. The 2006 Feasibility Study evaluated the extension of Carolina Bays Parkway from SC 9 in Horry County, SC to NC 904 in Brunswick County, NC.

3.2 Project Setting

The proposed project is located in the coastal regions of Horry County, SC and Brunswick County, NC. The project area is a major destination for recreation, tourism and retirement living in both states.

Horry County, SC is one of five coastal counties in the state and the proposed project is located near the northern edge of the Grand Strand/Myrtle Beach region. The Grand Strand has historically been a primary destination for coastal tourism and recreation in the state due to its geographic proximity and accessibility from inland regions. Over time, it has evolved and diversified to become a major economic hub for the state. Its regional economy remains rooted in the recreation and tourism industries but has expanded to serve a year-round market, fueling growth of secondary markets and industry diversification. Regional accessibility has also evolved over time to include two high-speed freeways, SC 31 and SC 22, connecting the Grand Strand region to points south and west within South Carolina.

Brunswick County, NC is one of eight coastal counties in the state, nearly all of which have developed coastal waterfronts and beach communities with similar tourism-based economies. Geography and accessibility of Brunswick County beaches has been the primary influence on historic patterns of growth and development in Brunswick County. Proximity to the City of Wilmington (New Hanover County) to the north, a port city with an economy rooted in commerce and tourism, has increasingly influenced growth in the northern parts of Brunswick County. This part of the county has evolved into a bedroom community of Wilmington and remains the fastest growing area in the county. The beaches and inland communities of southern Brunswick County are more remote. This has contributed to a low density pattern of development focused around agriculture and small coastal towns served by a road network that was not designed to provide high-speed connections. Area amenities contribute to a quality of life that has proven increasingly attractive for retirees. As a result, areas in southern Brunswick County have seen substantial growth of the residential market as retirees have migrated to the area. Particularly notable residential growth has occurred in the Town of Carolina Shores and the Town of Shallotte, where the number of housing units more than doubled between 2000 and 2015.

3.2.1 Study Area Description

The proposed Carolina Bays Parkway Extension project area is largely comprised of unincorporated areas in Horry and Brunswick Counties but contains portions of some small coastal towns and communities located on the inland side of the Intracoastal Waterway.

The project study area is shown on Figure 2 in Appendix A. The study area boundary was established with consideration given to the ability to develop a full range of alternatives while also minimizing potential impacts to important environmental features, including Waccamaw River Preserve and Management areas (see Figure 3 in Appendix A). From west to east, the project study area is approximately 19 miles long, with approximately five miles in South Carolina and 14 miles in North Carolina.

Horry County

Little River is the densest population center within the Horry County portion of the project area. This section of the US 17 corridor is the most densely developed part of the project area and carries some of the highest traffic volumes. Although it is an unincorporated community, it is recognized as a US Census Designated Place (CDP)

with an estimated 2015 population of 9,617. The Little River waterfront is a primary commercial tourism resource and destination in the area.

SC 9 is the mainline east-west connection serving the Horry County portion of the study area. The development pattern is moderately dense and contains a wide mix of uses that have been developed incrementally over a long period of time. Existing uses include residential subdivisions of varying densities and similar in age, commercial, industrial, service-oriented, institutional, and recreational uses. Recent development activity along the corridor includes the Seacoast Medical Center located just west of the US 17 interchange.

The area north of SC 9 and south of Little River Road contains predominantly residential uses that include a mix of more recently developed subdivisions and older single family homes as well as intermittent commercial, institutional (primarily churches) and light industrial uses clustered near intersections. Between Little River Road and the state line, agriculture is the predominant use with intermittent single family residential.

Brunswick County

The large majority of the Brunswick County portion of the study area lies within the county's unincorporated jurisdiction. The dominant development pattern includes low density commercial and industrial uses along the US 17 corridor and a mix of rural residential and agriculture uses along other secondary routes.

Located just north of the state line, Carolina Shores has an estimated 2015 population of 3,549. The town extends south of the US 17 corridor to the NC 179 corridor. The town's extraterritorial municipal jurisdiction (ETJ) extends north from US 17 toward Hickman Road. The town became incorporated in 1998, before which it was within the Town of Calabash. Carolina Shores is largely comprised of residential subdivisions.

The Town of Shallotte is centrally located in Brunswick County and serves as the primary commercial, service and employment destination for residents of southern and western Brunswick County, including the Brunswick County portion of the study area. The Town of Shallotte contains approximately 28 square miles, with an estimated population of 3,816 in 2015.

3.2.2 Existing Transportation Facilities

Within the proposed Carolina Bays Parkway Extension project area, the existing primary road network includes US 17 and various North Carolina and South Carolina state highway and secondary routes. There are no interstate facilities in the project area. With the exception of SC 31 and US 17 Shallotte Bypass, access along existing routes in the study area is largely uncontrolled.

US 17 is a principal arterial that extends from Winchester, VA to Punta Gorda Florida. The cross-section along US 17 varies within the study area, from a four-lane, median-divided facility to a five-lane facility. The posted speed limit ranges from 45 miles per hour (mph) to 60 mph. Land use along US 17 includes commercial, residential, institutional, and open space within the study area.

US 17 is included in the National Highway System (NHS) as a Non-Interstate Strategic Highway Route. US 17 is listed on the Strategic Highway Network (STRAHNET), a system of roads deemed necessary for mobilization and movement of commodities supporting U.S. military operations. US 17 is an SCDOT Strategic Corridor and an NCDOT Strategic Transportation Corridor, as well as a designated Hurricane Evacuation Route. In addition, the GSATS 2040 Metropolitan Transportation Plan identifies US 17 in the study area as part of the region's freight transportation system. Both South Carolina and North Carolina have developed Statewide Freight Plans in compliance with the Fixing America's Surface Transportation (FAST) Act. These plans inventory transportation assets that contribute to the movement of goods, develop strategies and set performance measures for freight transportation goals. US 17 in the study area is part of South Carolina's Strategic Freight Roadway Network and North Carolina's Priority Highway Freight Network.

South Carolina

Carolina Bays Parkway (SC 31) is a six-lane, fully access-controlled freeway that extends from SC 544 near Socastee to SC 9 in Little River, SC. Carolina Bays Parkway spans eastern inland Horry County west of and parallel to US 17 for approximately 26 miles, serving the Grand Strand region of the state. Construction of Phase III, which extends the southern terminus approximately 3.8 miles to SC 707 has yet to be completed. Within the study area, the posted speed limit along SC 31 is 65 mph. *SCDOT Strategic Corridor, NHS Principal Arterial*

SC 9 is a principal arterial that extends from the North Carolina border (north of Spartanburg, SC) to Horry County, SC. The cross-section along SC 9 varies within the study area, from a four-lane, median-divided facility to a five-lane facility. The posted speed limit is 45 mph and land use along SC 9 includes commercial, residential, institutional, and open space within the study area. *Hurricane Evacuation Route, Other NHS Route*

Highway 57 (Wampee Road/S-57) is a major collector that extends from Wampee, SC to the South Carolina state line. Within the study area, Highway 57 is a two-lane roadway with a posted speed limit of 45 mph. Land use along Highway 57 includes commercial, residential, institutional, and open space within the study area.

Sea Mountain Highway is a minor arterial that extends from SC 9 to SC 65. Within the study area, Sea Mountain Highway is a two-lane roadway with a posted speed limit of 45 mph. Land use along Sea Mountain Highway includes commercial, residential, institutional, and open space within the study area.

Little River Road (S-111) is a major collector that extends from Illman Road to Mineola Avenue. Within the study area, Little River Road is a two-lane roadway with a posted speed limit of 45 mph. Land use along Little River Road within the study area is primarily residential and open space.

SC 90 is a minor arterial that extends from US 501 Business in Red Hill, SC to US 17 in Little River, SC. Within the study area, SC 90 is a two-lane roadway with a posted speed limit of 45 mph. Land use along SC 90 includes commercial, residential, institutional, and open space within the study area.

Mineola Avenue (S-50) is a major collector that extends from the North Carolina Border to US 17. Within the study area, Mineola Avenue is a two-lane roadway with a posted speed limit of 35 mph. Land use along Mineola Avenue in the study area is primarily residential and open space.

North Carolina

NC 904 (Longwood Road/Seaside Road) is a major collector that extends from Main Street in Fair Bluff, NC to First Street in Ocean Isle Beach. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along NC 904 is primarily residential and open space within the study area.

Hickman Road (SR 1303) is a major collector that extends from US 17 to the South Carolina border. It is a two-lane roadway with a posted speed limit of 55 mph. Within the study area land use along Hickman Road is primarily residential and open space.

Calabash Road (SR 1300) is a minor collector that extends from Ash Little River Road to US 17. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along Calabash Road is primarily residential and open space within the study area.

Ash Little River Road (SR 1300) is a minor collector that extends from Calabash Road to Whiteville Road in Ash, NC. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along Ash Little River Road within the study area is primarily residential and open space.

Ocean Isle Beach Road (SR 1184) is a major collector that extends from US 17 to Beach Drive. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along Ocean Isle Beach Road includes commercial, residential, institutional, and open space within the study area. *Hurricane Evacuation Route*

US 17 Business (Main Street) is a major collector that extends from US 17 west of Shallotte to US 17 east of Shallotte. The cross-section along US 17 Business varies, but it is primarily a three-lane roadway with a posted

speed limit that ranges from 35 mph to 45 mph. All land uses are present along US 17 Business as it runs through downtown Shallotte.

NC 130 (Whiteville Road) is a minor arterial from US 74 Business in Maxton, NC to US 17, and a major collector from US 17 to US 17 Business. Within the study area, the cross-section of NC 130 varies from a two-lane roadway to a three-lane roadway with a posted speed limit of 45 mph.

3.2.3 Modal Relationships

No railroads serve the project area.

Coast RTA provides regional public transportation services in Horry and Georgetown Counties, SC, including 11 fixed route transit lines, paratransit services and emergency management assistance. Currently, none of the Coast RTA fixed routes operate within the study area. The Brunswick Transit System (BTS) provides non-emergency transportation services to the general public of Brunswick County and, through contract, to human service agency clients in Brunswick County. BTS does not offer fixed route service.

There are no airports or air fields located within the study area. The closest regional and international airports include Odell Williamson Municipal Airport (60J) in Ocean Isle Beach, Grand Strand Airport (CRE) in North Myrtle Beach, Myrtle Beach International Airport (MYR) in Myrtle Beach, and Wilmington International Airport (ILM) in Wilmington (New Hanover County).

3.2.4 Bicycle and Pedestrian Facilities

Existing sidewalks in the study area are limited to a few non-residential areas where the existing development pattern supports pedestrian use, including a portion of US 17 through Little River, and in residential subdivisions. Existing greenway/multi-use paths in the study area are limited to parks and other recreational properties.

There is no dedicated bicycle access along facilities in the study area; however, a few routes are designated state routes. Two South Carolina State Touring Bike Routes pass through the study area. The Northern Crescent follows SC 9 and the Coastal Route follows SC 179 from the North Carolina state line to US 17/Mineola Avenue/Little River Road/ Hwy 57, and follows Hwy 57 across SC 9.

NC Bicycle Route 3 (Ports of Call) is a state-designated route that passes through Brunswick County south of the study area. Additional routes in the study area have been identified for use by local cyclists and bicycle advocacy groups in the *Cape Fear Regional Bicycle Plan* (2017).

The East Coast Greenway (ECG) is a developing trail system along the Eastern Seaboard envisioned to link 25 major U.S. cities from Calais, Maine to Key West, Florida designed to accommodate pedestrians, cyclists and other non-motorized modes of transportation. No portion of the identified route is currently in the form of a greenway trail or multi-use path in the project study area. The proposed ECG trail route follows US 17 from North Myrtle Beach through Little River to meet SC 179 at the northern edge of Horry County. While a conceptual alignment has been created within the GSATS region in North Carolina, GSATS has not adopted a route for the North Carolina portion of its study area.

3.3 Logical Termini

The Carolina Bays Parkway Extension project limits begin at the current Carolina Bays Parkway terminus at SC 9 and extend to US 17 Shallotte Bypass. The proposed project would tie to freeways sections with full control of access at both termini. US 17 is a principal arterial and a critical local and regional transportation corridor. NC 130 provides connections outside of the study area to US 74 via US 701 to the north and coastal communities, beaches and other tourist destinations via NC 179 to the south. The proposed project will address impacts to environmental resources on a broad scope and serve as a reasonable improvement even if no additional transportation improvements are made beyond the project limits. In addition, the project will not restrict the consideration of other transportation improvements in the foreseeable future.

4.0 TRAFFIC OPERATIONS

4.1 Existing and Future Year No Build Traffic Volumes

A traffic forecast was prepared for the project in July 2017 for the 2016 Base Year No Build (Existing) and the 2040 Future Year No Build scenarios. The traffic forecast was updated in September 2018 to include average summer weekday traffic (ASWT) for both the 2016 Base Year No Build and 2040 Future Year No Build scenarios. For this forecast, ASWT represents average weekday traffic (Monday-Friday) for June, July and August. Table 1 summarizes the existing (2016) and projected future (2040) no build average annual daily traffic (AADT) and ASWT for major roadways within the project area in vehicles per day (vpd). 2016 and 2040 no build volumes for project area roadways are shown on Figures 4 through 7 in Appendix A.

Table 1. R-5876 Existing (2016) and Projected Future (2040) Traffic Volumes

Roadway Segment	2016 Base Year AADT ¹ (vpd)	2016 Base Year ASWT ² (vpd)	2040 Future Year AADT (vpd)	2040 Future Year ASWT (vpd)
South Carolina				
US 17 south of SC 90 to US 17 east of SC 179 / Graystone Blvd.	13,500 – 41,200	16,500 – 48,200	21,200 – 55,600	25,900 – 65,000
S-57 (Wampee Rd.) west of SC 9 to S-57 east of SC 111 (Little River Rd.)	6,800 – 13,800	7,600 – 16,000	12,600 – 18,200	14,200 – 21,100
SC 9 north of US 17 to SC 9 north of S-57 (Wampee Rd.)	24,200 – 33,600	29,000 – 38,800	30,700 – 45,800	36,800 – 52,900
Sea Mountain Hwy south of SC 90 to Sea Mountain Hwy south of SC 9	9,200 – 11,400	10,600 – 13,000	12,400 – 15,400	14,300 – 17,600
SC 31 west of SC 9	28,400	33,600	45,600	53,900
SC 90 west of US 17 to SC 90 west of Sea Mountain Highway	11,600 – 12,400	13,600 – 14,400	15,600 – 16,700	18,300 – 19,400
North Carolina				
US 17 west of Calabash Rd. / Country Club Dr. to US 17 north of NC 130	13,600 – 30,100	16,000 – 34,800	20,900 – 37,300	24,600 – 43,100
SR 1303 (Hickman Road) west of SR 1300 (Ash Little River Rd. / Calabash Rd.) to SR 1303 west of US 17	7,800 – 8,800	9,200 – 10,400	12,600 – 13,800	15,000 – 16,300
NC 904 (Seaside Road) south of US 17 to NC 904 (Longwood Road) north of SR 1304 (Pea Landing Road)	4,000 – 10,600	4,400 – 12,400	7,200 – 14,200	8,000 – 16,600
NC 130 west of US 17 SB ramps to NC 130 east of US 17 NB ramps.	9,300 – 10,100	10,600 – 11,400	14,800 – 16,200	16,900 – 18,300

¹ Average Annual Daily traffic

² Average Summer Weekday Traffic

4.2 Existing and Future Year No Build Capacity Analysis

A traffic analysis was completed in May 2018 for the 2016 existing and 2040 future year no build scenarios. Unsignalized and signalized intersections and interchanges were analyzed. The traffic analysis was updated in January 2019 to include an analysis of arterials and summer conditions. Table 2 summarizes the Level of Service (LOS) and associated delay for major intersections within the project area. 2016 and 2040 LOS for project area intersections, interchanges and roadways are shown on Figures 8 through 11 in Appendix A.

