

NEPA/Section 404 Merger Concurrence Point 2 Detailed Study Alternatives Carried Forward

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



May 4, 2020 | 1:30 p.m. – 3:30 p.m.

Online Meeting

See Calendar Invitation for Online Meeting Link & Call-in Number

Detailed Study Alternatives Carried Forward

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**

May 4, 2020

Meeting Agenda

1. Sign-in and Introductions
2. Purpose of Meeting
3. Project Update
4. Study Area
5. Preliminary Alternatives Review
6. Concurrence Point 2 Signature Form Review
7. Project Schedule and 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 reach concurrence on the alternatives that will be carried forward for detailed study. Formal concurrence on NEPA / Section 404 Merger Concurrence Point 2 will be requested during this meeting.

As noted during the September 30, 2019 Corridor Alternatives Screening 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. Further areas of refinement were identified following input on the preliminary corridor concepts from local officials and the public. A revised recommended study area for the Merger Team's consideration will be presented at today's meeting and formal concurrence will be requested.

2.0 PROJECT STATUS

2.1 Project Summary

The South Carolina Department of Transportation (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. The North Carolina Department of Transportation (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 project vicinity is shown in Figure 1 in Appendix A.

The project is a joint effort between the two states, with NCDOT serving as the lead for environmental review. Because the two projects represent one single and complete project, they will be addressed in a single Environmental Impact Statement. The proposed project is anticipated to involve the construction of a multilane, full control of access freeway, part on new location.

2.2 Purpose of and Need for the Proposed Project

Purpose of the Proposed Action: 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.

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.

Summary of Need for the Proposed Action: Many intersections and roadway segments in the study area are expected to either approach or exceed the roadway capacity limits in 2040. The population within Horry and Brunswick counties has steadily increased, and is expected to continue to increase, along with the number of tourists to the area. Growth in population, tourism, and supporting services has resulted in an increase in mixed-purpose traffic on area roads.

The NEPA/Section 404 Merger Team concurred on the purpose and need for the project at their March 19, 2019 Concurrence Point 1 (CP1) meeting.

2.3 Project Study Area

Several locations where the study area needs to be refined were identified during the development of the preliminary corridor concepts and following input from local officials and the public. A revised recommended

study area for the Merger Team's consideration will be presented at today's meeting (see Figure 2 in Appendix A) and formal concurrence will be requested.

2.4 Preliminary Alternatives Screening

An Alternatives Screening meeting was conducted on September 30, 2019 in Lumberton, North Carolina. The purpose of the meeting was to review preliminary corridor concepts for Carolina Bays Parkway Extension with the Merger Team and determine which concepts should be presented at public meetings.

During the presentation NV5 noted the northern alignment section of Corridor Concept 1 from Hickman Road to US 17 in North Carolina was developed outside of the modeling process and in response to input received from a local jurisdiction following the first local officials meeting. This segment is used as part of Corridor Concept 4 as well. The USACE and NCDWR suggested realigning a portion of this segment further to the north between Gwynn Road and Longwood Road to possibly reduce impacts. They supplied a sketch of the possible realignment and discussed further with NV5 technical team members following the meeting so this change could be developed further. No additional comments were received on the build corridor concepts.

The suggested realignment reduced impacts to modeled wetlands (46.2 acres), ponds (1.7 acres), 100-year floodplain (16.9 acres), and residential and commercial structures (28), with impacts to streams increasing (4,699 linear feet). Revised Corridor Concepts 1 and 4 and the remaining seven corridor concepts as presented at the Alternatives Screening meeting were presented to the public via the project website and at meetings in December 2019 (see Section 2.5).

Other comments and requests presented by the Merger Team at the Alternatives Screening meeting, or in response to follow up questions emailed from the project team after the meeting, are as follows:

- NCDCM requested additional information on an express lane option (one of the options noted under the Mass Transit Alternative).
Additional discussion is provided in Section 3.4.

- NCDCM asked the team to identify the Coastal Area Management Act (CAMA) Areas of Environmental Concern (AEC) at Concurrence Point 2.
Mapped CAMA AECs have been reviewed. Coastal Estuarine Water Shoreline AECs are located along the Intracoastal Waterway and Inlet Hazard Area AECs are located at inlets along the coast. These areas are located outside of the project study area. The proposed project will require a Coastal Area Management Act (CAMA) consistency determination from the North Carolina Division of Coastal Management.

- NCDCM reminded the technical team to include a discussion of sea level rise and climate change in accordance with North Carolina Executive Order 80 in future reports.
North Carolina Executive Order (EO) 80 sets forth several goals, including: a 40 percent reduction in statewide greenhouse gas emissions from 2005 levels; a 40 percent reduction in energy consumption in state-owned buildings from 2002-2003 levels; and, an increase of registered zero emission vehicles (ZEVs) to at least 80,000 by 2025. Cabinet agencies are required to evaluate the impacts of climate change on their programs and incorporate climate change mitigation into their operations. In accordance with EO 80, NCDEQ developed the North Carolina Clean Energy Plan to serve as a framework to help North Carolina transition to a clean energy economy and facilitate the development of a modern and resilient electric grid.

In December 2014, FHWA issued Order 5520 to establish policy on preparedness and resilience to climate change (all its symptoms, including sea-level rise) and extreme weather events. At the project level, FHWA published *Hydraulic Engineering Circular No. 25--Volume 2-- Highways in the Coastal Environment: Assessing Extreme Events* (HEC-25, Vol. 2; FHWA-NHI-14-006). The publication

provides technical guidance on how to incorporate extreme events and climate change into coastal highway designs, with a focus on sea level rise, storm surge, and wave action.

These topics will be included in the Draft EIS.

- Future decision packages should provide a list of alternatives that NCDOT and SCDOT propose for deletion along with the rationale for deletion.
- Future meeting packets should contain explanations of why the team should further consider or delete options suggested at the screening meeting (i.e. facilities with less than full access control or express lanes).

NCDOT and SCDOT recommendations are provided in Section 3.0 - Preliminary Alternatives, and elsewhere in this document as applicable.

- Should the “No Build” for future year include the construction of other projects in the study area programmed in the STIP?

The traffic forecast utilizes the GSATS 2040 Travel Demand Model as a tool to determine Base Year No-Build and Future Year No-Build volumes. The GSATS Model was run using the Existing plus Committed (RIDE 3) network (*fiscally constrained*). 2040 MTP Projects in the vicinity of the study area were coded and considered as part of the traffic forecast development. Other SCDOT and NCDOT long range planning documents were reviewed to determine if any additional projects warranted inclusion, and geometric modifications were incorporated into the 2040 Future Year No-Build *Synchro* models as needed.

- USACE HQ guidance directs final permit decisions to be completed in conjunction with the Record of Decision for the Carolina Bays Parkway Extension project. Regulation under 33 CFR 325, App. B directs that the USACE cannot issue a Record of Decision or permit until 30 days after the notice of availability of the Final EIS. The project timeline needs to reflect this constraint.

The project timeline presented in Section 2.6 reflects this constraint.

2.5 Public Involvement – Preliminary Alternatives Phase

NCDOT and SCDOT conducted two open house public meetings for the Carolina Bays Parkway Extension project in December 2019. One meeting was held on December 3rd in Sunset Beach, NC and the second was held on December 4th in Little River, SC. The informal public meetings gave the public the opportunity to view project information, ask questions, provide comments, and discuss various aspects of the project with the project team. An online version of the meetings was hosted through PublicInput.com, which gave users an opportunity to review the same information provided during the meeting, prioritize the nine corridor concepts in order of preference, and leave comments. A total of 553 individuals signed-in to the North Carolina meeting, and 467 individuals signed-in to the South Carolina meeting. More than 1,800 comments were received, with approximately 77 percent submitted via the project’s public input website.

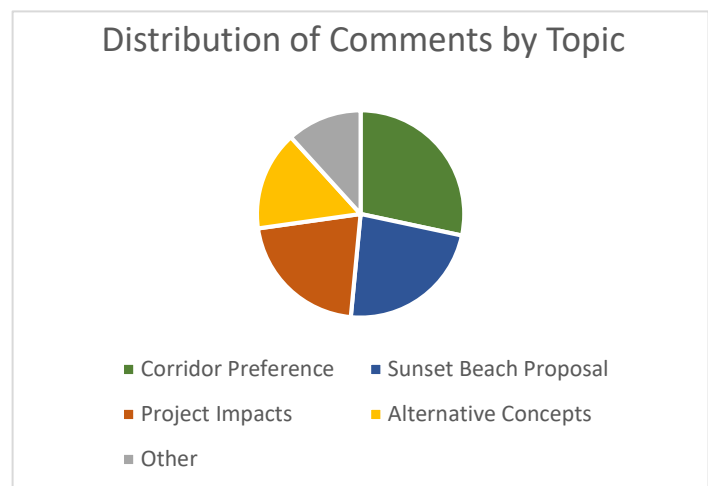


Exhibit 1. Distribution of Public Comments by Topic

As shown in Exhibit 1, the most prevalent topics addressed in public comments include corridor concept preference, support for an alternate concept proposed by Sunset Beach, potential impacts, and alternative concepts.

Interested public were able to rank the nine corridor concepts in order of preference through a poll on the project’s Public Input website (www.publicinput.com/Carolina-bays-pkwy). The results are shown in Exhibit 2 below. In addition, approximately 768 of the comments received related to a commenter’s preference on which corridor concepts to select or avoid. While each of the nine concepts received some level of support and opposition, most of the comments in this category were categorized as “Favor Concept 1 (Red)” or “Favor Concept 4 (Gold)”; more commenters expressed their support for these two concepts than all other concepts combined. An additional 590 comments were in support of an alignment proposed by the Town of Sunset Beach. The Sunset Beach proposal would extend Concept 1 inland and parallel to US 17 from Pea Landing Road NW to US 17 north of Shallotte.

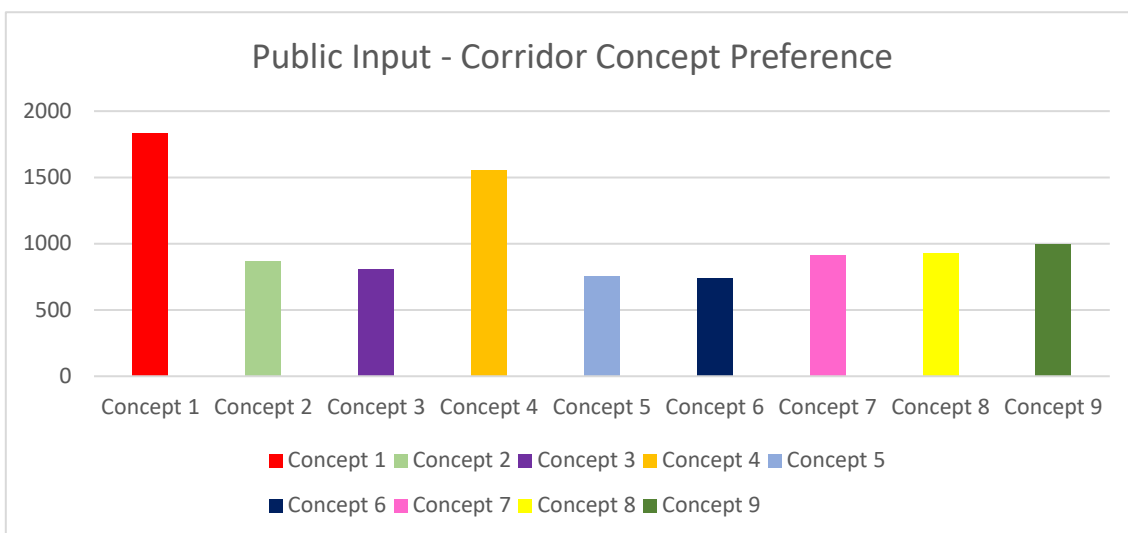


Exhibit 2. Corridor Concept Ranking Results from Public Input Website

The public submitted 576 comments regarding the potential impacts various corridor concepts may have to homes, businesses, farmland, cemeteries, and the environment throughout the project study area. Many of these comments relate to specific neighborhood concerns. Approximately 62 comments and one petition with 270 typed names were received regarding the preservation of Indigo Farms, a multi-generational organic farm in northeastern Horry County, South Carolina with a market across the North Carolina border in Brunswick County. All corridor concepts except 7 (Pink), 8 (Yellow), and 9 (Dark Green) would likely impact Indigo Farms in some capacity.

Approximately 420 comments were received that voiced a need for or suggestions to alternative concepts from the nine presented at the public meetings. Examples of these alternative concept suggestions include:

- Run the Parkway further inland, parallel to US 17 before tying in with the Shallotte Bypass
- Connect the Parkway to US 17 north of Shallotte
- Connect the Parkway to NC 211 beyond Shallotte and north of Supply
- Connect to I-140
- Connect to US 74
- Connect to I-40 north of Wilmington

Other less frequent comment topics included: increased traffic and safety; potential for increased flooding; additional evacuation route needed; project schedule, cost and funding; and, opposition to the project.

Four local jurisdictions submitted comments:

- The Town of Shallotte submitted a letter voicing their support of the project, specifically Corridor Concepts 1 (Red) and 2 (Light Green). They also noted a concern about the project’s design at the south end of Main Street, where the Town feels an interchange is necessary for emergency service accessibility.
- A resolution submitted by the Town of Sunset Beach voiced opposition to all nine corridor concepts due to anticipated community impacts associated with utilizing existing US 17, because none of the concepts would provide an alternate evacuation route, and all of the concepts would utilize US 17 between NC 904 and NC 130 in Shallotte. The Town submitted an alternative corridor concept that would extend Concept 1 inland and parallel to US 17 from Pea Landing Road NW to US 17 north of Shallotte.
- A resolution submitted by the Town of Calabash expressed concern that the proposed project would impact businesses and neighborhoods in the project study area regardless of which concept is selected. While the Town formally endorsed Corridor Concept 6 (Dark Blue), they also recommend the project team explore a tenth alternative similar to the proposal submitted by the Town of Sunset Beach to further minimize impacts to the area’s residents.
- A resolution submitted by the Town of Carolina Shores expressed concern and opposition to any of the corridor concepts that would impact an existing, established neighborhood. Therefore, the Town submitted their support for Corridor Concepts 1 (Red) or 4 (Gold).

2.6 Project Funding and Schedule

Based on preliminary cost estimates, the North Carolina portion of the project is expected to cost approximately \$367 million and the South Carolina portion approximately \$185 million, for a total estimated project cost of \$552 million. The SCDOT 2017-2022 STIP includes the purchase of property utilizing Horry County RIDE III sales tax funding for the extension of Carolina Bays Parkway from SC 9 to the North Carolina State line beginning in 2022. NCDOT is evaluating a range of potential funding options; however, right-of-way acquisition and construction for the portion of the project located in North Carolina is not yet funded in the STIP.

