

## **Appendix C**

# **Alternatives Evaluation**

**C.1 Alternatives Development Technical Memorandum**

**C.2 Shared Use Path Evaluation for Ashley River Bridge**



## **Appendix C.1**

# Alternatives Development Technical Memorandum

# 1 Introduction

The South Carolina Department of Transportation (SCDOT), in cooperation with the Federal Highway Administration (FHWA), is preparing alternatives for the proposed I-526 Lowcountry Corridor WEST Project (I-526 LCC WEST). This Alternatives Development Technical Memorandum is being prepared according to the provisions of the National Environmental Policy Act (NEPA) and corresponding regulations and guidelines of the FHWA, the lead federal agency (23 Code of Federal Regulations [CFR] 771 and 40 CFR 1500–1508) as well as the requirements of SCDOT, the project sponsor and lead state agency.

The purpose of this technical report is to clearly convey the alternatives development and screening process for the proposed I-526 LCC WEST Environmental Impact Statement (EIS). The boundaries of the study area, shown in Figure 1.1, generally encompass the section of I-26 north and south of the I-26/I-526 interchange and along the I-526 mainline from Paul Cantrell Boulevard to Virginia Avenue. The I-526 LCC WEST project also proposes improvements/changes to five interchanges along I-526; the I-526 at Paul Cantrell Boulevard interchange; the I-26/I-526 system-to-system interchange; the I-526 at Rivers Avenue interchange; the I-526 at N Rhett Avenue interchange and the I-526 at Virginia Avenue interchange.

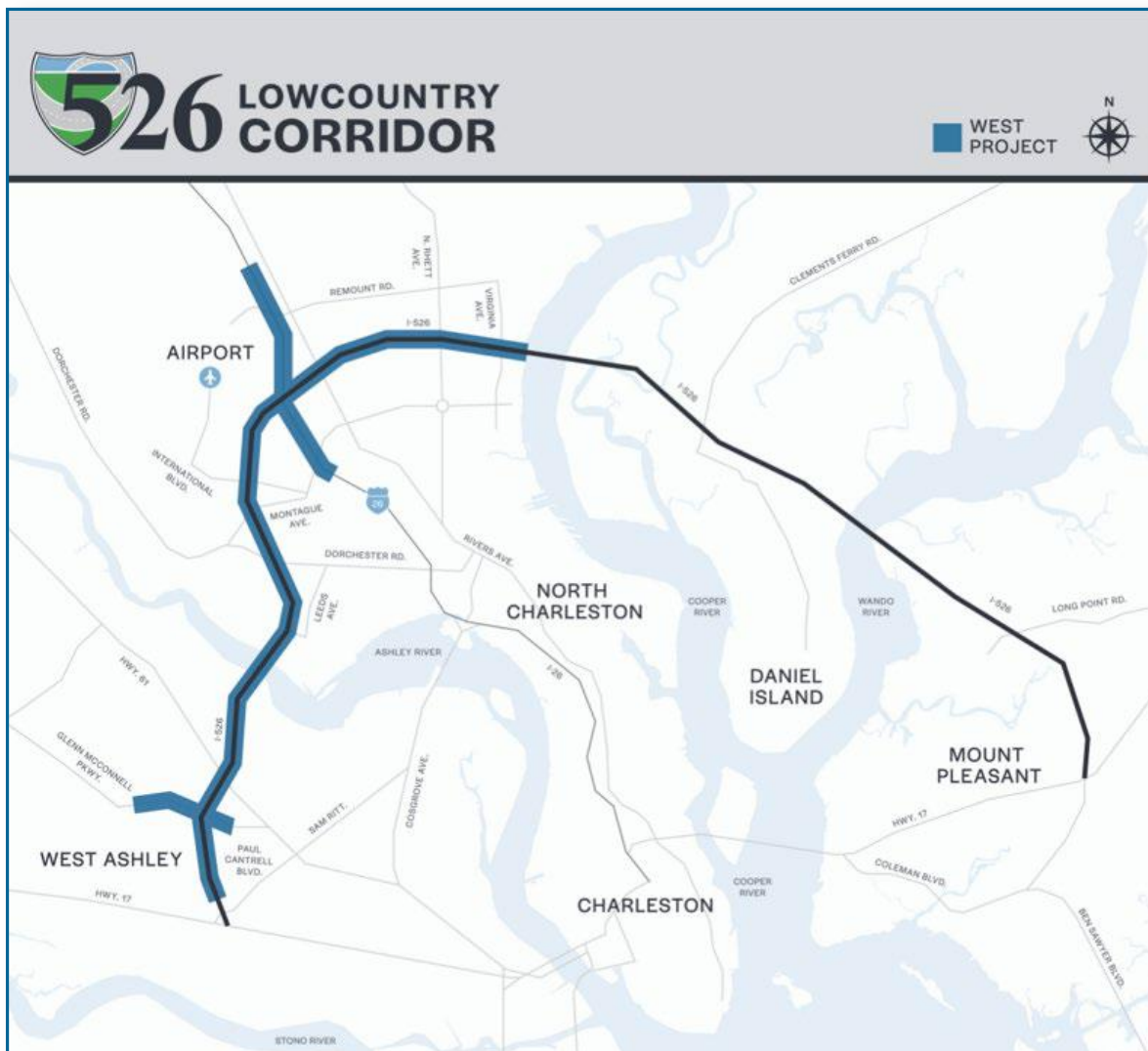


Figure 1.1 I-526 LCC WEST Project Study Area

To address the existing and future congestion and operational issues of the I-526 corridor in Charleston County, SCDOT commissioned a study to develop a long-range plan for the corridor. The Corridor Analysis for I-526 Between North Charleston and West Ashley (2013 Corridor Study) was completed in 2013 and is hereby incorporated by reference.<sup>1</sup> The 2013 Corridor Study documents the travel conditions at the I-526/I-26 system interchange and along I-526 between US 17 at Savannah Highway and US 52 at Rivers Avenue. The purpose of the study was to evaluate potential improvement strategies for the corridor in a holistic manner, and not widening alone. Several strategies to reduce future congestion were studied, including travel demand management, modal improvements for both passengers and freight, traffic operations improvements, and capacity improvements. The 2013 Corridor Study was used to develop alternatives for the I-526 LCC WEST project and are discussed in detail in Section 4.1 of this chapter.

The Berkeley-Charleston-Dorchester Council of Governments (BCDCOG), which serves as the Charleston Area Transportation Study Metropolitan Planning Organization (CHATS MPO), developed the Congestion Management Process (CMP) to assess conditions, identify deficiencies, and make recommendations.<sup>2</sup> The CMP identifies five strategies for the I-526 WEST corridor that were utilized during the alternative development process. These five strategies from the CMP are outlined below as well as references to where more detailed discussions are located in the report.

- Parallel Pedestrian Facilities/Greenways - the creation or enhancement of access for pedestrians and bicyclists, refer to Section 4.1.5.
- Education/Enforcement - addresses dangerous traffic behaviors and improved safety behaviors, refer to Section 4.1.6.
- Enhanced Operations - includes ramp metering, traffic signal prioritization, and other technology-based improvements, refer to Section 4.1.5.
- Bus on Shoulder/Bus Rapid Transit (BRT) - creates a corridor for buses that is separated, has signal prioritization, and fewer stops, refer to Section 4.1.6.
- Congestion Pricing/ Tolling - High Occupancy Vehicle/Transit lane to reflect the price of improved mobility on congested roads, refer to Section 4.1.4.



## 2 What are the Steps of the Alternative Analysis?

### Step 1: Preliminary Screening of the Range of Alternatives

Alternatives were developed based on the findings of the 2013 Corridor Study, SCDOT goals and priorities, further evaluation of the corridor, and input from the public and agencies. The alternatives are general in nature and are evaluated based on the ability to satisfy the purpose and need of the I-526 LCC WEST project.

### Step 2: Identify Preliminary Alternatives

Alternatives that advance from the preliminary screening are considered Preliminary Alternatives and move on to the next screening.

### Step 3: Screening of Preliminary Alternatives

The Preliminary Alternatives are then evaluated by the following screening criteria at a qualitative level:

- Acceptable Level of Service (LOS)
- Compatible with Adjacent Interchange
- Geometric Deficiencies Resolved
- Flexibility with Don Holt Bridge Replacement
- Constructability

If a Preliminary Alternative is unable to meet the criteria above, then it is considered not practicable or feasible. The alternatives that meet the screening criteria are identified as Proposed Reasonable Alternatives.

### Step 4: Identify Proposed Reasonable Alternatives

The Preliminary Alternatives that meet the purpose & need of the project are carried forward as the Proposed Reasonable Alternatives.