Without improvements, the US 17 and Hwy 57 / Hickman Road corridors are anticipated to experience a significant degradation in traffic operations by 2040. In the AADT scenario, four signalized intersections are anticipated to operate at LOS E or F in at least one of the peak hours (compared to none in 2016), while nine unsignalized intersections are anticipated to have at least one of the stop-controlled movements operating at LOS E or F in at least one of the peak hours (compared to two in 2016). In the 2040 ASWT scenario, nine signalized intersections are anticipated to operate at LOS E or F in at least one of the peak hours (compared to two in 2016), while 13 unsignalized intersections (including a US 17 eastbound U-turn east of Ocean Isle Beach Road) are anticipated to have at least one of the stop-controlled movements operating at LOS E or F in at least one of the peak hours (compared to five in 2016).

The freeway segments associated with the interchanges are also anticipated to experience a degradation in levels of service; however, to a lesser extent. Only two segments are anticipated to operate at LOS F in the 2040 AADT scenario, while eight are anticipated to operate at LOS E or F in the 2040 ASWT scenario.

While both volume scenarios (AADT and ASWT) show a degradation in traffic operations by 2040, the analysis shows the higher volumes expected with the ASWT scenario will have a greater impact to the operations when comparing the 2016 Base Year and 2040 Future Year. This is particularly true for the signalized intersections and freeway segments in the southwest portion of the study area.

The intersection and freeway measures of effectiveness presented in Table 2 are the primary features that provide an estimate of the traffic operations of the study area network. However, additional measures of effectiveness (segment LOS and travel times) were developed from outputs extracted from the models. Segment LOS is shown on Figures 8 through 11 and travel time information is presented in Section 4.3. Segment LOS should be considered as a secondary evaluation and consists of measured data extracted from TransModeler simulation runs and applied to Highway Capacity Manual (HCM) LOS methodologies.

Table 2. R-5876 Existing (2016) and Projected Future (2040) Average Annual Daily Traffic (AADT) and Average Summer Weekday Traffic (ASWT) Intersection Level of Service (LOS)

Intersection No. (Figures 4 to 11)	Intersection Name	Existing Intersection Control	Base Year 2016 (AADT)		Base Year 2016 (ASWT)		2040 No Build (AADT)		2040 No Build (ASWT)	
			Delay in Seconds (LOS) ¹				Delay in Seconds (LOS) ¹			
			AM	PM	AM	PM	AM	PM	AM	PM
South Carolina										
1	SC 9 at Hwy 57 (Wampee Rd.)	Signalized	28.9 (C) *	30.3 (C) *	39.5 (D) **	33.9 (C) *	88.4 (F)	66.2 (E) **	123.7 (F)	131.1 (F)
2	SC 9 at SC 31	Interchange ²	17.4 (B)	17.9 (B)	26.9 (D)	21.8 (C)	30.4 (D)	27.9 (D)	112.7 (F)	37.2 (E)
					Basic: SC 9 SB N. of SC 31 NB on-ramp to SC 9 NB		Basic: SC 9 SB north of SC 31 NB on-ramp to SC 9 NB		Merge: SC 9 SB south of SC 31 NB on ramp	
3	SC 9 at Food Lion Dr. / Sea Mountain Rd.	Signalized	18.3 (B)	16.7 (B) **	25.4 (C) **	27.1 (C) **	48.1 (D) **	38.5 (D) **	142.9 (F)	117.4 (F)
4	US 17/SC 9 Off Ramp at SC 90	Signalized	15.2 (B) *	6.3 (A) **	25.9 (C) **	10.5 (B) *	20.8 (C) *	27.3 (C) **	29.4 (C) **	30.8 (C) **
5	SC 9 NB Off Ramp at SC 90	Unsignalized	30.6 (D)	25.7 (D)	65.1 (F)	36.5 (E)	221.0 (F)	101.4 (F)	1758.2 (F)	71.5 (F)
6	US 17 at SC 90 / Fairway Drive	Signalized	26.5 (C) **	24.3 (C) **	24.8 (C) **	69.9 (E) **	66.9 (E) **	69.8 (E) **	67.8 (E) **	106.2 (F)
7	US 17 at River Hills / Coquina Harbor Dr.	Signalized	12.3 (B) **	12.5 (B) **	19.2 (B) **	26.8 (C) **	35.6 (D) **	26.3 (C) *	44.0 (D) **	94.3 (F)
8	US 17 at Horseshoe / Baker St.	Signalized	19.8 (B) **	13.1 (B) **	14.1 (B) **	19.5 (B) **	24.8 (C) **	34.4 (C) **	84.8 (F)	72.8 (E) **
9	US 17 at Pinehurst Circle	Signalized	4.7 (A) **	9.2 (A) *	12.2 (B) **	8.8 (A) **	20.2 (C) **	18.4 (B) **	18.6 (B) **	47.3 (D) **
10	US 17 at S-50 / Mineola Ave.	Signalized	14.7 (B) **	12.8 (B) **	12.7 (B) **	15.3 (B) **	11.6 (B) **	22.9 (C) **	19.8 (B) **	39.0 (D) **
11	US 17 SB at Heather Glen Way	Unsignalized	13.8 (C)	19.9 (C)	16.1 (C)	23.2 (C)	23.7 (C)	37.0 (E)	23.4 (C)	78.3 (F)
	US 17 NB at Heather Glen Way		17.8 (C)	12.9 (B)	26.4 (D)	16.4 (C)	28.7 (D)	17.2 (C)	36.0 (E)	22.0 (C)
14	US 17 at Heather Lakes Dr. / Pavilion Rd.	Unsignalized	34.0 (D)	37.9 (E)	54.4 (F)	43.1 (E)	39.9 (E)	67.0 (F)	197.2 (F)	39.4 (E)
20	US 17 at Graystone Blvd. / SC 179	Signalized	35.9 (D) *	29.8 (C) *	29.3 (C) *	58.2 (E)	27.5 (C)	27.3 (C) **	29.2 (C) **	95.1 (F)
21	S-57 (Wampee Rd.) at S-111 (Little River Rd.)	Unsignalized	10.9 (B)	17.8 (C)	11.6 (B)	19.3 (C)	13.3 (B)	21.6 (C)	12.8 (B)	80.2 (F)
36	SC 90 at Sea Mountain Highway	Signalized	39.6 (D) *	31.9 (C)	39.6 (D) *	41.4 (D) *	124.4 (F)	49.9 (D) **	147.7 (F)	54.6 (D) **
37	SC 9 - SC 90 - US 17	Interchange ²	24.6 (C)	22.8 (C)	29.2 (D)	27.3 (C)	30.9 (D)	30.6 (D)	38.8 (E)	37.4 (E)
					Basic: SC 9 south end segment		Diverge: SC 9 NB south of SC 9 NB ramp		Diverge: SC 9 NB south of SC 9 NB ramp	
North Carolina										
12	US 17 at NC 904 (2016) US 17 EB & NC 904 NB (2040)	Signalized	31.4 (C) *	39.8 (D) **	30.6 (C) **	28.9 (C) *	22.1 ³ (C)	24.8 ³ (C) *	26.8 ³ (C)	23.8 ³ (C)
	US 17 WB & NC 904 SB (2040)						19.0 ³ (B)	11.4 ³ (B) *	18.2 ³ (B)	12.9 ³ (B)
15	US 17 at SR 1300 (Calabash Rd.) / SR 1168 (Country Club Dr.)	Signalized	43.4 (D) **	30.2 (C) *	37.5 (D) **	38.6 (D) **	63.7 (E) **	35.3 (D) *	83.9 (F)	47.1 (D) **
16	US 17 at SR 1167 (Persimmon Rd.)	Unsignalized	12.6 (B)	14.0 (B)	16.2 (C)	13.9 (B)	21.3 (C)	17.0 (C)	24.8 (C)	20.2 (C)
17	US 17 SB at Hickman Rd.	Unsignalized	122.7 (F)	59.4 (F)	222.7 (F)	94.0 (F)	351.6 (F)	376.6 (F)	446.8 (F)	272.6 (F)
	US 17 NB at Hickman Rd.		16.6 (C)	14.1 (B)	20.8 (C)	14.9 (B)	25.5 (D)	17.4 (C)	31.5 (D)	17.6 (C)
18	US 17 WB at Middleton Dr.	Unsignalized	14.4 (C)	16.7 (C)	24.0 (C)	22.4 (C)	154.0 (F)	35.3 (E)	404.5 (F)	129.5 (F)
	US 17 EB at Middleton Dr.		18.6 (C)	12.7 (B)	28.1 (D)	15.3 (C)	48.5 (E)	26.0 (D)	64.6 (F)	24.8 (C)
19	US 17 at SR 1304 (Pea Landing Rd.) / SR 1165 (Thomasboro Rd.)	Signalized	14.7 (B) *	18.8 (B) **	17.9 (B) *	18.3 (B) *	22.0 (C) *	24.5 (C) *	33.9 (C) **	62.0 (E) **
22	SR 1303 (Hickman Rd.) at SR 1300 (Ash Little River Rd. / Calabash Rd.)	Unsignalized	18.3 (C)	17.6 (C)	19.6 (C)	21.9 (C)	31.5 (D)	28.3 (D)	40.0 (E)	152.0 (F)
23	SR 1303 (Hickman Rd.) at Crow Creek Dr.	Unsignalized	20.6 (C)	14.3 (B)	17.1 (C)	14.6 (B)	17.6 (C)	28.2 (D)	13.8 (B)	19.8 (C)
31	US 17 at SR 1319 (Union School Rd.)	Signalized	0.0 (A)	0.3 (A)	0.1 (A)	0.5 (A)	3.7 (A) **	2.8 (A) **	5.8 (A) **	3.8 (A) **
32	US 17 at SR 1184 (Ocean Isle Beach Rd.)	Unsignalized	27.7 (D)	18.5 (C)	48.5 (E)	23.0 (C)	279.2 (F)	31.2 (D)	384.0 (F)	247.3 (F)
33	US 17 at Old Shallotte Rd./US 17 Bus.(2016) US 17 Bus. WB & US 17 NB (2040)	Signalized	22.0 (C) *	30.2 (C) **	25.8 (C) *	21.2 (C) *	15.3 ⁴ (B)	27.4 ⁴ (C)	23.7 ⁴ (C)	26.3 ⁴ (C)
	Old Shallotte Rd. & US 17 SB (2040)						20.6 ⁴ (C)	14.6 ⁴ (B) **	22.0 ⁴ (C)	11.9 ⁴ (B)
34	US 17 SB Loop at NC 130	Unsignalized	18.2 (C)	13.4 (B)	44.2 (E)	15.3 (C)	842.0 (F)	274.6 (F)	926.9 (F)	612.0 (F)
35	US 17 NB Loop at NC 130 / Visitor Center	Unsignalized	22.0 (C)	18.8 (C)	28.3 (D)	28.2 (D)	101.5 (F)	66.3 (F)	340.2 (F)	169.9 (F)
38	US 17 at NC 130	Interchange ²	9.9 (A)	10.6 (A)	13.7 (B)	12.4 (B)	62.9 (F)	30.0 (D)	70.1 (F)	63.8 (F)
							Diverge: US 17 SB north of US 17 SB loop		Basic: US 17 SB north end basic segment	
141	US 17 WB U-turn west of US 17 and NC 904 ³	Signalized					12.7 (B) *	11.6 (B) *	21.2 (C) *	6.7 (A)
143	US 17 EB U-turn east of US 17 and NC 904 ³	Signalized					18.1 (B) *	18.7 (B) *	20.6 (C) *	19.8 (B)
144	US 17 NB U-turn north of Old Shallotte Rd./US 17 Bus./Main and US 17 ⁴	Signalized					28.6 (C) *	14.7 (B)	14.1 (B)	24 (C)
145	US 17 SB U-turn north of Old Shallotte Rd./US 17 Bus./Main and US 17 ⁴	Signalized					18.5 (B) *	9.5 (A)	20.5 (C) *	12.5 (B)

Table 2 Notes:

¹ LOS and delay: (1) Unsignalized Intersections - LOS represents the worst approach during one of the peak hours; (2) Signalized Intersections - Overall LOS is presented for signalized intersections. Asterisks denote one or more approaches during one of the peak hours are LOS E (*) or LOS F (**).

² The majority of interchange segments analyzed operate with an acceptable LOS. The table shows the highest segment density and LOS presented for an interchange freeway type segment during AM and PM peak hours.

³ This intersection is analyzed as part of the future superstreet at the US 17 and NC 904 intersection.

⁴ This intersection is analyzed as part of the future superstreet at the US 17 and US 17 Bus./Main St./Old Shallotte Rd. intersection.

4.3 Travel Time Analysis

Travel time information was collected from real-time data runs and traffic analysis program results and compared to the free-flow condition to evaluate the existing and future traffic operation along two routes in the project study area (Exhibit A). The northern corridor begins at US 17 and NC 130 (Whiteville Road) and continues along Hickman Road, SC 57 and ends on SC 9, for a total distance of 18.7 miles. The southern corridor follows US 17 from NC 130 to SC 9, for a total distance of 19.6 miles. A free-flow speed of 55 miles per hour (mph) was assumed for the northern corridor since the majority of the roadways along this route have a posted limit of 55 mph. A short segment (< half mile) of SC 57 is posted 45 mph near the SC 9 intersection. A free-flow speed of 50 mph was assumed for the southern corridor since the speed limit along US 17 is 55 mph in North Carolina and varies from 40-45 mph in South Carolina. Under ideal conditions, travel time is approximately 20 minutes for the North Route and 23 minutes for the South Route.