The project will follow the One Federal Decision environmental review process. The merger process aligns well with One Federal Decision agency concurrence mandated by the Memorandum of Understanding (MOU). The One Federal Decision MOU calls for federal agreement on a project’s purpose and need, alternatives to be studied in detail, and the preferred alternative. The NEPA/Section 404 merger process that is currently being followed to advance the Carolina Bays Parkway Extension project contains the three primary points listed in the One Federal Decision MOU but would document additional points to determine the minimum lengths of proposed hydraulic structures as well as formal discussions of avoidance and minimization of impacts to environmental features in the project area. The FHWA anticipates releasing a formal NOI after coordination on the projects purpose and need and detailed study alternatives, through the project’s merger process, is completed. Once the NOI is issued, One Federal Decision mandates that a Record of Decision (ROD) will be

Project Schedule



developed within two years after the NOI with permits following the ROD approval within 90 days. The current project schedule is shown in the graphic below.

3.0 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.

3.1 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. The No Build Alternative would not incur right-of-way or construction costs. There would be no impacts to streams, wetlands, or other natural or cultural resources, nor any residential or business relocations. The No Build Alternative would not enhance mobility or connectivity for traffic moving in and through the project area. Without improvements to the transportation network the primary purpose of the proposed project would not be met.

NCDOT and SCDOT Recommendation: While the No Build Alternative is recommended for elimination, it will be included in the NEPA documentation to provide a baseline for decision-makers to compare the environmental effects of the Detailed Study Alternatives.

3.2 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 also best suited for capacity or safety deficiencies at specific locations.

NCDOT and SCDOT Recommendation: Eliminate the TSM Alternative from further study.

SCDOT 2017-2022 STIP project (P038944) involves operational and safety improvements to the S-57 (Wampee Road)/S-111 (Little River Road) intersection, with right-of-way acquisition scheduled for 2020 and construction scheduled to start in 2021. It is expected that this project will improve traffic operations in the vicinity of this intersection; however, it is expected that Wampee Road would not show an appreciable increase in capacity in the design year with these improvements.

NCDOT STIP Projects R-5851 (right-of-way acquisition scheduled in 2023 and construction in 2025) and R-5857 (right-of-way acquisition scheduled in 2020 and construction in 2022) involve the conversion US 17 intersections with NC 904 and US 17 Business near Shallotte to Synchronized Street configurations. These operational improvements can be expected to help alleviate congestion and improve safety at these intersections. However, it is expected that area roadways would not experience an appreciable increase in mobility in design year 2040, nor would connectivity be improved, with TSM operational improvements.

TSM improvements would not add new lanes, control access, or provide alternative routes or means of travel to existing roadways. Mobility and connectivity would not improve for traffic moving in and through the project area. The TSM Alternative does not meet the purpose of and need for the proposed project and is recommended for elimination from further study.

3.3 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.

NCDOT and SCDOT Recommendation: Eliminate the TDM Alternative from further study.

The TDM Alternative is not a reasonable alternative for the proposed project by nature of the study area, a tourist destination and home to communities serving a large retiree population. It would not improve the transportation network in the study area by enhancing mobility or connectivity for traffic moving in and through the project area. The TDM Alternative would not meet the purpose and need of the proposed project and is recommended for elimination from further consideration.

3.4 Mass Transit

The Mass Transit Alternatives considers forms of transportation other than the single-occupancy passenger vehicle such as bus services, rail services, and express lanes. Express lanes are optional tolled lanes that are generally constructed along existing roadway facilities, typically interstates and other controlled access facilities, in heavily congested roadway corridors. Express lanes, such as High Occupancy Vehicle (HOV) or High Occupancy Transit (HOT) lanes and busways, provide a choice for drivers to bypass congestion when desired. Express lanes are intended to provide a mobility choice and more reliable travel times in peak periods for motorists and bus patrons. Alternatives for constructing express lanes on existing roadway facilities involve either converting existing lanes to express lanes or adding additional lanes to the roadway.

NCDOT and SCDOT Recommendation: Eliminate the Mass Transit Alternative from further study.

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.

Current roadway access and land use along area roads is not conducive to adding express lanes or converting existing lanes to express lanes.

The Mass Transit Alternative would only minimally address the current traffic flow problems in the area. In addition, it would not be a reasonable alternative because of potential lack of demand, dispersed residential areas and employment centers, and diversity of trip origins and destinations. The Mass Transit Alternative does not meet the purpose of and need for the proposed project and is recommended for elimination from further consideration.

Tolling

Consideration of toll roads as a potential funding option for major new roadway construction projects may be an option to get projects past the planning stage and move to construction. Tolling may be a potential mechanism for funding the proposed Carolina Bays Parkway Extension in North Carolina. However, a review of the financial feasibility of tolling does not begin until such projects are first approved by the nominating MPO or RPO through

inclusion in their adopted Comprehensive Transportation Plan, Metropolitan Transportation Plan, or other adopted local plan. The project must also advance through the state's Strategic Prioritization process and score well enough to be included in the local Transportation Improvement Program and the Statewide Transportation Improvement Program.

3.5 Build Alternatives – Preliminary Corridor Concepts

A review of the preliminary corridor concepts is provided below. The concepts are shown on Figures 3A-3L in Appendix A. Each of the 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. Table 1 identifies nearby resources and potential impacts for the corridor concepts reviewed in Section 3.5.3 below.

3.5.1 Methodology

As reviewed at the Alternatives Screening meeting, 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.

The northern alignment section of Corridor Concept 1 from Hickman Road to US 17 in North Carolina was developed outside of the modeling process and in response to input received from a local jurisdiction following the first local officials meeting. This segment is used as part of Corridor Concept 4 as well.

NCDOT Recommendation: For alternatives utilizing US 17 as part of the alignment between Hickman Road and US 17 Shallotte Bypass, expand the 1,000-foot corridor to the north 75 feet to provide additional design flexibility to reduce potential utility conflicts.

3.5.2 Typical Cross Sections

The preliminary Build Alternatives were developed using a suite of cross sections commonly used in either South Carolina or North Carolina (see Figures 4A through 4C in Appendix A). In all locations, a full control of access freeway with a design speed of 70 miles per hour (mph) were criteria used to set interchange locations and the general corridor width. The final recommended cross section(s) will be determined following the analysis of build forecast traffic. The typical section options that are being considered at the preliminary stage follow:

South Carolina

- **SCDOT Typical Section 1 – Four-lane median-divided:** 120-foot roadway width comprised of two 12-foot lanes with 12-foot outside shoulders (10-foot paved) in each direction with a 48-foot median containing 10-foot inside shoulders (4-foot paved). Total section width including ditches and slopes would be approximately 190 feet.
- **SCDOT Typical Section 2 – Six-lane median-divided:** 144-foot roadway width comprised of three 12-foot lanes with 12-foot outside shoulders (10-foot paved) in each direction with a 48-foot median containing 12-foot inside shoulders (10-foot paved). Total section width including ditches and slopes would be approximately 388 feet. This section matches the current Carolina Bays Parkway and would likely be used for the entire distance in South Carolina before transitioning to four lanes in North Carolina.

North Carolina

- **NCDOT Typical Section 1 (no frontage roads) – Four-lane median-divided:** 118-foot roadway width comprised of two 12-foot lanes with 12-foot outside shoulders (10-foot paved) in each direction with a 46-foot median containing 6-foot inside shoulders (4-foot paved). The total section width including ditches and slopes would be approximately 188 feet.
- **NCDOT Typical Section 2 (no frontage roads) – Six-lane median-divided:** 142-foot roadway width comprised of three 12-foot lanes with 12-foot outside shoulders (10-foot paved) in each direction with a 46-foot median containing 12-foot inside shoulders (10-foot paved). The total section width including ditches and slopes would be approximately 212 feet.
- **NCDOT Typical Section 1 (with frontage roads) – Four-lane median-divided:** Same dimensional description for four-lane median-divided freeway section above, but the addition of frontage roads on both sides would increase the total typical section width to approximately 346 feet. This cross section might be considered when widening existing roads in North Carolina such as Hickman Road, Calabash Road, or US 17.
- **NCDOT Typical Section 2 (with frontage roads) – Six-lane median-divided:** Same dimensional description for six-lane median-divided freeway section above, but the addition of frontage roads on both sides would increase the total typical section width to approximately 386 feet. This cross section may be considered when widening existing roads in North Carolina such as Hickman Road, Calabash Road, or US 17.

NCDOT and SCDOT Recommendation: Move forward with functional design of detailed study alternatives utilizing established design criteria for a freeway with full control of access. Determine the appropriate typical section pending the build traffic analysis.

US 17 is included in the National Highway System (NHS) as a Non-Interstate Strategic Highway Route and 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.

A freeway designation with full control of access is consistent with the vision presented in several planning documents including the 2006 Carolina Bays Parkway Extension Feasibility Study, a 2007 Feasibility Study Update, the 2010 Brunswick County Comprehensive Transportation Plan, the 2017 GSATS Metropolitan Transportation Plan.

3.5.3 Corridor Concept 1 / 1A

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 at NC 904.

Corridor Concept 1 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting. Input from the team at that meeting resulted in a revision to the Corridor Concept 1 alignment in the vicinity of NC 904. The revision reduced impacts to several natural and human environment features, including wetlands and single-family residences. The revised Corridor Concept 1 alignment was shown at the December 2019 public meetings.

As a result of feedback on the preliminary corridor concepts from the public and requests from the towns of Sunset Beach and Calabash, options to extend Concept 1 inland and parallel to US 17 were evaluated. These options included:

- An option similar to Sunset Beach’s suggested concept. Rather than continuing beyond NC 130 to US 17 north of Shallotte, which would add several miles to the project and essentially create a bypass of the US 17 Shallotte Bypass, the studied option terminates at an interchange with NC 130. While this option reduced overall impacts, it was not selected because of potential traffic and access conflicts at South Brunswick High School.
- An option that generally followed Old Shallotte Road from NC 904 to US 17. While this option reduced impacts in several categories, it was not selected because it resulted in substantial impacts to High Quality Waters and single family residential structures and would create access issues for some farms.
- A new location option from NC 904 to the US 17 Shallotte Bypass developed using GIS modeling methodology. This option reduces impacts to most human and natural environment categories over Concept 1 and was added to the preliminary alternatives as Concept 1A (see Figure 3C in Appendix A).

NCDOT and SCDOT Recommendation: Eliminate Concept 1 from further study. Move Concept 1A forward for detailed study.

Corridor Concept 1 is the highest ranked alternative based on public input and is endorsed by the towns of Shallotte and Carolina Shores. When compared to other corridor concepts, Concept 1 has among the lowest impacts to wetlands, ponds, 100-year floodplain, residential and commercial structures, cemeteries, and golf courses.

Corridor Concept 1A further reduces impacts to several environmental features including streams, High Quality Waters, 100-year floodplain, floodway, commercial structures, cemeteries, and golf courses.

3.5.4 Corridor Concept 2

Corridor Concept 2 (Figure 3D 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).

Corridor Concept 2 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting and shown at the December 2019 public meetings.

NCDOT and SCDOT Recommendation: Eliminate Concept 2 from further study.

Corridor Concept 2 ranks sixth out of the nine concepts based on public input and is endorsed by the Town of Shallotte. In comparison to other Corridors, Concept 2 would result in lower impacts to wetlands, moderate impacts to streams, and higher impacts to 100-year floodplain. With the exception of churches, Concept 2 would have low to moderate impacts to the human environment.

3.5.5 Corridor Concept 3

Corridor Concept 3 (Figure 3E 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 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting and shown at the December 2019 public meetings.

NCDOT and SCDOT Recommendation: Eliminate Concept 3 from further study.

In comparison to other corridors, Concept 3 would result in lower wetland impacts, moderate stream impacts, and moderate to high impacts on the human environment. Based on public input Corridor Concept 3 ranks seventh out of the nine concepts shown at the public meetings. There is little variation in the alignment between Concept 3 and Concept 2. Concepts 2 and 3 present similar wetland and stream impacts; however, Concept 3 would have greater impacts to the human environment.

3.5.6 Corridor Concept 4 / 4A

In comparison to Concepts 1, 2, and 3, Corridor Concept 4 (Figure 3F 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 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting. Input from the team at that meeting resulted in a revision to the Corridor Concept 4 alignment in the vicinity of NC 904. The revision reduced impacts to several human and natural environment features, including wetlands and single-family residences. The revised Corridor Concept 4 alignment was shown at the December 2019 public meetings.

Corridor Concept 4 follows the same route in North Carolina as Concept 1. Option A, discussed in Section 3.5.3, was also applied to Concept 4. Corridor Concept 4A, which extends Concept 4 on new location from NC 904 to US 17 Shallotte Bypass (see Figure 3G in Appendix A), is added to the preliminary alternatives.

NCDOT and SCDOT Recommendation: Move Concepts 4 and 4A forward for detailed study.

Corridor Concept 4 is the second highest ranked alternative based on public input and is endorsed by the Town of Carolina Shores. When compared to other corridor concepts, Concept 4 has higher impact to wetlands and streams, though lower impact to 100-year floodplain. With the exception of cemeteries, human environment impacts are lower than most alternatives.

While wetland impacts remain higher when compared to other corridor concepts, Concept 4A results in decreased impacts in several other categories including streams, High Quality Waters, 100-year floodplain, floodway, commercial structures, cemeteries, and golf courses. Concepts 4 and 4A would provide an alternate option to the alignment followed by Concept 1 in South Carolina.

3.5.7 Corridor Concept 5

Corridor Concept 5 (Figure 3H 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 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting and shown at the December 2019 public meetings.

NCDOT and SCDOT Recommendation: Eliminate Concept 5 from further study.

When compared to other corridor concepts, Concept 5 would result in higher wetland, church and cemetery impacts. Impacts to other human and natural environment features would be generally moderate; however, impacts to single family residential structures would be low. Corridor Concept 5 ranks eighth out of the nine preliminary concepts based on public input.

3.5.8 Corridor Concept 6

Corridor Concept 6 (Figure 3I 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 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting and shown at the December 2019 public meetings.

NCDOT and SCDOT Recommendation: Eliminate Concept 6 from further study.

When compared to other corridor concepts, Concept 6 would result in higher impacts to wetlands, streams, churches, cemeteries, and golf courses, and moderate impacts in most other categories. Corridor Concept 6 is endorsed by the Town of Calabash; however, it is the least preferred of the nine alternatives based on public input.

