

Corridor Alternatives Screening

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



September 30, 2019 | 1:15 p.m. – 3:30 p.m.
Southeastern North Carolina Agricultural Events Center
1027 US 74 ALT, Lumberton, North Carolina, 28358

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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
SCDOT Project P029554

September 30, 2019

Meeting Agenda

1. Sign-in and Introductions
2. Purpose of Meeting
3. Project Overview
4. Preliminary Alternatives Review
5. Discussion
6. Next Steps

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1.0 MEETING PURPOSE

The purpose of today's meeting is to review preliminary alternatives for the proposed Carolina Bays Parkway Extension project and determine what corridor concepts should be presented to the public. The North Carolina Department of Transportation (NCDOT) and South Carolina Department of Transportation (SCDOT) plan to conduct public meetings for the proposed project this fall.

2.0 PROJECT DESCRIPTION

NCDOT and 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.

SCDOT State Transportation Improvement Program (STIP) Project P029554 proposes to extend Carolina Bays Parkway 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 Impact Statement.

3.0 PURPOSE OF THE PROPOSED PROJECT

The primary 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. The NEPA/Section 404 Merger Team concurred on the purpose of the project at their March 19, 2019 Concurrence Point 1 meeting.

4.0 PROJECT STUDY AREA

The NEPA/Section 404 Merger Team concurred on the project study area at the March 19, 2019 Concurrence Point 1 meeting. During the development of preliminary corridor concepts and associated interchange concepts it became apparent that some portions of the original study area will need to be expanded (see Figure 2 in Appendix A). The project team will evaluate if any further refinements to the study area are required following input on the preliminary corridor concepts from the Merger Team, local officials, and the public. The project team will present a revised recommended study area for the Merger Team's consideration at the Detailed Study Alternatives Concurrence Point 2 meeting.

5.0 PRELIMINARY ALTERNATIVES

Preliminary alternatives for the proposed project include the No-Build Alternative, the Transportation Systems Management Alternative, the Travel Demand Alternative, the Mass Transit Alternative, and nine Build alternatives.

5.1 No-Build (No-Action) Alternative

The No-Build Alternative would not provide any substantial improvements to roadways within the study area through the year 2040. Only typical maintenance activities such as patching, resurfacing, regrading shoulders, and maintaining ditches would occur.

5.2 Transportation System Management (TSM) Alternative

Transportation Systems Management (TSM) improvements involve increasing the available capacity of a roadway within the existing right-of-way with minimum capital expenditures and without reconstructing or adding additional through lanes to the existing road. There are two types of TSM roadway improvements:

operational and physical improvements. Physical improvements are usually more capital intensive while operational changes are largely administrative in nature.

Items such as the addition of turn lanes, striping, signing, signalization, and minor realignments are examples of TSM physical improvements. Physical TSM improvements are most effective in addressing site-specific capacity and safety issues. Examples of TSM operational improvements include traffic law enforcement, speed restrictions, access control, and signal timing changes. These types of improvements are best suited for areas with capacity or safety deficiencies in specific locations.

5.3 Travel Demand Management (TDM) Alternative

Travel Demand Management (TDM) is an approach to mitigating traffic congestion. Examples of TDM alternatives include ridesharing, park & ride, flexible work schedules, and telecommuting programs. Ridesharing provides a vehicle option for people who normally travel via public transportation and non-motorized modes, but at times need to make special trips (e.g., grocery shopping, trips to rural areas, trips from a transit station to a final destination). Employers who provide flexible work schedules allow employees to choose their arrival and departure times, which may reduce peak travel demand by allowing employees to avoid the most congested travel times or more easily coordinate carpools and vanpools. Telecommuting allows employees to work from home. Because telecommuters are not traveling between home and work, travel demand may be reduced, particularly during peak hours.

5.4 Mass Transit

Mass transit alternatives include bus services, rail services, and express lanes. The project study area will be evaluated for characteristics suitable for implementation or enhancement of mass transit systems.

5.5 Build Alternatives – Preliminary Corridor Concepts

Utilizing GIS software from Environmental Systems Research Institute (ESRI), a least-cost model was developed for the study area. The least-cost model analyzed natural and human environment features, weighted for constraint factors, and generated best path alignments between termini for which potential corridors would generate the least overall impacts. After the model was run for all routes, centerlines were developed to reflect best path alignments using the modeled corridor, roadway design criteria and constructability considerations, aerial photography, and environmental features mapping. The centerlines were buffered, and nine 1,000-foot corridor alternatives were generated. Additional information regarding methodology and design criteria is included in Appendix B.

A review of the preliminary corridor concepts is provided below. The concepts are shown on Figures 3A-3J in Appendix A. Each of the nine preliminary corridor concepts would begin at the existing Carolina Bays Parkway/SC 9 interchange in South Carolina and end at the US 17 Shallotte Bypass in North Carolina. The location of the tie-in to existing US 17 varies by corridor concept; however, all concepts would utilize existing US 17 for approximately 6.3 miles between NC 904 (Longwood Road/Seaside Road) and NC 130 in Brunswick County. Three existing intersections are proposed for conversion to interchanges along this section of US 17, including NC 904, Ocean Isle Beach Road, and US 17 Business (Main Street).

Highlights from the Summary of Potential Environmental Effects table (Table 1) are included in the corridor concept descriptions. Refer to the table for a detailed listing of nearby resources and potential impacts.

5.5.1 Corridor Concept 1

Corridor Concept 1 (Figure 3B in Appendix A) extends to the east from the SC 9 interchange before turning north to cross Highway 57 (Wampee Road/S-57) near its intersection with Little River Road (S-111). The new location alignment runs generally north of and parallel to Highway 57 for approximately 2.3 miles to the North Carolina state line. In North Carolina, Concept 1 continues east on new location and turns north to parallel Ash-Little River Road for approximately 2.2 miles, crossing this facility at three locations before again turning east. The

new location route runs southeast for approximately 5.2 miles, crossing Gwynn Road and Pea Landing Road before tying into existing-location US 17 just west of its intersection with NC 904.

Corridor Concept 1 would result in the highest impacts to NWI/NC CREWS Wetlands (385.51 acres), though is tied with Concept 4 for the least impacts to 100-year floodplain (129.30 acres).

5.5.2 Corridor Concept 2

Corridor Concept 2 (Figure 3C in Appendix A) follows the same alignment as Concept 1 from the SC 9 interchange to the North Carolina state line. In North Carolina, the new location alignment includes a new interchange with Ash Little River Road and travels another 1.3 miles on new location before tying into Hickman Road near its intersection with Shingletree Road. Concept 2 follows Hickman Road and US 17 along existing location for the remainder of its length (approximately 11.9 miles).

In comparison to the other Corridors, Concept 2 would result in moderate impacts to streams (20,824 linear feet), NWI/NC CREWS wetlands (248 acres), and residential properties (179 single-family or mobile homes). Concept 2 would impact 22.71 acres of approved or planned residential development, the lowest of any alternative.

5.5.3 Corridor Concept 3

Corridor Concept 3 (Figure 3D in Appendix A) would utilize the same alignment as Concepts 1 and 2 through South Carolina. As it crosses the North Carolina state line, the new location alignment immediately ties into Hickman Road and follows both this route and US 17 on existing location for the remainder of its length (approximately 14.0 miles).

Corridor Concept 3 would result in the lowest impacts to modeled wetlands (233.75 acres), second lowest impacts to NWI/NC CREWS wetlands (236.95 acres), and the second highest impacts to residential properties (225 single-family or mobile homes).

5.5.4 Corridor Concept 4

In comparison to Concepts 1, 2, and 3, Corridor Concept 4 (Figure 3E in Appendix A) would follow a more southerly new location alignment from the SC 9 interchange before intersecting Little River Road at a proposed interchange. The route would then curve back to the north and provide a new interchange at Hickman Road, just east of the North Carolina state line. From here, Concept 4 would follow the same alignment as Concept 1 through the remainder of North Carolina.

Corridor Concept 4 is the longest evaluated option (21.43 miles) and would result in the highest impacts to modeled wetlands (363.53 acres). Along with Alternative 1, it would result in the lowest impacts to 100-year floodplain (129.30 acres) and would result in the lowest impacts to residential properties (179 single-family or mobile homes).

5.5.5 Corridor Concept 5

Corridor Concept 5 (Figure 3F in Appendix A) follows the same alignment as Concept 4 from the SC 9 interchange to the North Carolina state line. Concept 5 also includes a new interchange at Hickman Road before turning east to cross Ash Little River Road and continuing approximately 1.3 mile on new location before tying into existing Hickman Road in the same location as Concept 2. From here it would utilize existing location Hickman Road and US 17 for the remainder of its length (approximately 11.9 miles).

Corridor Concept 5 would result in the second highest impacts to modeled wetlands (304.73 acres) but second lowest impacts to residential properties (126 single-family or mobile homes). When compared to other concepts, moderate impacts to NWI/NC CREWS wetlands (240.58 acres), streams (21,609 linear feet), and approved or planned residential development (42.67 acres) are anticipated.

5.5.6 Corridor Concept 6

Corridor Concept 6 (Figure 3G in Appendix A) follows the same new location alignment as Concepts 4 and 5 through South Carolina. In North Carolina, the proposed alignment would tie immediately to Hickman Road in the same location as Concept 3 and follow existing location Hickman Road and US 17 for approximately 14.0 miles.

Corridor Concept 6 would result in the least impact to NWI/NC CREWS wetlands (232.12 acres) and have moderate impacts to streams (22,089 linear feet) and residential properties (169 single-family or mobile homes) when compared to other concepts.

5.5.7 Corridor Concept 7

Corridor Concept 7 (Figure 3H in Appendix A) utilizes the same alignment as Concepts 4, 5, and 6 from the SC 9 interchange to the proposed Little River Road interchange. Concept 7 continues to the northeast on new location, though follows a more southerly route into North Carolina than Concepts 1-6. Concept 7 is the only option to cross McLamb Road in North Carolina and includes a proposed interchange at Calabash Road. The alignment would then continue northeast, crossing Shingletree Road and tying into existing US 17 near its intersection with Hickman Road. The concept would utilize existing location US 17 for the remainder of its length (approximately 10.2 miles).

Concept 7 is the shortest of all options (19.04 miles) with the least number of interchanges (8) and lowest stream impacts (18,919 linear feet). This concept would result in moderate impacts to NWI/NC CREWS wetlands (245.16 acres) and residential properties (151 single-family or mobile homes) when compared to other concepts. While Concept 7 would impact the lowest number of commercial/industrial structures (107), it would also result in the highest impacts to approved or planned residential developments (91.80 acres).

5.5.8 Corridor Concept 8

Corridor Concept 8 (Figure 3I in Appendix A) follows the southernmost alignment from the SC 9 interchange, running on new location to the northeast with proposed interchanges at Little River Road and Mineola Avenue in South Carolina. The alignment curves to the northeast at Mineola Avenue, traversing on new location across the North Carolina state line and tying into existing US 17 just north of its intersection with Calabash Road. Concept 8 utilizes existing US 17 for the remainder of its length, or approximately 12.6 miles.

Concept 8 would result in the second highest impacts to streams (25,221 linear feet) and second highest residential impacts (246 single-family or mobile homes and 15 apartment or condominium buildings). When compared to other concepts, moderate impacts are anticipated to modeled wetlands (270.35 acres), NC CREWS/NWI wetlands (253.18 acres), and 100-year floodplain (180.05 acres).

5.5.9 Corridor Concept 9

Like Concept 8, Concept 9 (Figure 3J in Appendix A) follows the southernmost alignment from the SC 9 interchange, running to the northeast to cross Little River Road and Mineola Avenue, with proposed interchanges at both of these routes. To the east of Mineola Avenue, the alignment curves to the southeast to tie in with existing US 17 just south of the North Carolina state line. From here, Concept 9 follows US 17 for the remainder of its length (approximately 14.2 miles) through South Carolina and North Carolina to the project terminus.

Concept 9 would result in the highest impacts to several resources, including streams (30,369 linear feet), ponds (30.84 acres), 100-year floodplain (214.13 acres), residential properties (287 single-family or mobile homes and 31 apartments or condominiums), and commercial/industrial properties (140 structures). When compared to other concepts, moderate impacts are anticipated to modeled wetlands (291.03 acres) and NWI/NC CREWS wetlands (282.63 acres).