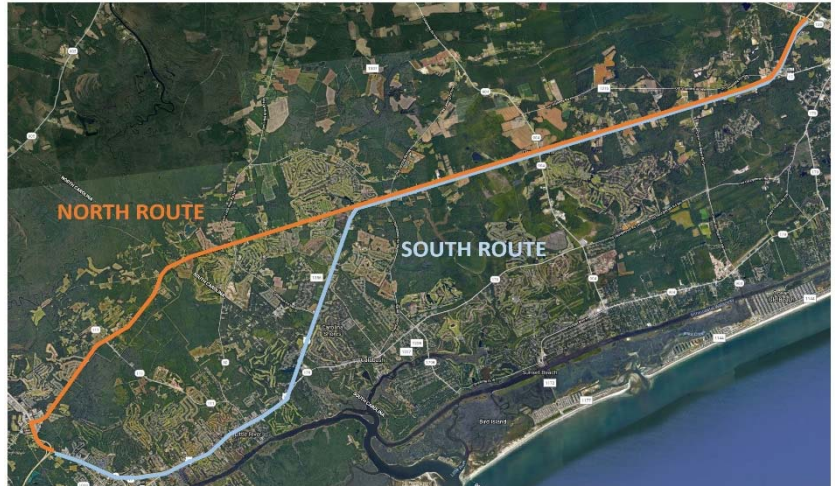


Exhibit A. Study Area Travel Time Analysis North and South Routes

Travel Time Index

Travel Time Index (TTI) is the ratio of travel time in the peak period to the travel time at free-flow conditions. The travel time for the free-flow conditions was calculated by dividing the distance of each route in the study area by the speed of the facility. A TTI value of 1.0 indicates a corridor is operating under ideal conditions with no congestion. Conversely, a value of 1.5 indicates a 20 minute free-flow trip takes 30 minutes during the peak. The increase in travel time is indicative of over saturated conditions, which result in slower speeds and delays for motorists. TTI values for real-time data and modeled results for the weekday PM peak hour are summarized in Exhibit B. The statistics indicate that both real-time and traffic model data report a TTI higher than ideal conditions. Traffic models predict that as travel demand increases over the next 20 years, the motorists will incur substantially higher travel times and lower speeds.

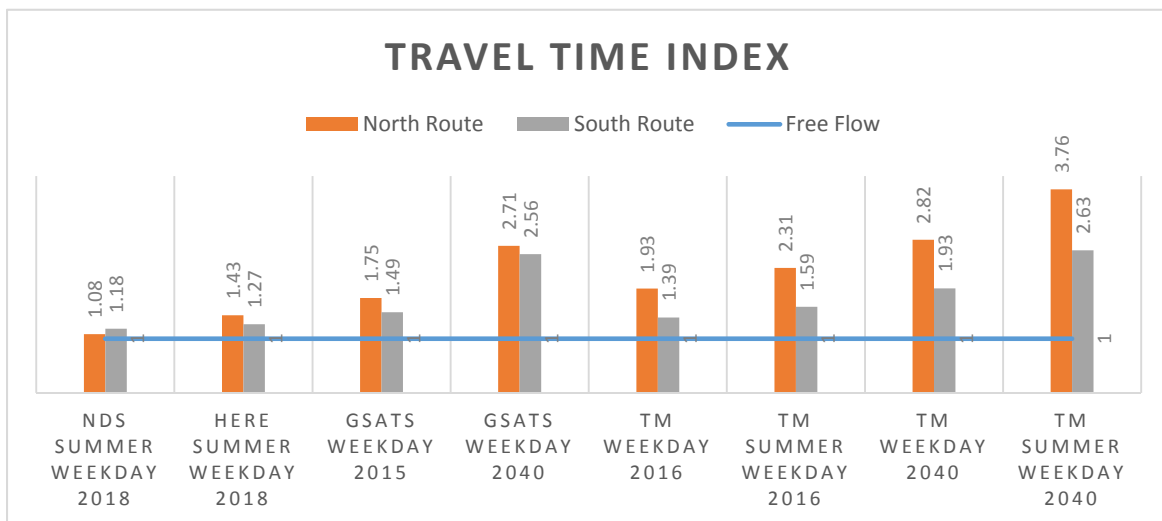


Exhibit B. Travel Time Index for Weekday PM Peak Hour Real-Time (NDS, HERE) and Modeled Scenarios (GSATS, TransModeler [TM])

Real-Time Travel Data

Field travel time runs were conducted by National Data and Surveying Services (NDS) on August 21, 2018 thru August 26, 2018. Four consecutive runs were completed during the midday (11 AM to 12 PM) and PM Peak (4 PM to 5 PM) each day in both directions of each corridor. The speed results indicate that motorists are traveling, on average, 10 percent slower than the posted limit.

Speed profiles for the North and South Route PM Peak, Weekday travel time runs show that while average corridor speeds are about 46 mph; speeds vary widely throughout the corridor (Exhibits C and D). The speed profiles indicate multiple times the vehicle was traveling less than 30 mph or stopped altogether. These delays can be attributed to traffic signals along the corridor as well as increased delays for waiting behind turning vehicles. Localized congestion is evident along the North Route at the Little River Road and SC 9 intersections. The South Route shows drops in speed at most major intersections and slower speed on SC 9 between SC 31 and Charter Road. These areas have more access to neighborhoods and commercial land uses.

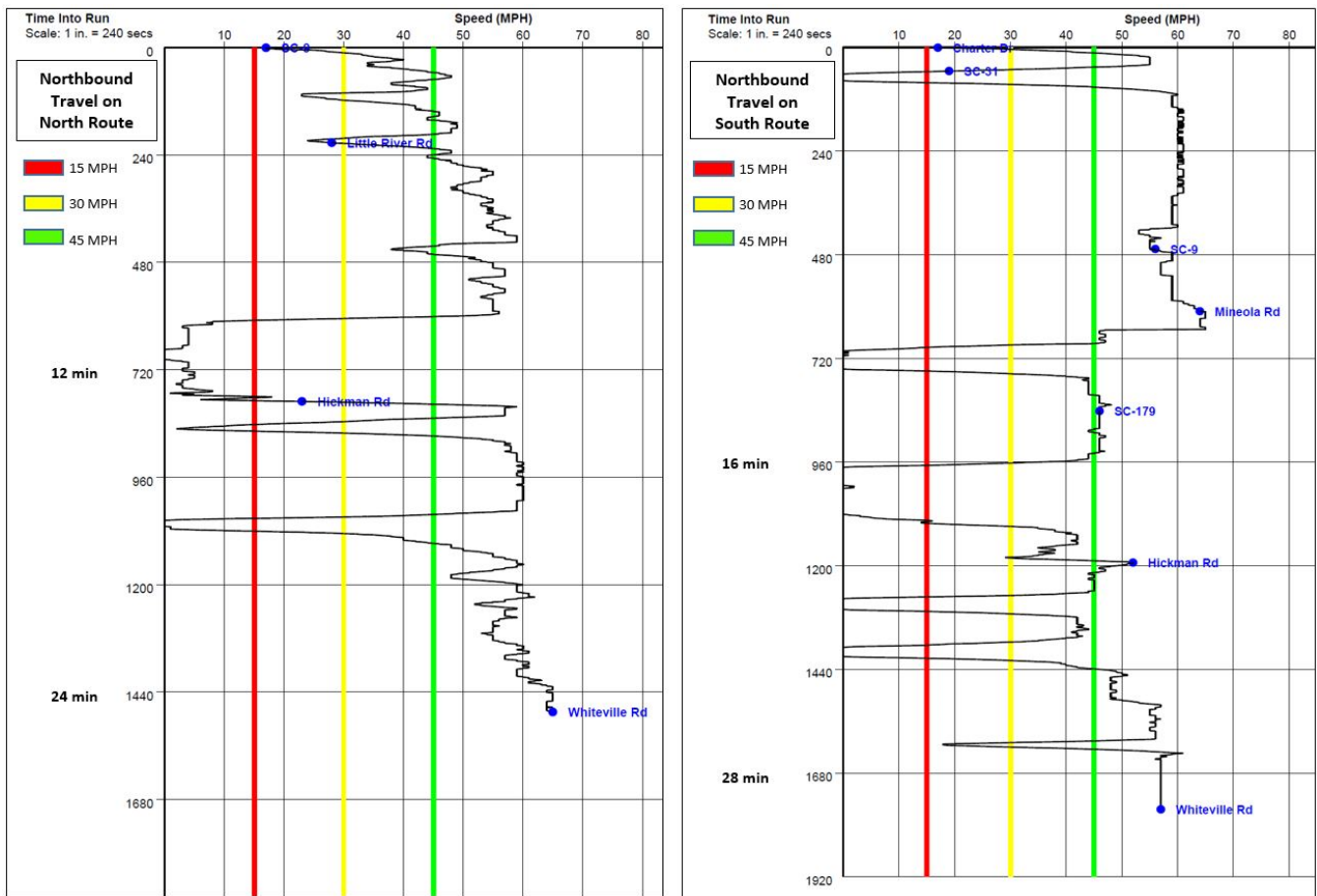


Exhibit C. Speed Profiles for NDS North Route and South Route, Weekday PM Peak, Northbound Travel Time Run

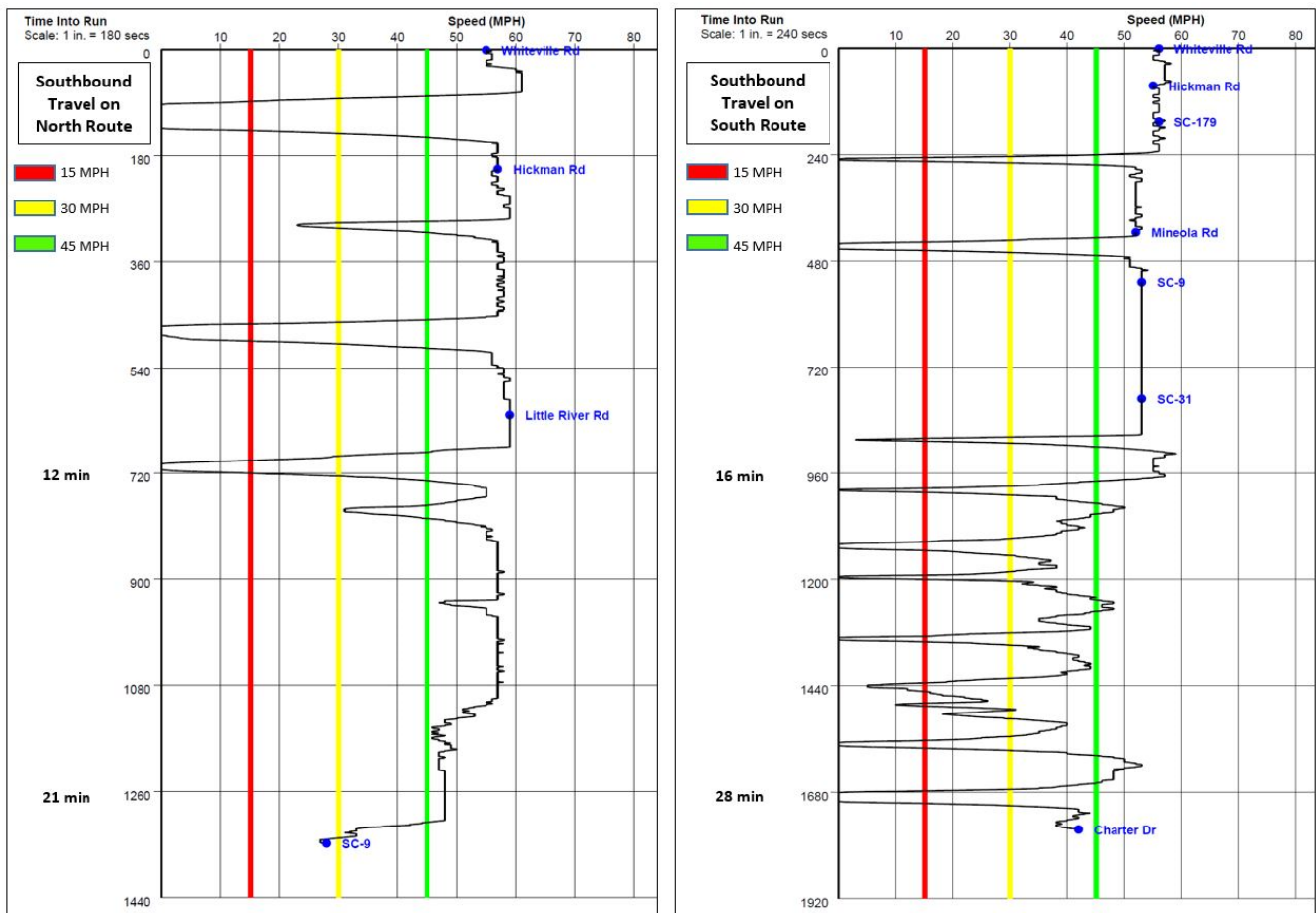


Exhibit D. Speed Profiles for NDS North Route and South Route, Weekday PM Peak, Southbound Travel Time Run

HERE tracking data relies on real-time GPS data from cell phone providers to determine speed, volumes and delay statistics. Data collected on August 7-9, 2018 was provided by NCDOT Traffic Operations Unit for segments along US 17, Hickman Road and SC 9. Data was not available for the segment of SC 57 from the South Carolina border to SC 9. A review of the data indicates that motorists incurred little to no delay on Hickman Road from US 17 to the South Carolina border, with vehicle speeds on average 46-55 mph. Vehicle speeds along US 17 from Hickman Road to SC 90 averaged just below 35 mph. Along SC 9 speeds varied based on peak hour and direction of travel. Off-peak direction speeds were at or above posted limits, while peak direction speeds were 40-60 percent below posted speeds.

The NDS data TTI ranges from 1.08 to 1.18 during the summer weekday. These results indicate that travel times during peak period exceed ideal conditions by as much as six minutes. The HERE data TTI ranges from 1.27 to 1.43 during the summer weekday.

Traffic Model Data

Travel time and speed for both routes calculated from 2015 No Build and 2040 No Build GSATS Travel Demand Model are shown in Table 3. For the 2015 average non-summer weekday, the TTI ranges from 1.49 to 1.75. The PM Peak hour shows significant delays, with travel times more than one and a half times ideal conditions. The speed results indicate that motorists are traveling 45-60 percent below the posted speed limit. By 2040 the TTI is expected to range from 2.56 to 2.71.

TransModeler was used to analyze 2016 forecasted traffic volumes and generate travel time and speed information for each corridor (see Table 3). The TTI ranges from 1.39 to 1.93 during the 2016 average non-summer weekday. The TTI ranges from 1.59 to 2.31 during the 2016 average summer weekday. The PM Peak hour shows significant delays and reductions in speed double ideal conditions. The 2040 No Build traffic volumes were also analyzed to estimate the future travel conditions. The TTI is expected to range from 1.93 to 2.82 during the 2040 average non-summer weekday and from 2.63 to 3.76 during the 2040 average summer weekday. Again, the PM peak hour conditions are expected to be highly congested with travel times exceeding an hour and average speeds more than 50 percent below the posted limit.