3.5.9 Corridor Concept 7

Corridor Concept 7 (Figure 3J 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).

Corridor Concept 7 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting and shown at the December 2019 public meetings.

NCDOT and SCDOT Recommendation: Move Concept 7 forward for detailed study.

Corridor Concept 7 ranks fifth out of the nine concepts based on public input. When compared to other concepts, Corridor Concept 7 would have moderate impacts to single family residential structures and lower impacts to churches and commercial/industrial structures, but higher impacts to apartments/condominiums, approved/ planned residential developments, and golf courses. Concept 7 would have lower stream impacts and higher impacts to wetlands.

3.5.10 Corridor Concept 8

Corridor Concept 8 (Figure 3K 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.

Corridor Concept 8 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting and shown at the December 2019 public meetings.

NCDOT and SCDOT Recommendation: Eliminate Concept 8 from further study.

When compared to other concepts, Corridor Concept 8 would result in high impacts to streams and single and multi-family residential structures, and moderate impacts in most other categories. This concept would also impact approximately 3.4 acres in an area designated Essential Fish Habitat. Corridor Concept 8 ranks fourth out of the nine concepts based on public input.

3.5.11 Corridor Concept 9

Like Concept 8, Concept 9 (Figure 3L 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.

Corridor Concept 9 was presented to the Merger Team at the September 30, 2019 Alternatives Screening Meeting and shown at the December 2019 public meetings.

NCDOT and SCDOT Recommendation: Eliminate Concept 9 from further study.

Concept 9 would result in the highest impacts to several resources, including streams, ponds, 100-year floodplain, single and multi-family residential and commercial/industrial structures, and public parks. This concept would also impact approximately 39 acres in an area designated Essential Fish Habitat.

Figure 5 in Appendix A shows the preliminary corridor concepts recommended for detailed study.

Table 1. Preliminary Corridor Alternative Concepts – Potential Environmental Effects

Impact Category ^{1,2}		Measure		Corridor Concept																					
				1		1A		2		3		4		4A		5		6		7		8		9	
				Total		Total		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	SC	NC	SC	NC		
Length (L-line)	Miles	21.49		20.80		19.77		19.63		21.37		20.68		19.64		19.38		19.04		19.36		20.18			
		5.33	16.16	5.33	15.47	5.33	14.44	5.34	14.29	5.19	16.18	5.19	15.49	5.19	14.45	5.19	14.19	5.14	13.90	5.73	13.63	6.49	13.69		
Proposed Interchanges	No.	9		6		9		9		9		6		9		9		8		9		10			
		2	7	2	4	2	7	2	7	2	7	2	4	2	7	2	7	2	6	3	6	4	6		
Natural Resource Impacts																									
Modeled Wetlands	Acres	249.78		244.19		238.08		233.75		314.83		309.25		304.73		299.67		291.88		270.35		291.03			
		107.05	142.73	107.05	137.14	107.03	131.05	107.32	126.43	176.79	138.04	176.79	132.46	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	224.59		262.98		248.08		236.95		216.73		255.12		240.58		232.12		245.16		253.18		282.63			
		36.32	188.27	36.32	226.66	36.31	211.77	36.96	199.99	34.80	181.93	34.80	220.32	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	25,845 (23)		14,805		20,824 (15)		20,906 (15)		26,935 (24)		15,895 (19)		21,609 (16)		22,089 (16)		18,919 (16)		25,221 (19)		30,369 (20)			
		2,575 (4)	23,270 (19)	2,574 (4)	12,231 (14)	2,574 (4)	18,250 (11)	2,474 (4)	18,432 (11)	3,664 (5)	23,270 (19)	3,664 (5)	12,231 (14)	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	18.15		18.04		21.80		22.69		16.27		16.16		20.04		20.18		21.99		20.65		30.84			
		7.19	10.96	7.19	10.85	7.15	14.65	7.20	15.49	5.17	11.10	5.17	10.99	5.17	14.87	5.17	15.01	6.16	15.83	6.52	14.13	16.10	14.74		
HQW	Linear Feet	926		533		925		925		926		533		925		925		925		925		925			
			926		533		925		925		926		533		925		925		925		925		925		
Designated Shellfish Harvest Area ⁴	Acres	0		0		0		0		0		0		0		0		0		0		0.08			
																						0.08			
Essential Fish Habitat ⁵	Acres	0		0		0		0		0		0		0		0		0		3.43		38.80			
																					3.43	26.55	12.25		
SC Critical Area	Acres	0		0		0		0		0		0		0		0		0		0		76.15			
																						76.15			
Known Federally Protected Species ⁶	Study Area Occurrence	0		0		0		0		0		0		0		0		0		0		0			
100-Year Floodplain	Acres	112.40		51.94		213.95		204.22		112.40		51.94		198.69		202.21		202.52		180.05		214.13			
			112.40		51.94		213.95		204.22		112.40		51.94		198.69		202.21		202.52		180.05	31.40	182.73		
Floodway	Acres	2.46		1.10		2.46		2.46		2.46		1.10		2.46		2.46		2.46		2.46		2.46			
			2.46		1.10		2.46		2.46		2.46		1.10		2.46		2.46		2.46		2.46		2.46		
Human Environment Impacts																									
Residential – Single Family / Mobile Home	No. Structures	145		161		179		225		91		107		126		169		151		246		287			
		64	81	64	97	63	116	63	162	9	82	9	98	9	117	9	160	9	142	41	205	54	233		
Residential – Apartment / Condominium ⁷	No. Structures	4		4		4		4		4		4		4		4		13		15		31			
			4		4		4		4		4		4		4		4		13		15		31		
Commercial / Industrial ⁸	No. Structures	111		45		117		121		110		44		116		114		107		118		140			
		29	82	29	16	29	88	29	92	24	86	24	20	24	92	24	90	24	83	24	94	44	96		

		Corridor Concept																					
		1		1A		2		3		4		4A		5		6		7		8		9	
Impact Category ^{1,2}	Measure	Total		Total		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	SC	NC	SC	NC
Approved / Planned Residential Dev.	Acres	32.95		36.80		22.71		36.11		43.29		47.13		38.77		42.67		91.80		48.42		65.42	
		8.86	24.09	8.86	27.94	8.86	13.85	8.86	27.25	16.25	27.04	16.25	30.89	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		0.57		0.57		0.57		0		0.57		0.57		0.57		0.57		1.68	
			0.57				0.57		0.57		0.57				0.57		0.57		0.57		0.57	1.11	0.57
Church	No. Properties	4		4		9		11		1		1		6		8		3		4		4	
		3	1	3	1	3	6	3	8		1		1		6		8		3		4		4
Cemetery ⁹	Boundary	2		1		2		5		5		4		5		7		3		4		4	
			2		1		2	1	4	3	3	3	2	3	3	3	4	1	2	1	3	1	3
EMS / Fire Station	No. Structures	0		1		0		0		0		1		0		0		0		0		0	
					1							1											
Golf Course ¹⁰	Acres (No. Courses)	16.13 (1)		0		28.80 (2)		47.45 (4)		16.13 (1)		0		28.80 (2)		45.98 (4)		65.48 (4)		19.28 (2)		34.55 (4)	
			16.13 (1)				28.80 (2)		47.45 (4)		16.13 (1)				28.80 (2)		45.98 (4)	7.56 (1)	57.93 (4)		19.28 (2)	3.13 (1)	31.42 (4)
Library	No. Structures	0		0		0		1		0		0		0		1		0		0		0	
									1							1							
Physical Environment Impacts																							
Hazardous Waste Site - RCRA	No. Sites	2		1		2		2		2		1		2		2		2		3		3	
		1	1	1		1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	2	1
Registered USTs	No. Sites	6		6		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	3	3	3	3	3	4
Communication Tower	No. Structures	2		2		2		2		2		2		2		2		1		1		1	
			2		2		2		2		2		2		2		2		1		1		1
Electrical Substation	No. Sites	1		1		2		2		0		0		1		1		0		0		0	
		1		1		1	1	1	1						1		1						
Water Tower	No. Structures	1		1		1		1		0		0		0		0		0		0		0	
		1		1		1		1															
Wastewater Treatment Plant	No. Sites	1		1		1		1		0		0		0		0		0		0		0	
		1		1		1		1															
NPDES Stormwater Permit	No. Sites	1		0		1		1		1		0		1		1		1		1		1	
			1				1		1		1				1		1		1		1		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, 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, 4A 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

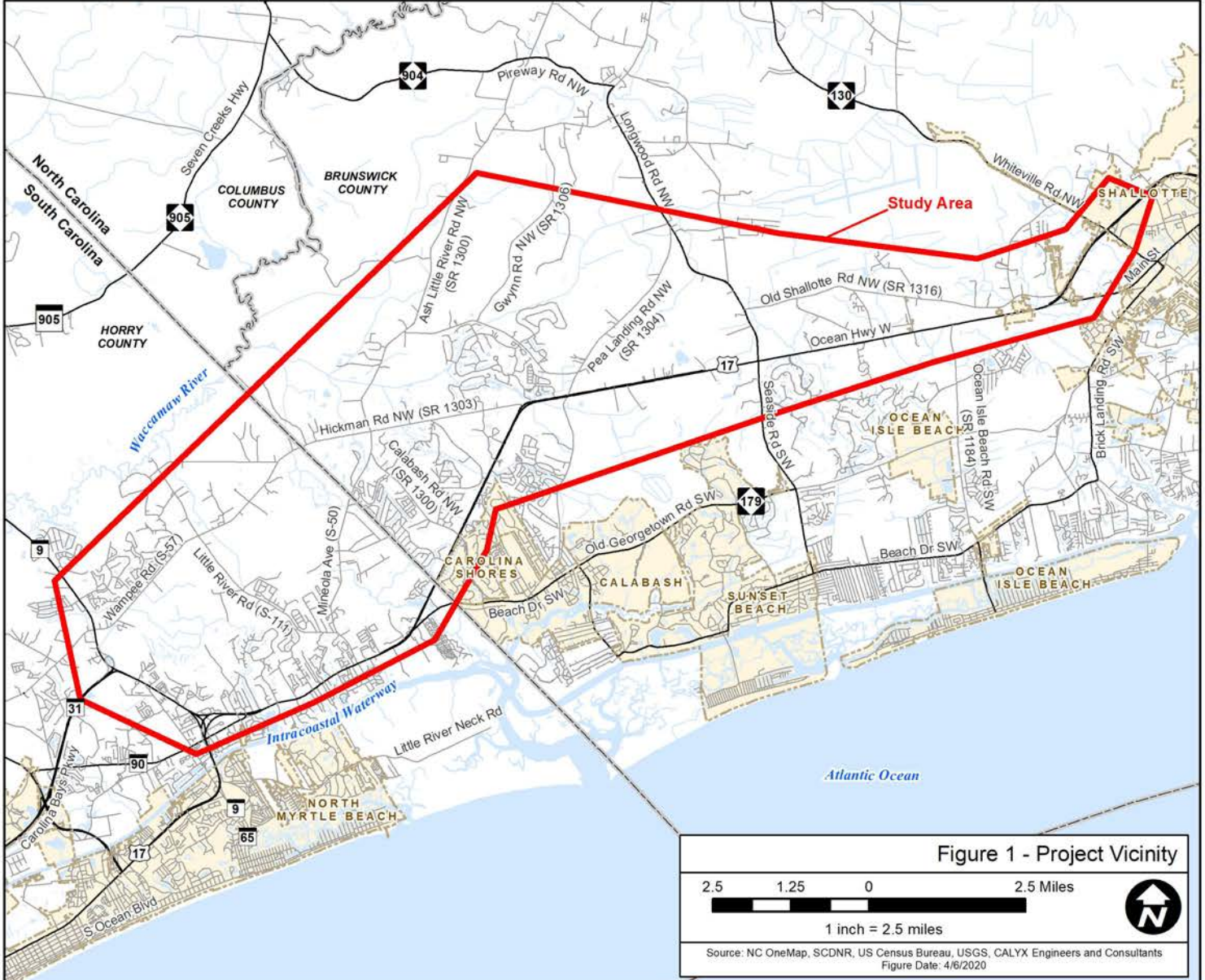
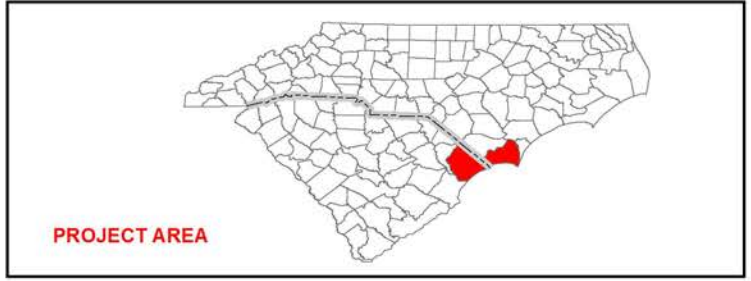
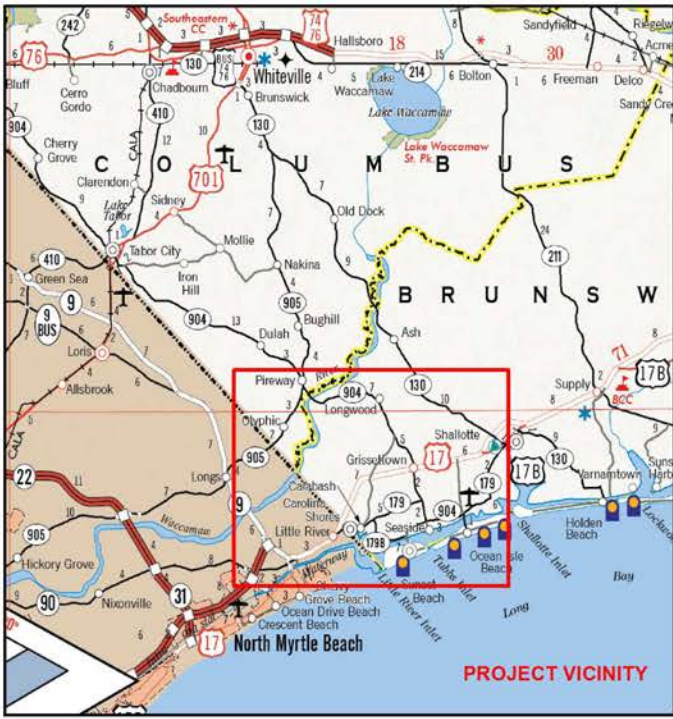
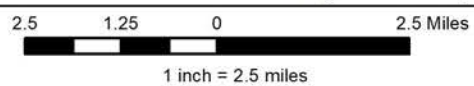