Table 1. Preliminary Corridor Alternative Concepts – Potential Environmental Effects

Impact Category ^{1,2}		Measure		Corridor Concept																	
				1		2		3		4		5		6		7		8		9	
				Total		Total		Total		Total		Total		Total		Total		Total		Total	
				SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC		
Length (L-line)	Miles	21.2		19.77		19.63		21.43		19.64		19.38		19.04		19.36		20.18			
		5.33	15.87	5.33	14.44	5.34	14.29	5.19	16.24	5.19	14.45	5.19	14.19	5.14	13.90	5.73	13.63	6.49	13.69		
Proposed Interchanges	No.	10		9		9		10		9		9		8		9		10			
		2	8	2	7	2	7	2	8	2	7	2	7	2	6	3	6	4	6		
Natural Resource Impacts																					
Modeled Wetlands	Acres	295.98		238.08		233.75		363.53		304.73		299.67		291.88		270.35		291.03			
		107.04	188.94	107.03	131.05	107.32	126.43	176.77	186.76	176.77	127.96	176.77	122.90	169.96	121.92	158.83	111.52	183.45	107.58		
NWI / NC CREWS Wetlands	Acres	285.51		248.08		236.95		280.22		240.58		232.12		245.16		253.18		282.63			
		36.31	249.20	36.31	211.77	36.96	199.99	34.79	245.43	34.79	205.79	34.79	197.33	27.72	217.44	42.83	210.35	79.15	203.48		
Streams	Linear Feet / (Crossings) ³	21,146 (20)		20,824 (15)		20,906 (15)		22,236 (22)		21,609 (16)		22,089 (16)		18,919 (16)		25,221 (19)		30,369 (20)			
		2,574 (4)	18,572 (16)	2,574 (4)	18,250 (11)	2,474 (4)	18,432 (11)	3,664 (5)	18,572 (17)	3,664 (5)	17,946 (11)	3,656 (5)	18,432 (11)	3,084 (5)	15,834 (11)	5,948 (7)	19,273 (12)	7,664 (7)	22,705 (13)		
Ponds	Acres	19.87		21.80		22.69		18.00		20.04		20.18		21.99		20.65		30.84			
		7.19	12.68	7.15	14.65	7.20	15.49	5.17	12.83	5.17	14.87	5.17	15.01	6.16	15.83	6.52	14.13	16.10	14.74		
HQW	Linear Feet	925		925		925		925		925		925		925		925		925			
		0	925	0	925	0	925	0	925	0	925	0	925	0	925	0	925	0	925		
Designated Shellfish Harvest Area ⁴	Acres	0		0		0		0		0		0		0		0		0.08			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08	0		
Essential Fish Habitat ⁵	Acres	0		0		0		0		0		0		0		3.43		38.80			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.43	26.55	12.25		
SC Critical Area	Acres	0		0		0		0		0		0		0		0		76.15			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76.15	0		
Known Federally Protected Species ⁶	Study Area Occurrence	0		0		0		0		0		0		0		0		0			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
100-Year Floodplain	Acres	129.30		213.95		204.22		129.30		198.69		202.21		202.52		180.05		214.13			
		0	129.30	0	213.95	0	204.22	0	129.30	0	198.69	0	202.21	0	202.52	0	180.05	31.40	182.73		
Floodway	Acres	2.46		2.46		2.46		2.46		2.46		2.46		2.46		2.46		2.46			
		0	2.46	0	2.46	0	2.46	0	2.46	0	2.46	0	2.46	0	2.46	0	2.46	0	2.46		
Human Environment Impacts																					
Residential – Single Family / Mobile Home	No. Structures	170		179		225		117		126		169		151		246		287			
		63	107	63	116	63	162	9	108	9	117	9	160	9	142	41	205	54	233		
Residential – Apartment / Condominium ⁷	No. Structures	4		4		4		4		4		4		13		15		31			
		0	4	0	4	0	4	0	4	0	4	0	4	0	13	0	15	0	31		

Impact Category ^{1,2}		Measure		Corridor Concept																	
				1		2		3		4		5		6		7		8		9	
				Total		Total		Total		Total		Total		Total		Total		Total		Total	
		SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC		
Commercial / Industrial ⁸	No. Structures	114		117		121		113		116		114		107		118		140			
		29	85	29	88	29	92	24	89	24	92	24	90	24	83	24	94	44	96		
Approved / Planned Residential Dev.	Acres	33.05		22.71		36.11		43.39		38.77		42.67		91.80		48.42		65.42			
		8.86	24.19	8.86	13.85	8.86	27.25	16.24	27.15	16.24	22.53	14.08	28.59	19.85	71.95	25.57	22.85	49.34	16.08		
Public Park	Acres	0.57		0.57		0.57		0.57		0.57		0.57		0.57		0.57		1.68			
		0	0.57	0	0.57	0	0.57	0	0.57	0	0.57	0	0.57	0	0.57	0	0.57	1.11	0.57		
Church	No. Properties	4		9		11		1		6		8		3		4		4			
		3	1	3	6	3	8	0	1	0	6	0	8	0	3	0	4	0	4		
Cemetery ⁹	Boundary	2		2		5		5		5		7		3		4		4			
		0	2	0	2	1	4	3	3	3	3	3	4	1	2	1	3	1	3		
Golf Course ¹⁰	Acres (No. Courses)	16.60 (1)		28.80 (2)		47.45 (4)		16.60 (1)		28.80 (2)		45.98 (4)		65.48 (4)		19.28 (2)		34.55 (4)			
		0	16.60 (1)	0	28.80 (2)	0	47.45 (4)	0	16.60 (1)	0	28.80 (2)	0	45.98 (4)	7.56 (1)	57.93 (4)	0	19.28 (2)	3.13 (1)	31.42 (4)		
Library	No. Structures	0		0		1		0		0		1		0		0		0			
		0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0		
Physical Environment Impacts																					
Hazardous Waste Site - RCRA	No. Sites	2		2		2		2		2		2		2		3		3			
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2		
Registered USTs	No. Sites	6		6		6		6		6		6		6		6		7			
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3		
Communication Tower	No. Structures	2		2		2		2		2		2		1		1		1			
		0	2	0	2	0	2	0	2	0	2	0	2	0	1	0	1	0	1		
Electrical Substation	No. Sites	1		2		2		0		1		1		0		0		0			
		1	0	1	1	1	1	0	0	0	1	0	1	0	0	0	0	0	0		
Water Tower	No. Structures	1		1		1		0		0		0		0		0		0			
		1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
Wastewater Treatment Plant	No. Sites	1		1		1		0		0		0		0		0		0			
		1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
NPDES Stormwater Permit	No. Sites	1		1		1		1		1		1		1		1		1			
		0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1		

¹ Impacts based on 400-foot impact boundary (generally 200 feet each side of concept centerline).

² Potential impacts are not anticipated for the following resource categories: Determined Eligible Historic sites/boundaries, NC Natural Heritage Areas, NC Anadromous Fish Spawning Areas, NC Primary Nursery Areas, public water supply wells, 303(d) waters, daycares, private conservation easements, EMS/Fire stations, government facilities, hospitals, recreational facilities, or schools.

³ Number of L-line crossings. ⁴ Harvest Areas classification of Prohibited located within the study area.

⁵ Essential Fish Habitat for Snapper, Grouper located within the study area.

⁶ NC: American Alligator (T); SC: Spotted Turtle and Wood Stork are found within 3-miles of the study area and may occur within the study area where suitable habitat exists. SCDNR recommends surveys to rule out presence of species before proceeding with construction at the determined project location.

⁷ Structure count only – apartment and condominium buildings within the same complex are counted individually.

⁸ Structure count only - multiple businesses may be located within a structure.

⁹ Cemetery spans the NC / SC border for Concepts 4 and 5.

¹⁰ Farmstead Golf Links spans the NC / SC border. Only the NC portion of Farmstead Links is crossed in Concepts 3 and 6. Concept 7 crosses both NC and SC portions of Farmstead Links.

Appendix A

Figures

Carolina Bays

Parkway Extension

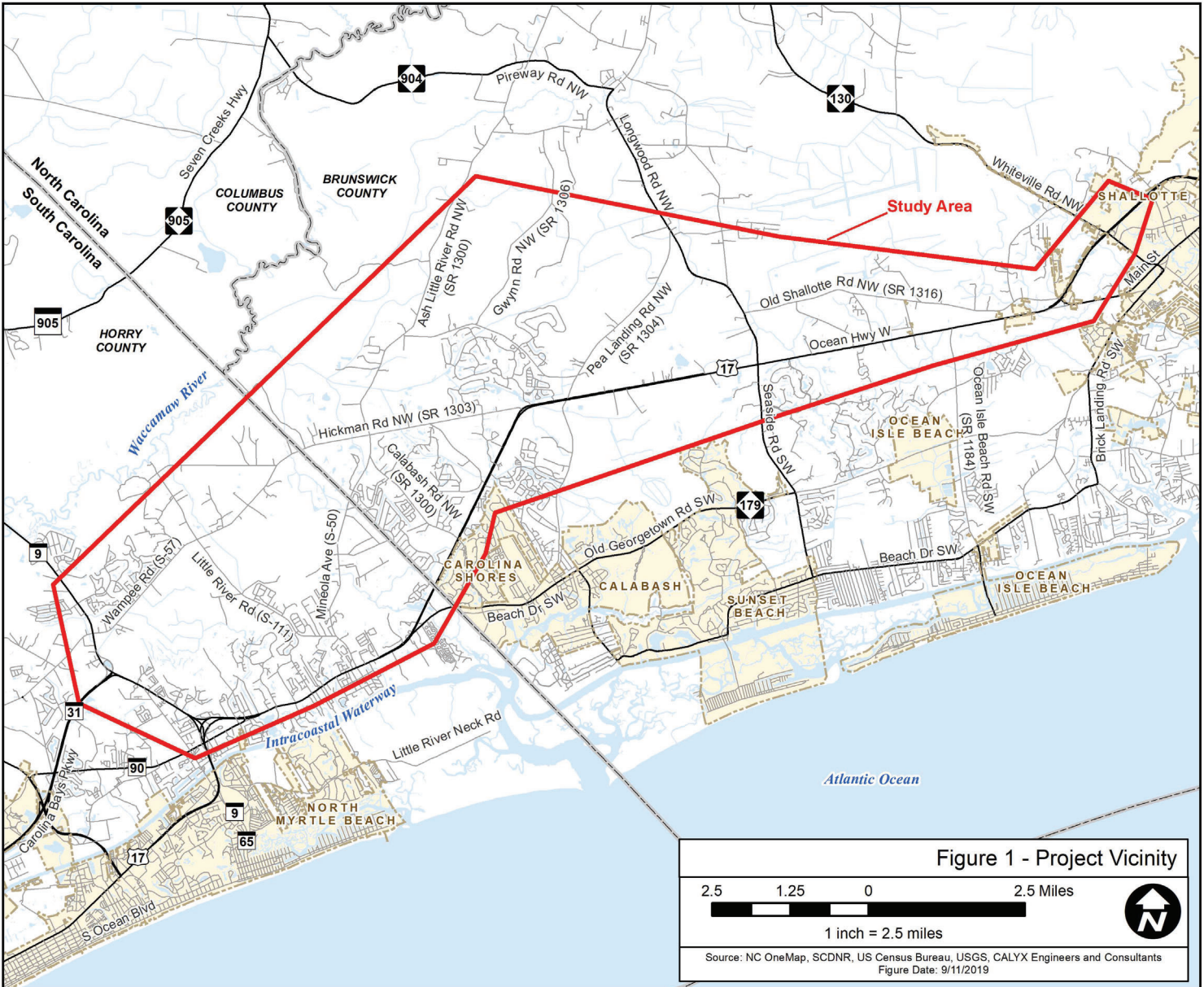
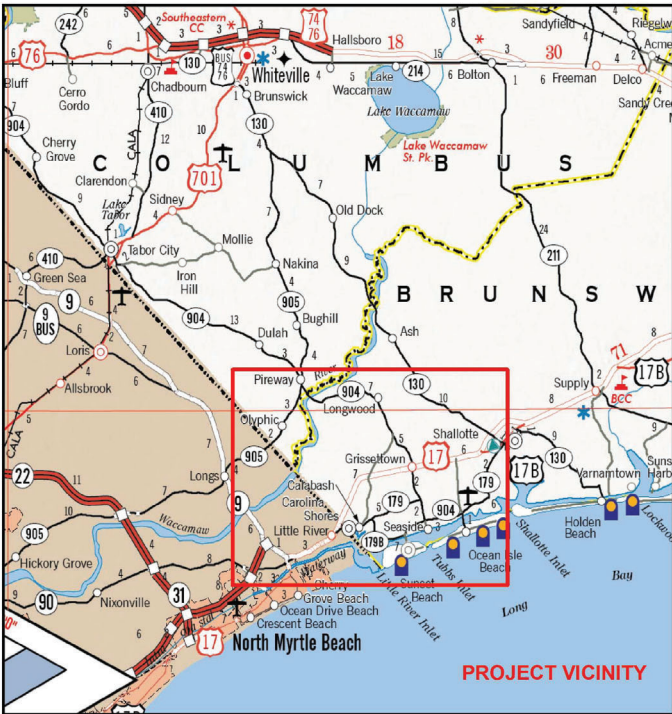
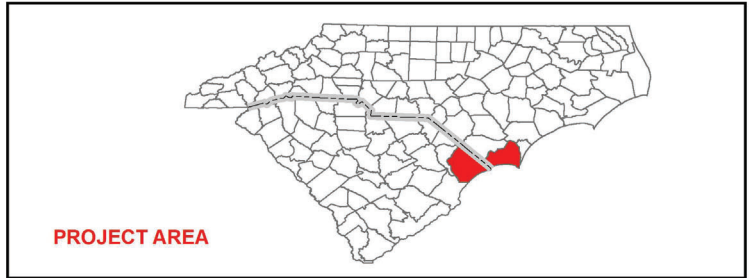
North Carolina + South Carolina