### Step 5: Detailed Impact Evaluation of Proposed Reasonable Alternatives

The Proposed Reasonable Alternatives are being evaluated based on the following evaluation criteria:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Purpose &amp; Need               <ul style="list-style-type: none"> <li>&gt; Traffic                   <ul style="list-style-type: none"> <li>▪ AADT</li> <li>▪ V/C Ratio</li> <li>▪ LOS</li> </ul> </li> </ul> </li> <li>• Essential Fish Habitat</li> <li>• Hazardous Materials</li> <li>• Cultural Resources</li> <li>• Noise</li> </ul> | <ul style="list-style-type: none"> <li>• Delineated Wetlands</li> <li>• Relocations</li> <li>• Environmental Justice</li> <li>• Threatened &amp; Endangered Species</li> <li>• Utilities</li> <li>• Cost</li> <li>• Section 4(f) &amp; 6(f)</li> <li>• Reduce/Eliminate Geometric Deficiencies to Improve Safety</li> <li>• Hurricane Evacuation Route Compatibility</li> </ul> |
|--|---|

### Step 6: Recommended Preferred Alternative

The Proposed Reasonable Alternative that best balances the potential impacts to the human and natural environment will be recommended as the Preferred Alternative.

**AADT = Average Annual Daily Traffic**

**LOS = Level of Service** Way to describe roadway operating conditions based on speed, travel time, maneuverability, delay and safety

**V/C Ratio = Volume to Capacity Ratio** Compares roadway demand (volume) with roadway supply (capacity)

Source: Highway Capacity Manual

## Preliminary Screening of the Range of Alternatives

**Identify Preliminary Alternatives**

**Screening of Preliminary Alternatives**

**Identify Proposed  
Reasonable Alternatives**

**Detailed Impact Evaluation of  
Proposed Reasonable Alternatives**

**Recommended  
Preferred Alternative**

Figure 2.1 Alternatives Development Flowchart

## 3 How Were the Range of Alternatives Developed?

This technical memorandum outlines the alternative development process for the I-526 LCC WEST and describes the methodology that is being used to determine if an alternative satisfies the purpose and need of the project. The purpose and need of the I-526 LCC WEST was developed with input from the public, Community Advisory Council (CAC), as well as state and federal regulatory agencies. The CAC is a group of residents serving as community liaisons from the potentially impacted EJ communities. The council meets regularly to provide input on the project, help guide the process to formulate an EJ Community Mitigation Plan and help inform other residents on how they can get involved and have a voice in the project decision-making process. More detailed information regarding the purpose and need can be found in Chapter 2 of the Draft EIS.

NEPA regulations and guidance from FHWA and the Council on Environmental Quality (CEQ) stipulate three primary reasons why an alternative might be determined to be not reasonable and eliminated from further consideration.

- The alternative does not satisfy the purpose of and need for the project
- The alternative is determined to be not practical or feasible from a technical and/or economic standpoint
- The alternative substantially duplicates another alternative

During the development of the range of alternatives for this DEIS, the October 2013 Corridor Study was used in conjunction with the following goals and priorities provided by SCDOT, input from the public, comments from the agencies, and coordination with SCDOT staff.

- Provide congestion relief by improving I-26/I-526 interchange and I-526 mainline operation
- Reduce/eliminate geometric deficiencies to improve safety
- Financial constraints of available funding

### 3.1 October 2013 Corridor Study

In 2013, SCDOT completed a study of I-526 in order to produce a long-range plan for the corridor. The 2013 Corridor Study documented travel conditions along an eight-mile section of I-526 between US 17 (Savannah Highway) and US 52 (Rivers Avenue) including the system-to-system interchange between I-526 and I-26. According to the study, increased congestion is forecasted for the I-526 Corridor. The existing route is a four-lane, divided interstate serving as a freeway around the Charleston area connecting West Ashley to Mount Pleasant and is widely used by commuters and various commercial and industrial operations. The I-526 Corridor has been identified as one of the most congested in the state and has been designated as a “Mega Project” in the State Long-Range Interstate Plan, which indicates construction costs exceed multiple years of the state’s interstate program funding. A number of the recommendations from the 2013 Corridor Study were programmed in the State Transportation Improvement Program (STIP).

## 3.1.1 Public Involvement During the 2013 Corridor Study

Public Involvement in the local Charleston community was crucial in developing the alternatives considered in the 2013 Corridor Study. To engage the community, a project steering committee and a project stakeholder committee were developed as well as a project website, surveys and public information meetings.

The Steering Committee consisted of the following agencies: SCDOT, FHWA, Berkeley Charleston Dorchester Council of Governments (BCDCOG), Charleston Area Regional Transportation Authority (CARTA), Charleston County, City of Charleston, City of North Charleston, South Carolina State Ports Authority, and TriCounty Link. Six steering committee meetings were held. Each agency exhibits a shared interest in addressing the transportation issues within the I-526 corridor.

The project stakeholder committee consisted of individuals representing organizations with interest in the I-526 study corridor due to proximity to the corridor and/or the impact the corridor has on their everyday operations. Three stakeholder committee meetings provided valuable insight from everyday users on the existing deficiencies and potential improvements to address deficiencies in the corridor study area. Refer to Chapter 6: Public Involvement for the stakeholder list.

The first public meeting, regarding the 2013 Corridor Study, was held on September 20, 2011 at North Charleston City Hall council chambers. The meeting allowed the public the opportunity to review graphics showing the study area and existing traffic data along the corridor, as well as a video simulation of existing conditions. Attendees were invited to share their thoughts and comments on reducing traffic congestion within the study area on feedback sheets provided at the meeting. An additional public meeting was held on June 3, 2014 in North Charleston. A formal presentation displayed concepts to reduce traffic congestion along the corridor. These corridor improvement strategies included Transportation Demand Management (TDM), Modal, Traffic Operations and Capacity. As with any design or planning project, public participation was influential in shaping the project to the interests and needs of the community. Different ideas, problems, and solutions were identified by collaborating with the public and gathering feedback.

## 3.1.2 2013 Corridor Study Improvement Strategies

The purpose of the 2013 Corridor Study was to look at all-inclusive improvement strategies for the corridor which have the best benefit for the travelling public and not only widening. Improvement strategies were organized into four categories: 1) Transportation Demand Management (TDM), 2) Modal (transit/ freight), 3) Traffic Operations, and 4) Capacity Improvement. TDM improvements consisted of rideshares, employer-based incentives, flexible work schedules, and public outreach programs. Modal improvements included new and improved transit routes and facilities as well as public/private partnerships. Traffic Operation strategies focused on a series of improvements to geometric deficiencies along the corridor, upgrades to pavement marking and signing, and intelligent transportation system (ITS) implementation. Capacity Improvement options incorporated both the widening of I-526 to a six-lane section from Paul Cantrell Boulevard to Rivers Avenue and interchange improvements to I-26/I-526 as well as improvements to other interchanges, collector-distributor (C-D) systems, braided ramps, and barrier-separated lanes.

**C-D = Collector-Distributor**  
Roads that connect the mainline of the interstate to frontage roads/ramps

To quantify the existing congestion issues along the I-526 corridor and in the Charleston area, a review of existing travel statistics and operations was conducted and existing traffic information was collected along the I-526 study corridor, including: turning movement counts, intersection signal timing, and geometric data. As part of the analyses for the I-526 corridor, actual origin-destination data was needed to accurately model existing vehicle paths for use in the study VISSIM micro-simulation model.

**VISSIM:**  
a microscopic multi-modal traffic flow simulation software package developed by PTV Planung Transport Verkehr AG in Karlsruhe, Germany. The name is derived from “Verkehr in Städten SIMulationsmodell” (German for “Traffic in cities simulation model”)

The measures of effectiveness from employing the TDM and Modal strategies was based on overall traffic reduction along I-526 and consequent postponement of the need for large-scale improvements. Based on the traffic reduction calculations, TDM and Modal strategies were expected to have a combined potential reduction of 12.6% in total traffic volumes; if this potential reduction was achieved, capacity improvement strategies could be pushed back five to ten years. However, this reduction in congestion is not substantial enough to meet the purpose and need of the I-526 LOC WEST project which still makes larger infrastructure improvements necessary for these strategies to be successfully implemented in the future. The cost of constructing Bus Rapid Transit (BRT), rail-based transit, and new intermodal facilities would exceed \$300 million. Project grouping strategies within the plan recommended widening I-526 and improving the I-26/I-526 interchange in the year 2020. See Section 4.1.5 for more information on TSM/TDM strategies that were evaluated in the 2013 Corridor Study.

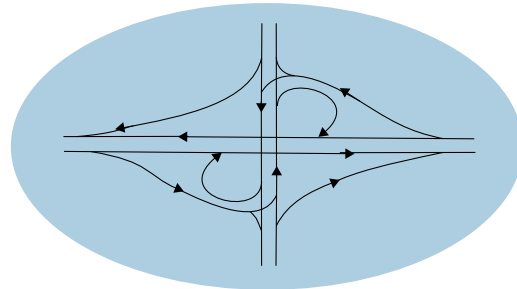
Traffic Operation improvements focused on relieving specific operational concerns within the existing network were also considered for the I-526 corridor and adjacent arterial-street networks. Geometric traffic operation improvements, pavement marking improvements, signing improvements, ITS technologies, and managed lanes strategies were analyzed. Recommended Traffic Operations strategies are discussed in detail in Chapter 7 of the Corridor Analysis for I-526 Between North Charleston and West Ashley.