Figure 1 - Project Vicinity



Source: NC OneMap, SCDNR, US Census Bureau, USGS, CALYX Engineers and Consultants
Figure Date: 4/6/2020

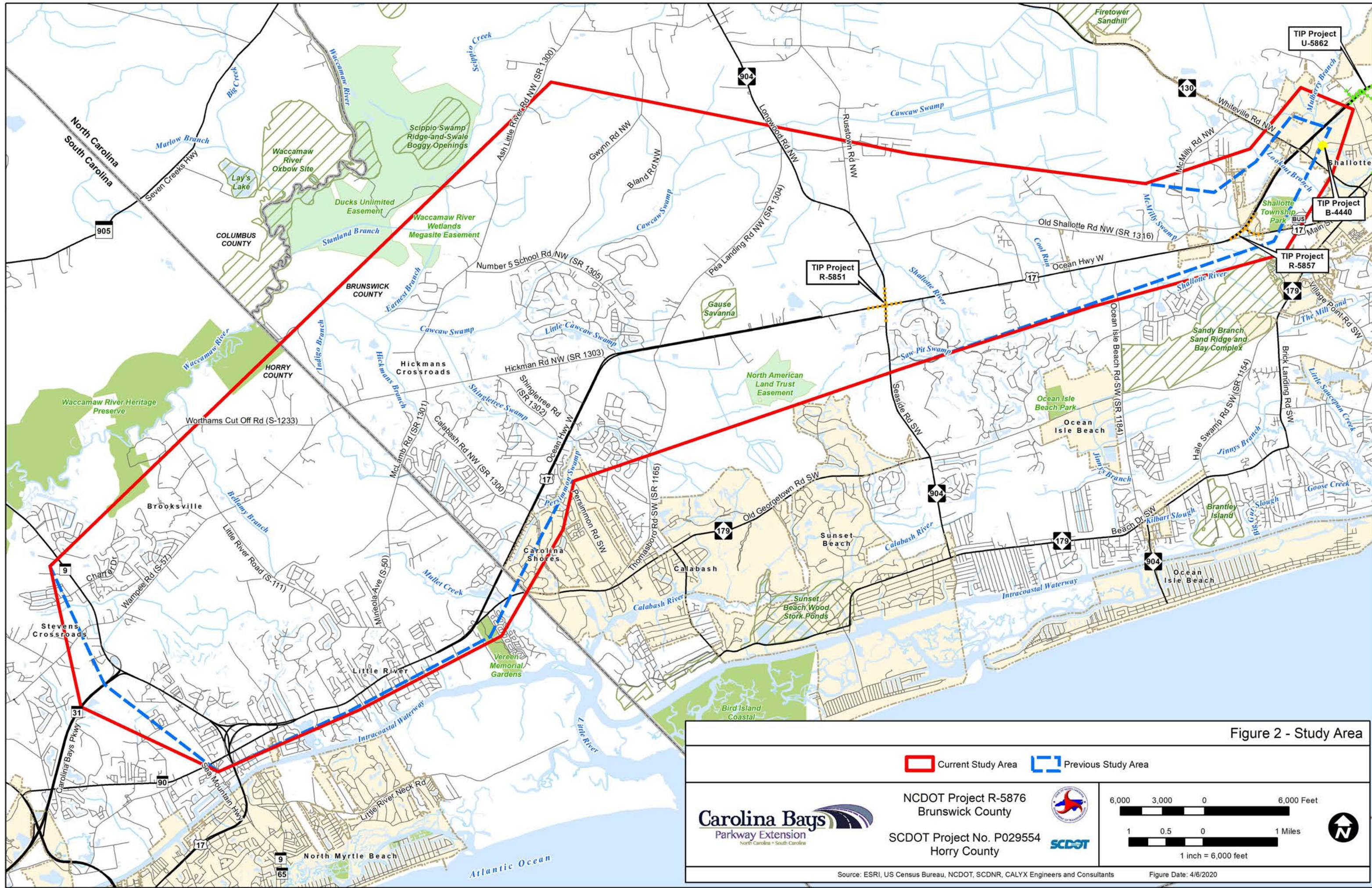


Figure 2 - Study Area

Current Study Area
 Previous Study Area

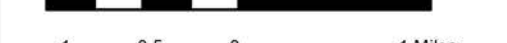


NCDOT Project R-5876
Brunswick County

SCDOT Project No. P029554
Horry County



6,000 3,000 0 6,000 Feet



1 0.5 0 1 Miles

1 inch = 6,000 feet



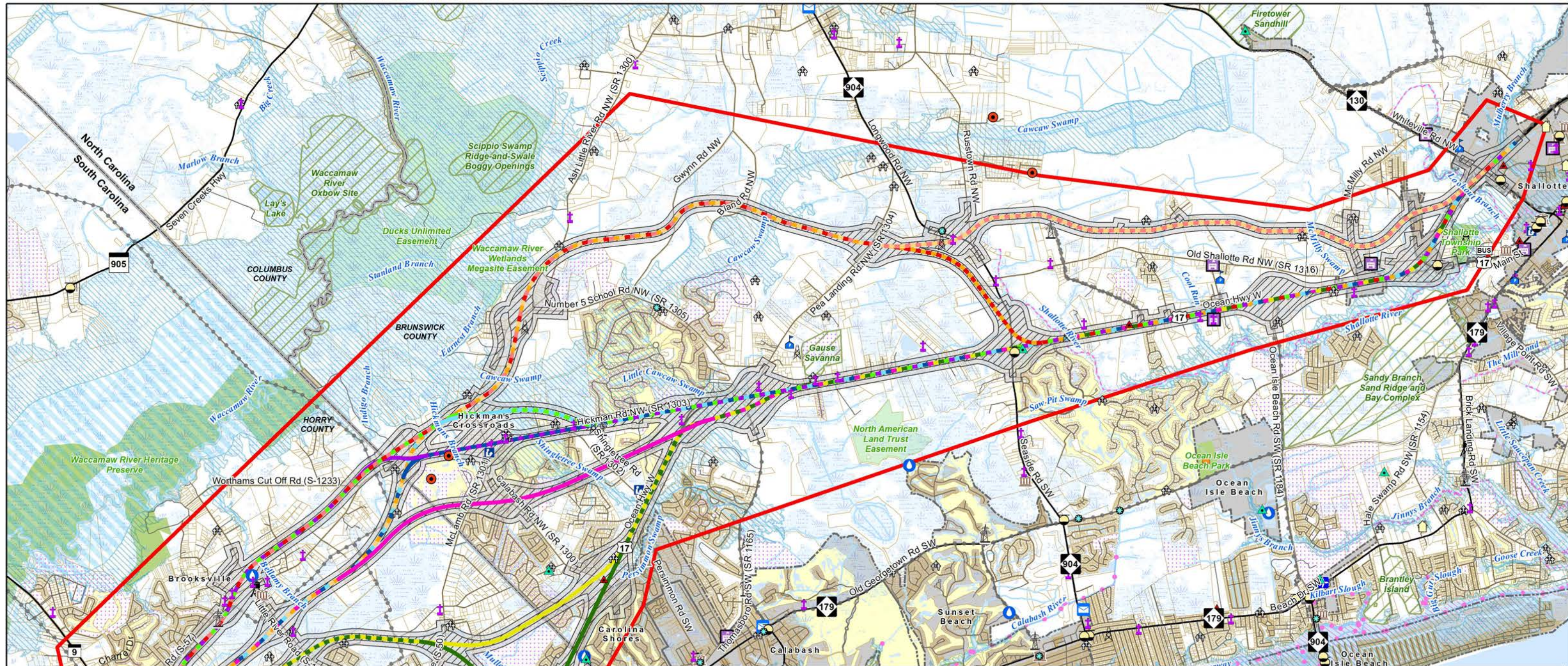


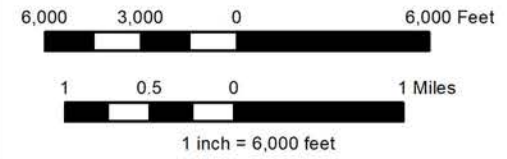
Figure 3A - Preliminary Corridor Concepts (All Concepts)

<ul style="list-style-type: none"> Preliminary Concept Centerline Concept 1 Concept 1A Concept 2 Concept 3 Concept 4 Concept 4A Concept 5 Concept 6 Concept 7 Concept 8 Concept 9 	<ul style="list-style-type: none"> Preliminary Corridor Concept (400 ft) - All Concepts Preliminary Study Corridor (1,000 ft) - All Concepts Study Area Assisted Living Facility Airport Cemetery Church 	<ul style="list-style-type: none"> Communication Tower Daycare Determined Eligible Historic Site EMS / Fire / Police Government Facility Hazardous Waste Site - RCRA Hospital Library 	<ul style="list-style-type: none"> LWCF 6(f) Property NPDES Permit - Active PARTF Property Post Office Public Water Supply Recreational Facility Registered UST School 	<ul style="list-style-type: none"> Substation Wastewater Treatment Plant Water Tower Transmission Line Major Road Minor Road River / Stream High Quality Waters 303d Water 	<ul style="list-style-type: none"> 303d Waterbody Waterbody Modeled Wetland 100-Year Floodplain Floodway County Boundary Municipal Boundary Parcel 	<ul style="list-style-type: none"> Approved / Planned Residential Development 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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NCDOT Project R-5876
Brunswick County

SCDOT Project P029554
Horry County



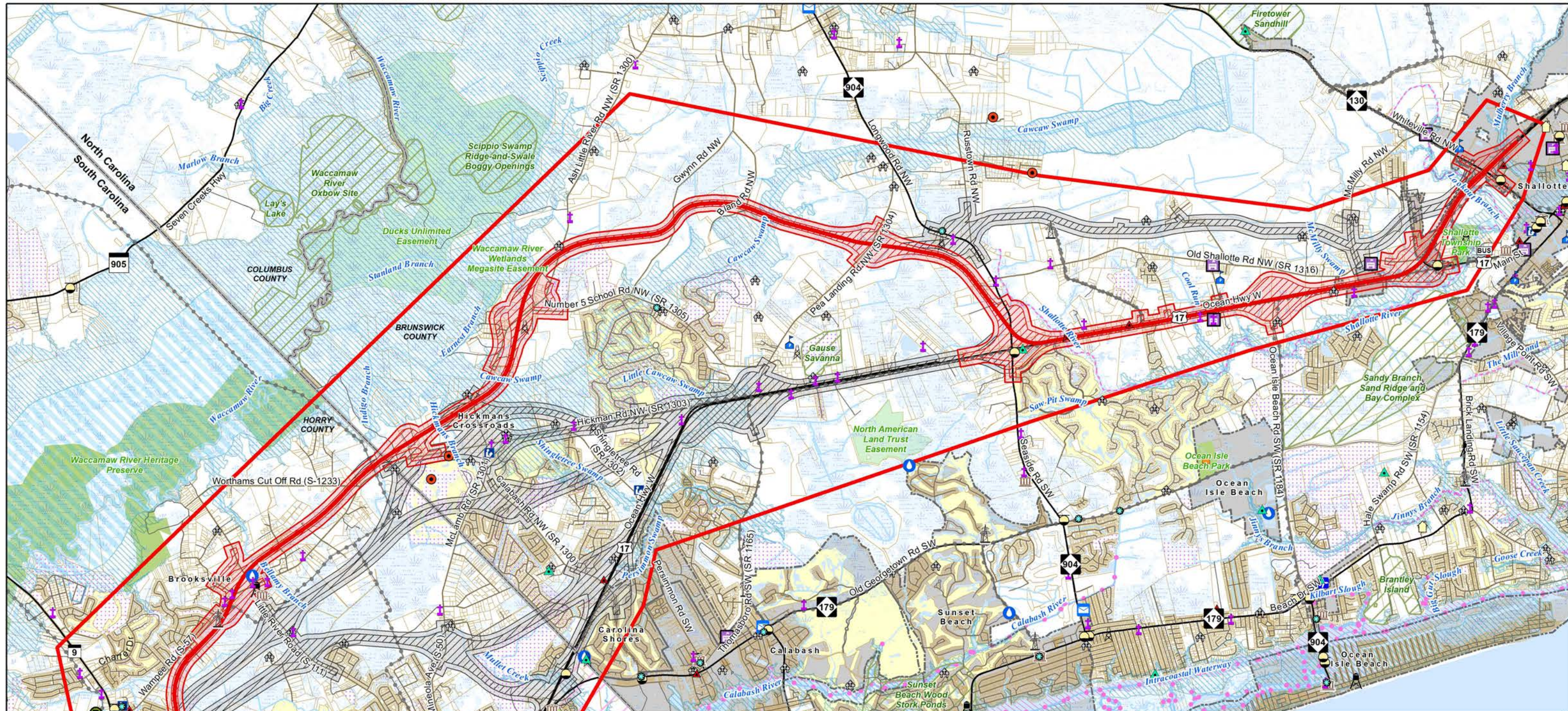


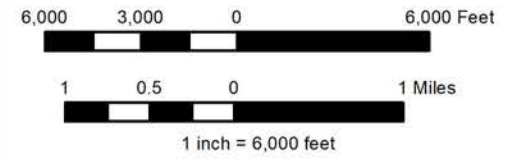
Figure 3B - Preliminary Corridor Concepts (Concept 1)