NCDOT Project R-5876
Brunswick County



SCDOT Project P029554
Horry County



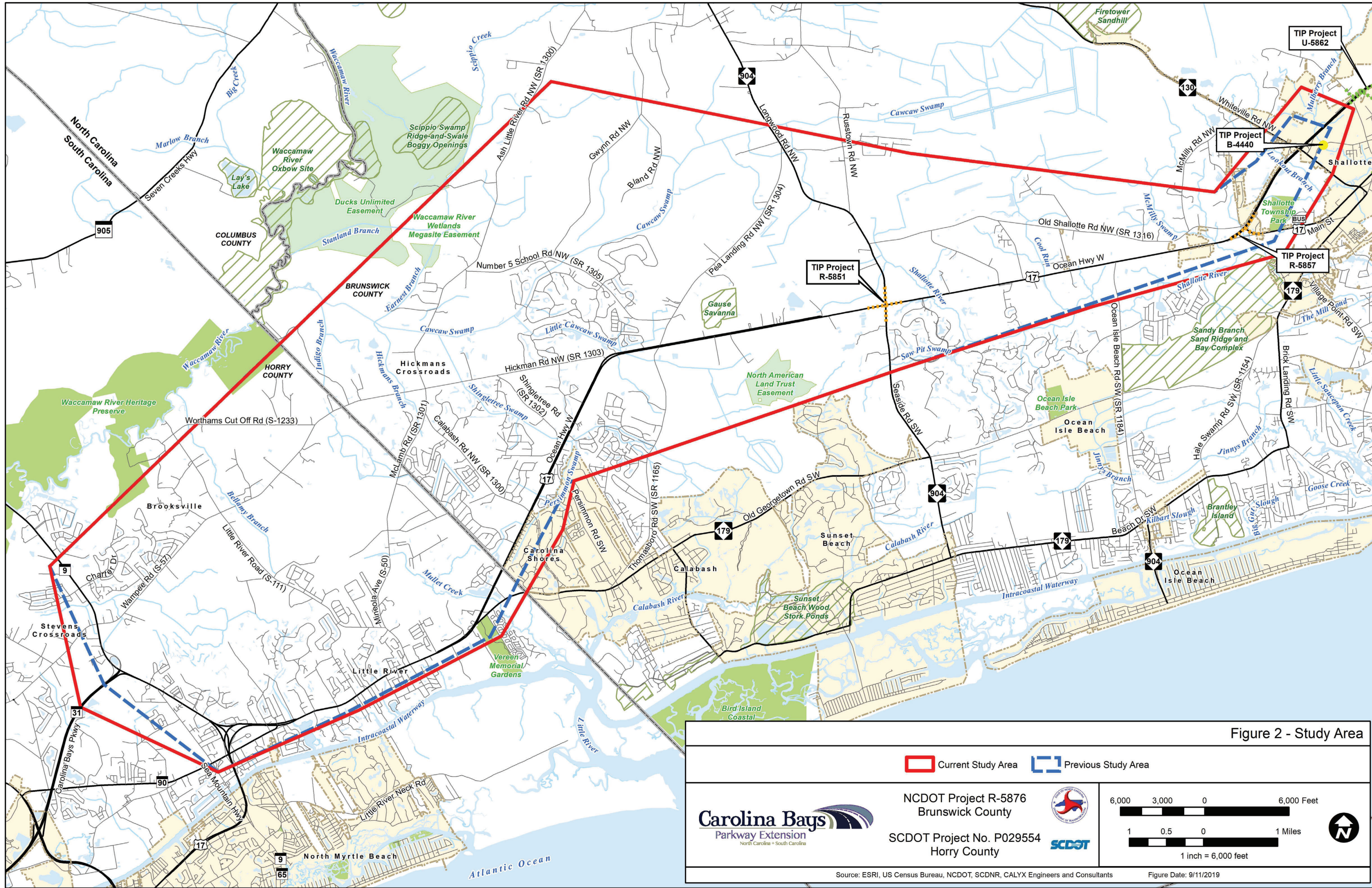


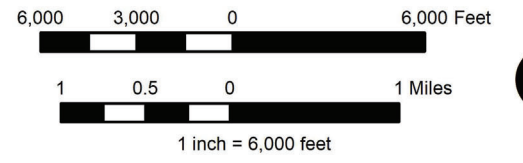
Figure 2 - Study Area

Current Study Area Previous Study Area



NCDOT Project R-5876
Brunswick County

SCDOT Project No. P029554
Horry County



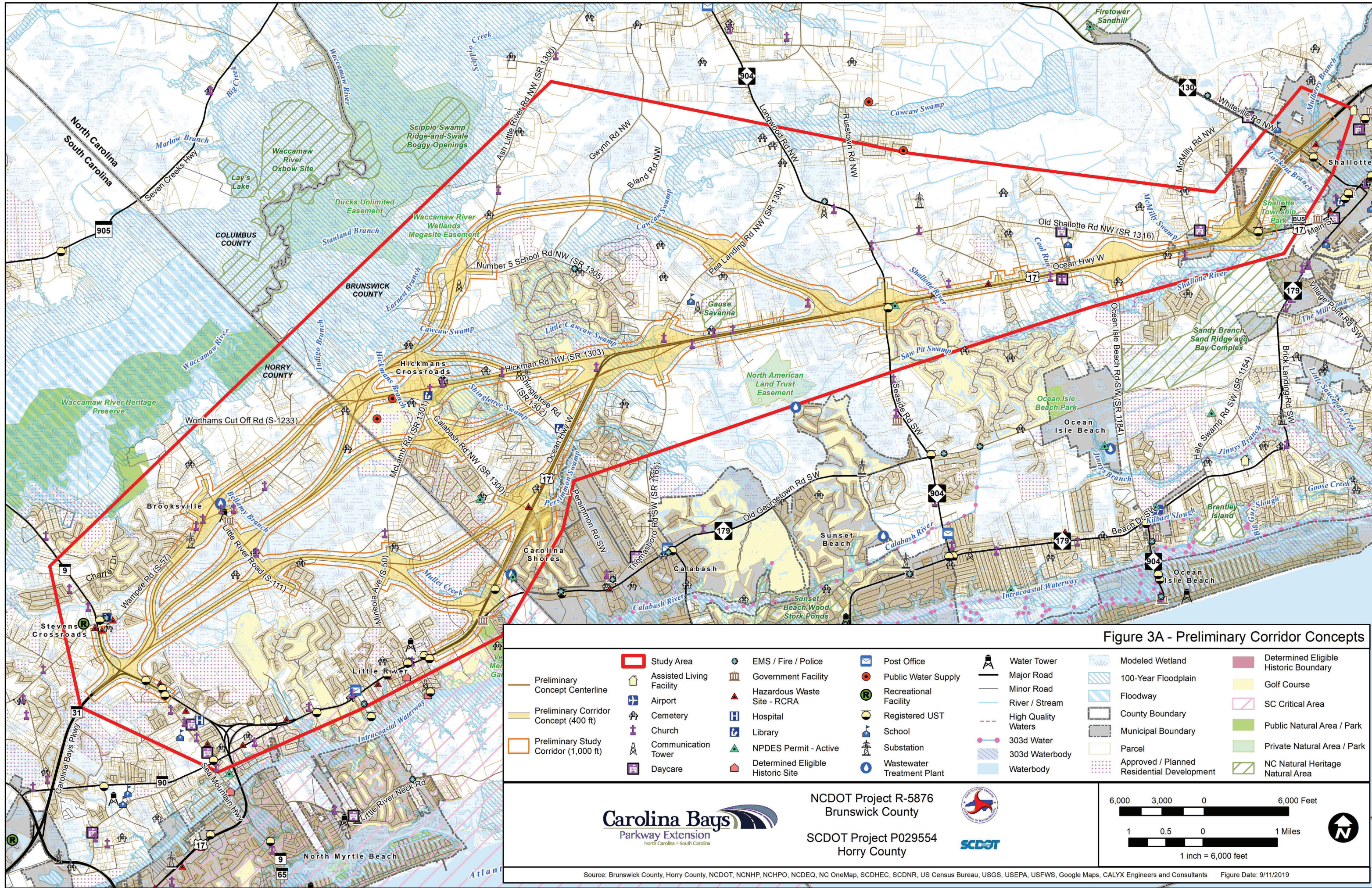


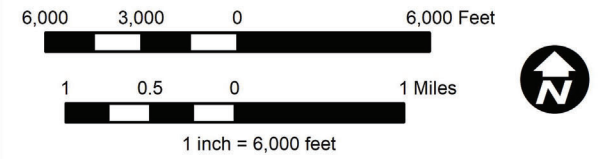
Figure 3A - Preliminary Corridor Concepts

Study Area	Assisted Living Facility	EMS / Fire / Police	Post Office	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Concept Centerline	Airport	Hazardous Waste Site - RCRA	Public Water Supply	Major Road	100-Year Floodplain	Golf Course
Preliminary Corridor Concept (400 ft)	Cemetery	Hospital	Recreational Facility	Minor Road	Floodway	SC Critical Area
Preliminary Study Corridor (1,000 ft)	Church	Library	Registered UST	High Quality Waters	County Boundary	Public Natural Area / Park
	Communication Tower	School	Substation	303d Waterbody	Municipal Boundary	Private Natural Area / Park
	Daycare	Wastewater Treatment Plant	Wastewater Treatment Plant	Waterbody	Parcel	NC Natural Heritage Natural Area
					Approved / Planned Residential Development	