Table 3. Summary of Travel Time and Speed for North and South Routes

Scenario	Travel Time (Minutes) and Speed (MPH)							
	North Route				South Route			
	Northbound		Southbound		Northbound		Southbound	
	AM	PM	AM	PM	AM	PM	AM	PM
Ideal Conditions	20:24 minutes (55.0 mph)				23:31 minutes (50.0 mph)			
NDS 2018 Summer Weekday	22:19 (49.3)	22:35 (48.7)	22:19 (49.3)	21:32 (51.0)	29:14 (43.0)	28:51 (43.9)	31:35 (43.0)	26:49 (43.3)
Base Year								
GSATS Model 2015 Weekday	27:36 (41.5)	35:42 (32.1)	28:36 (41.7)	35:48 (32.0)	28:36 (41.7)	34:42 (34.3)	27:12 (42.9)	35:18 (33.1)
TransModeler 2016 Weekday	23:17 (48.1)	35:32 (31.5)	25:41 (45.8)	43:02 (27.3)	22:01 (50.5)	31:26 (35.4)	23:33 (48.6)	34:04 (33.6)
TransModeler 2016 Summer Weekday	24:16 (46.2)	44:11 (25.4)	26:24 (44.5)	49:56 (23.5)	22:31 (49.4)	37:23 (29.3)	23:52 (47.9)	37:20 (30.6)
Future Year								
GSATS Model 2040 Weekday	38:36 (29.7)	54:36 (21.0)	39:00 (29.4)	56:06 (20.4)	34:46 (34.6)	58:42 (20.3)	34:00 (34.4)	61:42 (18.9)
<i>Increase over 2015 (Minutes and Percent)</i>	11:00 (40%)	18:54 (53%)	11:54 (44%)	20:18 (57%)	6:00 (21%)	24:00 (69%)	6:48 (25%)	26:24 (75%)
TransModeler 2040 Weekday	24:41 (45.3)	60:05 (18.6)	27:20 (42.9)	55:09 (20.7)	23:48 (46.7)	48:31 (22.8)	25:21 (45.1)	42:14 (26.9)
<i>Increase over 2016 (Minutes and Percent)</i>	1:24 (5%)	24:33 (69%)	1:39 (5%)	12:07 (28%)	1:47 (7%)	17:05 (55%)	1:48 (6%)	8:10 (24%)
TransModeler 2040 Summer Weekday	26:47 (41.8)	81:16 (13.8)	29:43 (39.5)	72:01 (15.7)	26:48 (41.4)	65:08 (17.0)	26:11 (43.7)	58:38 (19.3)
<i>Increase over 2016 (Minutes and Percent)</i>	2:31 (10%)	37:05 (84%)	3:19 (12%)	22:05 (44%)	4:17 (19%)	27:45 (74%)	2:19 (9%)	21:18 (57%)

4.4 Accident Analysis

Traffic crash data were obtained for North Carolina and South Carolina routes within the study area between April 2013 and March 2018 and January 2012 and September 2017, respectively. Crash rates for the North Carolina routes were compared to statewide average crash rates for similar roadways (see Table 4). Crash rates for the South Carolina routes were compared to statewide and Horry County crash rates calculated from data contained in the South Carolina Traffic Collision Fact Book 2016 (published by the South Carolina Department of Public Safety) (see Table 5).

Table 4. Crash Rate Comparisons – North Carolina Routes

Roadways In North Carolina	Crash Rates ¹					
	Total	Fatal	Non-Fatal Injury	Night	Wet	Critical ²
Statewide, All US Routes (4-lane, divided, no access control) ³	241.28	0.85	67.77	56.37	35.27	-
US 17, SC State Line to ½ mile N of NC 130	118.93	1.16	34.34	38.42	15.33	242.41
Statewide, Rural NC Routes (2-lane, undivided) ³	181.73	2.16	56.54	67.22	28.41	-
NC 904, ¼ mile N of Pea Landing Rd to Ocean Ridge Pkwy	304.02	0	114.72	120.46	28.68	185.50
Statewide Rural NC Secondary Routes ³	237.10	2.48	69.34	100.16	39.01	-
SR 1165 Thomasboro Rd, S of US 17 to US 17	291.86	15.78	47.33	102.55	23.66	244.25
SR 1300 Calabash/Ash Little River Rd, SR 1354 to US 17	328.60	3.16	104.27	145.34	25.28	241.62
SR 1301 McLamb Rd, Calabash Rd to State Line	161.61	0	53.87	26.94	0	250.39
SR 1303 Hickman Rd, SC State Line to US 17	184.27	2.05	71.66	51.19	20.47	240.73
SR 1304 Pea Landing Rd, US 17 to NC 904	533.67	20.93	83.71	251.14	31.39	245.34
SR 1305 Number 5 School Rd, Calabash Rd to Pea Landing	557.96	0	119.56	358.69	39.85	253.29
SR 1316 Old Shallotte Rd, NC 904 to US 17	540.11	4.58	196.82	265.48	77.81	242.54

¹All crash rates per 100 million vehicle miles travelled.

²Based on the statewide crash rate for the specific roadway type (95% level of confidence). Critical crash rates are the result of statistically adjusting rates for similar routes to remove elements of chance and randomness. Crashes at locations exceeding critical rates are generally not random occurrences.

³NC DOT Transportation Mobility and Safety Division, Traffic Safety Unity, 2015 – 2017 Three Year Crash Rates.

Table 5. Crash Rate Comparisons – South Carolina Routes

Roadways In South Carolina	Crash Rate ¹					Critical Rates ²	
	Total	Fatal	Non-Fatal Injury	Night	Wet	State-wide	Horry County
Statewide SC Routes (2013-2015)	260.29	1.71	107.81	N/A	N/A	-	-
Horry Co, SC Routes (2016)	364.05	2.32	105.63	N/A	N/A	-	-
SC US 17, SC 9 to NC State Line	254.70	2.02	64.60	59.55	36.67	261.83	365.87
SC 9, Waccamaw River Br to US 17	200.67	1.95	60.07	46.11	28.90	261.80	365.84
SC 31/Carolina Bays Pkwy, SC 90 – SC 9	97.88	0.68	23.63	40.50	34.43	262.47	366.63
S-57 Wampee Rd, SC 9 to NC State Line	488.49	1.51	158.80	137.62	117.96	263.56	367.92
S-50 Mineola Ave, US 17 to NC State Line	446.73	5.96	154.87	148.91	83.39	266.80	371.74
S-111 Brooksville/Little River Rd, S-50 to S-1233	214.26	0	73.04	87.65	43.83	266.17	371.00

¹All crash rates per 100 million vehicle miles travelled.

²Based on the statewide and Horry County crash rates respectively (95% level of confidence). Critical crash rates are the result of statistically adjusting rates for similar routes to remove elements of chance and randomness. Crashes at locations exceeding critical rates are generally not random occurrences.

Recent crash experience in North Carolina along US 17 is less than that experienced on similar routes in all categories other than fatal crashes. In South Carolina, recent crash experience along US 17 is similar to statewide averages for all routes and less than all Horry County routes. Several of the other routes analyzed within the North Carolina portion of the study area have recently experienced higher crash rates than similar routes in the state. Four intersections qualified for the North Carolina Highway Safety Improvement Program

(HSIP) for 2018: US 17 at NC 904, US 17 at Hickman Road, US 17 at Pea Landing Road, and Hickman Road at SR 1300 Calabash/Ash Little River Road.

In both states, the predominant collision type along US 17 was rear-end crashes, which are generally indicative of overall congestion issues. These types of collisions occur mainly in areas where there is frequent “stop-and-go” traffic or at locations where vehicles may stop suddenly or slow to turn. Angle crashes were the next most prevalent in South Carolina. Angle and left-turn crashes are typically among the most severe and usually occur at at-grade intersections. They can also be indicative of insufficient gaps in the traffic flow as well as poor roadway sight conditions. Crash types along the other area roadways are summarized in Tables 6 and 7.

Table 6. Crash Types along Other Area Roadways in North Carolina

Other Area Roadways in North Carolina	Most Prevalent Crash Types ¹						Other Crash Types ²	Total Crashes
	Fixed Object	Animal	Left-Turn	Angle	Rear End	Side Swipe		
NC 904	19	15	13	16	25	10	8	106
NC 130 Whiteville Road @ US 17	0	0	0	7	10	1	1	19
SR 1165 Thomasboro Rd	6	11	9	6	2	2	1	37
SR 1300 Calabash/Ash Little River Rd	28	28	16	12	8	3	9	104
SR 1301 McLamb Rd	1	1	1	1	1	0	1	6
SR 1303 Hickman Rd	16	13	8	27	12	6	8	90
SR 1304 Pea Landing Rd	9	19	10	7	1	5	0	51
SR 1305 Number 5 School Rd	1	11	0	0	0	0	2	14
SR 1316 Old Shallotte Rd.	45	24	27	4	7	4	7	118

¹NCDOT Crash Data, April 2013 to March 2018

²Includes backing, head-on, jackknife, collisions with movable objects, other collision types with vehicles, other non-collisions, rollovers, and right turn crash types.

Reported crash types along area roadways in North Carolina that have experienced higher than average crash rates do not reveal specific crash patterns. Given the lower volumes of traffic on these routes, left-turn, angle and sideswipe crashes may be indicative of geometric deficiencies.

Table 7. Crash Types along Other Area Roadways in South Carolina

Other Area Roadways in South Carolina	Most Prevalent Crash Types ¹				Other Crash Types ²	Total Crashes
	Ran off Road	Rear End	Angle	Side Swipe		
SC 31/Carolina Bays Pkwy	104	11	5	13	12	145
SC 9	46	238	217	86	31	618
S-50 Mineola Ave	40	13	13	5	4	75
S-57 Wampee Rd	105	120	56	26	16	323
S-111 Brooksville/Little River Rd	19	12	6	4	3	44

¹SCDOT Crash Data, January 2012 to September 2017

²Includes head-on, animal, pedestrian, bicyclist, and non-collision crash types.

The rear-end crashes along Hwy 57 are likely reflective congested conditions. Crash types along SC 9 were analyzed in the vicinity of key intersections as well as the overall corridor. As was the case for US 17, rear-end crashes were the most prevalent along SC 9, with angle crashes the second most prevalent crash type.

5.0 SOCIAL AND ECONOMIC CONDITIONS

The Demographic Study Area (DSA) is defined to provide demographic characteristics for the community surrounding the project and contains the smallest statistical area of US Census Block Group boundaries that contain the Direct Community Impact Area (DCIA). The DSA boundary is displayed on Figure 12 in Appendix A.

5.1 Population Trends

The project's DSA contains a notable retirement population. The median age for the DSA overall is 52.9 years, in comparison to a median age of 50 for Brunswick County and 43 for Horry County. The highest concentrations of elderly persons are located in the Brunswick County portion of the DSA.

The total population of the DSA is generally well-balanced in size between the Brunswick and Horry County, with approximately 46.5 percent of the total DSA population residing in Brunswick County and 53.5 percent in Horry County based on recent estimates. As the total land area covered by the DSA boundary is not equally distributed between the two counties, this suggests population density is higher in the Horry County portion of the DSA.

The DSA has experienced notably high rates of growth in recent years, considerably higher than countywide and statewide rates. Total population growth in the DSA between 2000 and 2010 was approximately 55.1 percent (4.5 percent annually), while countywide growth rates for the same period were approximately 46.9 percent (3.9 percent annually) in Brunswick and approximately 37.0 percent (3.2 percent annually) in Horry.

The South Carolina Revenue and Fiscal Affairs Office (<http://abstract.sc.gov/chapter14/pop5.html>) reports the Horry County population is projected to increase from 269,291 people in 2010 to 393,160 people in 2035, an approximately 46 percent change. The North Carolina Office of Budget and Management (<https://www.osbm.nc.gov/demog/county-projections>) reports the Brunswick County population is projected to increase from 108,064 people in 2010 to 186,944 people in 2035, an approximately 73 percent change.

5.2 Economy and Employment

The average unemployment rate for the DSA (9.8 percent) is generally consistent with statewide rates (9.5 percent in South Carolina and 9.4 percent in North Carolina). It is higher than the countywide rate in Horry (8.7 percent) and lower than the countywide rate in Brunswick (11.4 percent). Regarding employment as an economic indicator, local planners in Brunswick County have noted that a large portion of the community does not work due to the sizeable retirement population living in the area. For the working population, the services and tourism industries are some of the strongest local employment and economic drivers. Major employment centers serving the region are the Myrtle Beach/Grand Strand area, Shallotte and the Wilmington area (New Hanover County, NC).

Commuter data for the Brunswick County portion of the DSA indicate 33 percent of workers travel outside the county for work, which is somewhat higher than the countywide statistic (25.5 percent) and slightly higher than the statewide statistic for North Carolina (28.3 percent). Relative to commuter directionality, 25 percent of workers in the Brunswick County portion of the DSA commute to another state for work, presumably South Carolina based on geography, and eight percent commute to another county within North Carolina for work. Local planners in Brunswick County identified US 17, NC 179 and Hickman Road as the routes most heavily used by commuters traveling from the project area to Horry County for work.

Within the Horry County portion of the DSA, the average unemployment rate (7.9 percent) is lower than the countywide rate (8.7 percent). Horry County representatives have indicated within the Grand Strand region overall, the beach and Intracoastal Waterway areas house most of the region's employers. The SC 9 corridor is a growing focal point for commercial activity and professional services, anchored by McLeod Hospital. The Seacoast Medical Center and associated medical service providers as well as assisted living facilities are the highest growth employment sector at this time.

In the Horry County portion of the DSA, a total of approximately 7.4 percent of workers travel outside the county for work, which is consistent with the countywide trend (7.9 percent) but widely inconsistent with the statewide trend across South Carolina (29.1 percent). This suggests the local economy in Horry County is notably stronger on average than the local economies in other South Carolina counties. Within the DSA, 6.1 percent of Horry County workers commute to another state for work, presumably North Carolina based on geography, and 1.3 percent commute to another county within South Carolina for work. Local planners in Horry County noted the existing traffic congestion issues in the area are not a result of commuter traffic, rather they are a result of tourism related traffic.

According to information provided by the Horry County Planning representative, the market for residential growth in the study area remains high, along with commercial uses. The Little River area is the third-fastest growing area in the county and has seen substantial new construction, redevelopment and infill activity in recent years. In the Brunswick County portion of the study area, local and regional planners have reported ongoing and planned construction in a number of master-planned subdivision communities.