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

Carolina Bays Parkway Extension
North Carolina + South Carolina

NCDOT Project R-5876
Brunswick County

SCDOT Project P029554
Horry County



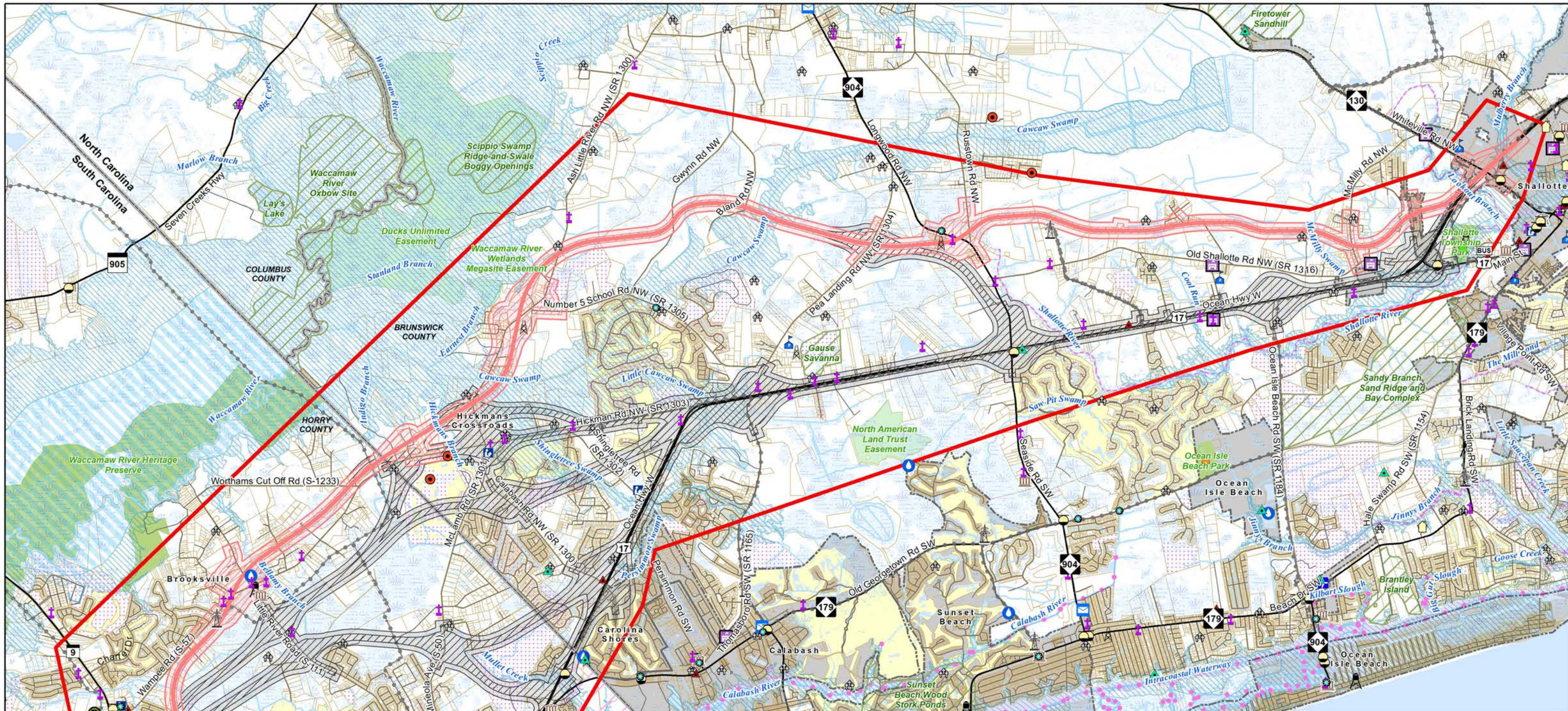


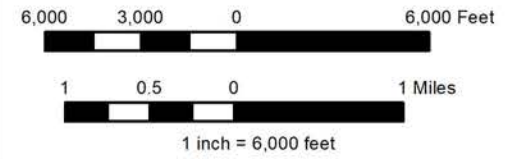
Figure 3C - Preliminary Corridor Concepts (Concept 1A)

Preliminary Concept 1A Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 1A (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 1A (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	Library	School	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	LWCF 6(f) Property	Substation	303d Waterbody	Approved / Planned Residential Development	
		NPDES Permit - Active	Wastewater Treatment Plant	Waterbody		

Carolina Bays Parkway Extension
North Carolina + South Carolina

NCDOT Project R-5876
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Horry County



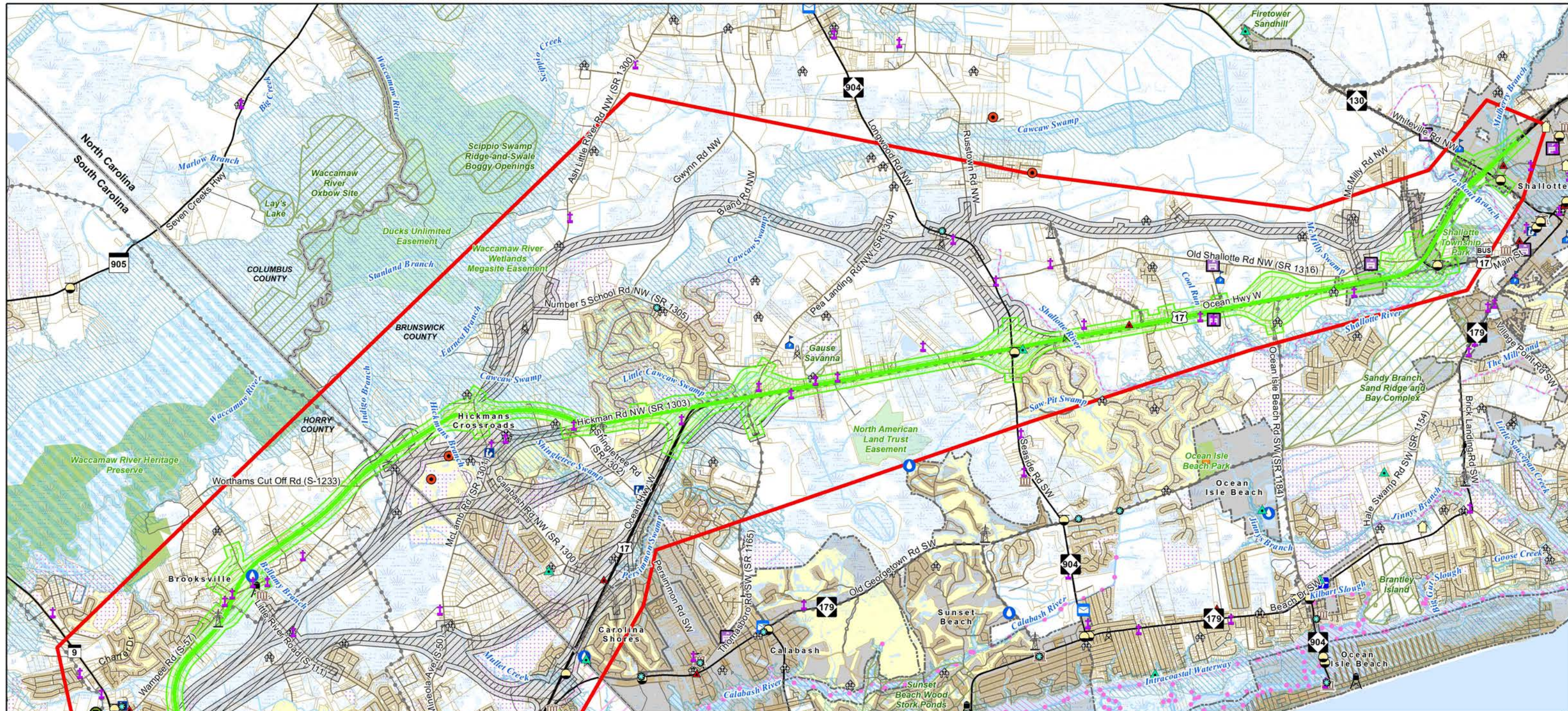


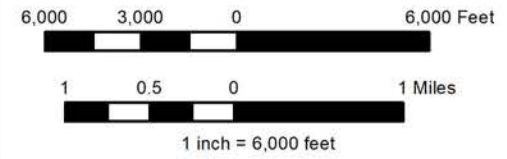
Figure 3D - Preliminary Corridor Concepts (Concept 2)

Preliminary Concept 2 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 2 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 2 (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	Library	School	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	LWCF 6(f) Property	Substation	303d Waterbody	Approved / Planned Residential Development	
		NPDES Permit - Active	Wastewater Treatment Plant	Waterbody		

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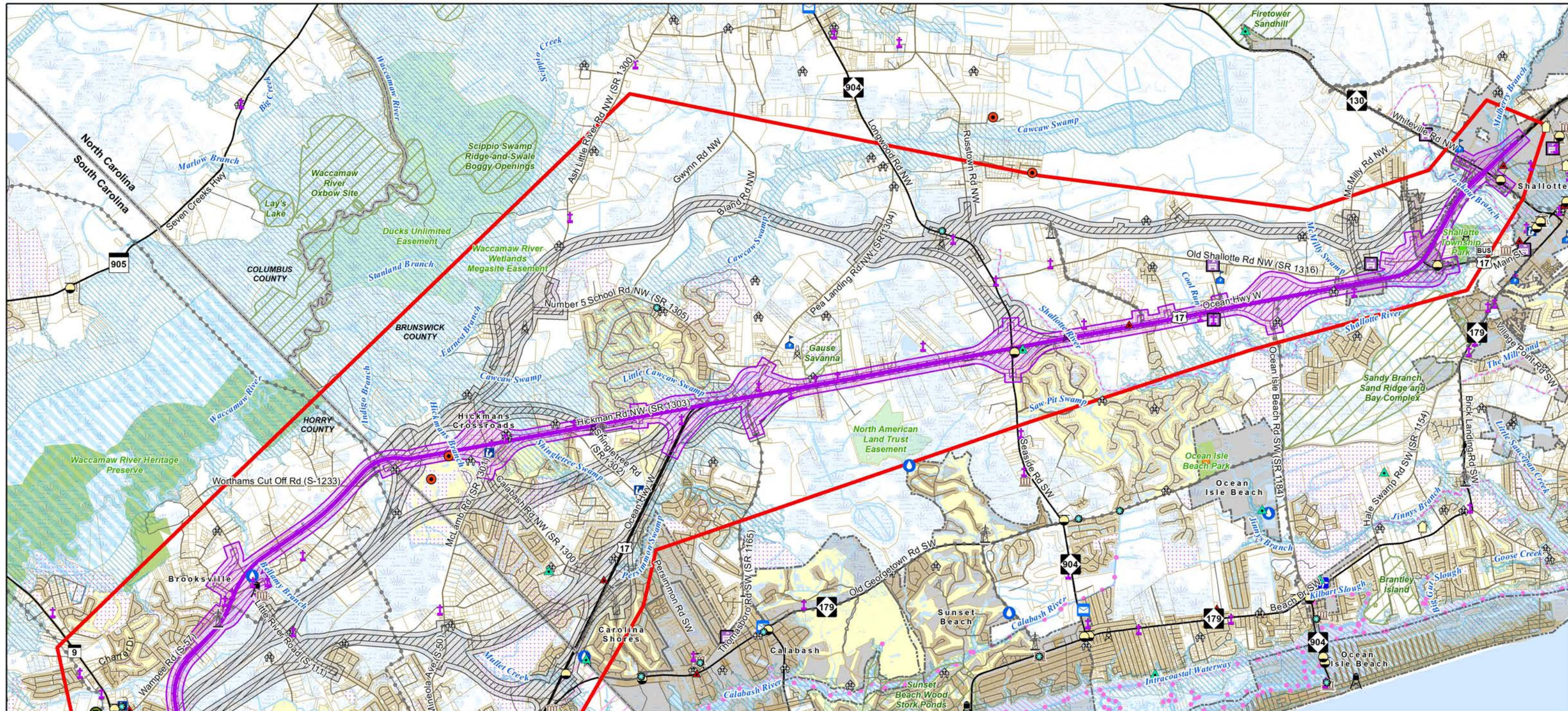


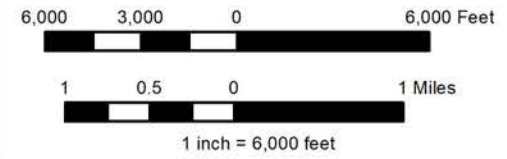
Figure 3E - Preliminary Corridor Concepts (Concept 3)

Preliminary Concept 3 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 3 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 3 (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
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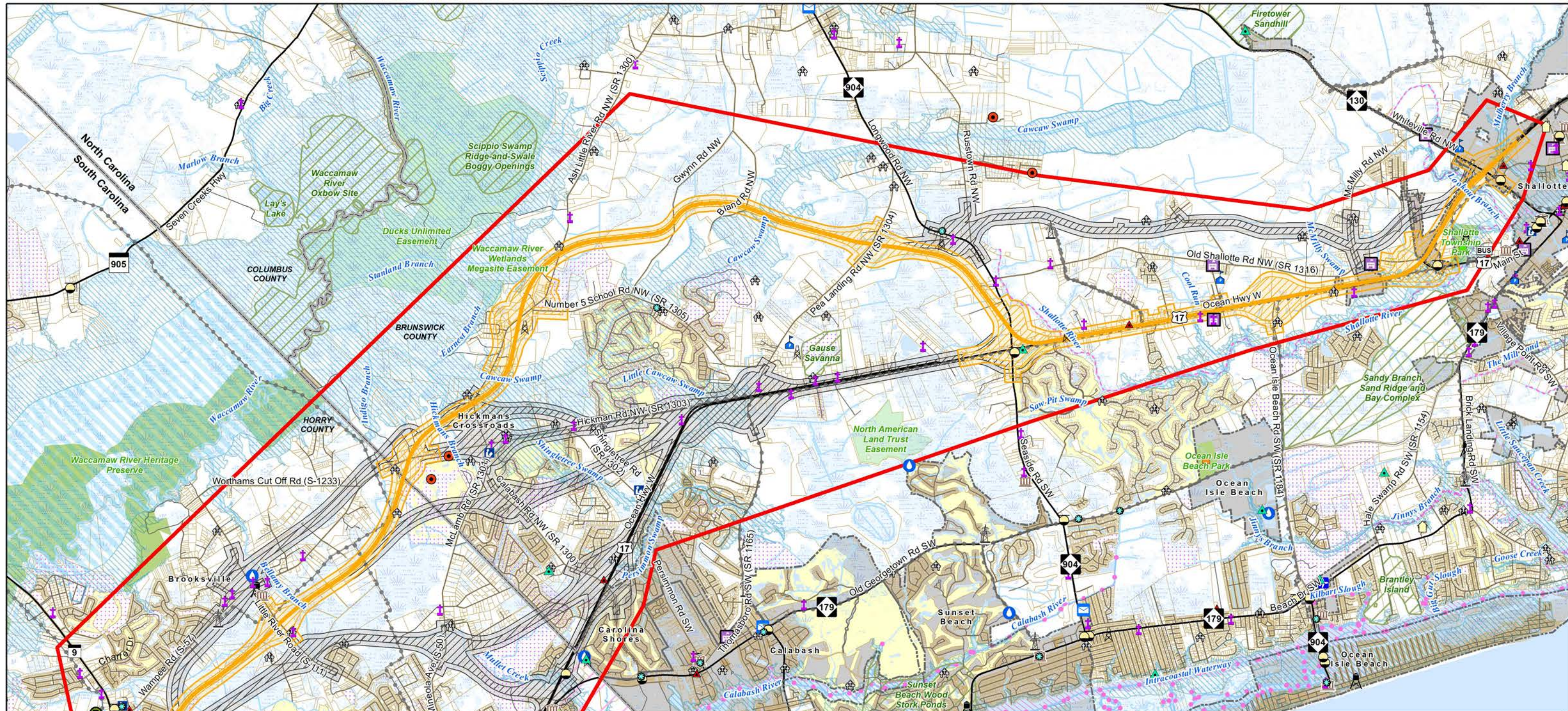