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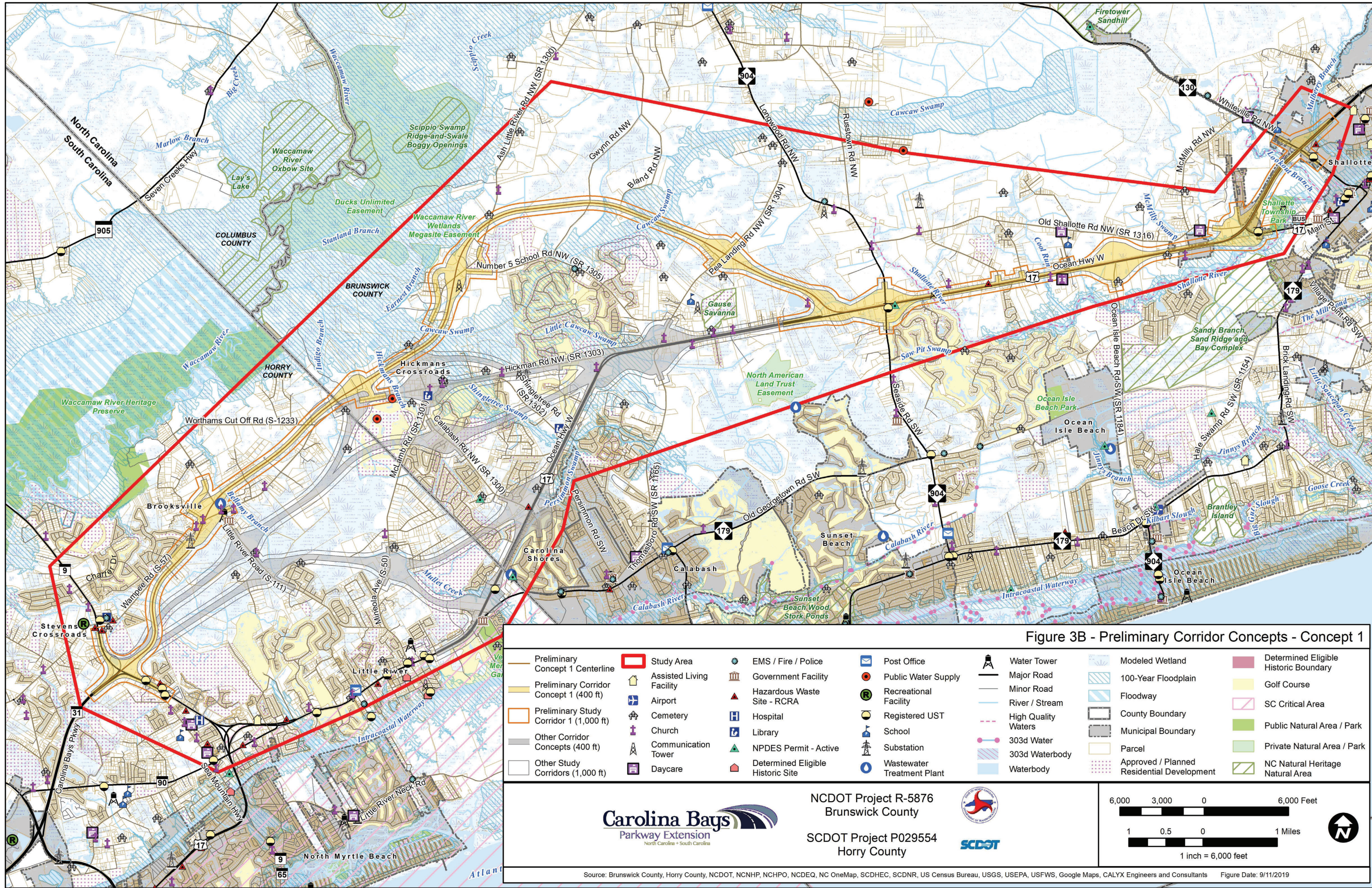


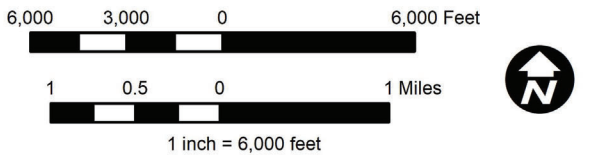
Figure 3B - Preliminary Corridor Concepts - Concept 1

Preliminary Concept 1 Centerline	Study Area	EMS / Fire / Police	Post Office	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 1 (400 ft)	Assisted Living Facility	Government Facility	Public Water Supply	Minor Road	100-Year Floodplain	Golf Course
Preliminary Study Corridor 1 (1,000 ft)	Airport	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hospital	Registered UST	High Quality Waters	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Library	School	303d Waterbody	Municipal Boundary	Private Natural Area / Park
	Communication Tower	NPDES Permit - Active	Substation	Waterbody	Parcel	NC Natural Heritage Natural Area
	Daycare	Determined Eligible Historic Site	Wastewater Treatment Plant		Approved / Planned Residential Development	

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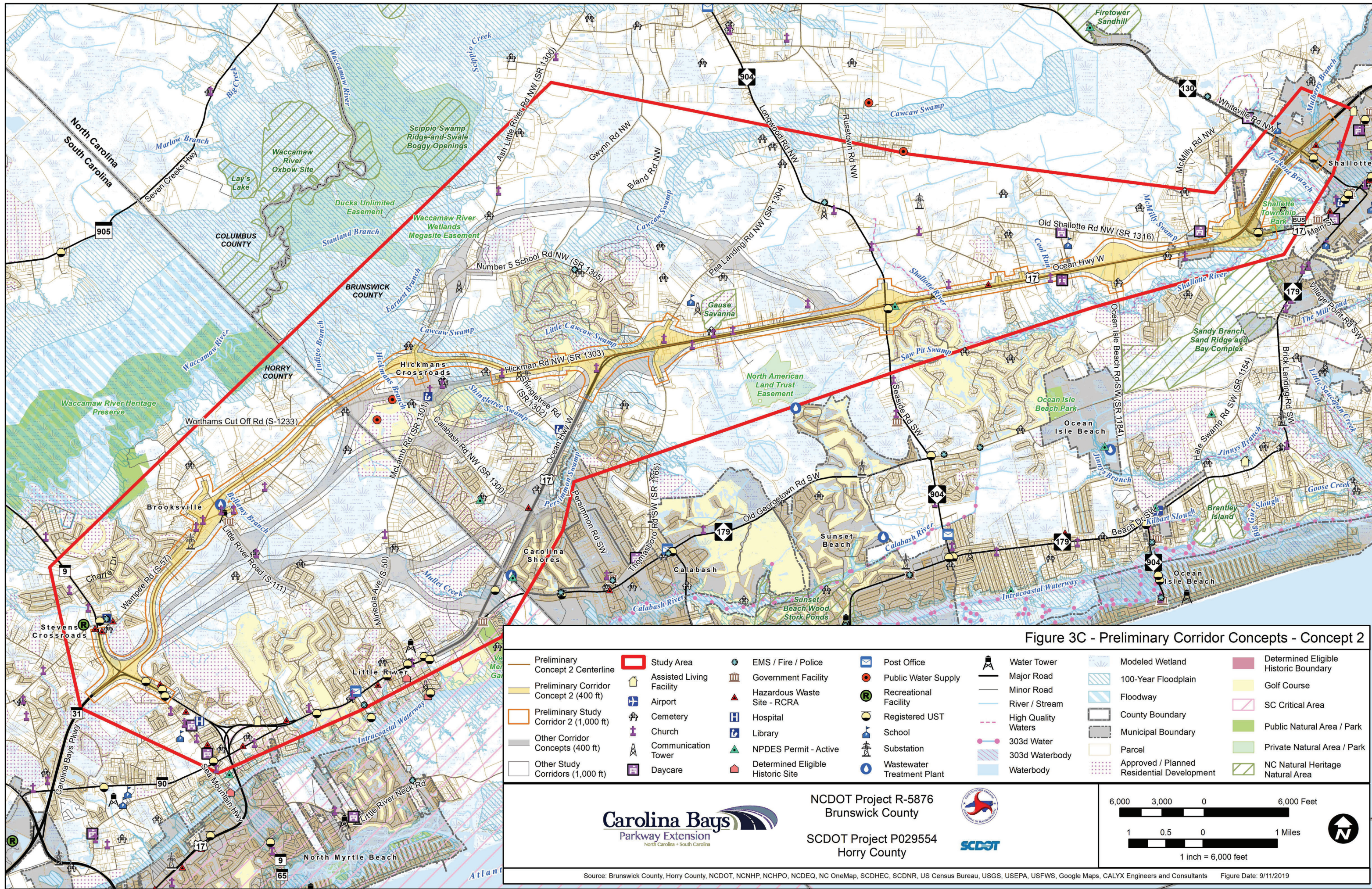


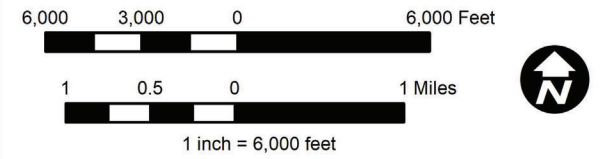
Figure 3C - Preliminary Corridor Concepts - Concept 2

Preliminary Concept 2 Centerline	Study Area	EMS / Fire / Police	Post Office	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 2 (400 ft)	Assisted Living Facility	Government Facility	Public Water Supply	Minor Road	100-Year Floodplain	Golf Course
Preliminary Study Corridor 2 (1,000 ft)	Airport	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hospital	Registered UST	High Quality Waters	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Library	School	303d Water	Municipal Boundary	Private Natural Area / Park
	Communication Tower	NPDES Permit - Active	Substation	303d Waterbody	Parcel	NC Natural Heritage Natural Area
	Daycare	Determined Eligible Historic Site	Wastewater Treatment Plant	Waterbody	Approved / Planned Residential Development	

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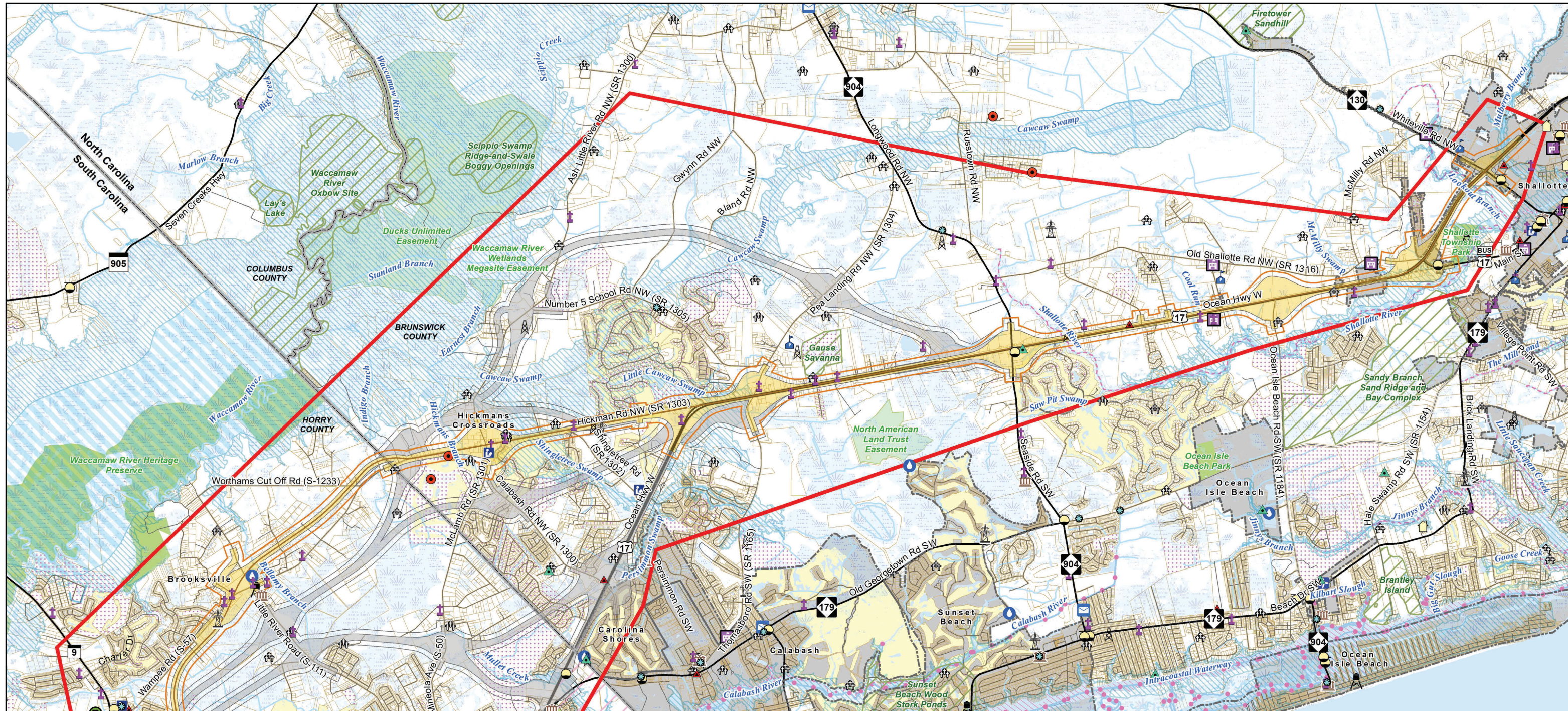