Capacity Improvement strategies considered for this study include widening the I-526 corridor to a six-lane section, improving C-D systems, interchange improvement alternates, braided entrance/exit ramps, barrier separated lanes, alternate routes, and arterial widening. The 2013 Corridor Study analyses also considered nine interchange operations along the I-526 study corridor and the operation of three adjacent interchanges along I-26. To capture the area of influence for each interchange, the study area was extended to include crossing roads as necessary.

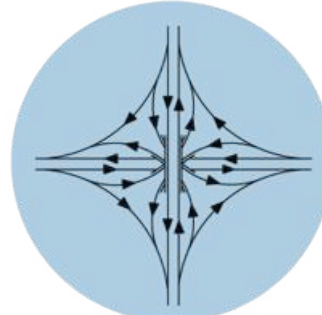
As part of the review of capacity improvements to the I-526 study corridor, several improvement scenarios were considered at the interchanges to address existing and projected congestion issues. These included 1) I-526 & US 17/Sam Rittenberg Boulevard; 2) I-526 at Paul Cantrell Boulevard; 3) Paul Cantrell Boulevard at Magwood Drive; 4) I-526 at Leeds Avenue; 5) I-526 at Dorchester Road/Paramount Drive; 6) I-526 at Montague Avenue/International Boulevard; 7) I-26/I-526 System-to-System; and 8) I-526 at Rivers Avenue. Based on the findings of the 2013 Corridor Study, five of the eight interchanges were recommended for evaluation based on SCDOT goals and priorities previously discussed.

Potential interchange alternatives were developed based on the common interchange types shown in Figure 3.1.

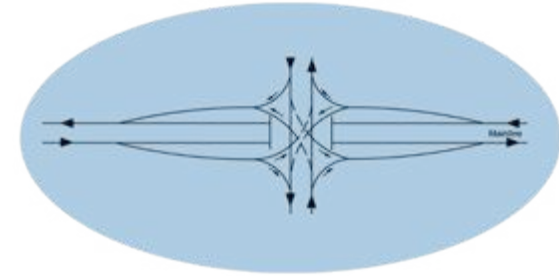




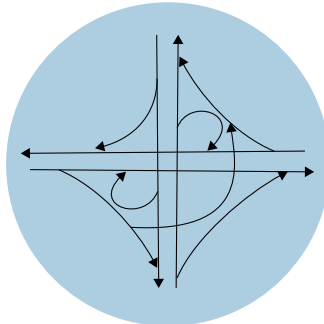
SEMI-DIRECTIONAL  
INTERCHANGE



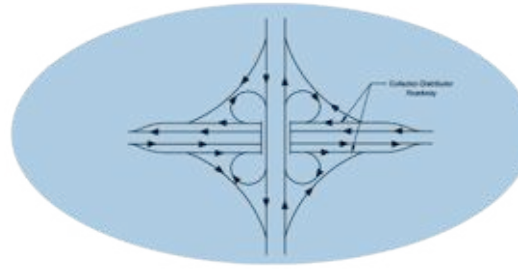
DIRECTIONAL INTERCHANGE  
WITH DIRECT CONNECTIONS



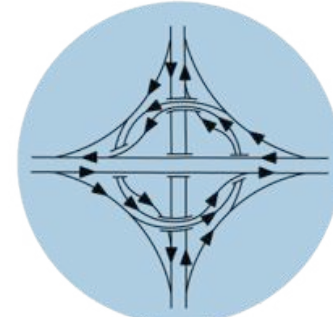
SINGLE-POINT DIAMOND  
INTERCHANGE



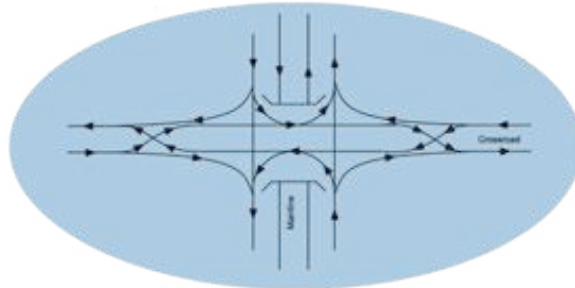
PARTIAL CLOVERLEAF  
INTERCHANGE



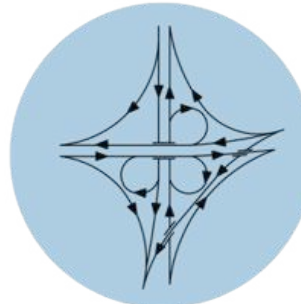
CLOVERLEAF INTERCHANGE WITH  
COLLECTOR-DISTRIBUTOR ROADWAYS



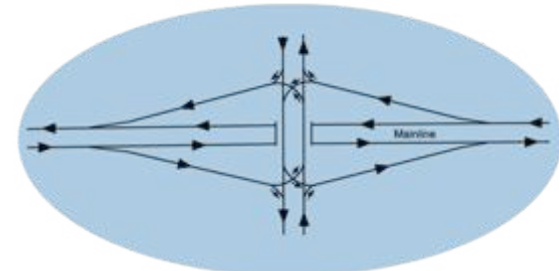
TURBINE



DIVERGING DIAMOND  
INTERCHANGE



DIRECTIONAL INTERCHANGE WITH  
DIRECT & SEMI-DIRECT  
CONNECTIONS AND LOOP RAMPS



DIAMOND INTERCHANGE

Figure 3.1 Common Interchange Types

## *I-526 & Paul Cantrell Boulevard (2013 Corridor Study)*

The existing I-526 & Paul Cantrell Boulevard interchange is a partial cloverleaf with loops serving the eastbound and westbound movements from I-526 to Paul Cantrell Boulevard. Partial improvements were identified to address substantial peak hour traffic to/from West Ashley to the west of Paul Cantrell Boulevard. Refer to Figures 3.2 - 3.5.

### **Alternate 1: Diverging Diamond Interchange (DDI)**

- Allows traffic to cross to the opposite side of the roadway to allow for two-phase signalization
- Reduces left-turn conflicts



Figure 3.2 2013 Corridor Study I-526 & Paul Cantrell Boulevard Alternate 1

### **Alternate 2: Modified Single-Point Urban Interchange (SPUI) with Directional Ramp to I-526 Eastbound**

- Directional ramp to I-526 eastbound
- Allows for accommodation of peak hour left turn movements
- Requires bridge structures over Paul Cantrell Boulevard to be replaced and columns from the median to be removed



Figure 3.3 2013 Corridor Study I-526 & Paul Cantrell Boulevard Alternate 2



### Alternate 3: Two-Lane Paul Cantrell Eastbound to I-526 Eastbound Loop

- Replaces dual left turns from Paul Cantrell Boulevard eastbound to I-526 eastbound with a two-lane loop ramp



Figure 3.4 2013 Corridor Study I-526 & Paul Cantrell Boulevard Alternate 3

### Alternate 4: Triple Left-Turn Lanes

- Maintains existing interchange configuration
- Provides triple left-turn movement from eastbound Paul Cantrell Boulevard to I-526 eastbound
- Requires extension of existing acceleration lanes from I-526 eastbound to the bridge over the Ashley River



Figure 3.5 2013 Corridor Study I-526 & Paul Cantrell Boulevard Alternate 4

The major deficiencies with the I-526 to Paul Cantrell Boulevard interchange include high volume of traffic for eastbound and westbound movements during peak hours. Alternate 4, Triple Left-Turn Lanes, addresses the operations in the AM peak hour. To improve the afternoon peak hour deficiencies, the consideration of improvements to the Paul Cantrell Boulevard at Magwood Drive intersection were identified.

### *Paul Cantrell Boulevard & Magwood Drive (2013 Corridor Study)*

The existing intersection consists of a signalized intersection with a six-lane Paul Cantrell Boulevard cross section with exclusive right-turn lanes and double left-turn lanes from Paul Cantrell Boulevard westbound to Magwood Drive southbound. To improve capacity of the intersection, it was determined grade-separation improvements would be required.

#### **Alternate 1: Tight Urban Diamond**

- Replaces existing at-grade intersection with a grade-separated, compressed diamond interchange



Figure 3.6 2013 Corridor Study Paul Cantrell Boulevard & Magwood Drive Alternate 1

**At grade intersection = where a local road intersects a highway at the same elevation**

**Grade separation = a method of aligning a junction of two or more roadways at different elevations so that they will not disrupt the traffic flow on other transit routes when they cross each other**

Based upon the review criteria, this alternate is recommended to mitigate the congestion at the Paul Cantrell Boulevard & Magwood Drive Intersection.