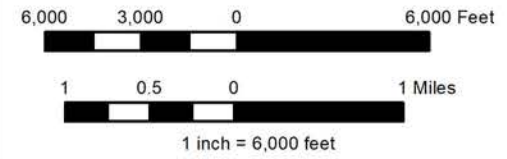
Figure 3F - Preliminary Corridor Concepts (Concept 4)

Preliminary Concept 4 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 4 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 4 (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	Library	School	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	LWCF 6(f) Property	Wastewater Treatment Plant	303d Waterbody	Approved / Planned Residential Development	
	NPDES Permit - Active	NPDES Permit - Active		Waterbody		

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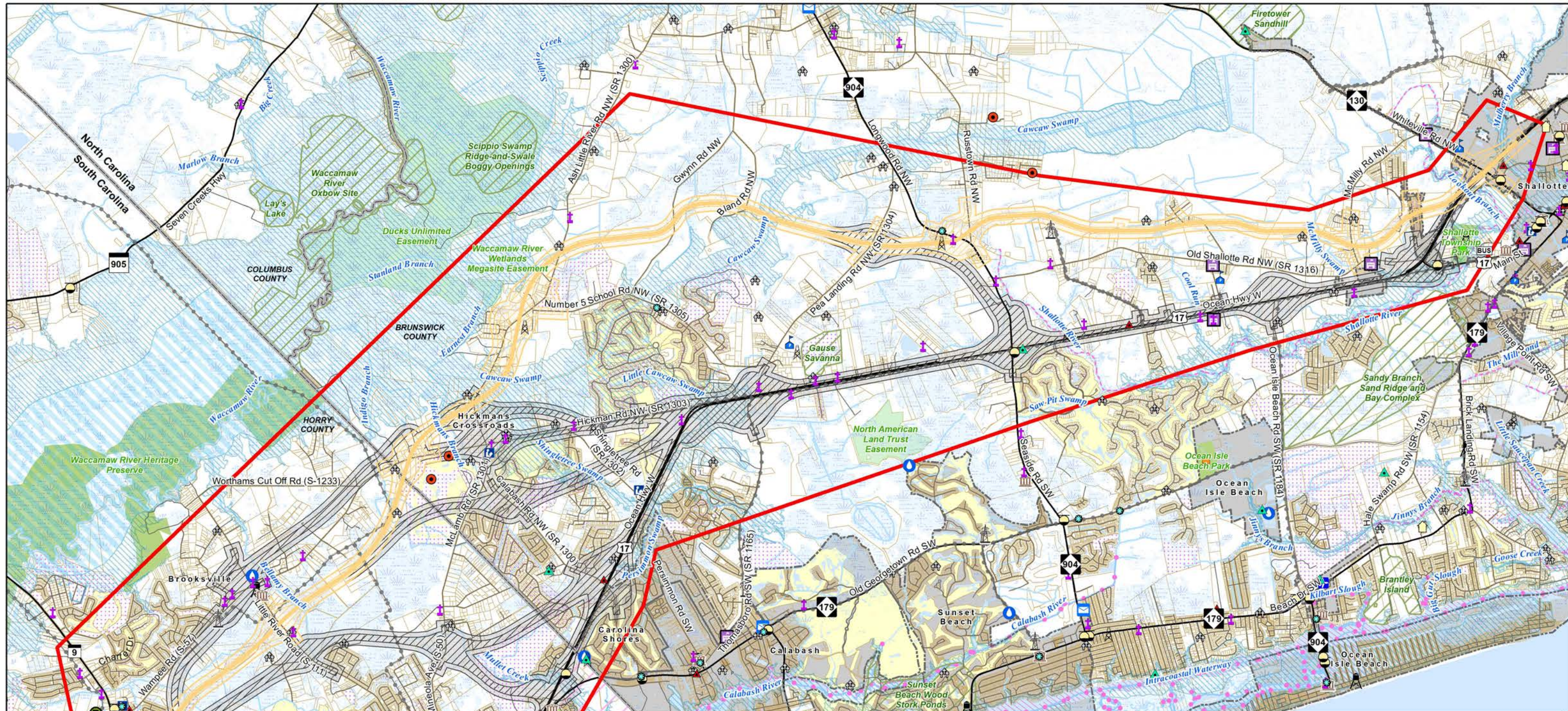


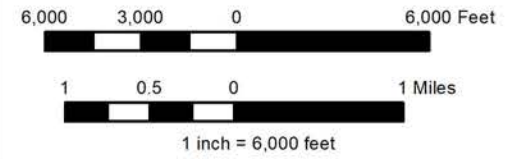
Figure 3G - Preliminary Corridor Concepts (Concept 4A)

Preliminary Concept 4A Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 4A (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 4A (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
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	Daycare	LWCF 6(f) Property	Substation	303d Waterbody	Approved / Planned Residential Development	
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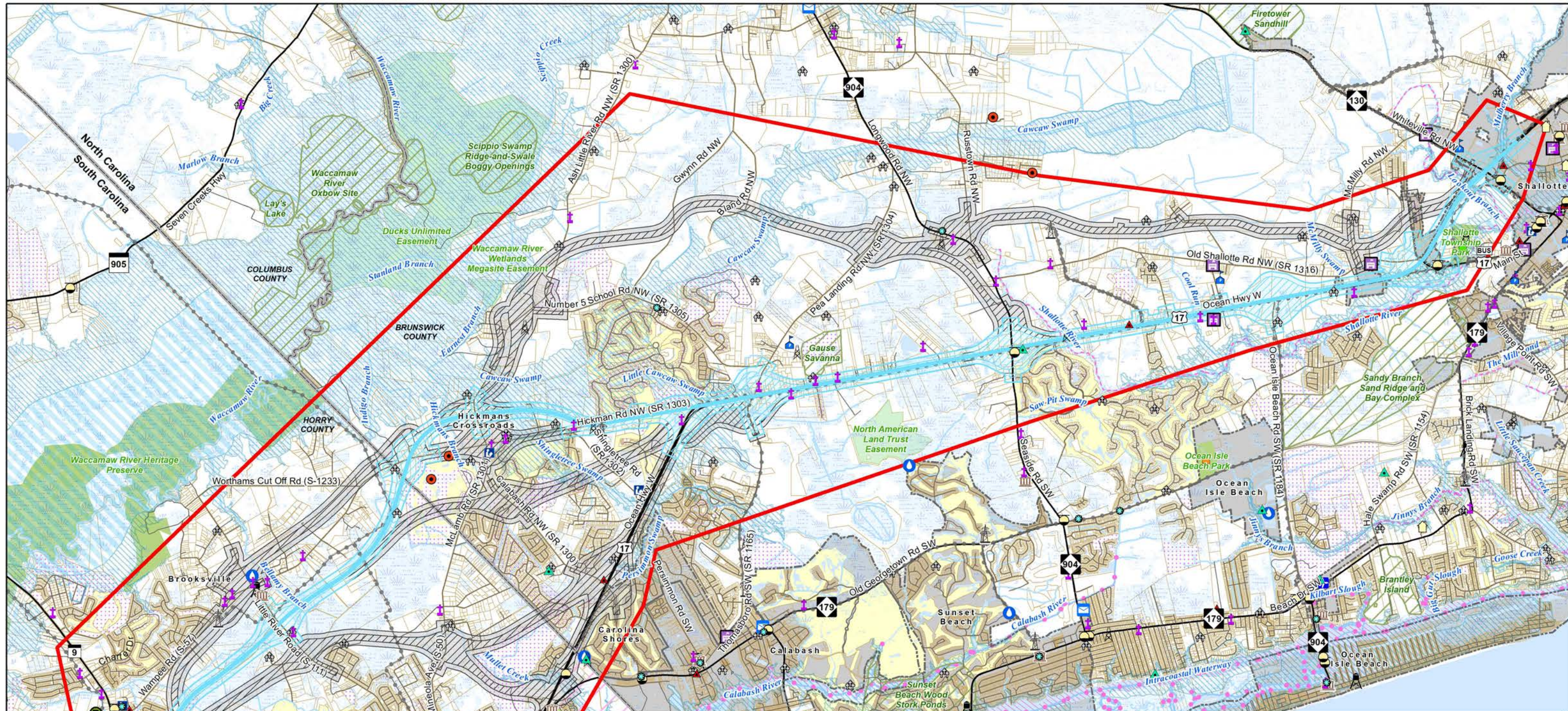


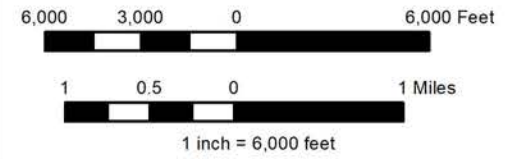
Figure 3H - Preliminary Corridor Concepts (Concept 5)

Preliminary Concept 5 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 5 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 5 (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	Library	School	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	LWCF 6(f) Property	Substation	303d Waterbody	Approved / Planned Residential Development	
		NPDES Permit - Active	Wastewater Treatment Plant	Waterbody		

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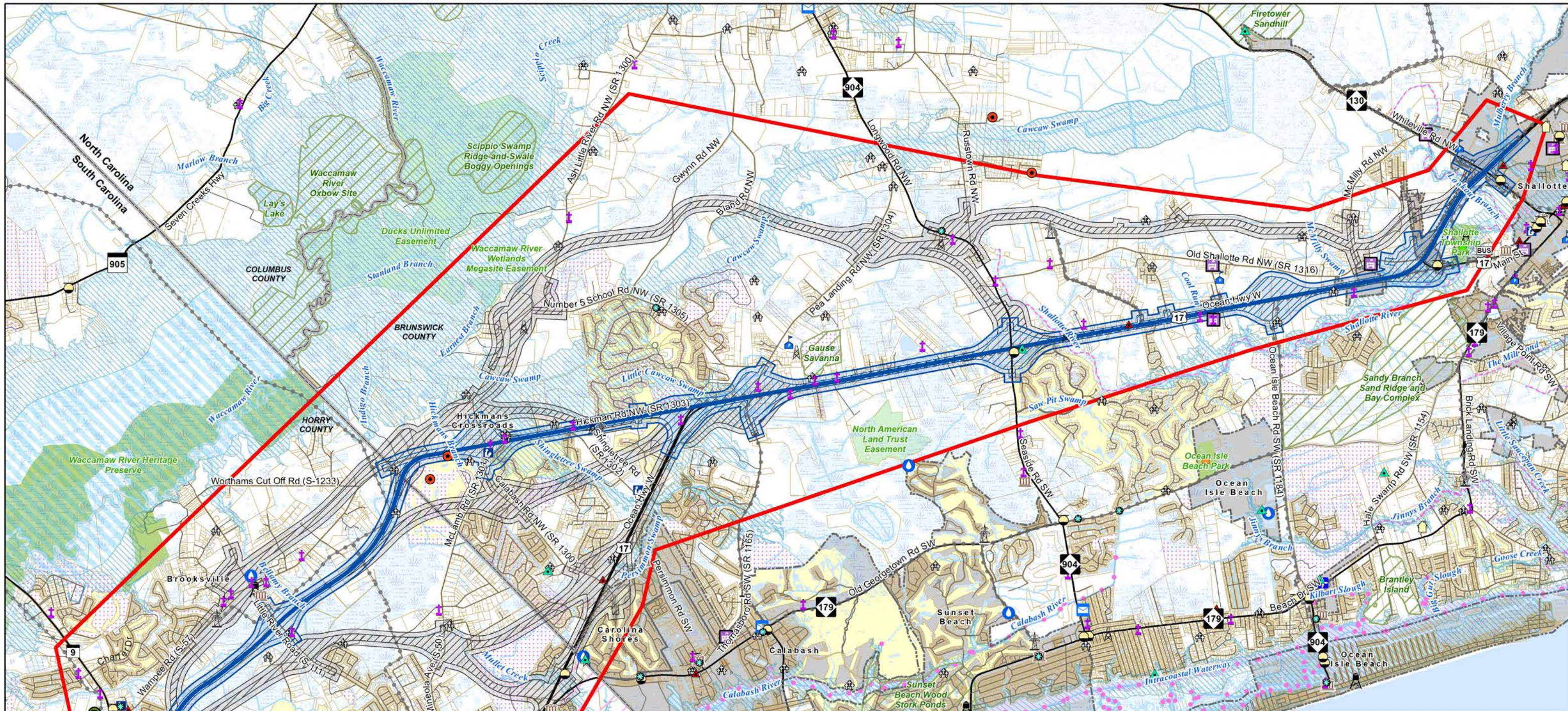


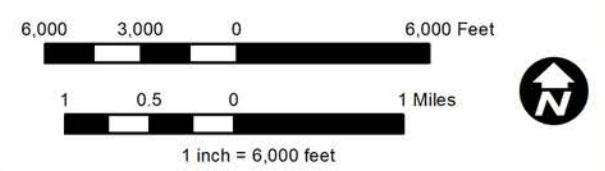
Figure 3I - Preliminary Corridor Concepts (Concept 6)

Preliminary Concept 6 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 6 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 6 (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	Library	School	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	LWCF 6(f) Property	Substation	303d Waterbody	Approved / Planned Residential Development	
		NPDES Permit - Active	Wastewater Treatment Plant	Waterbody		