Local government planners in the project area have noted the importance of tourism and the large retiree population in shaping the social and economic context of the project area. The variety of business and economic resources located in the study area are largely on trend with a clear focus on tourism and service industries. Rooted in its proximity to coastal beaches and waterways, the area has historically been a popular tourist destination where recreational tourism plays a key role in the local and regional economy. As the seasonal and year-round population base has grown notably in recent decades, largely as a result of retirees migrating to the area, the local economy has also grown and evolved to include a broad range of recreational tourism resources.

The Grand Strand region is a national golfing destination and there are a number of courses located in the study area. Many of the courses are located within residential communities that contain a mix of single-family and multi-family options to accommodate both full-time residents and visiting golfers. Other business and economic resources in the study area include traditional retail tourism districts, a limited number of industrial parks as well as an increasing number of medical service providers and facilities.

The Economic Impact of Tourism on the Grand Strand, an April 2016 study by Coastal Carolina University, (https://www.coastal.edu/media/2015ccuwebsite/contentassets/documents/wallcollege/grantcenterdocs/Tourism%20Impact%20Study_2016v7-17-17.pdf) notes the impact of tourism on the Myrtle Beach area of South Carolina. In addition to remaining the number one industry in both Horry and Georgetown counties, the independent research also found that tourism generates \$7 billion annually for the local market and supports more than 83,000 jobs, 80 percent of which are maintained year-round. The study notes that in 2014, more than 17 million people visited the Myrtle Beach area, representing 37 percent of the South Carolina Department of Parks, Recreation & Tourism's statewide economic impact of \$19 billion. The report also found that tourism generated \$2.2 billion in annual income for employees and businesses, as well as \$485 million in state and local taxes.

Visit North Carolina (<https://partners.visitnc.com/economic-impact-studies>) reports visitor spending in Brunswick County in 2016 accounted for over \$544 million in expenditures, up nearly seven percent from 2015. In 2016, tourism related jobs employed more than 5,000 people, generating more than \$105 million in payroll and over \$58 million in state and local taxes.

6.0 PROJECT AREA PLANS

6.1 Transportation Plans

The 2040 GSATS Metropolitan Transportation Plan Update

The 2040 GSATS Metropolitan Transportation Plan (MTP) Update (October 2017) is an update to the previous long-range transportation plan adopted in 2011. The MTP notes the Grand Strand area attracted approximately

18 million visitors in 2016, which is up from the 17 million visitors in 2015, and the growing resident population combined with high levels of seasonal visitors place high levels of demand on transportation infrastructure.

The proposed project is included in the 2040 GSATS MTP new construction recommendations for South Carolina as the Extension of Carolina Bays Parkway to US 17 in North Carolina (Hwy 57 / NC 1303 improvements) and for North Carolina as a proposed new freeway from US 17 (Shallotte Bypass / Seaside) to South Carolina state line.

Brunswick County 2010 Comprehensive Transportation Plan (CTP) (2010)

This long range plan covers the multi-modal transportation needs of Brunswick County through 2035. The 2010 CTP highway recommendations includes NCDOT project R-3436, I-74 from US 74/76 in Columbus County, NC to the South Carolina state line in Brunswick County. Interchange location recommendations include NC 904 and Hickman Road. Other improvements included in the Plan include upgrading US 17 within the GSATS MPO boundary to an expressway and widening NC 904 to a multilane facility from Ash Little River Road to NC 179.

Cape Fear Regional Bicycle Plan (2017), Cape Fear Regional COG

The *Cape Fear Regional Bicycle Plan* is a comprehensive regional planning document adopted in July, 2017 by local governments in the region, including Brunswick County. The 30-year plan vision is for bicycling to be a safe and accessible form of transportation and recreation for residents and visitors, with key destinations served by well-connected bikeways that increase tourism and promote economic development.

Brunswick County Trail Plan (2017)

The *Brunswick County Trail Plan* consists of two maps, existing and proposed trails. The plan does not prioritize any routes in particular or outline a funding strategy for any of the proposed routes.

Horry County Bicycle and Pedestrian Plan (2013)

The *Horry County Bicycle and Pedestrian Plan* assesses the different areas and communities in Horry County where better connectivity for bicyclists and pedestrians can be most effectively provided. The plan does not make any facility recommendations affecting the study area.

GSATS 2015-2019 Transportation Improvement Program (TIP)

The GSATS 2015-2019 TIP includes the proposed Carolina Bays Parkway Extension from SC 9 to the North Carolina state line as its number one priority project. The document notes the TIP period covered is 2015-2022.

North Carolina 2018-2027 State Transportation Improvement Program (STIP)

Carolina Bays Parkway Extension is included in the current NCDOT 2018-2027 STIP as project R-5876, from the South Carolina state line to US 17 at NC 130; Construct freeway on new location. R-5876 is programmed for planning and environmental study only.

One other transportation project is included in the 2018-2027 adopted STIP in the project study area:

- R-5851: Convert the intersection of US 17 and NC 904 to a superstreet. Right-of-way is currently scheduled in 2023 and construction in 2025.
- R-5857: US 17 South of Shallotte and US 17 North of Shallotte, Convert intersections to Superstreets. Right-of-way is currently scheduled in 2020 and construction in 2022.

South Carolina 2017-2022 State Transportation Improvement Program (STIP)

SCDOT 2017-2022 STIP Project P029554 proposes to extend Carolina Bays Parkway (SC 31) from its current terminus at SC 9 in Horry County, South Carolina to the North Carolina state line. Right-of-way funding is programmed beginning in fiscal year 2021. There are no new location or widening projects included in SCDOT's STIP for the project area, but there are several pavement rehabilitation and ITS projects.

RIDE 3 Program, Horry County, SC

In November 2016 Horry County voters supported a one-cent capital projects sales tax for roads. The tax, which went into effect in May 2017, increases the level of sales tax in Horry County an additional penny on all retail sales and prepared food. The RIDE 3 commission included Carolina Bays Parkway Extension among the list of 20 projects that will receive funding through the program. The project, extending SC 31 from SC 9 to the state line, is slated to receive \$125 million through RIDE 3.

6.2 Land Use Plans and Zoning

There are a number of additional planning documents identifying goals and objectives for development in the project areas including:

- **Horry County Envision 2025 Comprehensive Plan (2008)**
- **Brunswick County CAMA Core Land Use Plan (2007)**
- **Town of Shallotte 2007 CAMA Core Land Use Plan**
- **Town of Carolina Shores Draft Comprehensive Plan (Ongoing, 2017)**
- **Brunswick County Unified Development Ordinance (2015)**
- **Town of Shallotte Unified Development Ordinance**
- **Highway 57 and Highway 9 Area Plan (2003), Horry County**
- **Little River Neighborhood Area Plan, Horry County**
- **Horry County Parks and Open Space Plan (2009)**
- **Brunswick County Comprehensive Parks and Recreation Master Plan (2009)**

7.0 PURPOSE AND NEED PUBLIC INVOLVEMENT

A project newsletter was mailed to property owners and residents in the project study area in early December, 2018. The newsletter provided information about the proposed Carolina Bays Parkway Extension, information about the planning process, and requested public input on the project's draft purpose and area transportation needs. As of January 31, 2019, a total of 33 comments were received by email, letter, the project's toll-free information line, and the Contact Us portal on NCDOT's project website. In addition, the project's PublicInput site hosted on NCDOT's online Engagement Hub received more than 1,450 views. The site provides information on the project and requested input on the project's purpose and need via survey or direct comment by January 21, 2019. Approximately 185 participants provided more than 100 comments via the site through the end of January.

In addition to comments on purpose and need, respondents provided input regarding concerns about potential impacts to the human environment such as property impacts and noise, and impacts to the natural environment such as flooding, wetlands and wildlife. Several suggestions regarding potential alignments were provided, including extending the project to I-140 in Wilmington, avoiding developed areas, and the suggestion to develop the project in phases.

Comments on the project purpose and area transportation needs included:

- The project will help with heavy traffic, including heavy truck traffic, on Hickman Road.
- The project will help address congestion on US 17 in the Little River area.
- SC 9 may not see much benefit because of dense / increasing development.
- Several commenters noted safety concerns related to narrow lanes and accidents on Hwy 57.
- The project will improve hurricane evacuation options.
- The project will have economic benefits.

- A stop light at Hwy 57 and Little River Road (S-111) is needed to handle congestion and improve safety.
- Concern the project would not divert through-traffic currently using US 17 near the State line.
- Concern the project benefits would not outweigh impacts and costs.
- The project will help ease traffic associated with future growth.

Overall, commenters were supportive of the proposed project. In addition to providing opportunities for open-ended feedback, the online survey asked questions about traffic in the study area to gauge if there were specific issues that users may be experiencing on area roadways. Results of the online survey questions are summarized in Tables 8 and 9 below.

Table 8. Public Input on Project Area Traffic Issues Survey Questions

Survey Request: Select all of the Following You Feel Apply to Specific Roadways in the Project Study Area	Percent of Responders Indicating Agreement ¹				
	South Carolina Route			North Carolina Route	
	SC 9	US 17	Hwy 57	Hickman Rd.	US 17
Too much traffic	77%	90%	84%	88%	67%
Long delays at signalized intersections	64%	59%	36%	27%	46%
Long delays at unsignalized intersections	44%	48%	54%	47%	36%
Too many trucks	42%	42%	63%	58%	41%
Too many driveways	35%	41%	52%	54%	40%
Difficult to pull into or out of driveways	44%	38%	57%	58%	37%
Frequent accidents	48%	49%	43%	36%	36%

¹Percentages for each route indicate the percent of respondents who selected each option. Because respondents could select more than one option, percentages do not add up to 100.

Table 9. Public Input on Congestion and Delay Survey Question

Survey Request: Select When You Consider Congestion and Delay to be Problematic on Area Roadways	Percent of Responders Indicating Agreement ¹
Summer months	70%
Evening rush hour	58%
Most of the time	55%
Morning rush hour	48%
Weekends	38%
Holidays	24%
Weekdays	25%
Never	4%

¹Percentages for each route indicate the percent of respondents who selected each option. Because respondents could select more than one option, percentages do not add up to 100.

The Town of Shallotte submitted a letter expressing strong support for the proposed project, citing several expected benefits including improved safety on existing roadways, economic benefits to local communities and Brunswick County resulting from improved mobility, and improved emergency evacuation routes.

Appendix A

Figures

Carolina Bays

Parkway Extension

North Carolina + South Carolina



NCDOT Project R-5876
Brunswick County



SCDOT Project P029554
Horry County

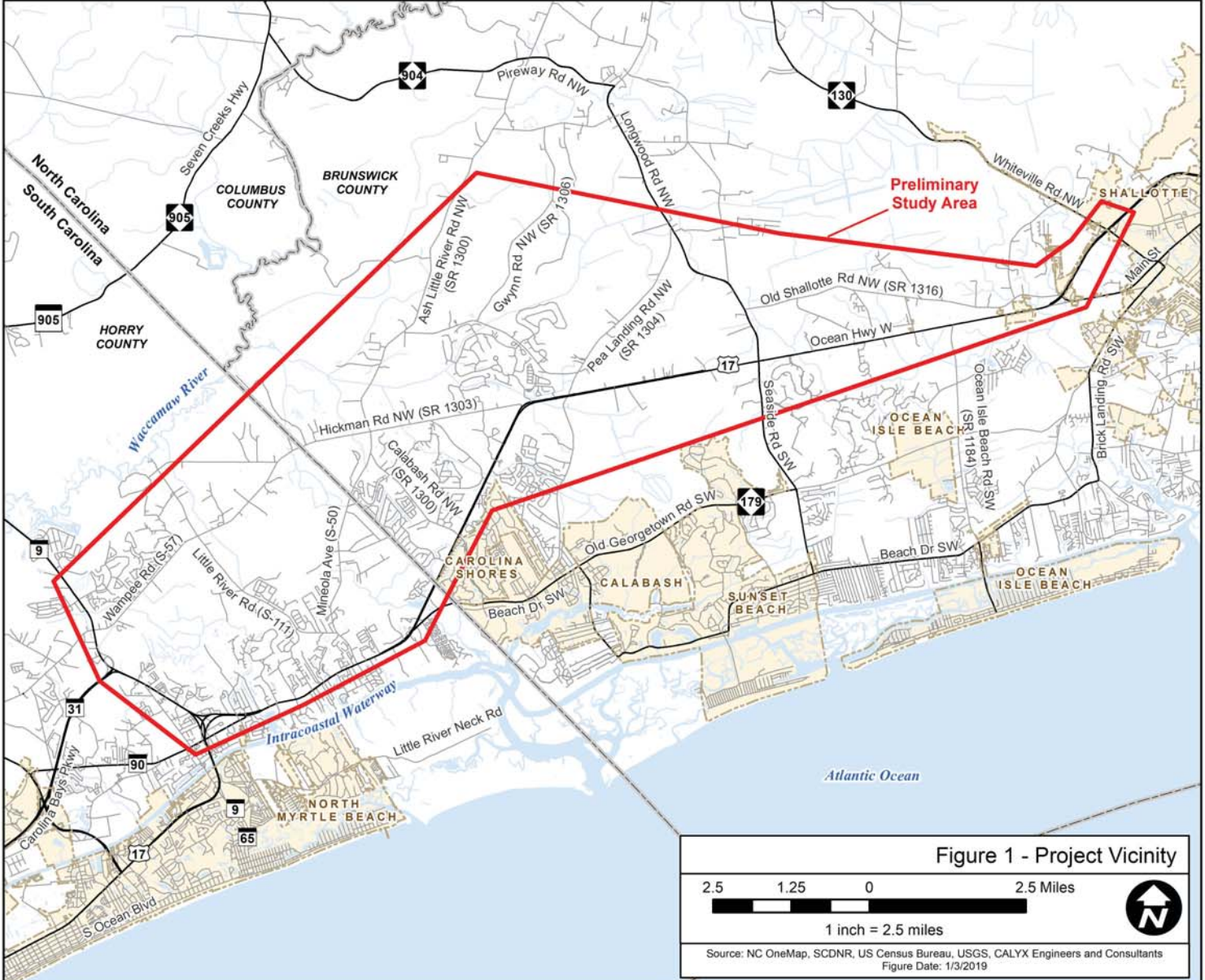
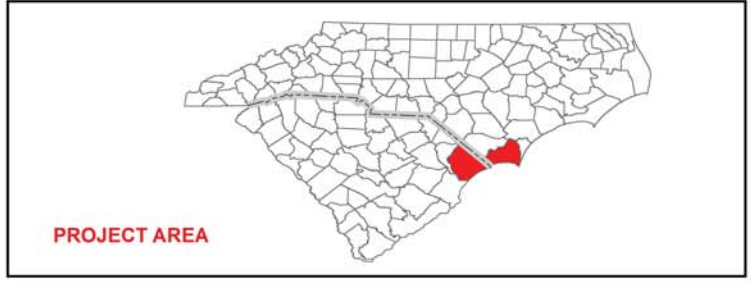
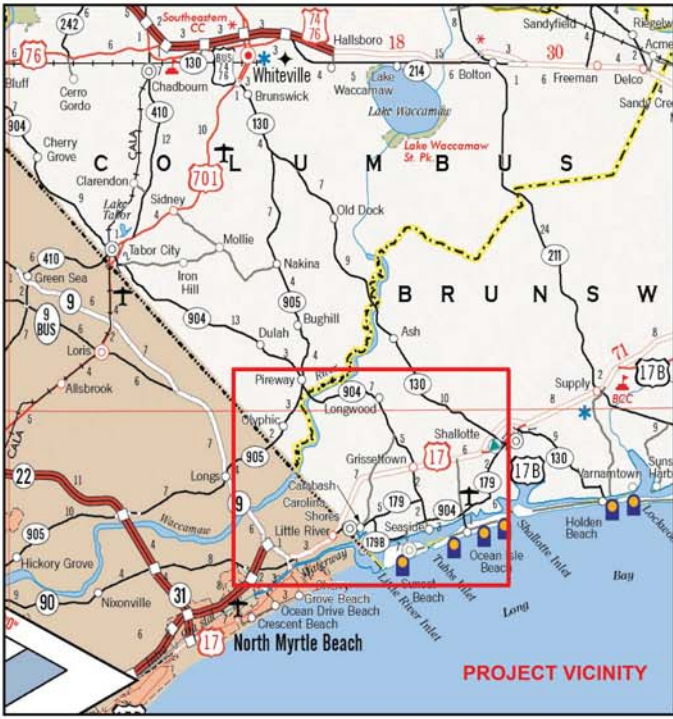
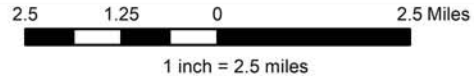