The 2013 Corridor Study, using traffic forecast through 2035, determined that this alternative would mitigate the congestion deficiencies at the I-526/Paul Cantrell Boulevard interchange that are caused by this intersection. For this reason, it will be included in the Range of Alternatives for further evaluation.



## *I-26/I-526 System-to-System (2013 Corridor Study)*

Improvements to the I-26/I-526 system-to-system interchange were also assessed. The I-26/I-526 system-to-system interchange currently consists of a combination of directional and loop ramps providing for all movements from one interstate to another. There is a two-lane directional fly-over ramp from I-526 eastbound to I-26 westbound, loop ramps in the other three quadrants of the interchange, and a C-D road in the two western quadrants of the interchange. During the 2013 Corridor Study, a total of fifteen deficiencies were identified for the I-26/I-526 system-to-system interchange, and seven improvement alternates were developed to address these deficiencies. Using the VISSIM analysis program, the alternates were modeled to simulate potential problem areas with the respective alternates. The seven alternates were then modified for the final concept designs and reviewed to determine a recommended concept for the I-26/I-526 interchange. Figures 3.7 - 3.13 give a description and graphic of the seven alternates developed. This review considered rankings against the following criteria: number of deficiencies addressed, utility impacts, right-of-way impacts, environmental impacts, compatibility with widening to the I-526 median, and cost.

### **Alternate 1: Semi-Directional Ramps at I-26/I-526 with DDI at Rivers Avenue**

- Replaces low speed loops with semi-directional ramps
- Extends I-26 eastbound C-D system from Remount Road to the I-26 & I-526 interchanges
- New westbound I-26 C-D system from Montague Avenue to existing C-D system at Remount Road
- New C-D systems on north and south sides of I-526 between I-26 and Rivers Avenue
- New westbound C-D continuing through International Boulevard

DDI = Diverging Diamond Interchange, C-D = Collector-Distributor



Figure 3.7 2013 Corridor Study I-26/I-526 Alternate 1



**Alternate 2: Semi-Directional Ramps at I-26/I-526 with PARCLO at Rivers Avenue**

- Similar to Alternate 1 with improved ramp geometry at I-526 & Rivers Avenue

PARCLO = Partial Cloverleaf Interchange



Figure 3.8 2013 Corridor Study I-26/I-526 Alternate 2

**Alternate 3: Semi-Directional Ramps at I-26/I-526 with Relocated PARCLO at Rivers Avenue**

- Similar to Alternate 2 with reconfigured Rivers Avenue ramps

PARCLO = Partial Cloverleaf Interchange



Figure 3.9 2013 Corridor Study I-26/I-526 Alternate 3

**Alternate 4: Semi-Directional Ramps at I-26/I-526 with one loop retained and ramps removed on west side of Rivers Avenue**

- Eliminates westbound I-526 access from Rivers Avenue
- Westbound I-26 to westbound I-526 loop ramp is retained



Figure 3.10 2013 Corridor Study I-26/I-526 Alternate 4

**Alternate 5: Directional Ramps at I-26/I-526 with one loop retained with Relocated PARCLO and braided ramps at Rivers Avenue**

- Eastbound I-26 directional ramp to the median of eastbound I-526
- Westbound I-26 directional ramp to the outside of westbound I-526

PARCLO = Partial Cloverleaf Interchange



Figure 3.11 2013 Corridor Study I-26/I-526 Alternate 5



**Alternate 6: Semi-Directional Flyover Ramps at I-26/I-526 with Relocated PARCLO and braided ramps at Rivers Avenue**

- Replaces all loops with semi-directional flyover ramps
- Rivers Avenue ramps similar to Alternate 3

PARCLO = Partial Cloverleaf Interchange



Figure 3.12 2013 Corridor Study I-26/I-526 Alternate 6

**Alternate 7: Semi-Directional Turbine Interchange at I-26/I-526 with PARCLO and braided ramps at Rivers Avenue**

- Replaces interchange with semi-directional turbine interchange
- Differs from other directional ramp alternates by separating movements and eliminating weaves in interchange

PARCLO = Partial Cloverleaf Interchange



Figure 3.13 2013 Corridor Study I-26/I-526 Alternate 7

The 2013 Corridor Study, using traffic forecast through 2035, determined that Alternative 7 would best mitigate the congestion deficiencies at the I-26/I-526 interchange. For this reason, it was included in the Range of Alternatives for further evaluation. Alternative 7 replaces the existing interchange with a semi-directional turbine interchange as shown in Figure 3.13. The key component of this design is that there is no weaving within the interchange. All weaving occurs on the lower-speed C-D systems. The traffic from I-26 westbound to I-526 is placed on a C-D system beginning at Montague Avenue. This alternative includes C-D systems on both sides of I-526 between the I-26 and Rivers Avenue interchanges. The traffic from I-26 to I-526 westbound is on a braided-ramp system and existing C-D systems to and from Remount Road are extended to the new interchange at I-26 & I-526.



## *I-526 & Rivers Avenue (2013 Corridor Study)*

The I-526 & Rivers Avenue interchange is located close to the east of the I-26 & I-526 interchange and is a partial cloverleaf interchange with loops in the southeast and northwest quadrants. Improvements were identified to be consistent with the improvements to the I-26 & I-526 interchange.

### **Alternate 1: Diverging Diamond Interchange (DDI)**

- Replaces existing loops to accommodate considerable left-turn movements from Rivers Avenue

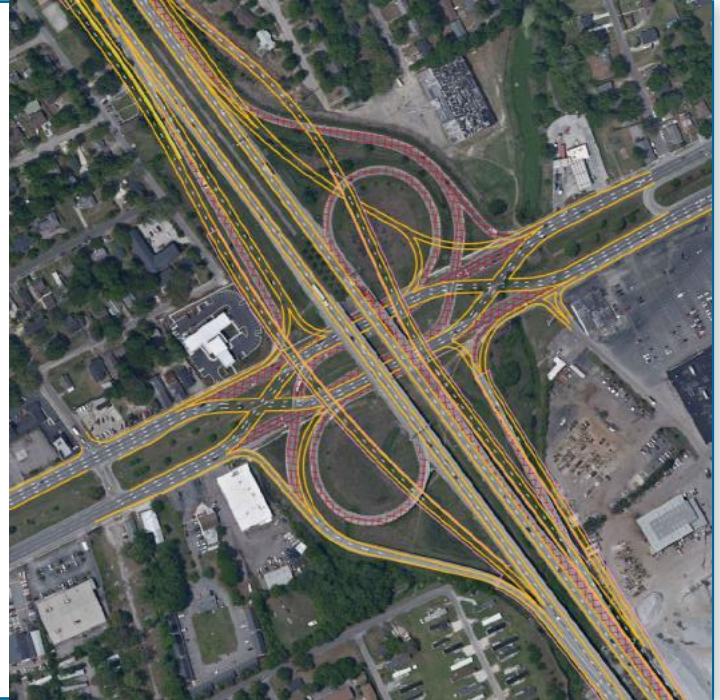


Figure 3.14 2013 Corridor Study I-526 & Rivers Avenue Alternate 1

### **Alternate 2: Partial Cloverleaf**

- Provides an additional loop in the northwest quadrant of the interchange
- Provides more length from traffic to weave between Rivers Avenue and I-26 interchange



Figure 3.15 2013 Corridor Study I-526 & Rivers Avenue Alternate 2

### Alternate 3: Partial Interchange

- Provides access to/from I-526 toward Mt. Pleasant only
- Removes movements to/from west on I-526
- Remount Road or Montague Avenue would be used to accommodate traffic to/from west towards I-26

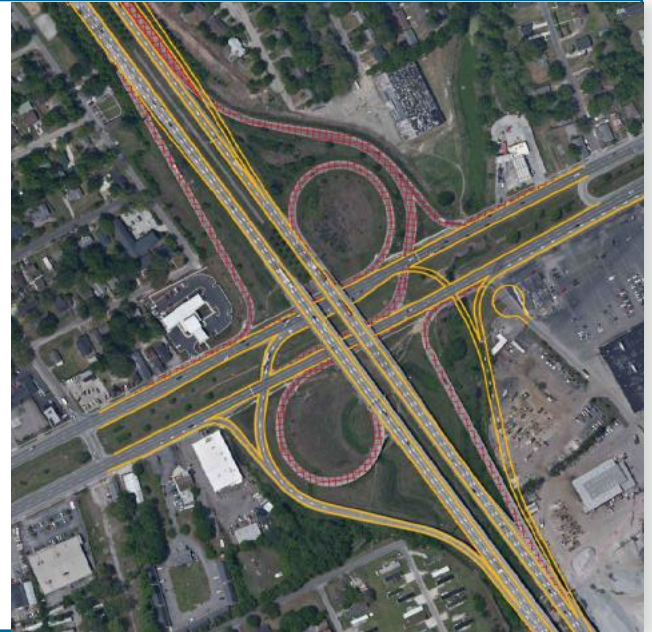


Figure 3.16 2013 Corridor Study I-526 & Rivers Avenue Alternate 3

### Alternate 4: Maintain Existing Configuration

- Maintain existing interchange form
- Relocates ramps to accommodate proposed I-526 C-D roads



Figure 3.17 2013 Corridor Study I-526 & Rivers Avenue Alternate 4

Based upon the review criteria, it was determined Alternate 4 is most compatible with the adjacent I-26 & I-526 interchange and would best mitigate the congestion deficiencies present at the I-526 & Rivers Avenue interchange.