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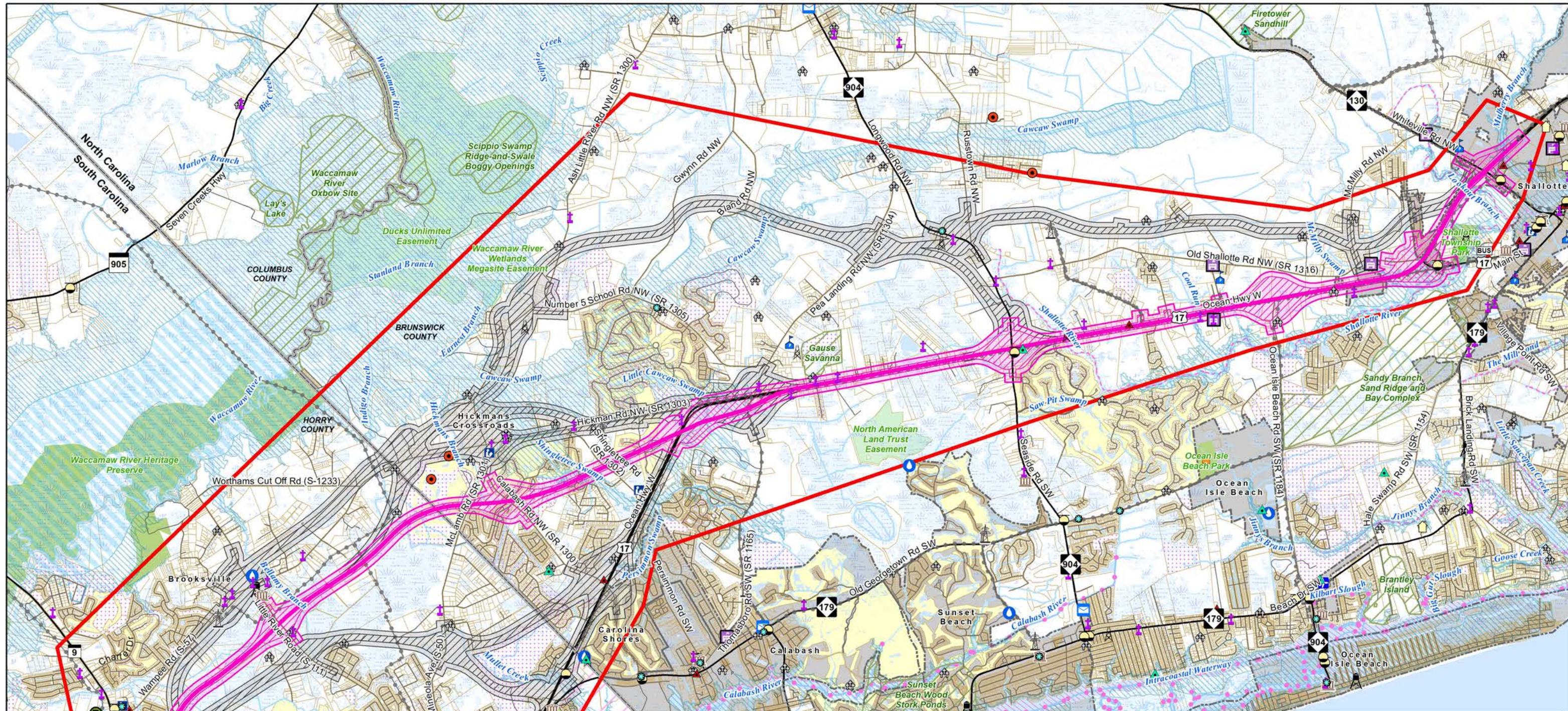


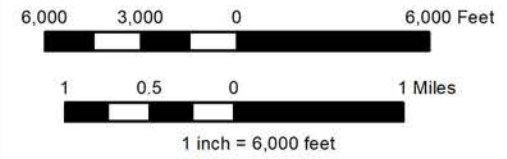
Figure 3J - Preliminary Corridor Concepts (Concept 7)

Preliminary Concept 7 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 7 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 7 (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	Library	School	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	LWCF 6(f) Property	Wastewater Treatment Plant	303d Waterbody	Approved / Planned Residential Development	
		NPDES Permit - Active		Waterbody		

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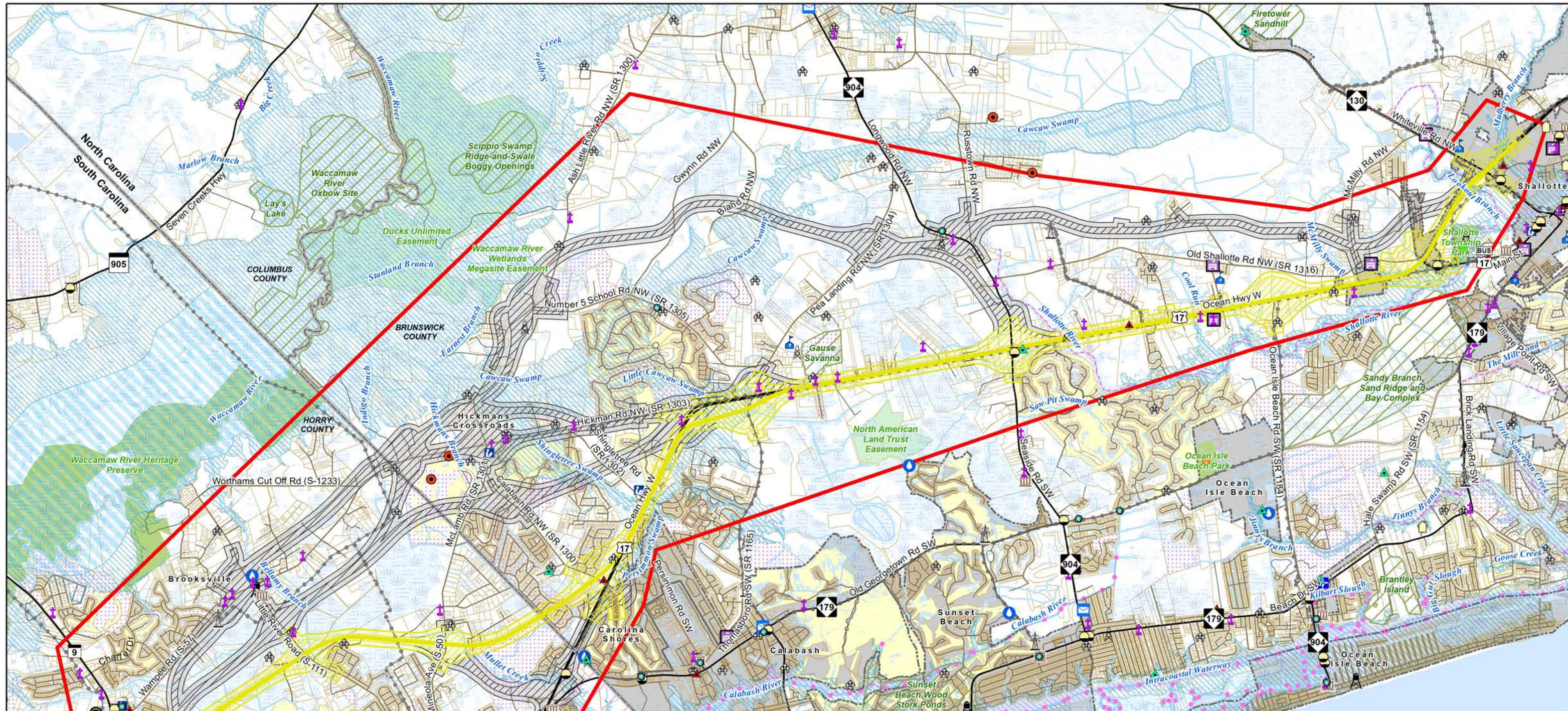


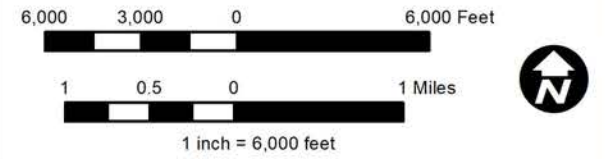
Figure 3K - Preliminary Corridor Concepts (Concept 8)

Preliminary Concept 8 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 8 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course
Preliminary Study Corridor 8 (1,000 ft)	Airport	Government Facility	Public Water Supply	Minor Road	Floodway	SC Critical Area
Other Corridor Concepts (400 ft)	Cemetery	Hazardous Waste Site - RCRA	Recreational Facility	River / Stream	County Boundary	Public Natural Area / Park
Other Study Corridors (1,000 ft)	Church	Hospital	Registered UST	High Quality Waters	Municipal Boundary	Private Natural Area / Park
	Communication Tower	Library	School	303d Water	Parcel	NC Natural Heritage Natural Area
	Daycare	LWCF 6(f) Property	Wastewater Treatment Plant	303d Waterbody	Approved / Planned Residential Development	
		NPDES Permit - Active		Waterbody		

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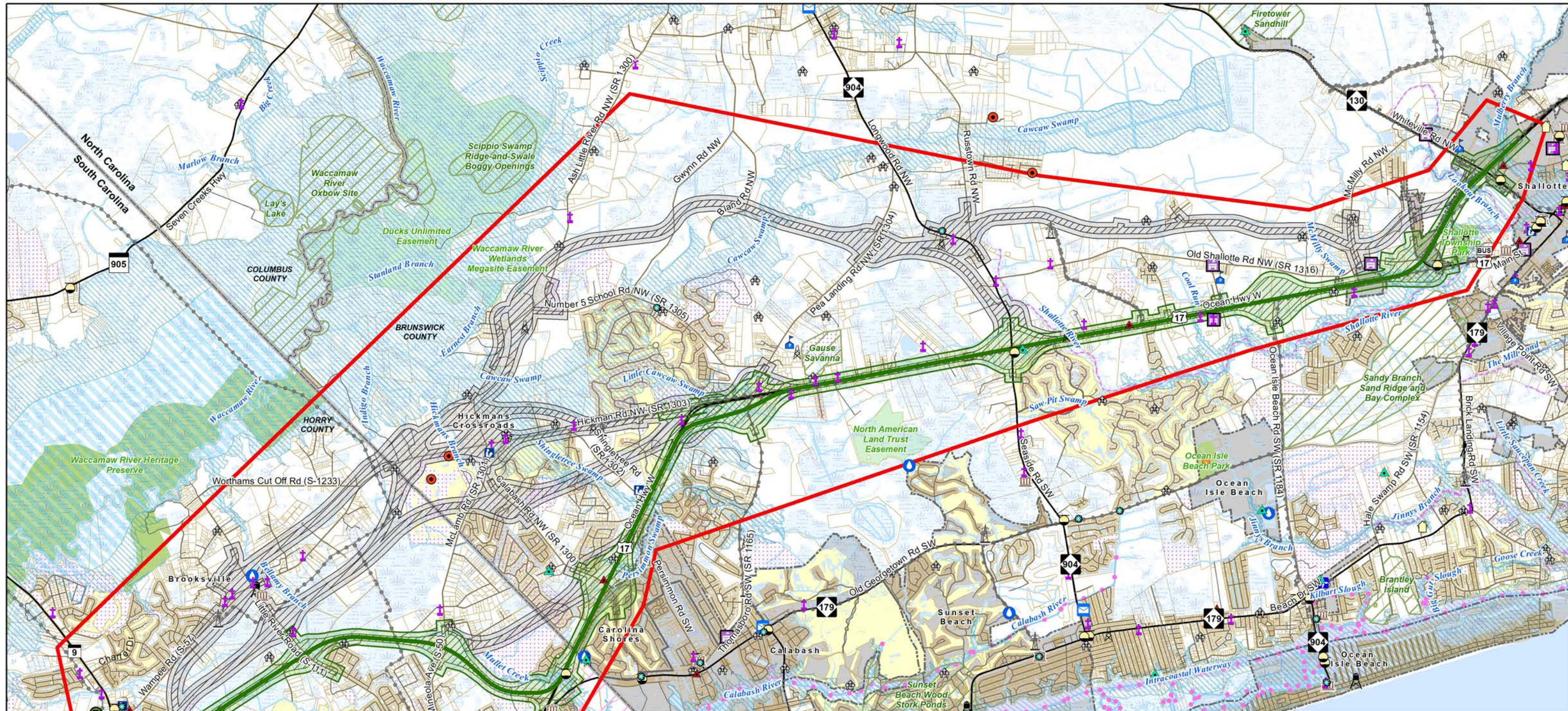


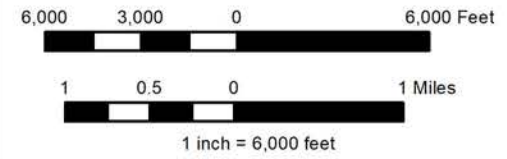
Figure 3L - Preliminary Corridor Concepts (Concept 9)

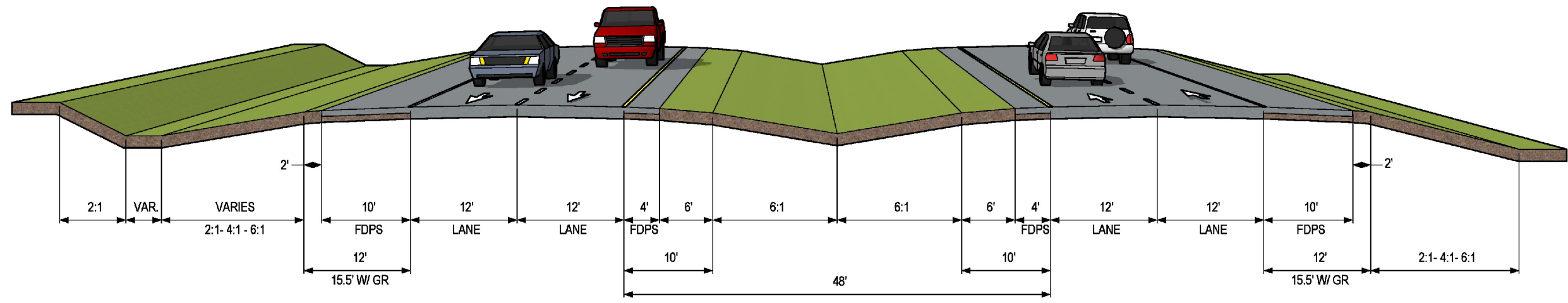
Preliminary Concept 9 Centerline	Study Area	Determined Eligible Historic Site	PARTF Property	Water Tower	Modeled Wetland	Determined Eligible Historic Boundary
Preliminary Corridor Concept 9 (400 ft)	Assisted Living Facility	EMS / Fire / Police	Post Office	Transmission Line	100-Year Floodplain	Golf Course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

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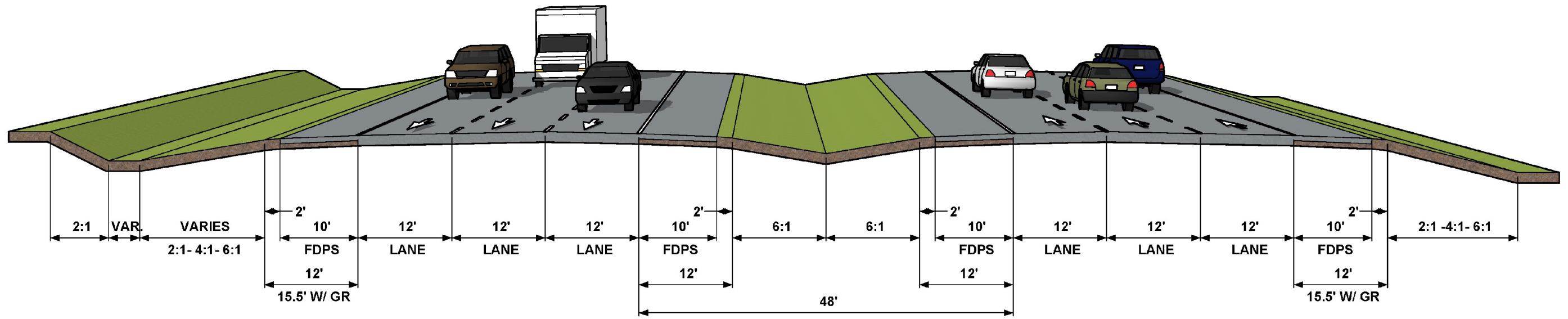
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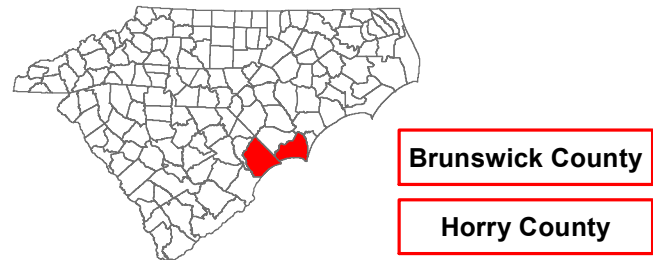