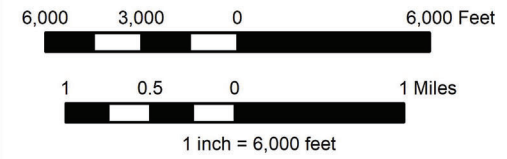
Figure 3D - Preliminary Corridor Concepts - Concept 3

Preliminary Concept 3 Centerline	Study Area	EMS / Fire / Police	Post Office	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 3 (400 ft)	Assisted Living Facility	Government Facility	Public Water Supply	Major Road	100-Year Floodplain	Golf Course
Preliminary Study Corridor 3 (1,000 ft)	Airport	Hazardous Waste Site - RCRA	Recreational Facility	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hospital	Registered UST	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Library	School	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	NPDES Permit - Active	Substation	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	Determined Eligible Historic Site	Wastewater Treatment Plant	303d Waterbody	Approved / Planned Residential Development	
			Waterbody	Waterbody		

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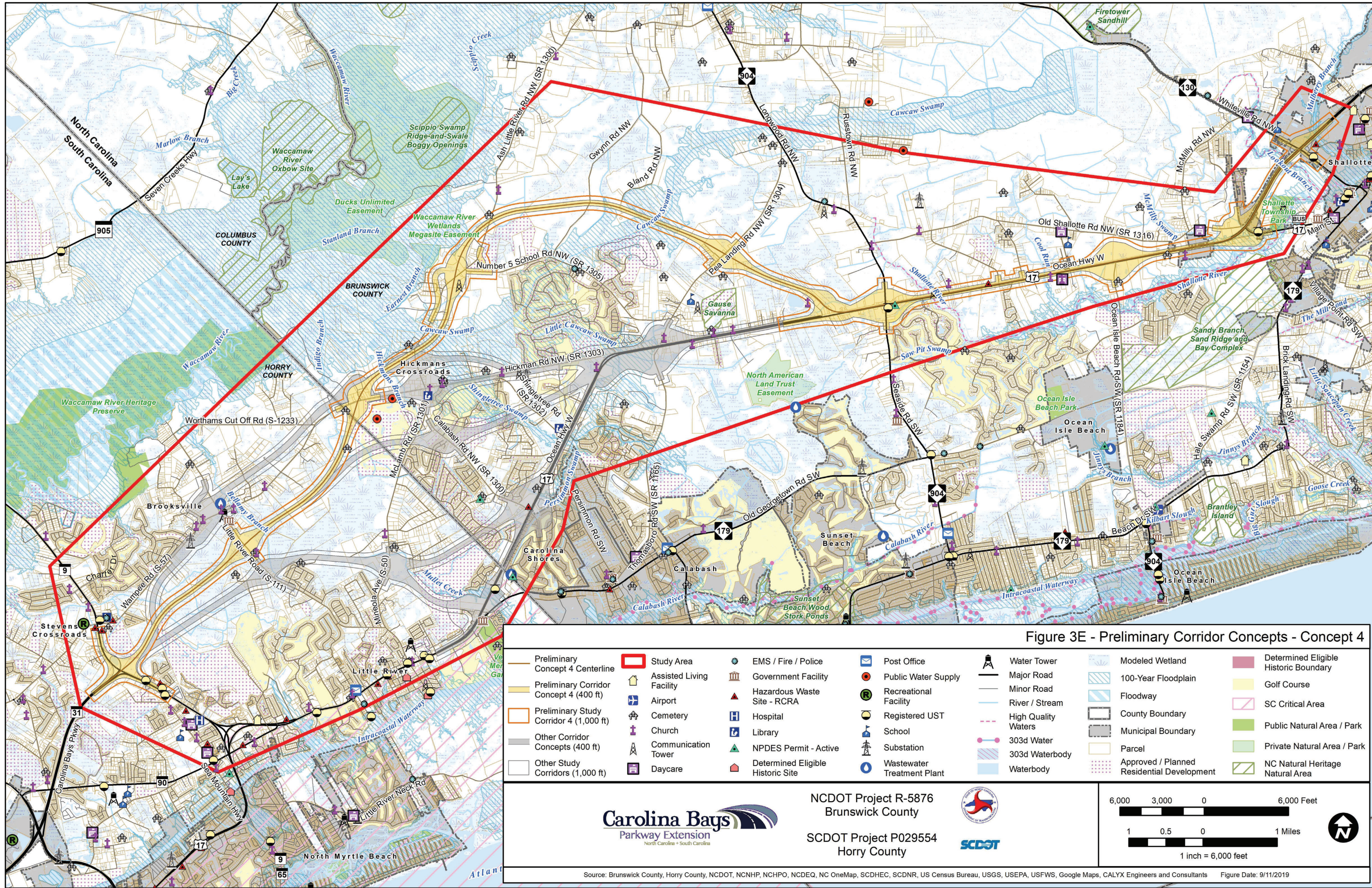


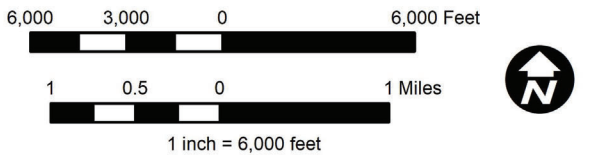
Figure 3E - Preliminary Corridor Concepts - Concept 4

<ul style="list-style-type: none"> Preliminary Concept 4 Centerline Preliminary Corridor Concept 4 (400 ft) Preliminary Study Corridor 4 (1,000 ft) Other Corridor Concepts (400 ft) Other Study Corridors (1,000 ft) 	<ul style="list-style-type: none"> Study Area Assisted Living Facility Airport Cemetery Church Communication Tower Daycare 	<ul style="list-style-type: none"> EMS / Fire / Police Government Facility Hazardous Waste Site - RCRA Hospital Library NPDES Permit - Active Determined Eligible Historic Site 	<ul style="list-style-type: none"> Post Office Public Water Supply Recreational Facility Registered UST School Substation Wastewater Treatment Plant 	<ul style="list-style-type: none"> Water Tower Major Road Minor Road River / Stream High Quality Waters 303d Water 303d Waterbody Waterbody 	<ul style="list-style-type: none"> Modeled Wetland 100-Year Floodplain Floodway County Boundary Municipal Boundary Parcel Approved / Planned Residential Development 	<ul style="list-style-type: none"> Determined Eligible Historic Boundary Golf Course SC Critical Area Public Natural Area / Park Private Natural Area / Park NC Natural Heritage Natural Area
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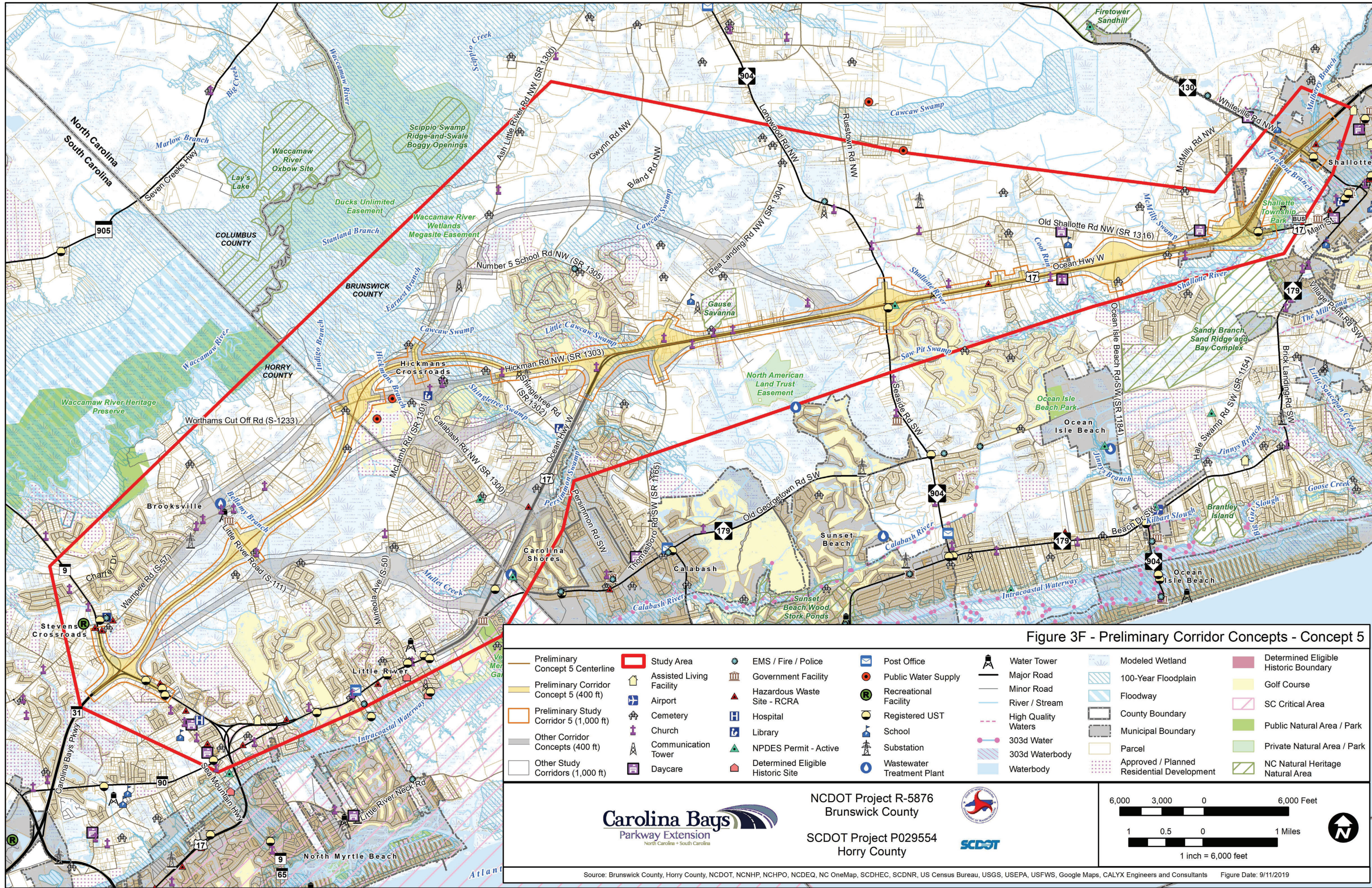


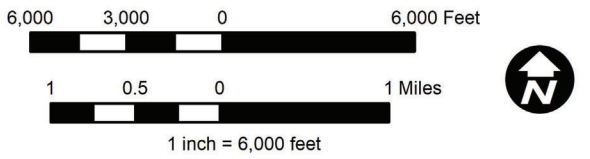
Figure 3F - Preliminary Corridor Concepts - Concept 5

Preliminary Concept 5 Centerline	Study Area	EMS / Fire / Police	Post Office	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 5 (400 ft)	Assisted Living Facility	Government Facility	Public Water Supply	Major Road	100-Year Floodplain	Golf Course
Preliminary Study Corridor 5 (1,000 ft)	Airport	Hazardous Waste Site - RCRA	Recreational Facility	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hospital	Registered UST	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Library	School	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	NPDES Permit - Active	Substation	303d Waterbody	Parcel	NC Natural Heritage Natural Area
	Daycare	Determined Eligible Historic Site	Wastewater Treatment Plant	Waterbody	Approved / Planned Residential Development	