The 2013 Corridor Study, using traffic forecast through 2035, determined that Alternative 4 would best mitigate the congestion deficiencies at the I-526 & Rivers Avenue interchange. For this reason, it was included in the Range of Alternatives for further evaluation. The findings of the 2013 Corridor Study were used as a starting point when developing the Range of Alternatives for the I-526 LCC WEST DEIS.



## 4 What are the Range of Alternatives?

Based on the 2013 Corridor Study, a wide range of alternatives were developed and analyzed to see if they met the primary purpose and need of the project. In an effort to address the existing and future congestion and operational issues identified for the corridor, a range of alternatives were developed to include the following:




















- No-Build
- Alternative Alignment Improvements
  - > East Montague Avenue
  - > Remount Road
  - > US 78 to Virginia Avenue
  - > Ashley Phosphate Road to Virginia Avenue
  - > Bees Ferry Road to Dorchester Road
- Managed Lanes
- Transportation System Management (TSM) and Transportation Demand Management (TDM) Strategies
- Mass Transit
- Existing Corridor Improvements

### 4.1 Preliminary Screening of the Range of Alternatives

The Range of Alternatives are evaluated using the purpose and need of the project. Table 4.1 summarizes the preliminary screening and the details are included in Sections 4.1.1-4.1.7.

The Berkeley-Charleston-Dorchester Council of Governments (BCDCOG) Charleston Area Transportation Study CHATS Travel Demand Model (CHATS Model) was used to evaluate and compare those alternatives that involve the improvements to existing local and new location facilities. This model includes the 2040 Existing and Committed Regional Network and socioeconomic data extrapolated to the project design year, 2050.

Table 4.1 Preliminary Screening of the Range of Alternatives

	No Build	Improvements to Existing Local Facilities		New Location			Managed Lanes*	TSM/TDM*	Mass Transit*	Existing Corridor Improvements
		East Montague Ave	Remount Rd	US 78 to Virginia Ave	Ashley Phosphate Rd to Virginia Ave	Bees Ferry Rd to Dorchester Rd				
Satisfies I-526 LCC WEST Purpose & Need	-									
Carried Forward as Preliminary Alternatives										

\* Eliminated as stand-alone alternatives

### 4.1.1 No-Build/No Action

Under the provisions of NEPA, the effects of not implementing the proposed action must also be considered. The No-Build Alternative provides a baseline for comparing potential environmental impacts with the other reasonable alternatives. Analysis of the No-Build Alternative must discuss the existing conditions as well as what is reasonably expected to occur in the foreseeable future if the proposed action is not constructed. For example, the No-Build Alternative must include nearby transportation projects that can reasonably be expected to be in place for the design year. Reasonably foreseeable projects typically come from the fiscally constrained list of projects in the State Transportation Improvement Program (STIP) and in the local metropolitan planning organizations long-range plans, as well as other programming documents from the municipalities in which the project occurs. While the No-Build Alternative does not meet the purpose and need of the project, it is carried forward as it provides a foundation for comparing the benefits and environmental impacts of the other alternatives.

**CHATS Model Setup:** This CHATS Model included all existing facilities and committed improvements that are included in the design year, except for improvements to I-526 which were removed to reflect true no-build conditions.

### 4.1.2 Alternative Alignment Improvements

SCDOT initiated an evaluation of alternate routes that satisfy the purpose and need of the I-526 LCC WEST project. The study evaluated the enhancement of existing roadway facilities along with the creation of new alignment corridors. The enhancements include the development of alternate alignments which could be used to decrease interstate traffic volumes. The corridors listed do not include any options which provide an alternate route between I-26 and the Cooper River (refer to Figure 4.1).

During the process of assessing feasible alternate routes, additional route development is restricted by several regional landmarks and environmental features. Impacts to these points of interest are detrimental to the community as a whole; and any alternative that impacts these features are deemed unreasonable for improving congestion along I-526. Such regional landmarks and environmental features were recognized as constraints and include:

- Charleston International Airport is South Carolina's largest airport. It served nearly 4.5 million travelers in 2018 and is operated under a joint-use agreement with Joint Base Charleston. The combined airport area of civilian facilities and the Charleston Air Force Base extends over 2,000 acres, covering most of the land to the west of the I-26/I-526 interchange between I-26/I-526 and the Ashley River, and extending north to Ashley Phosphate Road. The location and size of the airport prevent alternate route development to the west of I-26 for approximately four miles to the north of the Airport.
- The Cooper River defines the easternmost boundary of the North Charleston city limits and remains a vital commercial channel for the region. Currently, the Don Holt Bridge and the Arthur Ravenel Jr. Bridge are the only two structures that provide vehicular access across the river. Any alternate route which involves the construction of a third roadway bridge increases the cost of the project drastically. In addition, many areas east of N Rhett Avenue are comprised of wetlands related to the Cooper River branch that connects to the Goose Creek Reservoir. Alternate routes constructed in this vicinity result in substantial impacts to the surrounding natural environment.
- The Goose Creek Reservoir is situated just east of the Rivers Avenue business district near Hanahan and serves as the primary water supply storage for much of the Charleston region. The 600-acre reservoir area is also home to a wide variety of animal species and has become a popular destination for fishers and paddleboaters alike.

The reservoir stretches from just northeast of Murray Drive to Goose Creek Road, impeding any new alternate alignment between Rivers Avenue and N Rhett Avenue.

- Francis Marion National Forest/Bonneau Ferry Wildlife Management Area prevents new alternate four-lane routes north of I-526 which connect I-26 to US 17. Wildlife management is overseen by the South Carolina Department of Natural Resources.

Alternatives 1 and 2 are new alignment alternatives, and their location is influenced by these landmark and environmental constraints.

SCDOT evaluated the potential improvement of existing local roadways as an alternative to widening I-526, focusing primarily on an alternative route between I-26 and Virginia Avenue, parallel to I-526. Montague Avenue (Alternative 3) and Remount Road (Alternative 4) were selected. In order to avoid multiple iterations of each alternative having different cross sections, SCDOT first evaluated a separate, limited access facility along the same general route. This type of facility would attract the maximum traffic demand for a given location, and if either of these routes produced favorable traffic demand, the route would be investigated in more detail.

Alternatives 1, 2, 3 and 4 were all developed in an attempt to reduce or eliminate the need for widening I-526 east of I-26. Another new alignment was added to determine whether widening existing I-526 between Dorchester Road and Paul Cantrell Boulevard could be eliminated. This is a new alignment crossing the Ashley River and connecting Dorchester Road to the west end of Glenn McConnell Parkway. This new alignment was combined with one of the eastern alignments, Alternative 2, as Alternative 2B.

The BCDCOG TDM model interface was used to carry out the alternative analysis in the TransCad software. The analysis incorporated the network changes reflecting the alternative alignments as described in this section and 2050 socioeconomic inputs. No changes were made to other model inputs and assumptions and the model was executed following the BCDCOG set up for a model run incorporating 7 feedback loops.