Figure 1 - Project Vicinity



Source: NC OneMap, SCDNR, US Census Bureau, USGS, CALYX Engineers and Consultants
Figure Date: 1/3/2019

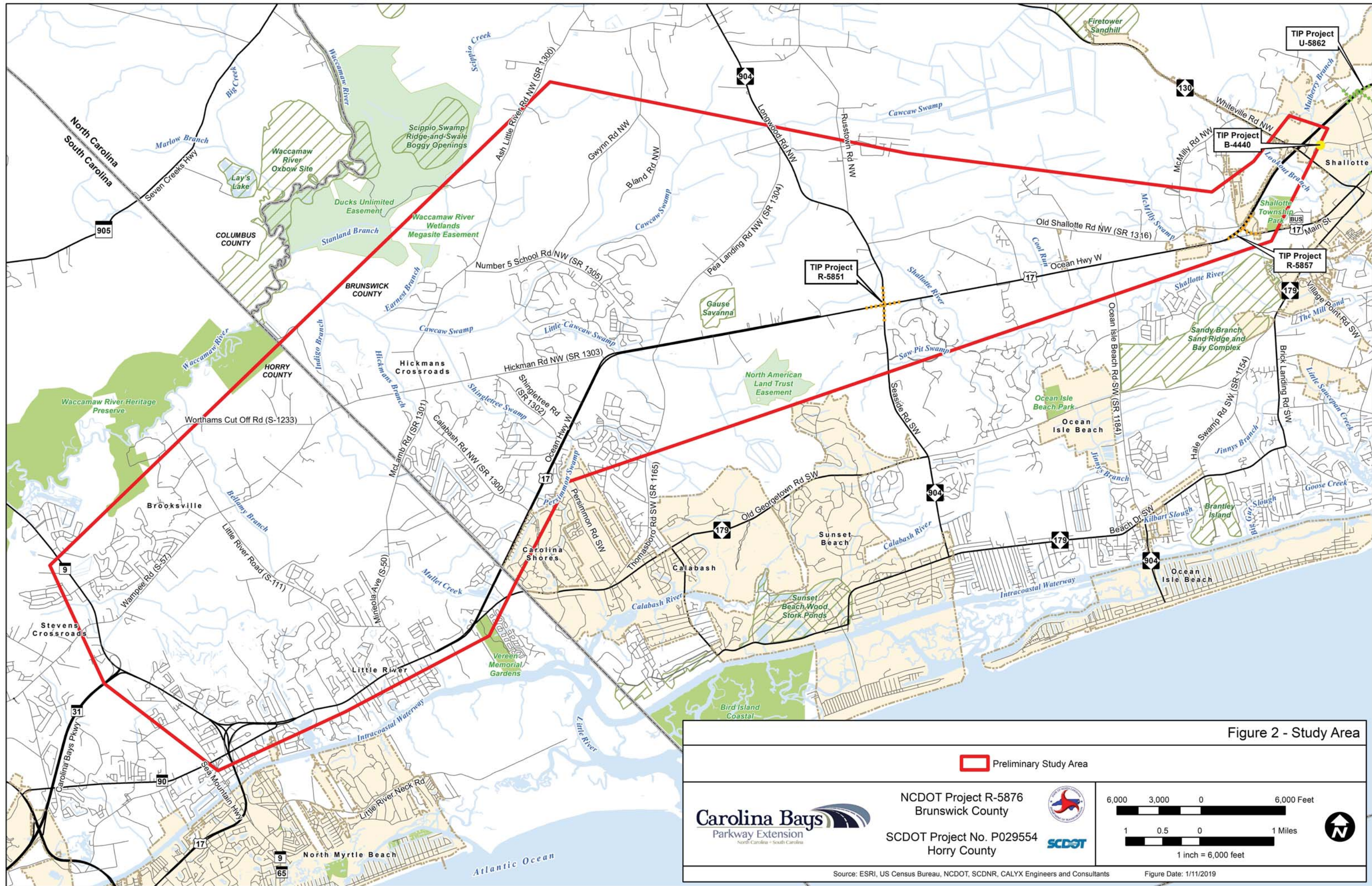
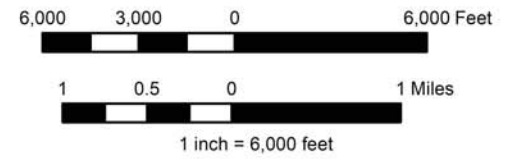


Figure 2 - Study Area

 Preliminary Study Area

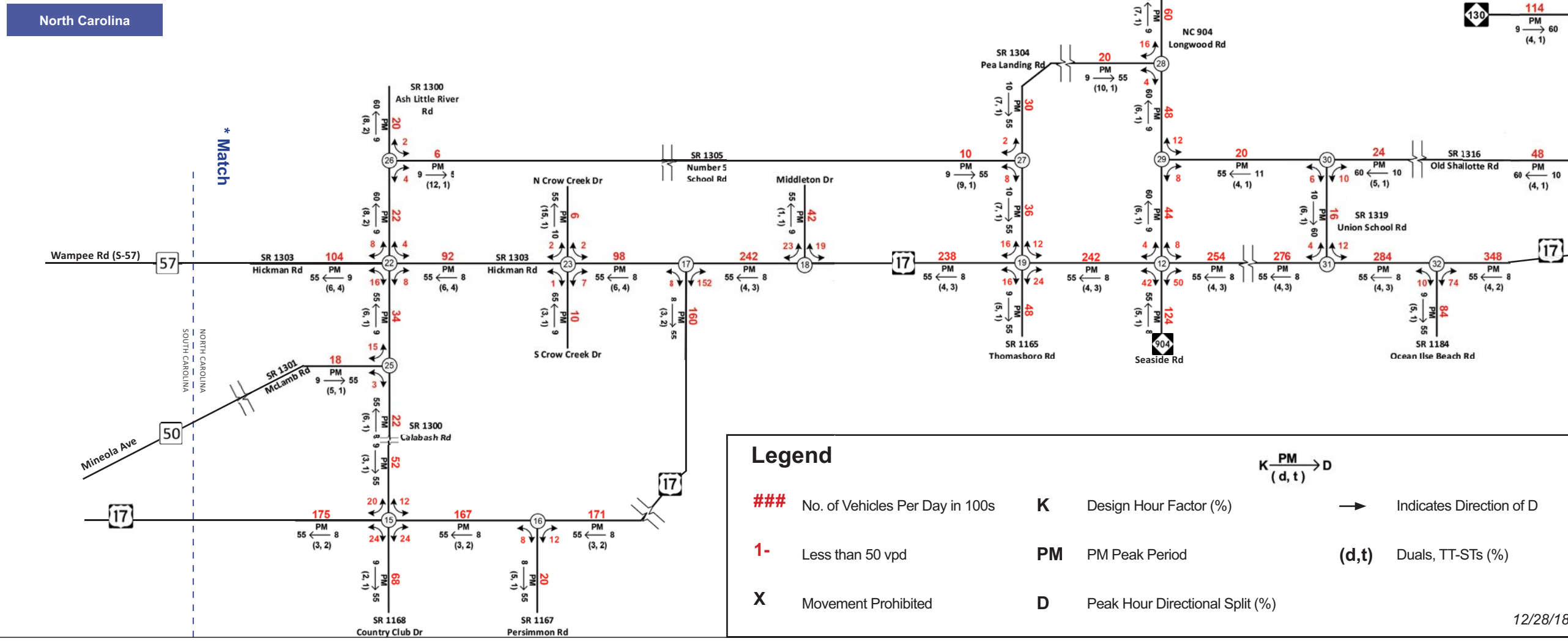
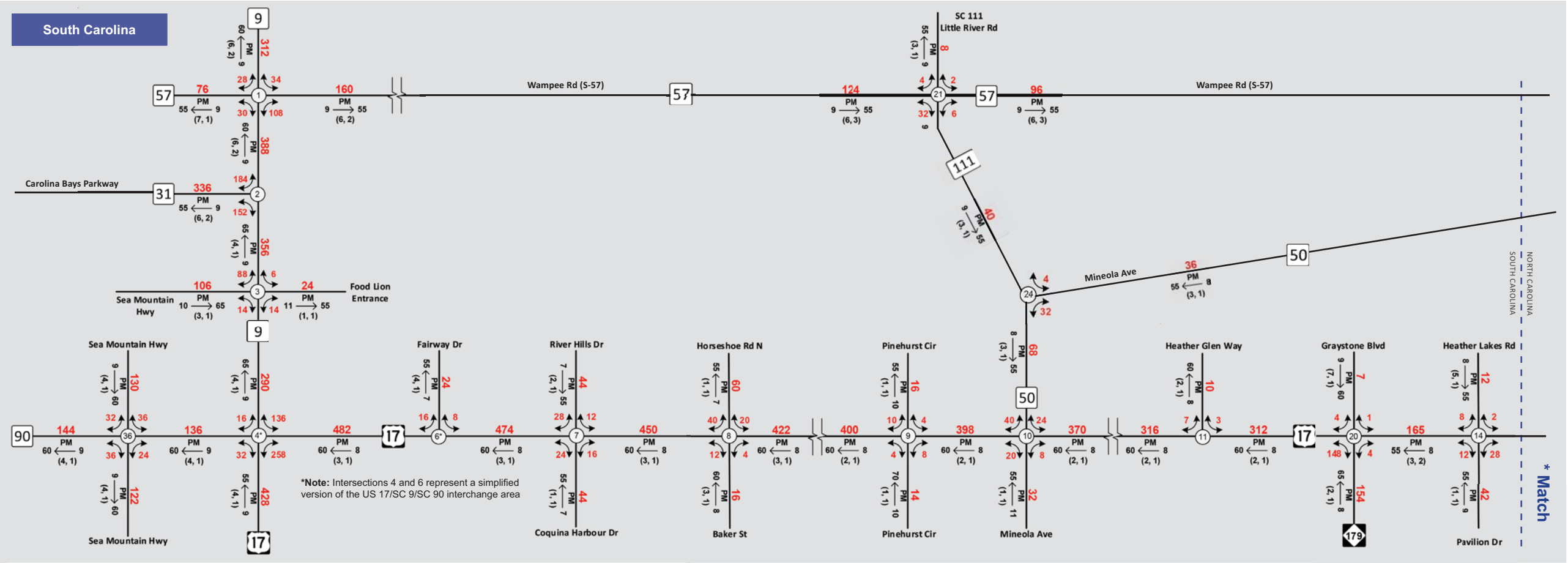


NCDOT Project R-5876
Brunswick County
SCDOT Project No. P029554
Horry County



Source: ESRI, US Census Bureau, NCDOT, SCDNR, CALYX Engineers and Consultants

Figure Date: 1/11/2019



Legend

No. of Vehicles Per Day in 100s
 1- Less than 50 vpd
 X Movement Prohibited

K Design Hour Factor (%)
 PM PM Peak Period
 D Peak Hour Directional Split (%)

$K \xrightarrow{PM} D$
 (d, t) → Indicates Direction of D
 (d, t) Duals, TT-STs (%)

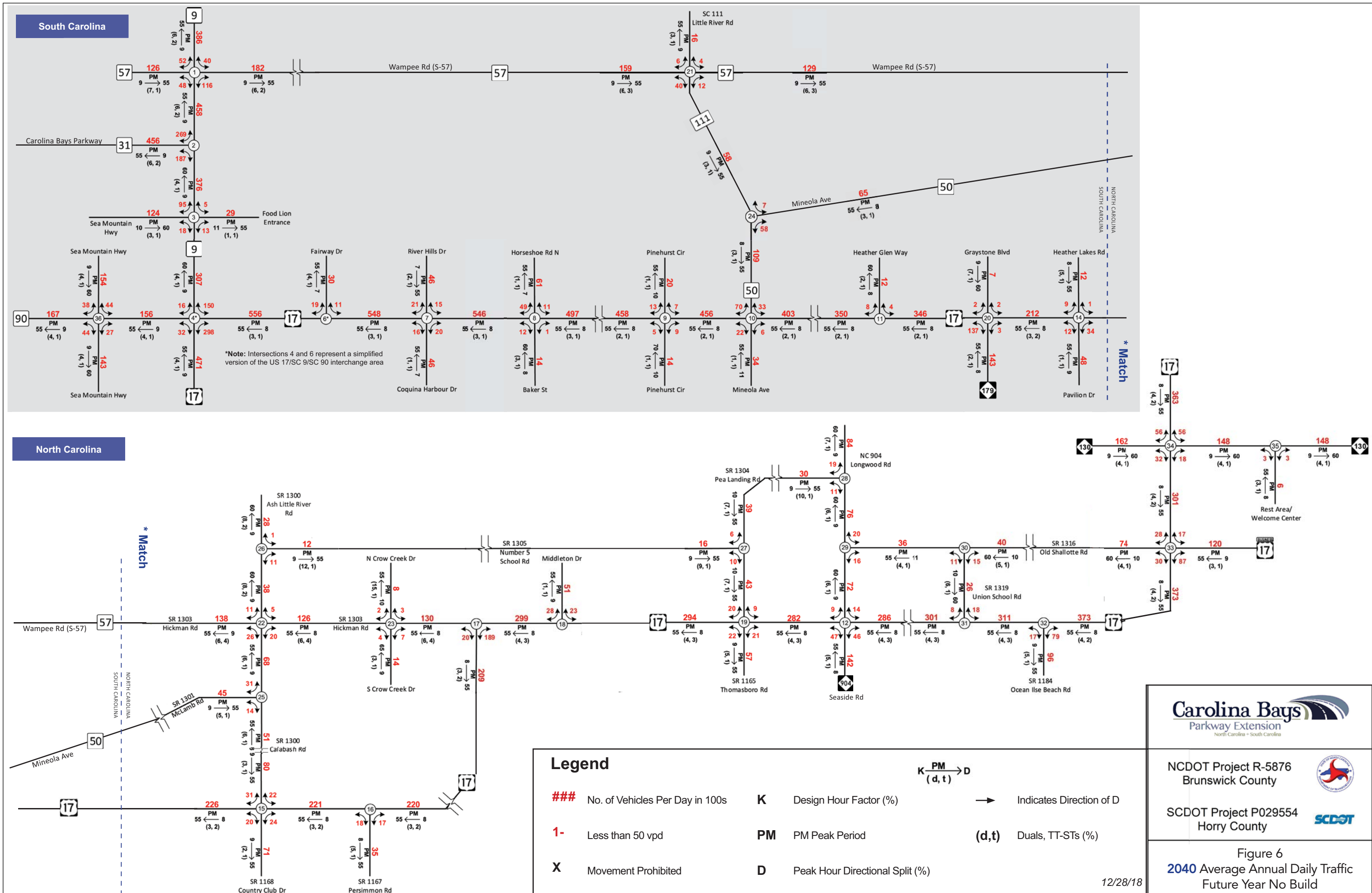
Carolina Bays Parkway Extension
 North Carolina - South Carolina