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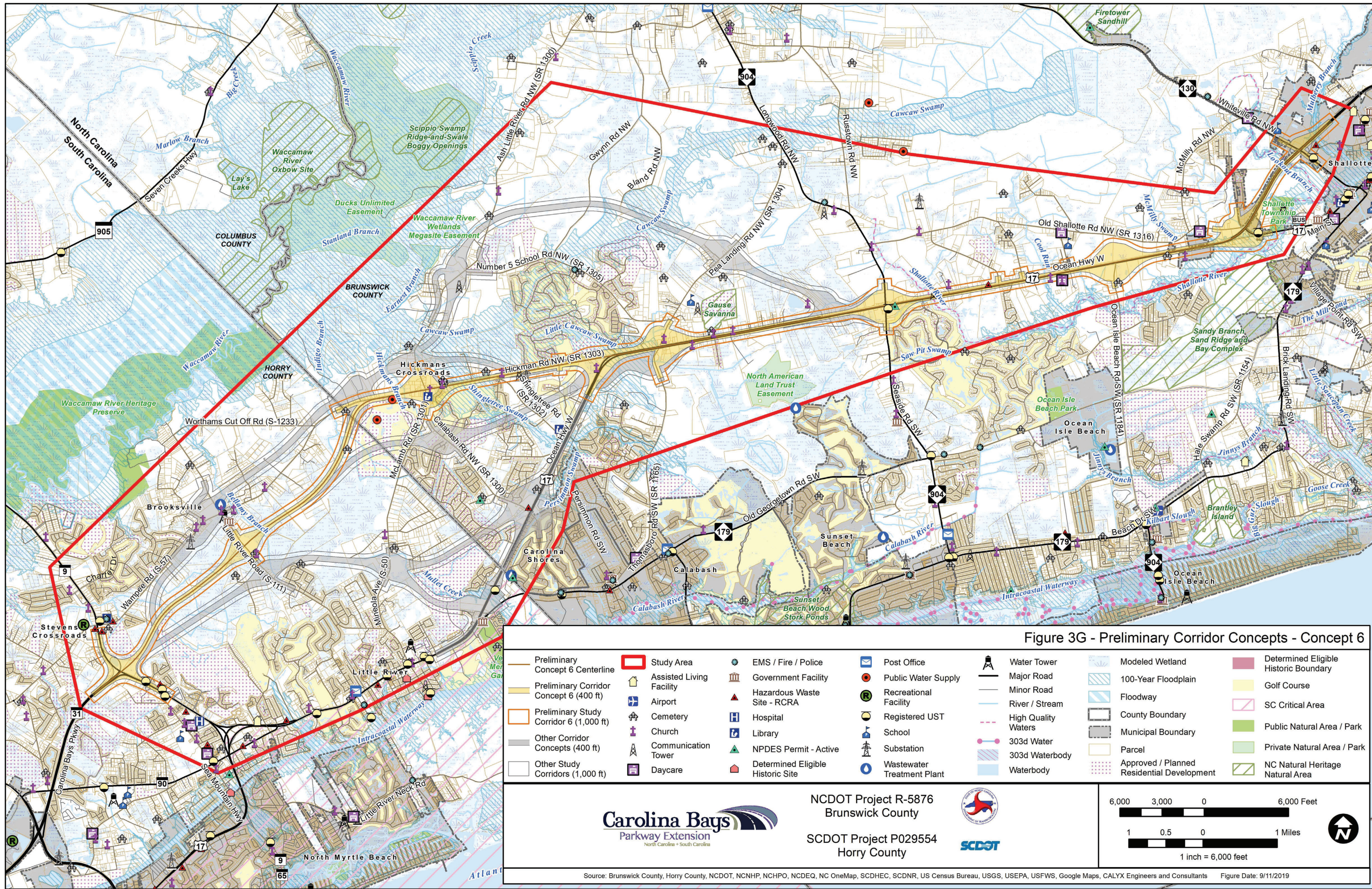
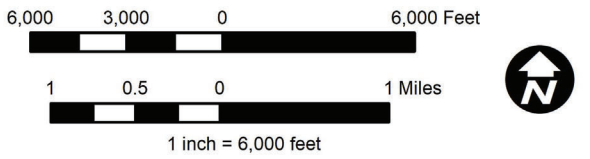


Figure 3G - Preliminary Corridor Concepts - Concept 6

<ul style="list-style-type: none"> Preliminary Concept 6 Centerline Preliminary Corridor Concept 6 (400 ft) Preliminary Study Corridor 6 (1,000 ft) Other Corridor Concepts (400 ft) Other Study Corridors (1,000 ft) 	<ul style="list-style-type: none"> Study Area Assisted Living Facility Airport Cemetery Church Communication Tower Daycare 	<ul style="list-style-type: none"> EMS / Fire / Police Government Facility Hazardous Waste Site - RCRA Hospital Library NPDES Permit - Active Determined Eligible Historic Site 	<ul style="list-style-type: none"> Post Office Public Water Supply Recreational Facility Registered UST School Substation Wastewater Treatment Plant 	<ul style="list-style-type: none"> Water Tower Major Road Minor Road River / Stream High Quality Waters 303d Water 303d Waterbody Waterbody 	<ul style="list-style-type: none"> Modeled Wetland 100-Year Floodplain Floodway County Boundary Municipal Boundary Parcel Approved / Planned Residential Development 	<ul style="list-style-type: none"> Determined Eligible Historic Boundary Golf Course SC Critical Area Public Natural Area / Park Private Natural Area / Park NC Natural Heritage Natural Area
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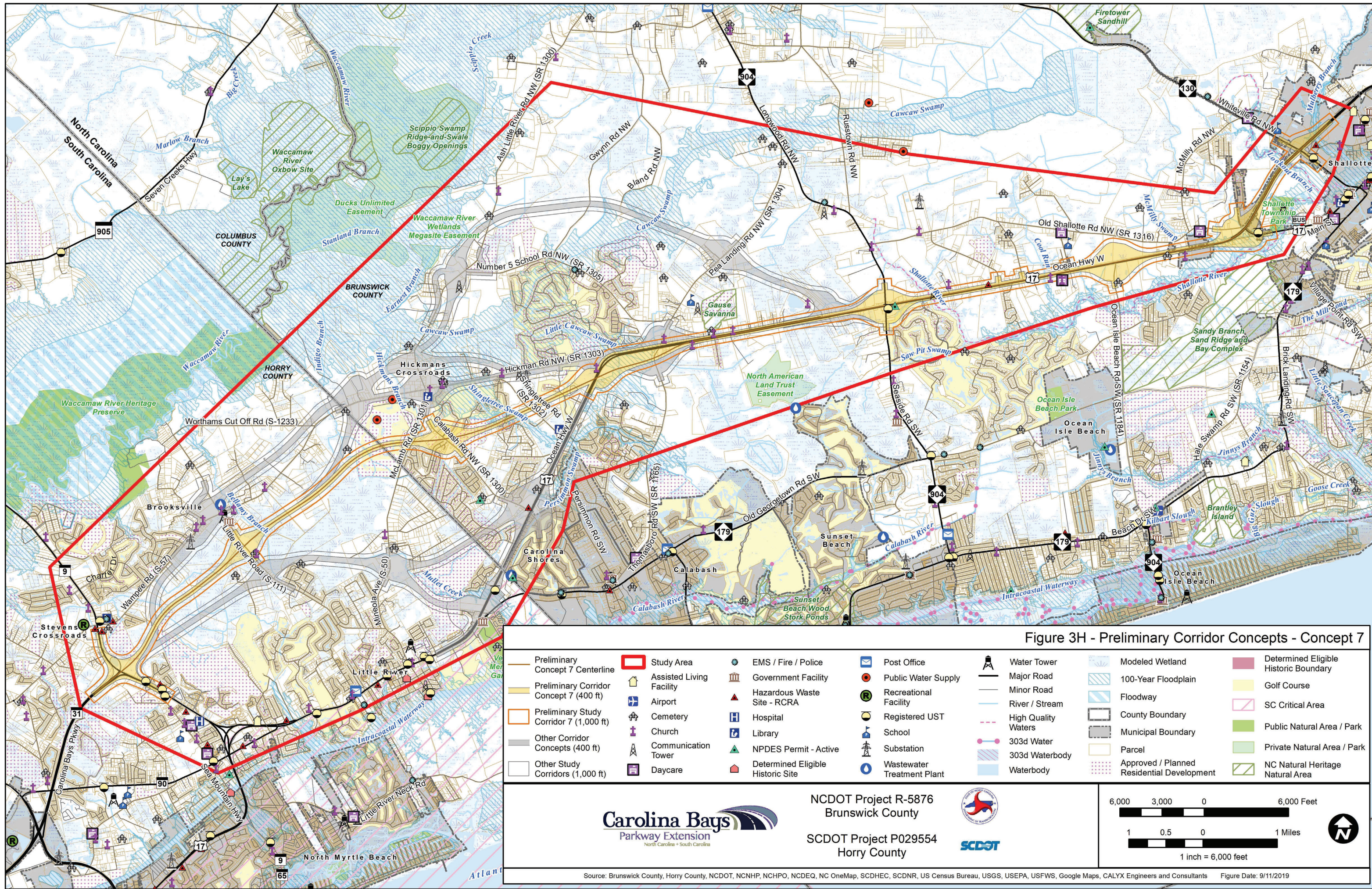


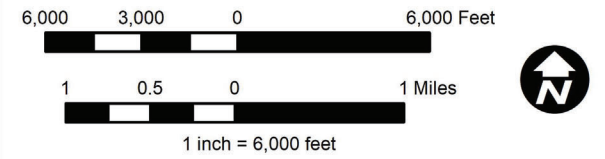
Figure 3H - Preliminary Corridor Concepts - Concept 7

Preliminary Concept 7 Centerline	Study Area	EMS / Fire / Police	Post Office	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 7 (400 ft)	Assisted Living Facility	Government Facility	Public Water Supply	Major Road	100-Year Floodplain	Golf Course
Preliminary Study Corridor 7 (1,000 ft)	Airport	Hazardous Waste Site - RCRA	Recreational Facility	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hospital	Registered UST	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Library	School	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	NPDES Permit - Active	Substation	303d Waterbody	Parcel	NC Natural Heritage Natural Area
	Daycare	Determined Eligible Historic Site	Wastewater Treatment Plant	Waterbody	Approved / Planned Residential Development	

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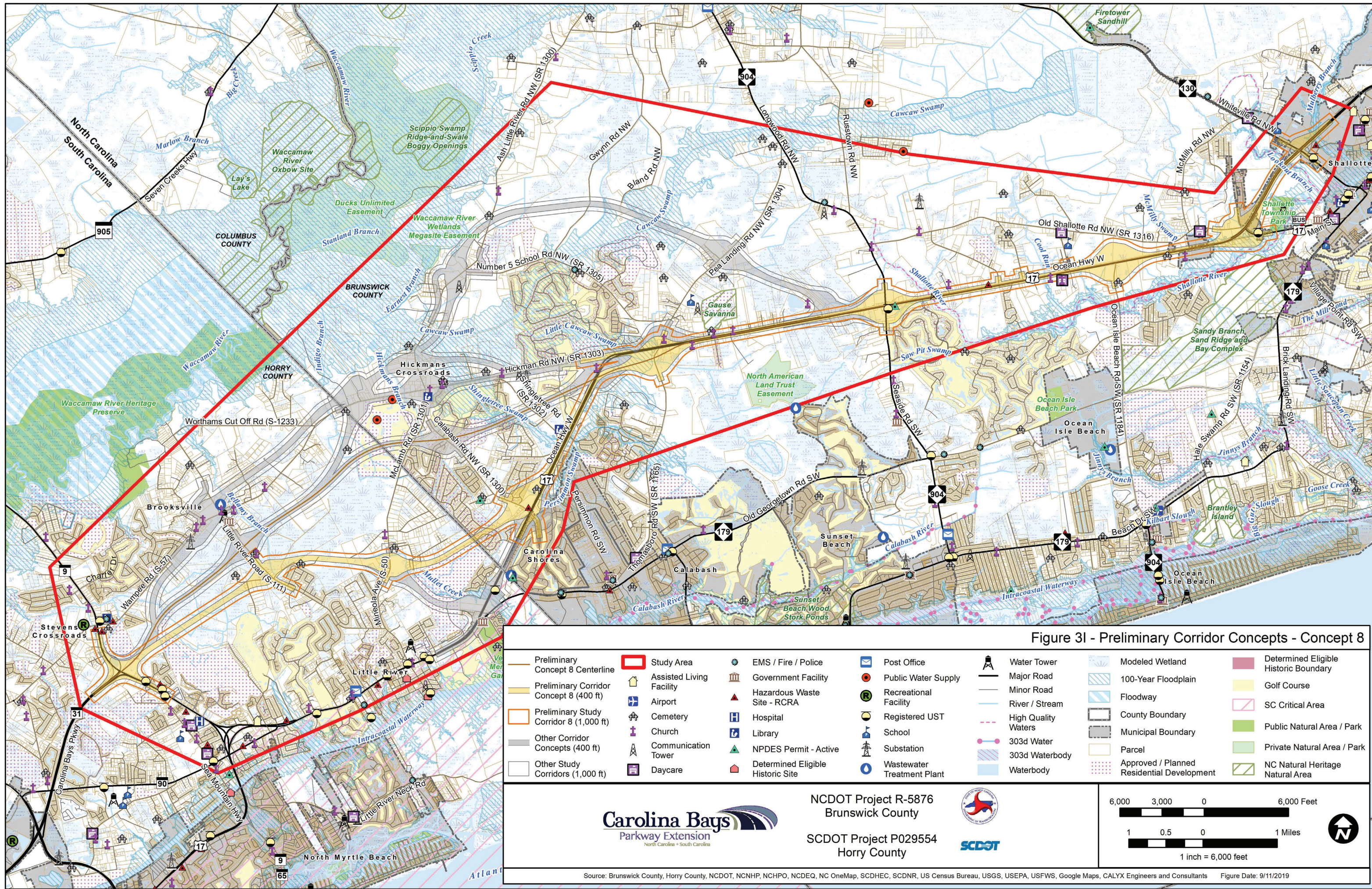