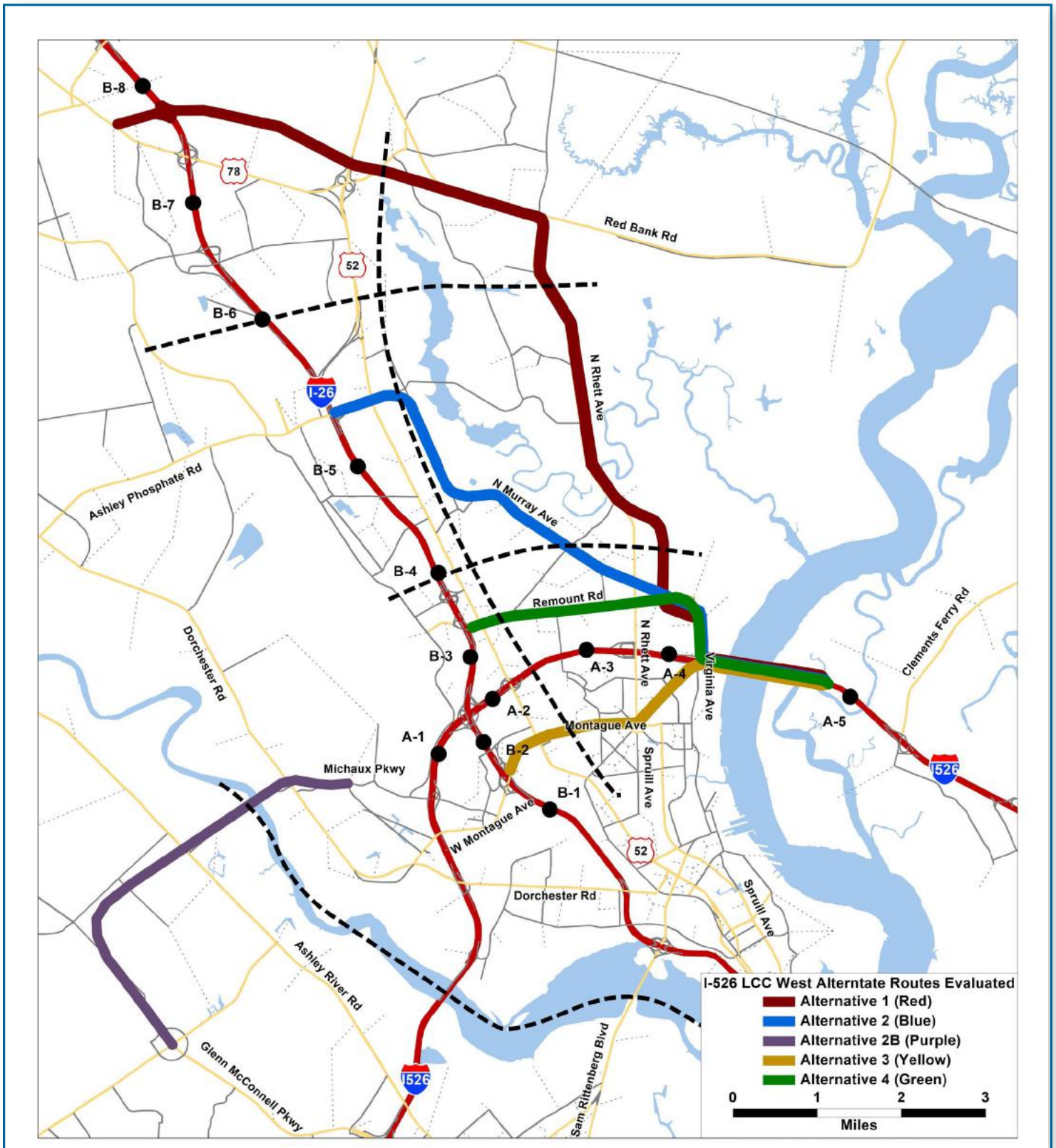


Figure 4.1 Alternative Corridor Improvements



### *Alternative 1: US 78 to Virginia Avenue (Red Alignment)*

This proposed new alignment is established to connect key points along I-26 and I-526 in the vicinity of the existing Cooper River crossing at the Don Holt Bridge. The US 78 to Virginia Avenue route utilizes portions of Red Bank Road and N Rhett Avenue to create a four-lane, controlled access facility with new interchanges. A new location roadway section running north of Charleston Southern University and North Charleston Wannamaker County Park connects US 78 west of I-26 to the Red Bank Road corridor. Upgrading the existing roadway impacts commercial and residential development along Red Bank Road and potentially impacts the North Charleston Terminal facilities.

CHATS Model Setup: Alternative 1 was modeled as a limited-access direct connector between I-26 and I-526 with 2 lanes in each direction and no intermediate interchanges. It begins at US 78 just south of Ladson Road and continues through a full cloverleaf interchange with I-26. Speed and per lane capacity was modeled consistent with urban interstate facility type assumptions in BCDCOG. Total distance of the alternative is 12.1 miles. Improvements to I-526 were removed from the model for this alternative.

Table 4.2 provides a comparison between No-Build, Alternative 1, and the Existing Corridor Improvements alternative (Build).

Table 4.2: Alternative 1 – University Boulevard to Virginia Avenue

Map Loc	Road Name	Section	Daily Total Assigned Volumes for Both Directions			Volume vs. Capacity (V/C)			Number of Lanes for Both Directions		
			No Build	Alt 1	Build	No Build	Alt 1	Build	No Build	Alt 1	Build
A-1	I-526	West of I-26	103,200	115,700	123,200	1.32	1.48	0.64	4	4	11
A-2		I-26 to Rivers Ave	79,500	79,700	101,500	1.02	1.02	0.66	4	4	8
A-3		Rivers Ave to N Rhett Ave	102,400	102,400	115,100	1.31	1.31	0.74	4	4	8
A-4		East of Virginia Ave	127,600	136,600	137,400	1.63	1.74	1.18	4	4	7
B-7	I-26	North of US78 University Blvd	134,800	156,900	135,000	1.08	1.25	1.08	6	6	6
B-6		US78 to Weber Blvd	141,800	139,700	142,600	1.13	1.11	1.14	6	6	6
B-5		Weber Blvd to US 52	151,300	150,000	152,800	1.21	1.20	1.22	6	6	6
B-4		Ashley Phosphate Rd to Aviation Ave	190,200	195,000	192,600	1.14	1.17	1.15	8	8	8
B-3		Remount Rd to I-526	198,800	209,000	193,600	0.95	1.00	0.59	10	10	16
B-2		I-526 to Montague Ave	128,800	150,200	121,500	0.80	0.94	0.55	8	8	11
B-1		South of Montague Ave	124,500	145,500	119,400	0.78	0.91	0.74	8	8	8
	Screenline 1	Alt 1 Alignment (Red)	0	42,800	0		0.54			4	

Traffic modeling results indicate that the alternative alignment from University Boulevard to Virginia Avenue, Alternative 1, results in the following:

- I-526 east of Rivers Avenue remains over capacity, while the Existing Corridor Improvements (Build) accommodates the traffic demand using only 74% of its capacity.
- Comparing all sections of I-26 affected by the project, the Existing Corridor Improvements provide a greater reduction in the volume to capacity ratio for most of the segments.
- The proposed alternative route attracts only 42,800 vehicles per day, using only 54% of its capacity. Since the model included a separate, limited access facility that is approximately 12.1 miles in length, the associated environmental and property impacts would be significant for this limited benefit.

### *Alternative 2: Ashley Phosphate Road to Virginia Avenue (Blue Alignment)*

This proposed new alignment is a four-lane, controlled access facility which follows a short section of Ashley Phosphate Road east of I-26, then connects to Railroad Avenue and heads south before traversing on new location to run parallel to Murray Drive along the existing utility easement. A variety of features are impacted by this proposed route, including but not limited to commercial and residential development along Ashley Phosphate Road and Murray Drive, Hanahan Elementary School and Trident Technical College, and the City of Hanahan Recreation Center and its associated park areas. In addition, major utility relocations are required.

CHATS Model Setup: Alternative 2 was modeled as a limited-access direct connector between I-26 and I-526 with 2 lanes in each direction and no intermediate interchanges. Its alignment starts with direct connectors to I-26 near Ashley Phosphate Rd then it follows Ashley Phosphate Rd to the east and turns south along Railroad Drive. The alignment continues south along N Murray Ave and Virginia Ave to its terminus with I-526. Speed and per lane capacity was modeled consistent with the urban interstate facility assumptions in BCDCOG. Total distance of the alternative is 7.5 miles. Improvements to I-526 were removed from the model for this alternative.

Table 4.3 provides a comparison between No-Build, Alternative 2 and the Existing Corridor Improvements alternative (Build).

Table 4.3: Alternative 2 – Ashley Phosphate Road to Virginia Avenue

Map Loc	Road Name	Section	Daily Total Assigned Volumes for Both Directions			Volume vs. Capacity (V/C)			Number of Lanes for Both Directions		
			No Build	Alt 2	Build	No Build	Alt 2	Build	No Build	Alt 2	Build
	I-526	West of I-26	103,200	104,900	123,200	1.32	1.34	0.64	4	4	11
A-1		I-26 to Rivers Ave	79,500	67,000	101,500	1.02	0.86	0.66	4	4	8
A-2		Rivers Ave to N Rhett Ave	102,400	82,200	115,100	1.31	1.05	0.74	4	4	8
A-3		East of Virginia Ave	127,600	102,700	137,400	1.63	1.31	1.18	4	4	7
A-4	I-26	North of US78 University Blvd	134,800	136,500	135,000	1.08	1.09	1.08	6	6	6
B-7		US78 to Weber Blvd	141,800	146,700	142,600	1.13	1.17	1.14	6	6	6
B-6		Weber Blvd to US 52	151,300	158,600	152,800	1.21	1.27	1.22	6	6	6
B-5		Ashley Phosphate Rd to Aviation Ave	190,200	168,000	192,600	1.14	1.01	1.15	8	8	8
B-4		Remount Rd to I-526	198,800	179,400	193,600	0.95	0.86	0.59	10	10	16
B-3		I-526 to Montague Ave	128,800	129,200	121,500	0.80	0.81	0.55	8	8	11
B-2		South of Montague Ave	124,500	124,500	119,400	0.78	0.78	0.74	8	8	8
B-1											
	Screenline 1	Alt 2 Alignment (Blue)	0	38,000	0		0.48			4	

Traffic modeling results indicate that the alternative alignment from Ashley Phosphate Road to Virginia Avenue, Alternative 2, results in the following:

- I-526 east of Rivers Avenue remains over capacity, while the Existing Corridor Improvements (Build) accommodates the traffic demand using only 74% of its capacity.
- Comparing all sections of I-26 affected by the project, the Existing Corridor Improvements provide a greater reduction in the volume to capacity ratio for most of the segments.
- The proposed alternative route attracts only 38,000 vehicles per day, using only 48% of its capacity. Since the model included a separate, limited access facility that is approximately 7.5 miles in length, the associated environmental and property impacts would be significant for this limited benefit.