NCDOT Project R-5876
 Brunswick County


SCDOT Project P029554
 Horry County

Figure 5
 2016 Average Summer Weekday Traffic
 Base Year No Build

12/28/18




Legend		
###	No. of Vehicles Per Day in 100s	
1-	Less than 50 vpd	
X	Movement Prohibited	
K	Design Hour Factor (%)	
PM	PM Peak Period	
D	Peak Hour Directional Split (%)	
$K \xrightarrow{PM} \begin{matrix} (d, t) \end{matrix}$		Indicates Direction of D
		(d,t) Duals, TT-STs (%)



Carolina Bays
Parkway Extension
North Carolina - South Carolina

NCDOT Project R-5876
Brunswick County



SCDOT Project P029554
Horry County


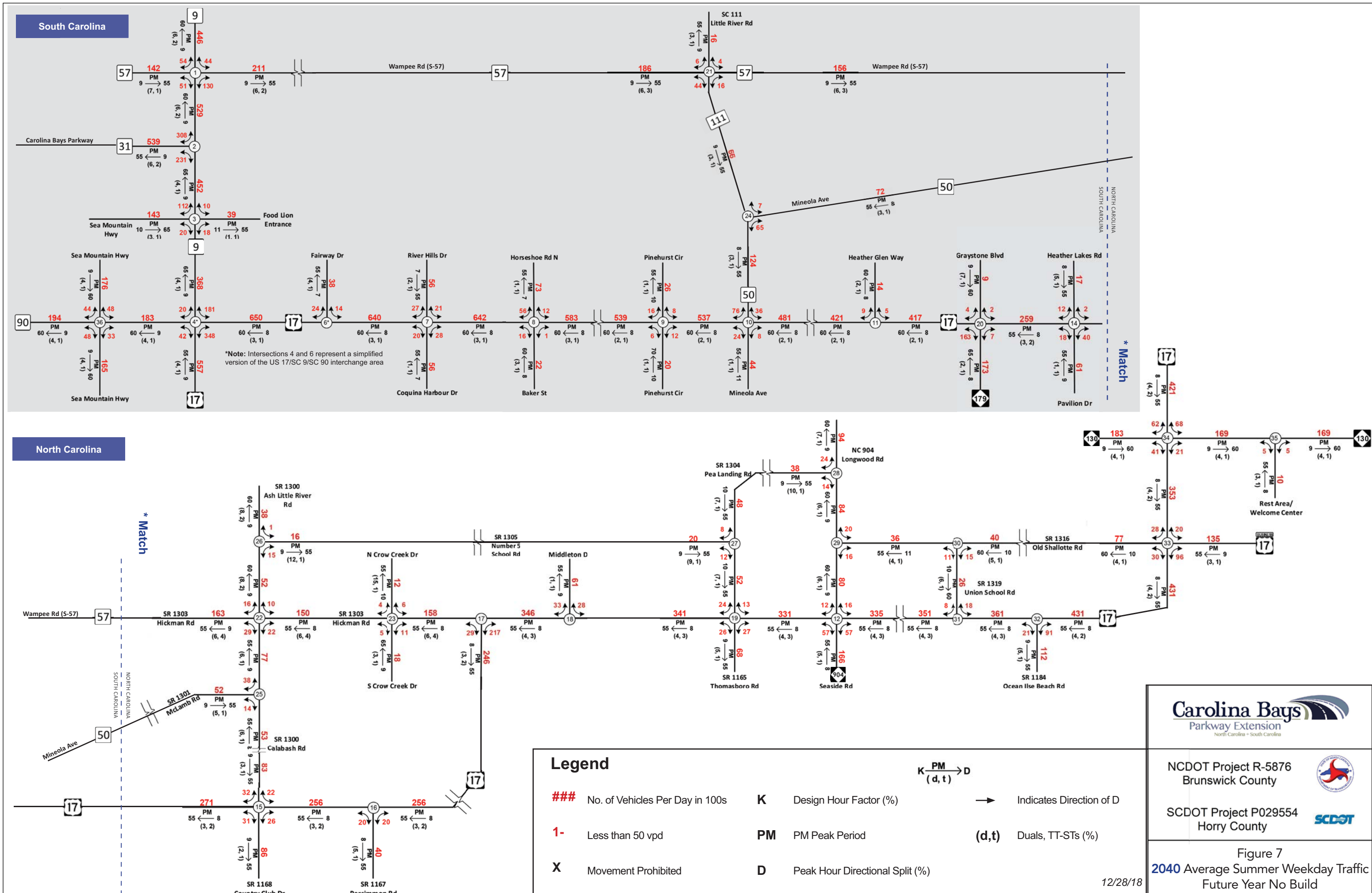



Figure 6
2040 Average Annual Daily Traffic
Future Year No Build

12/28/18




Legend		$K \xrightarrow{\text{PM}} D$ <small>(d, t)</small>	
###	No. of Vehicles Per Day in 100s	K	Design Hour Factor (%)
1-	Less than 50 vpd	PM	PM Peak Period
X	Movement Prohibited	(d,t)	Duals, TT-STs (%)
		→	Indicates Direction of D



Carolina Bays
Parkway Extension
North Carolina - South Carolina

NCDOT Project R-5876
Brunswick County



SCDOT Project P029554
Horry County


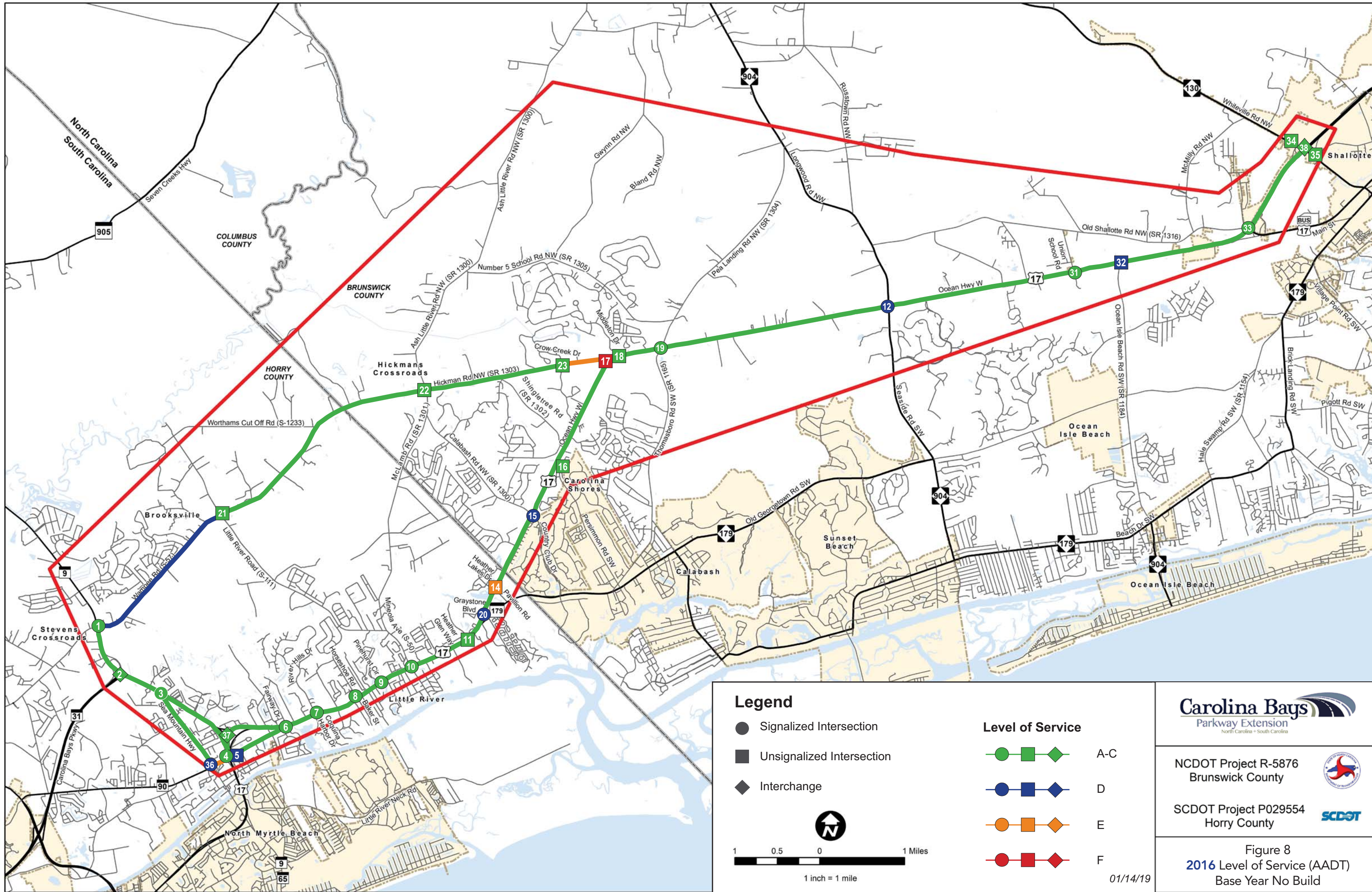


Figure 7
2040 Average Summer Weekday Traffic
Future Year No Build

12/28/18



Legend

- Signalized Intersection
- Unsignalized Intersection
- ◆ Interchange

Level of Service

- ■ ◆ A-C
- ■ ◆ D
- ■ ◆ E
- ■ ◆ F

1 0.5 0 1 Miles
1 inch = 1 mile

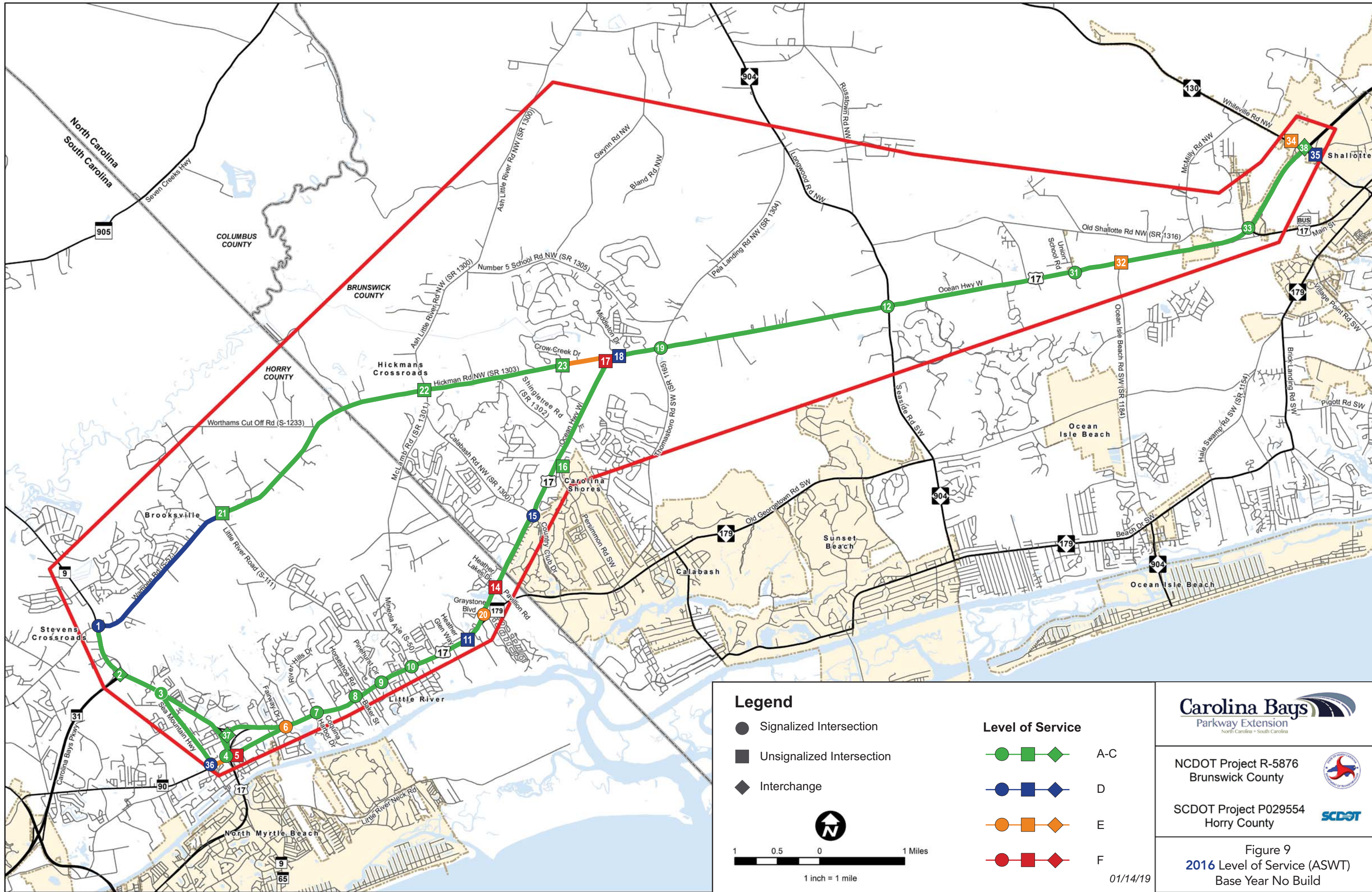
Carolina Bays Parkway Extension
North Carolina • South Carolina