SCDOT Typical Section 1
Four-Lane Median-Divided Freeway



SCDOT Typical Section 2
Six-Lane Median-Divided Freeway

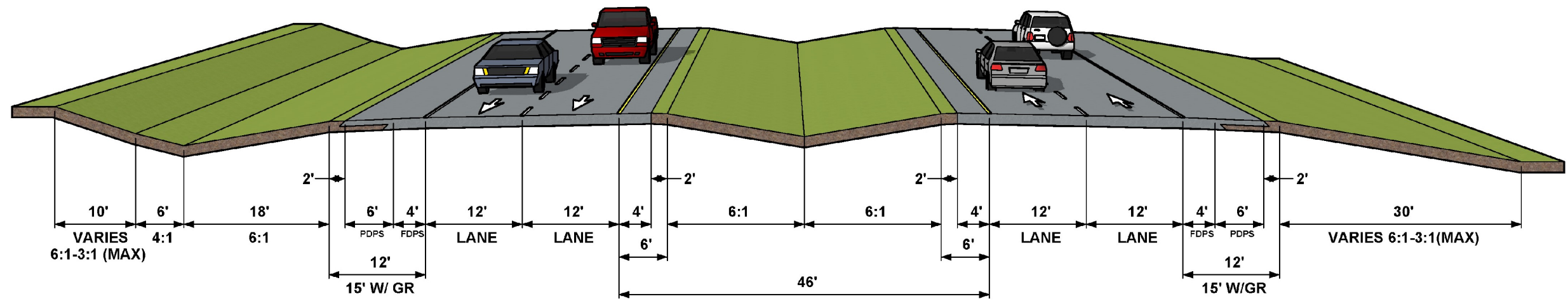
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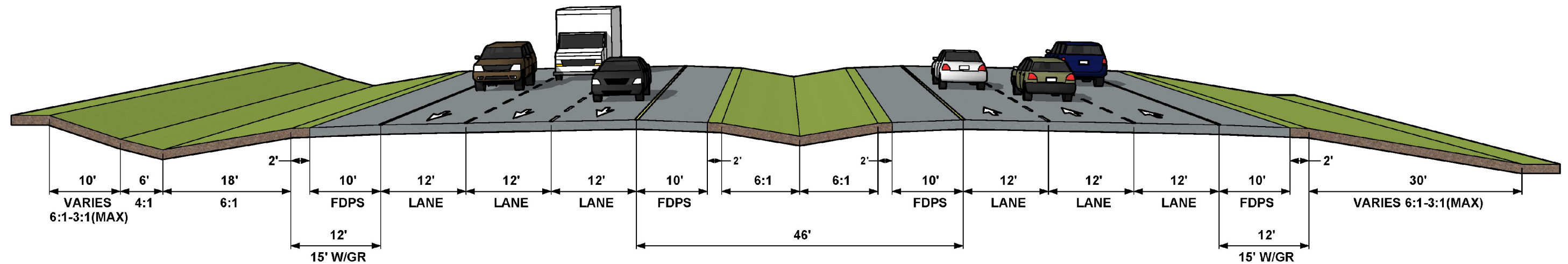
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Figure 4A
SCDOT Proposed
Typical Sections

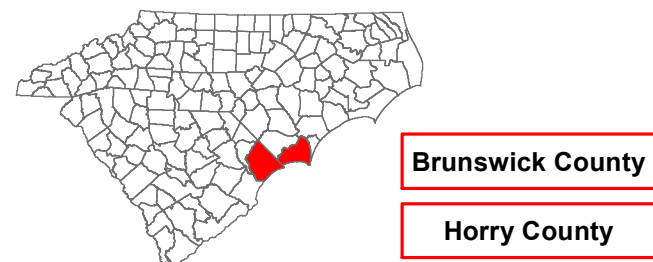


**NCDOT Typical Section 1
Four-Lane Median-Divided Freeway**



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

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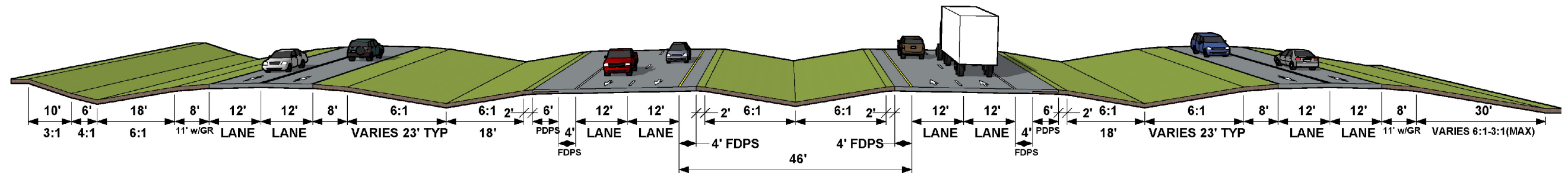


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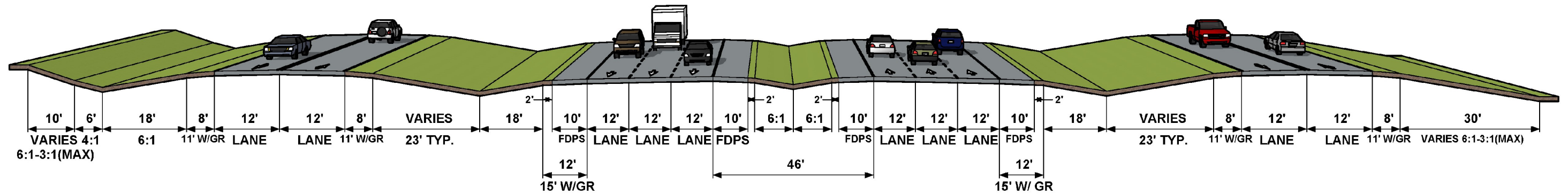


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**Figure 4B
NCDOT Proposed
Typical Sections**

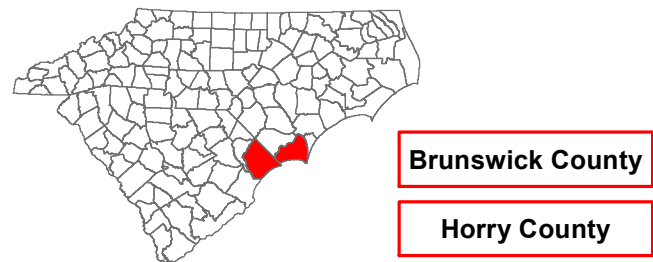


NCDOT Typical Section 1
Four-Lane Median-Divided Freeway with Frontage Roads



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

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Figure 4C
NCDOT Proposed
Typical Sections

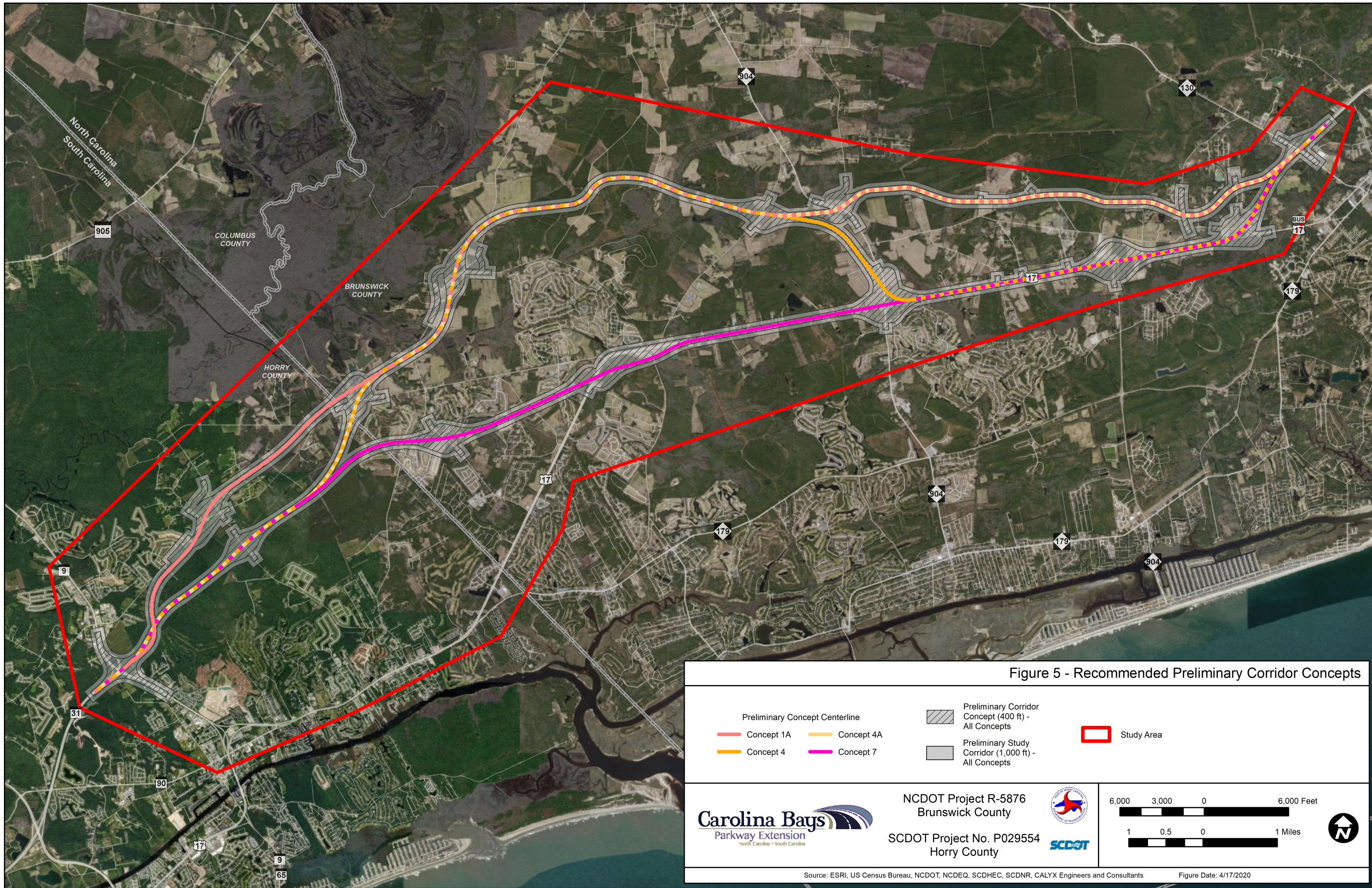


Figure 5 - Recommended Preliminary Corridor Concepts

<p>Preliminary Concept Centerline</p> <p>— Concept 1A — Concept 4A</p> <p>— Concept 4 — Concept 7</p>		<p> Preliminary Corridor Concept (400 ft) - All Concepts</p> <p> Preliminary Study Corridor (1,000 ft) - All Concepts</p>	<p> Study Area</p>
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<p>Carolina Bays Parkway Extension North Carolina • South Carolina</p>	<p>NCDOT Project R-5876 Brunswick County</p>	<p>SCDOT</p>	<p>6,000 3,000 0 6,000 Feet</p> <p>1 0.5 0 1 Miles</p>
	<p>SCDOT Project No. P029554 Horry County</p>		

Source: ESRI, US Census Bureau, NCDOT, NCDEQ, SCDHEC, SCDNR, CALYX Engineers and Consultants Figure Date: 4/17/2020

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

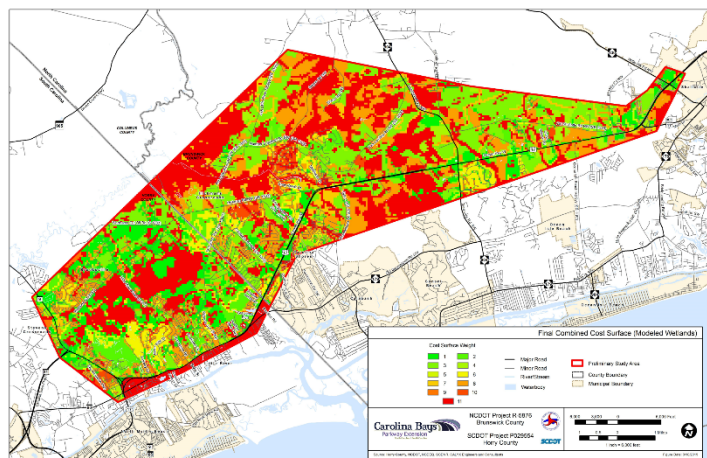


Exhibit A. Least Cost Surface Example

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.

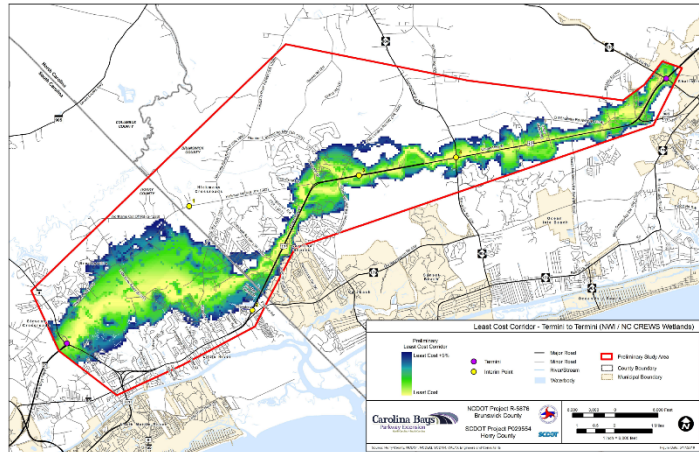


Exhibit B. Least Cost Corridor Example

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