### *Alternative 2B: Bees Ferry Road to Dorchester Road (Alt 2 + Purple Alignment)*

A third new alignment route is being evaluated to the west of I-26 which establishes a new connector across the Ashley River. The potential roadway was assumed to be four lanes with controlled access but does not include an interchange at Ashley River Road. The potential Bees Ferry Road to Dorchester Road alignment requires a new bridge over the Ashley River that could potentially impact the existing Shadowmoss Plantation residential development.

CHATS Model Setup: Alternative 2B was modeled by adding to the network the blue alignment (Alternative 2) and the purple alignment connecting the existing Bees Ferry Rd and New Dorchester Rd and crossing the Ashley River. The Purple alignment was modeled with 2 lanes in each direction. Speed and per lane capacity was modeled consistent with the urban principal arterial assumptions in BCDCOG. Total distance of the alternative is 5.3 miles and the assumed posted speed for the purple alignment is 45 miles per hour. Improvements to I-526 were removed from the model for this alternative.

Table 4.4 provides a comparison between No-Build, Alternative 2, and the Existing Corridor Improvements alternative (Build).



Table 4.4: Alternative 2B – Alternative 2 + Bees Ferry to Dorchester Road

Map Loc	Road Name	Section	Daily Total Assigned Volumes for Both Directions			Volume vs. Capacity (V/C)			Number of Lanes for Both Directions		
			No Build	Alt 2B	Build	No Build	Alt 2B	Build	No Build	Alt 2B	Build
A-1	I-526	West of I-26	103,200	106,300	123,200	1.32	1.34	0.64	4	4	11
A-2		I-26 to Rivers Ave	79,500	67,400	101,500	1.02	0.86	0.66	4	4	8
A-3		Rivers Ave to N Rhett Ave	102,400	82,700	115,100	1.31	1.05	0.74	4	4	8
A-4		East of Virginia Ave	127,600	102,800	137,400	1.63	1.31	1.18	4	4	7
S4-3		Crossing Ashley River (Screenline 4)	109,200	102,900	141,600	1.39	1.31	0.87	4	4	8
B-7	I-26	North of US78 University Blvd	134,800	136,600	135,000	1.08	1.09	1.08	6	6	6
B-6		US78 to Weber Blvd	141,800	146,600	142,600	1.13	1.17	1.14	6	6	6
B-5		Weber Blvd to US 52	151,300	158,500	152,800	1.21	1.27	1.22	6	6	6
B-4		Ashley Phosphate Rd to Aviation Ave	190,200	168,100	192,600	1.14	1.01	1.15	8	8	8
B-3		Remount Rd to I-526	198,800	179,500	193,600	0.95	0.86	0.59	10	10	16
B-2		I-526 to Montague Ave	128,800	128,500	121,500	0.80	0.81	0.55	8	8	11
B-1		South of Montague Ave	124,500	122,500	119,400	0.78	0.78	0.74	8	8	8
	Screenline 4	Alt 2B Alignment (Purple)	0	24,600	0		0.70			4	

Traffic modeling results indicate that the alternative alignment from Bees Ferry Road to Dorchester Road, Alternative 2B, results in the following:

- I-526 east of Rivers Avenue remains over capacity, while the Existing Corridor Improvements (Build) accommodates the traffic demand using only 74% of its capacity.
- Comparing all sections of I-26 affected by the project, the Existing Corridor Improvements provide a greater reduction in the volume to capacity ratio for most of the segments.
- The proposed alternative route over the Ashley River attracts only 24,600 vehicles per day and does not significantly impact volumes along I-526 directly west of I-26. Associated environmental and property impacts would be significant for this limited benefit.

### *Alternative 3: Improvements along East Montague Avenue (Yellow Alignment)*

This existing route runs nearly parallel to I-526 from I-26 to Virginia Avenue and serves as a minor arterial facility connecting I-26 to the Park Circle area. East Montague Avenue, known as the old “Main Street” weaves through two of the city’s most historic neighborhoods. Liberty Hill stands as the oldest surviving neighborhood within North Charleston, while Park Circle represents one of the earliest concepts of a garden community in the United States. Other features along the route include North Charleston High School, North Charleston United Methodist Church, Royal Baptist Family Life and Banquet Center, and the Felix Pinckney Community Center. Residential development dominates along the western segment of the route from North Boulevard to Rivers Avenue, while commercial development is prevalent on the eastern segment from Jenkins Avenue to Virginia Avenue.

Recognizing the nature of the East Montague Avenue corridor, particularly the level of access to the local street network and individual properties, Alternative 3 was modeled as a separate, limited access direct connector between I-26 and I-526 with 2 lanes in each direction. Speed and per lane capacity was modeled consistent with the urban interstate facility assumptions in BCDCOG. Total distance of the alternative is 4.3 miles. Improvements to I-526 were removed from the model for this alternative. If the results of this alternative indicated that it would attract a sufficient amount of traffic demand from I-526 between I-26 and Virginia Avenue to eliminate the need for improvements to I-526, the alternative would be refined.

Table 4.5 provides a comparison between No-Build, Alternative 3 and the Existing Corridor Improvements alternative (Build).

Table 4.5: Alternative 3 – Montague Avenue Corridor

Map Loc	Road Name	Section	Daily Total Assigned Volumes for Both Directions			Volume vs. Capacity (V/C)			Number of Lanes for Both Direction		
			No Build	Alt 3	Build	No Build	Alt 3	Build	No Build	Alt 3	Build
	I-526	West of I-26	103,200	103,700	123,200	1.32	1.32	0.64	4	4	11
A-1		I-26 to Rivers Ave	79,500	68,100	101,500	1.02	0.87	0.66	4	4	8
A-2		Rivers Ave to N Rhett Ave	102,400	86,000	115,100	1.31	1.10	0.74	4	4	8
A-3		East of Virginia Ave	127,600	106,000	137,400	1.63	1.35	1.18	4	4	7
A-4	I-26	North of US78 University Blvd	134,800	134,900	135,000	1.08	1.08	1.08	6	6	6
B-7		US78 to Weber Blvd	141,800	142,200	142,600	1.13	1.13	1.14	6	6	6
B-6		Weber Blvd to US 52	151,300	152,100	152,800	1.21	1.21	1.22	6	6	6
B-5		Ashley Phosphate Rd to Aviation Ave	190,200	190,700	192,600	1.14	1.14	1.15	8	8	8
B-4		Remount Rd to I-526	198,800	202,200	193,600	0.95	0.97	0.59	10	10	16
B-3		I-526 to Montague Ave	128,800	139,100	121,500	0.80	0.87	0.55	8	8	11
B-2		South of Montague Ave	124,500	131,600	119,400	0.78	0.82	0.74	8	8	8
B-1											
	Screenline 1	Alt 3 Alignment (Yellow)	0	35,800	0	N/A	0.47	N/A	N/A	4	N/A

Traffic modeling results indicate that the alternative Montague Avenue Alignment, Alternative 3, results in the following:

- I-526 east of Rivers Avenue remains over capacity, while the Existing Corridor Improvements (Build) accommodates the traffic demand using only 74% of its capacity.
- Comparing all sections of I-26 affected by the project, the Existing Corridor Improvements provide a greater reduction in the volume to capacity ratio for most of the segments.
- The proposed alternative route attracts only 35,800 vehicles per day, using only 47% of its capacity. Since the model included a separate, limited access facility along the Montague Avenue corridor, the associated impacts to businesses and residential properties would be significant for this limited benefit.



#### *Alternative 4: Improvements to Remount Road*

This existing route serves the area just north of the I-526 corridor and connects I-26 to the North Charleston Terminal (NCT) and its associated facilities along the Cooper River. The NCT sits on over 200 acres and handles nearly one-fourth of the Port of Charleston's total container volume, necessitating a large volume of truck traffic along the roadway. Other features along this route include Matilda Dunston Elementary School, Remount Baptist Church, Aldersgate United Methodist Church, Revive Charleston, First Southern Methodist Church, Victory Missionary Baptist Church, and MWV/Kapstone Park. Residential development exists mainly along the south side of the road from Shelton Street to N Rhett Avenue, and commercial development runs along the entire length of the corridor.