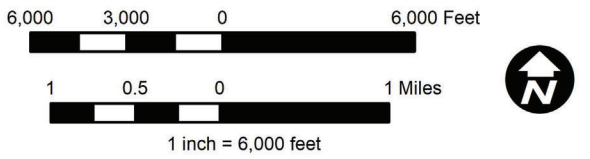
Figure 3I - Preliminary Corridor Concepts - Concept 8

<ul style="list-style-type: none"> Preliminary Concept 8 Centerline Preliminary Corridor Concept 8 (400 ft) Preliminary Study Corridor 8 (1,000 ft) Other Corridor Concepts (400 ft) Other Study Corridors (1,000 ft) 	<ul style="list-style-type: none"> Study Area Assisted Living Facility Airport Cemetery Church Communication Tower Daycare 	<ul style="list-style-type: none"> EMS / Fire / Police Government Facility Hazardous Waste Site - RCRA Hospital Library NPDES Permit - Active Determined Eligible Historic Site 	<ul style="list-style-type: none"> Post Office Public Water Supply Recreational Facility Registered UST School Substation Wastewater Treatment Plant 	<ul style="list-style-type: none"> Water Tower Major Road Minor Road River / Stream High Quality Waters 303d Water 303d Waterbody Waterbody 	<ul style="list-style-type: none"> Modeled Wetland 100-Year Floodplain Floodway County Boundary Municipal Boundary Parcel Approved / Planned Residential Development 	<ul style="list-style-type: none"> Determined Eligible Historic Boundary Golf Course SC Critical Area Public Natural Area / Park Private Natural Area / Park NC Natural Heritage Natural Area
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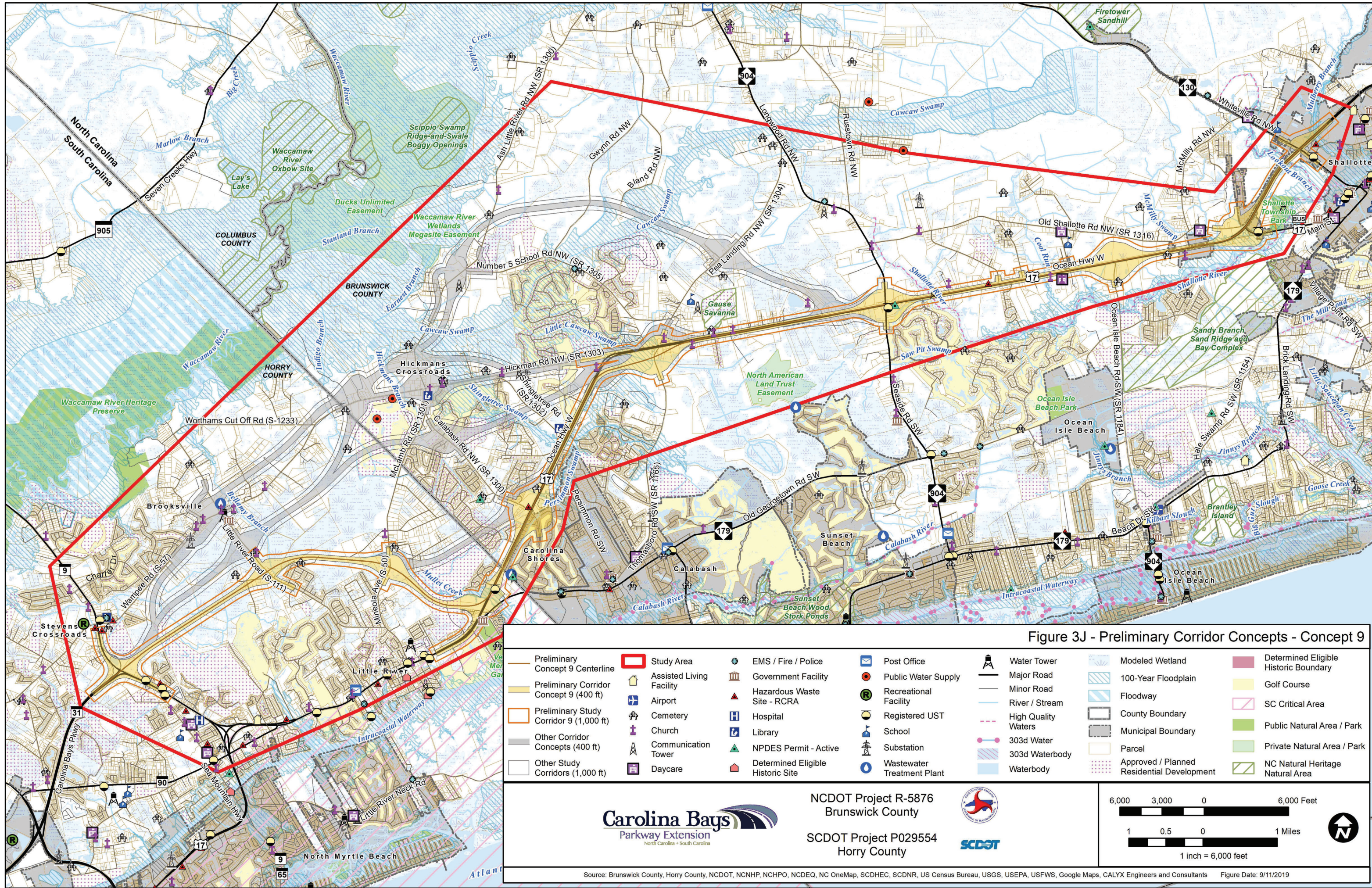


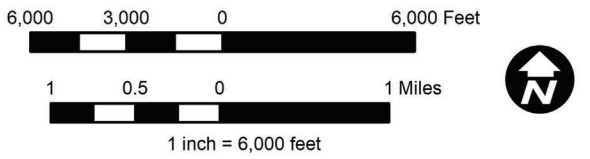
Figure 3J - Preliminary Corridor Concepts - Concept 9

Preliminary Concept 9 Centerline	Study Area	EMS / Fire / Police	Post Office	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 9 (400 ft)	Assisted Living Facility	Government Facility	Public Water Supply	Major Road	100-Year Floodplain	Golf Course
Preliminary Study Corridor 9 (1,000 ft)	Airport	Hazardous Waste Site - RCRA	Recreational Facility	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hospital	Registered UST	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Library	School	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	NPDES Permit - Active	Substation	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	Determined Eligible Historic Site	Wastewater Treatment Plant	303d Waterbody	Approved / Planned Residential Development	
			Waterbody			

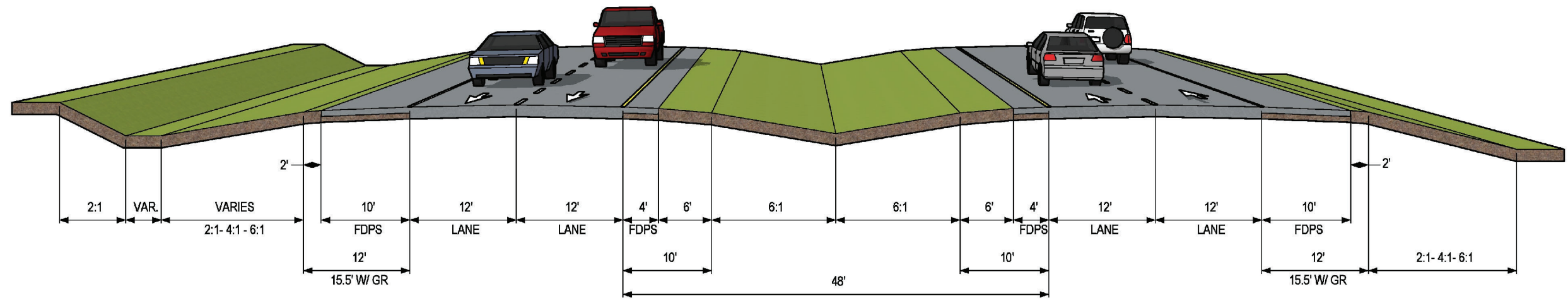
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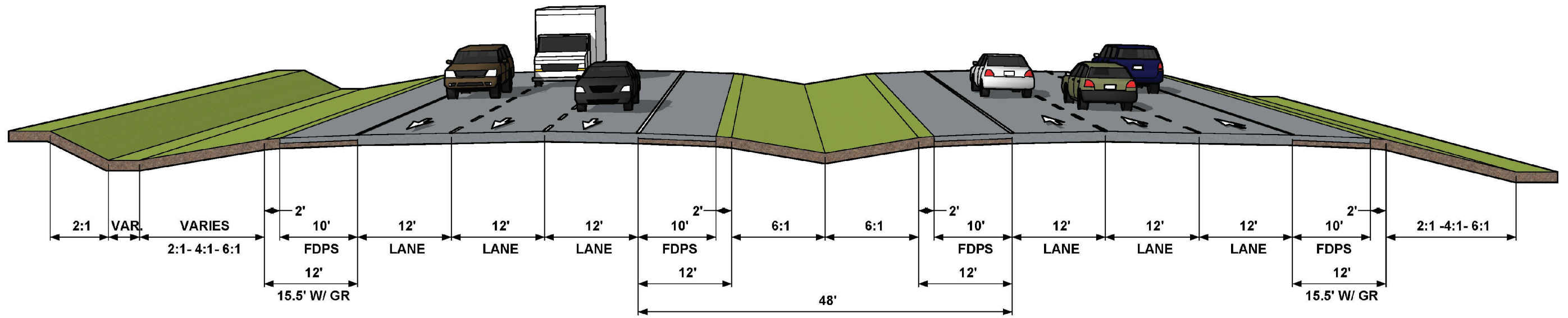
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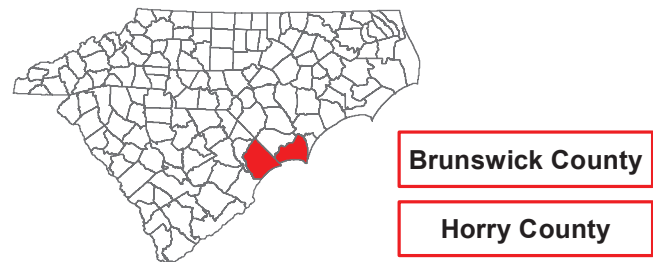