NCDOT Project R-5876
Brunswick County

SCDOT Project P029554
Horry County

Figure 8
2016 Level of Service (AADT)
Base Year No Build

01/14/19



Legend

- Signalized Intersection
- Unsignalized Intersection
- ◆ Interchange

Level of Service

- ■ ◆ A-C
- ■ ◆ D
- ■ ◆ E
- ■ ◆ F

1 0.5 0 1 Miles
1 inch = 1 mile

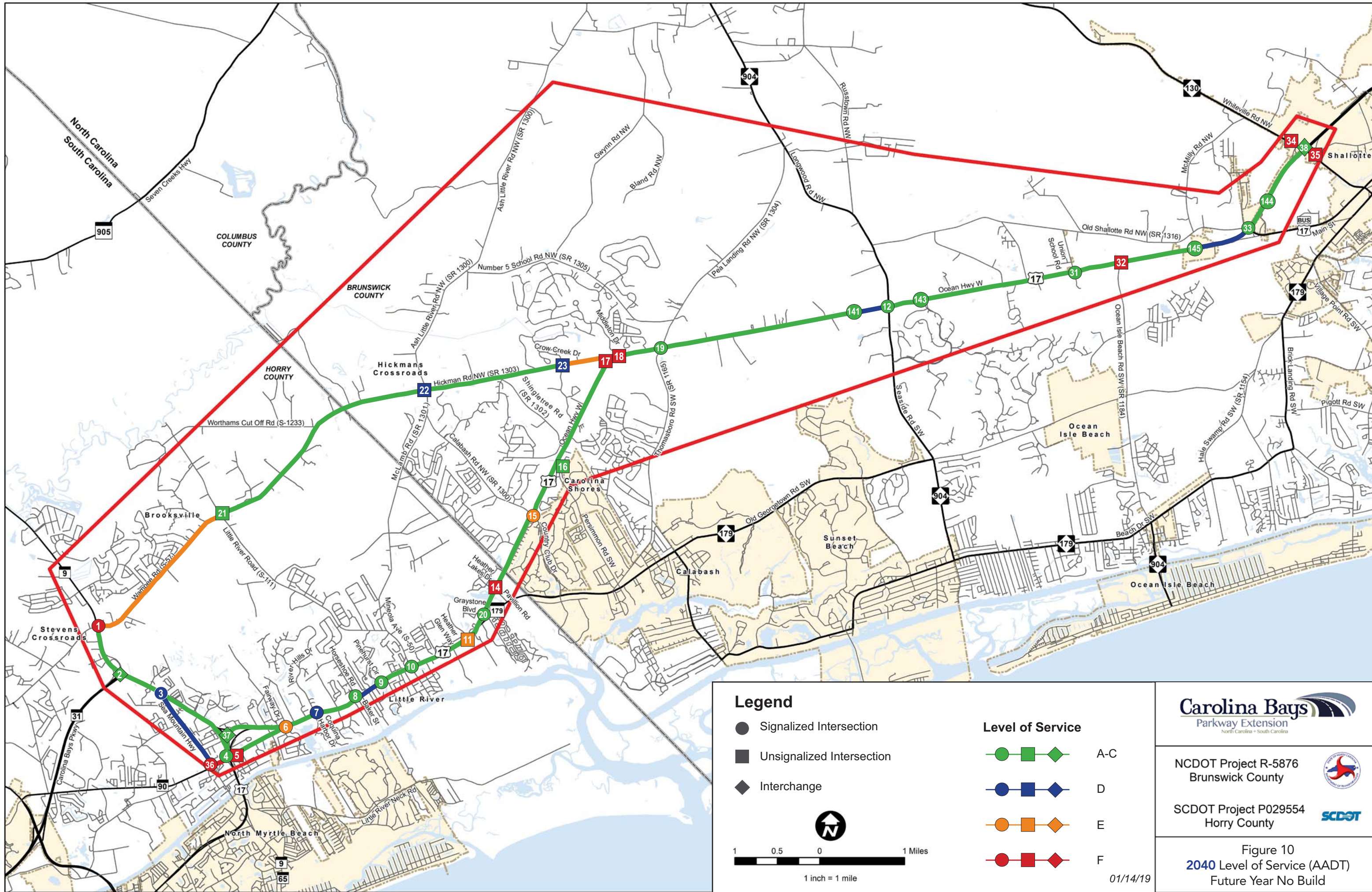
Carolina Bays Parkway Extension
North Carolina • South Carolina

NCDOT Project R-5876
Brunswick County

SCDOT Project P029554
Horry County

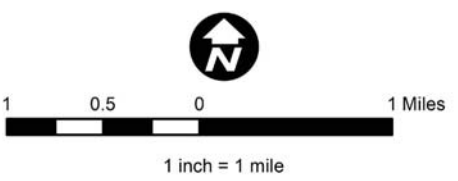
Figure 9
2016 Level of Service (ASWT)
Base Year No Build

01/14/19



- Legend**
- Signalized Intersection
 - Unsignalized Intersection
 - ◆ Interchange

- Level of Service**
- ■ ◆ A-C
 - ■ ◆ D
 - ■ ◆ E
 - ■ ◆ F



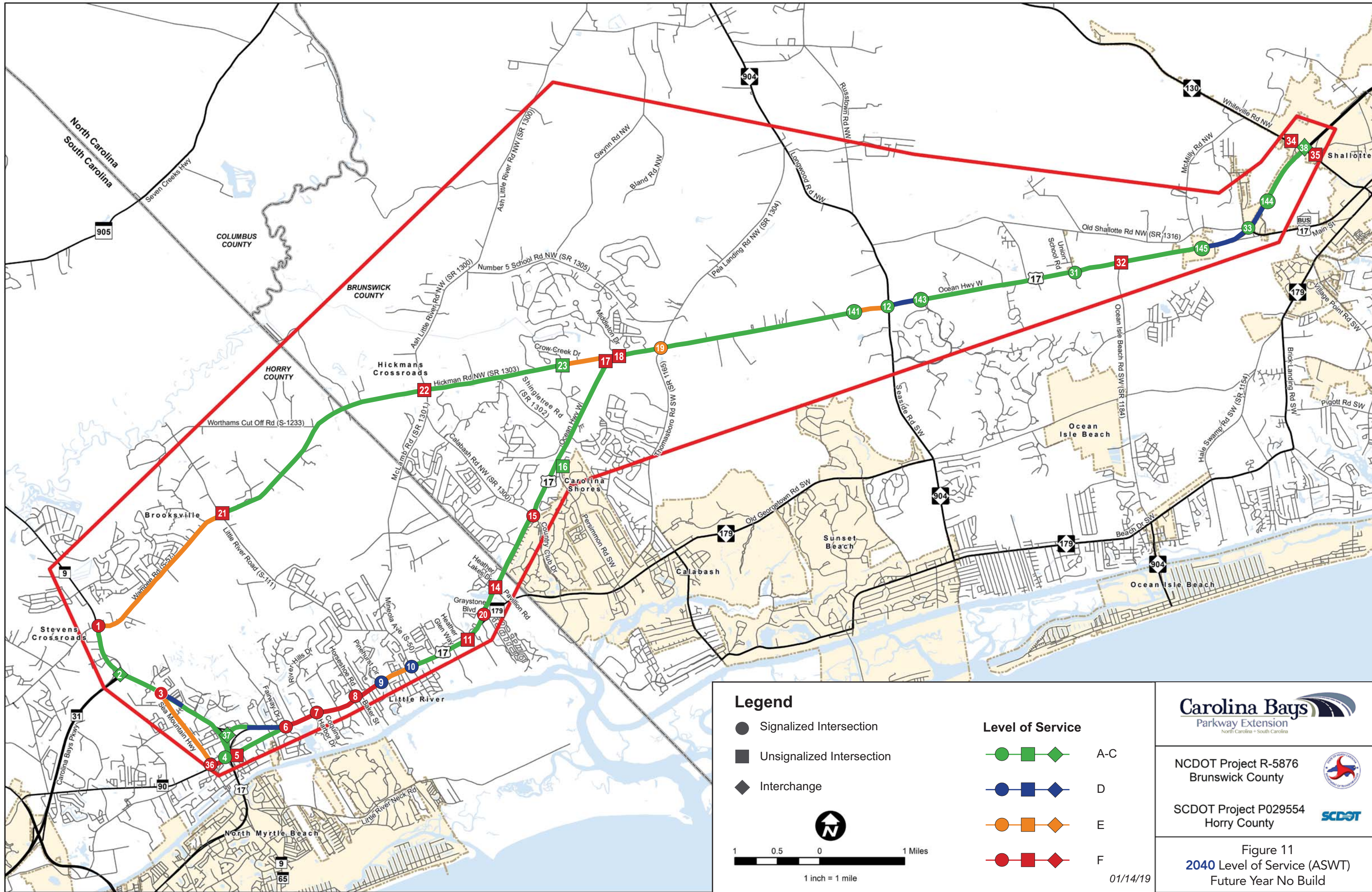
Carolina Bays
Parkway Extension
North Carolina • South Carolina

NCDOT Project R-5876
Brunswick County

SCDOT Project P029554
Horry County

Figure 10
2040 Level of Service (AADT)
Future Year No Build

01/14/19



Legend

- Signalized Intersection
- Unsignalized Intersection
- ◆ Interchange

Level of Service

- ■ ◆ A-C
- ■ ◆ D
- ■ ◆ E
- ■ ◆ F

1 0.5 0 1 Miles
1 inch = 1 mile

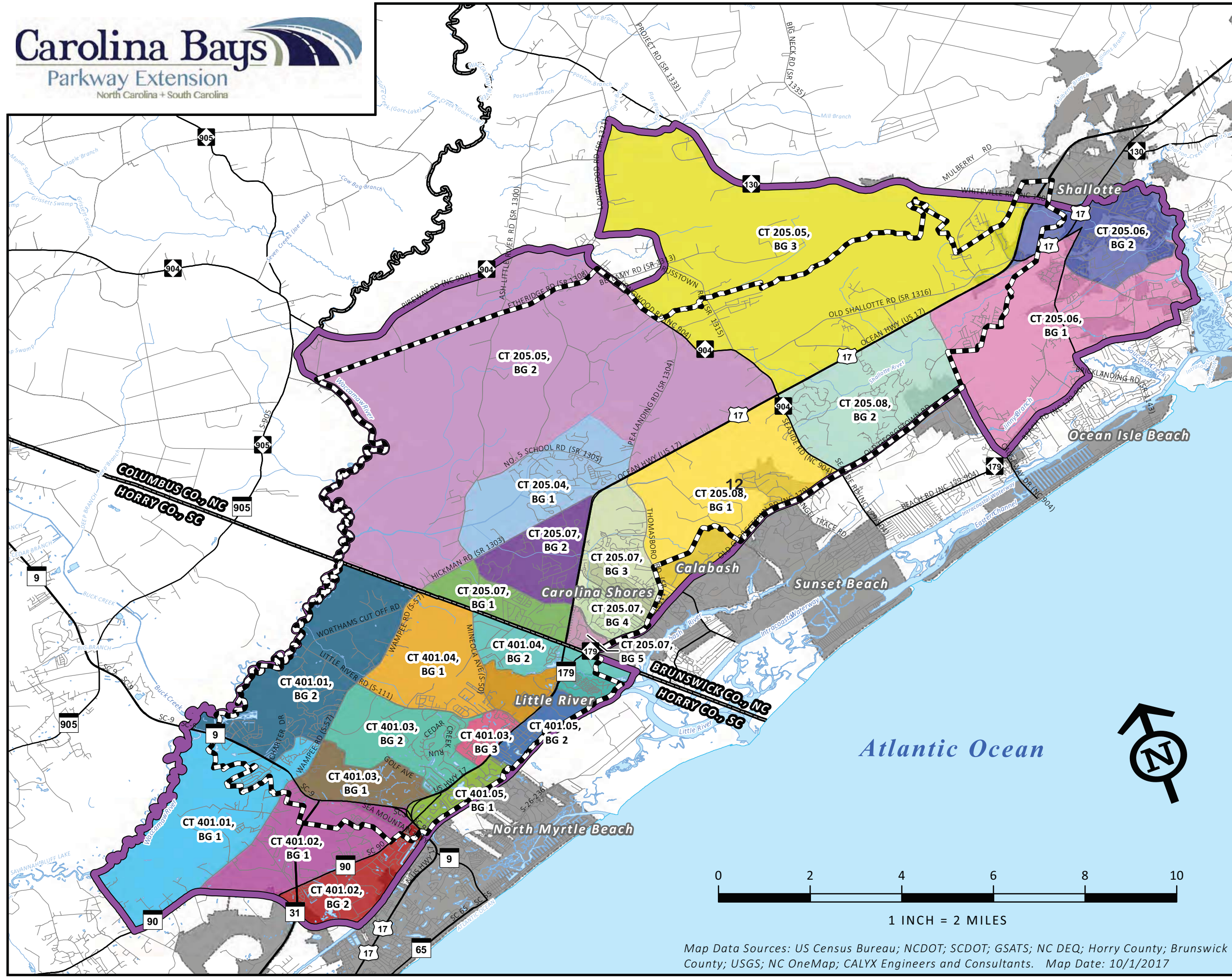
Carolina Bays Parkway Extension
North Carolina • South Carolina

NCDOT Project R-5876
Brunswick County

SCDOT Project P029554
Horry County

Figure 11
2040 Level of Service (ASWT)
Future Year No Build

01/14/19



Carolina Bays Parkway Extension

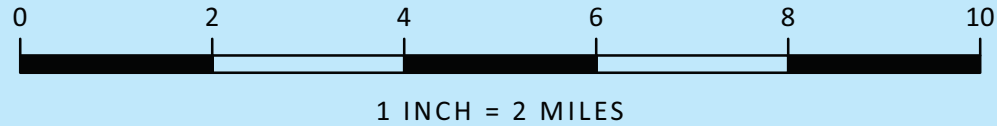
NCDOT Project R-5876
SCDOT Project P029554

From SC 9 in Horry County, SC to US 17 Shallotte Bypass in Brunswick County, NC

FIGURE 12 Demographic Study Area (DSA) Boundary



- Legend**
- DCIA BOUNDARY
 - DSA BOUNDARY
 - COUNTY BOUNDARIES
 - STREAM
 - WATER BODY
 - PLACES & MUNICIPALITIES



Map Data Sources: US Census Bureau; NCDOT; SCDOT; GSATS; NC DEQ; Horry County; Brunswick County; USGS; NC OneMap; CALYX Engineers and Consultants. Map Date: 10/1/2017