**SCDOT Typical Section 1
Four-Lane Median-Divided Freeway**



**SCDOT Typical Section 2
Six-Lane Median-Divided Freeway**

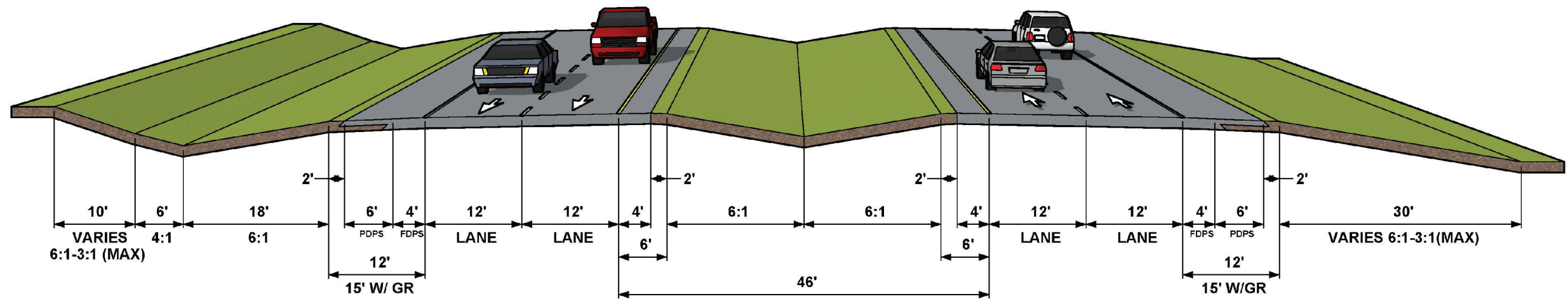
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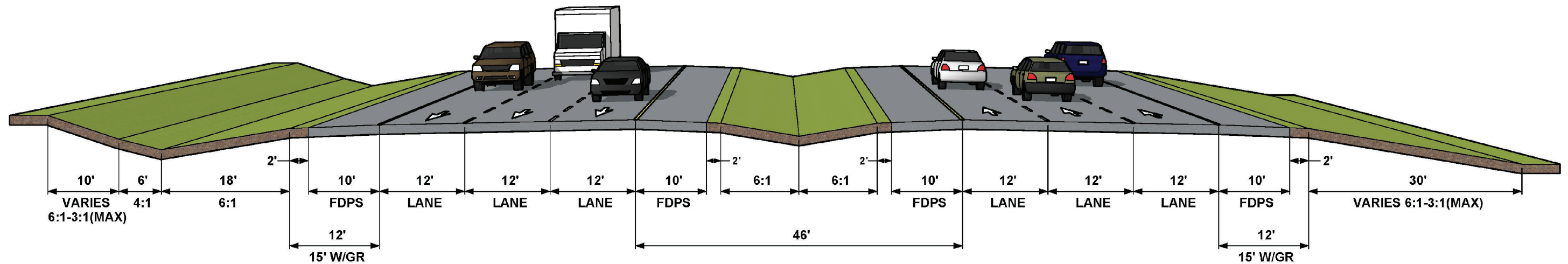
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**Figure 4A
SCDOT Proposed
Typical Sections**

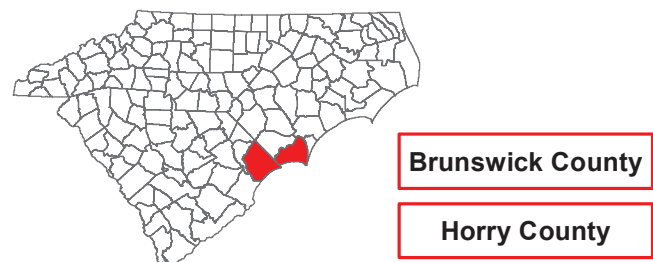


**NCDOT Typical Section 1
Four-Lane Median-Divided Freeway**



**NCDOT Typical Section 2
Six-Lane Median-Divided Freeway**

**Not to Scale*



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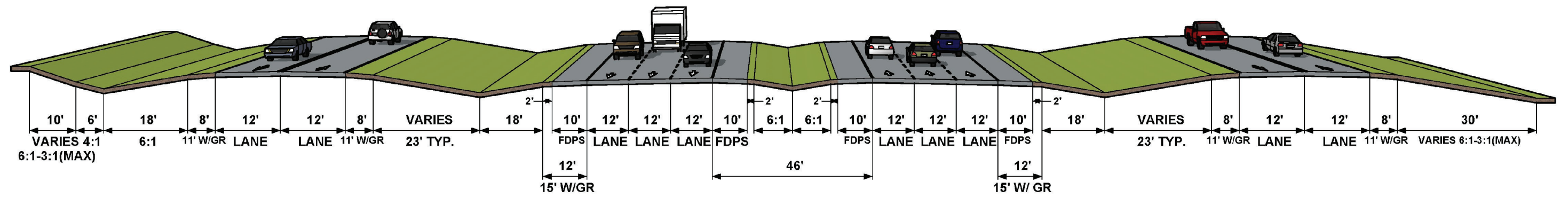


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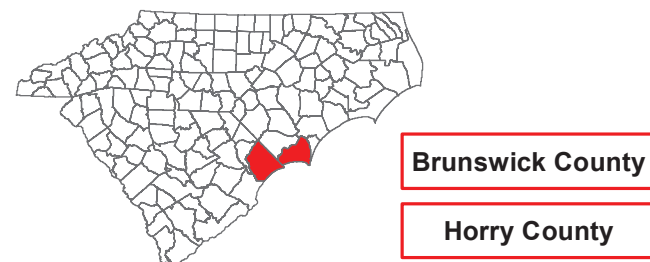
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**Figure 4B
NCDOT Proposed
Typical Sections**



**NCDOT Typical Section 2
Six-Lane Median-Divided Freeway with Frontage Roads**

**Not to Scale*



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**Figure 4C
NCDOT Proposed
Typical Sections**

Appendix B

Corridor Screening and Design Criteria

Corridor Screening and Design Criteria

Screening Methodology

A windshield survey was conducted to identify neighborhoods, community facilities, and other notable features along several major roads within the project area. Additional information was gathered from published sources and files of various state and federal resource agencies. Input was sought from local planning agencies to determine the compatibility with local planning goals, and to note any areas of potential controversy.

Published information regarding the project area and region was derived from a number of resources including, but not limited to:

- NC Department of Environmental Quality (NCDEQ) and SC Department of Natural Resources (SCDNR) 24k stream data
- NC Division of Coastal Management (DCM) Wetland Mapping
- US Fish and Wildlife Service National Wetlands Inventory (NWI) mapping
- Property data for Horry County, SC and Brunswick County, NC
- NC Natural Heritage Program (NHP) data
- National Oceanic and Atmospheric Administration (NOAA) Essential Fish Habitat
- Aerial photography
- US Census Bureau Data
- Local planning documents

A GIS-based analysis of potential preliminary corridor concepts was conducted for the proposed project. The preliminary corridors were developed using a least-cost model utilizing ArcGISPro and the Spatial Analyst extension.

Least-cost path analysis determines the least costly path to travel between a source and destination across a cost (impedance) surface. Cost can be a function of time, distance, or other criteria defined by the user. Using the developed least-cost paths, corridors can then be created to identify the areas of least-cost to travel between locations.

A series of both natural environment and human features were used to develop the cost surface. The cost surface is a raster dataset that identifies the cost of traveling through each cell. The higher the cell value, the higher the cost to travel through the cell. Data was collected and grouped into two categories: natural environment features and human environment features. Weights were assigned to each of the data layers in these categories. The higher the weight/score, the higher the cost to travel through the layer.

Utilizing the final cost surface, least-cost paths were calculated for a combination of source and destination locations. Alternate

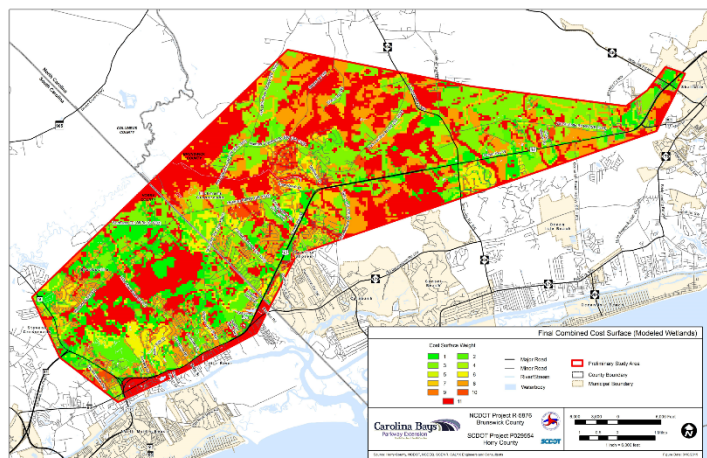


Exhibit A. Least Cost Surface Example

versions of the least-cost paths were generated using NWI and NCCREWS wetland data, versus data from NCDOT's Wetland Prediction Model. Least-cost path output is represented by single lines with the lowest accumulated cost between two points and tends to be jagged in nature.

Least-cost corridors were then developed to provide an optimal range of cells in which concept centerlines could be created. The least-cost corridors represent the set of cells that fell within a defined threshold (5 percent) of the total score of the single least-cost path. This means that any cell belonging to a corridor has an accumulated cost that is within 5 percent of the associated least-cost path's total cost.

The modeled paths and corridors served as the basis for the development of the preliminary corridor concepts. Alignment centerlines were placed to minimize impacts to resources, provide a roadway that is constructible, and cross streams, roads and utility easements at a reasonable angle.

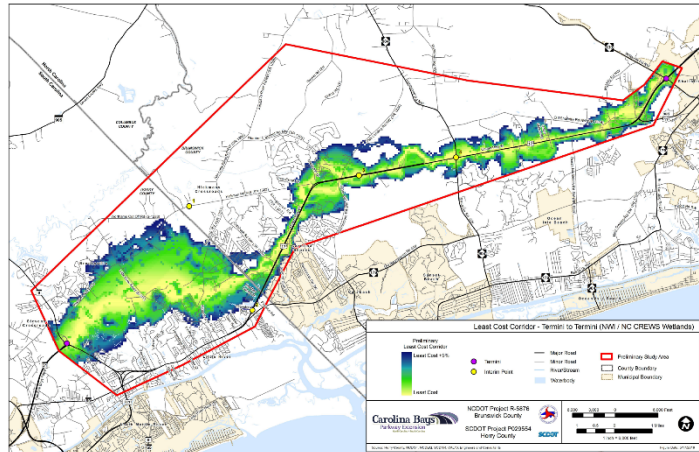


Exhibit B. Least Cost Corridor Example

Design Criteria

The following design criteria were also used when developing the preliminary corridor concepts:

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- Freeway Classification
- Control of access facility
- Design speed of 70 miles per hour (mph)
- Right-of-way width: variable
- Typical Sections (see Figure 4 in Appendix A)
 - Lane Width: 12 feet
 - Roadway Width (Four-Lane): 120 feet comprised of two 12-foot lanes with 12-foot outside shoulders (ten-foot paved) in each direction with a 48-foot median containing ten-foot inside shoulders (four-foot paved)
 - Roadway Width (Six-Lane): 144 feet comprised of three 12-foot lanes with 12-foot outside shoulders (ten-foot paved) in each direction with a 48-foot median containing 12-foot inside shoulders (ten-foot paved)
- Maximum grade of three percent; desired minimum grade of 0.3 percent though longitudinal gradients of 0.0 percent may be acceptable on some pavements that have cross slopes with adequate drainage.
- Side slopes of 6:1 (minimum) to 2:1 (maximum) for all cut or fill heights

Carolina Bays Parkway Extension - North Carolina

- Freeway/Rural Arterial Classification
- Control of access facility
- Design speed of 70 mph
- Right-of-way width: 300 feet (variable)
- Typical Sections (see Figure 4 in Appendix A)
 - Lane Width: 12 feet
 - Roadway Width (Four-Lane): 118 feet comprised of two 12-foot lanes with 12-foot outside shoulders (ten-foot paved) in each direction with a 46-foot median containing six-foot inside shoulders (four-foot paved). With guard rail and inclusive of cut and fill slopes the total typical section width would be approximately 188 feet.
 - Roadway Width (Six-Lane): 142 feet comprised of three 12-foot lanes with 12-foot outside shoulders (ten-foot paved) in each direction with a 46-foot median containing 12-foot inside shoulders (ten-foot paved). With guard rail and inclusive of cut and fill slopes the total typical section width would be approximately 212 feet. The addition of frontage roads on both sides would increase the total typical section width to approximately 386 feet.
- Maximum grade of three percent; minimum grade of 0.3 percent
- Side slopes of 6:1 (minimum) to 3:1 (maximum) for all cut or fill heights