Recognizing the nature of the Remount Road corridor, particularly the level of access to the local street network and individual properties, Alternative 4 was modeled as a separate, limited access direct connector between I-26 and I-526 with 2 lanes in each direction. Speed and per lane capacity was modeled consistent with the urban interstate facility assumptions in BCDCOG. Total distance of the alternative is 4.8 miles. Improvements to I-526 were removed from the model for this alternative. If the results of this alternative indicated that it would attract a sufficient amount of traffic demand from I-526 between I-26 and Virginia Avenue to eliminate the need for improvements to I-526, the alternative would be refined.

Table 4.6 provides a comparison between No-Build, Alternative 4 and the Existing Corridor Improvements alternative (Build).

Table 4.6: Alternative 4 – Remount Road Corridor

Map Loc	Road Name	Section	Daily Total Assigned Volumes for Both Directions			Volume vs. Capacity (V/C)			Number of Lanes for Both Directions		
			No Build	Alt 4	Build	No Build	Alt 4	Build	No Build	Alt 4	Build
	I-526	West of I-26	103,200	104,500	123,200	1.32	1.36	0.64	4	4	11
A-1		I-26 to Rivers Ave	79,500	63,900	101,500	1.02	0.86	0.66	4	4	8
A-2		Rivers Ave to N Rhett Ave	102,400	72,800	115,100	1.31	1.06	0.74	4	4	8
A-3		East of Virginia Ave	127,600	93,100	137,400	1.63	1.31	1.18	4	4	7
A-4	I-26	North of US78 University Blvd	134,800	135,700	135,000	1.08	1.09	1.08	6	6	6
B-7		US78 to Weber Blvd	141,800	143,800	142,600	1.13	1.17	1.14	6	6	6
B-6		Weber Blvd to US 52	151,300	153,800	152,800	1.21	1.26	1.22	6	6	6
B-5		Ashley Phosphate Rd to Aviation Ave	190,200	199,000	192,600	1.14	1.01	1.15	8	8	8
B-4		Remount Rd to I-526	198,800	171,100	193,600	0.95	0.86	0.59	10	10	16
B-3		I-526 to Montague Ave	128,800	126,300	121,500	0.80	0.80	0.55	8	8	11
B-2		South of Montague Ave	124,500	122,900	119,400	0.78	0.76	0.74	8	8	8
B-1											
	Screenline 1	Alt 4 Alignment (Green)	0	49,100	0		0.64			4	

Traffic modeling results indicate that the alternative Remount Road Alignment, Alternative 4, results in the following:

- I-526 east of Rivers Avenue remains over capacity, while the Existing Corridor Improvements (Build) accommodates the traffic demand using only 74% of its capacity.
- Comparing all sections of I-26 affected by the project, the Existing Corridor Improvements provide a greater reduction in the volume to capacity ratio for most of the segments.
- The proposed alternative route attracts only 49,100 vehicles per day, using only 64% of its capacity. Since the model included a separate, limited access facility along the Remount Road corridor, the associated impacts to businesses and residential properties would be significant for this limited benefit.

### *Alternative Alignment Improvements - Summary*

Alternative alignments that were modeled do not attract a sufficient volume of traffic demand to eliminate the need to widen the existing I-526 corridor, as the I-526 corridor still indicates segments that are over capacity.

Additionally, the alternatives covered a wide range of alignments, particularly between I-26 and Virginia Avenue, where property impacts are of particular concern. Alignments 1 (Red) and 2 (Blue) will result in environmental impacts. Alternatives 3 and 4, along East Montague Avenue and Remount Road, respectively, would only be possible by an elevated roadway through a densely developed commercial corridor.

Therefore, Alignments 1, 2, 2B, 3, and 4 were eliminated as potential alternatives because they do not meet the purpose and need for the I-526 LCC WEST project.

### **4.1.3 Managed Lanes**

Managed lanes is one of the Transportation Demand Management (TDM) strategies evaluated. The 2013 Corridor Study included an evaluation of managed lanes in the I-526 corridor and predicted the study area is not a long enough corridor to realize the potential of high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes, and that a more regional plan including the I-26 corridor should be examined to increase the feasibility of managed lanes.

More recent managed lane studies, (included in the current I-26 Corridor Study) concluded that managed lanes may be feasible on I-526 if they extended westward on I-26 at least as far as the US 52 Connector near Ashley Phosphate Road. A regional managed lane study was conducted as part of the I-26 Corridor Study that included all of I-526 and I-26 from US 17 to Exit 187-Ridgeville. A suggested improvement from the plan is the implementation of HOT managed lanes from Exit 199 (US 17 Alt – Summerville) to I-26 Terminus at US 17 and along I-526 the entire section.

There are currently no programmed improvements to I-26 between I-526 and the US 52 Connector; therefore, managed lanes cannot be justified based on a committed improvement ensuring their functionality upon completion of the I-526 LCC WEST Project. Whereas managed lanes alone do not meet the project's purpose and need and therefore not considered a viable stand-alone alternative, the 12-foot shoulders included in the proposed project accommodate future managed lane options on I-26 or potential bus-on-shoulder transfers between the two interstates.



## 4.1.4 Transportation System Management/Transportation Demand Management

The Transportation System Management/Transportation Demand Management (TSM/TDM) strategies evaluated in the 2013 Corridor Study are listed in Table 4.2. A total reduction of 5.2% of total overall traffic can be expected with the implementation of all 10 of the TDM programs evaluated in the 2013 Corridor Study. TSM includes lower cost improvements to improve efficiency and safety. A few examples of TSM consist of improving signal timing, adding high occupancy vehicle lanes as well as adding turn lanes. TDM focuses on lessening travel demand by reducing the number of vehicle trips and vehicle miles traveled on a roadway or redistributing this demand in space or time to decrease system deficiency. TDM regional strategies may include strategies such as encouraging drivers to carpool or ride the bus, and/or encouraging employers to allow non-standard work hours or telecommuting options for employees.

The following documents were also reviewed to determine if additional TSM/TDM studies provide better estimates of travel demand reduction. These studies did not reference reductions in travel demand related to single occupancy vehicles.

- The Public Transportation element of the Charleston Area Transportation Study (CHATS) Long-Range Transportation Plan (LRTP), January 2019
- Appendix D of the CHATS LRTP, Transit Needs Assessment, January 2019
- Travel Market Analysis element of the BCDCOG Regional Transit Framework Plan, March 2018
- Corridor Alternatives Evaluation & Recommendations element of the BCDCOG Regional Transit Framework Plan, March 2018
- Congestion Management Process report, BCDCOG, January 2019

According to the US Census Bureau American Community Survey, the percentage of commuters driving alone to work has only reduced by 0.4 percent between 2013 and 2019. The percentage of carpoolers and public transit users also declined by an average of less than one percent. This data indicated an increase in telecommuters, but not substantial enough to reduce congestion given the current and future traffic demand for the corridor. I-526 from Mount Pleasant to Savannah Highway was identified in the Regional Transit Framework Plan as a high capacity transit (HCT) corridor. This plan establishes the needs and makes recommendations based on public and stakeholder input, operations, and available funding. However, the plan does not provide forecasts. Based on the American Community Survey data through 2019, and the document review described above, the TSM/TDM recommendations from the 2013 Corridor Study are still applicable.

As a standalone alternative, TSM and TDM improvements do not adequately improve the corridor and meet the purpose and need to increase capacity and reduce congestion given the current and future level of service (LOS). While TSM/TDM strategies alone do not meet the project's purpose and need and therefore are not being considered a viable stand-alone alternative, TSM/TDM alternatives to shift commuter behavior are being considered as future regional projects.

All TDM strategies identified in the I-526 Corridor Study as listed in Table 4.7, with the exception of bike/walk enhancements, have already been funded by FHWA and implemented by SCDOT and BCDCOG. Therefore, forecasts of future traffic in the I-526 corridor already consider TDM and TSM strategies to be implemented.

Table 4.7 Transportation Demand Management Strategies

Strategy	Traffic Reduction Potential
Carpools/Rideshare Matching Vanpools	2.0%
Transit Pass Incentives Financial Incentives	1.5%
Telecommuting Compressed Work Week	0.1%
Work Flex Time Staggered Work Hours	0.5%
Bike/Walk Enhancements	0.1%
Education, Promotion	1.0%
<b>Total Reduction Potential</b>	<b>5.2%</b>

Source: Adapted from *I-526 Corridor Analysis Between North Charleston and West Ashley*, Table ES3

Note: All strategies with the exception of Bike/Walk Enhancements have been funded by FHWA

## 4.1.5 Mass Transit

The measure of effectiveness for the proposed transit strategies are based on the potential reduction in traffic along the I-526 corridor. Mass transit options are a growing topic of interest in the Charleston area as evidenced by public desire to include mass transit in the project alternatives. In addition to public desire, FHWA also recommends that mass transit alternatives be considered on proposed highway projects in urbanized areas with populations of over 200,000 people (FHWA Technical Advisory 6640.8A). Specific modal strategies studied for the I-526 corridor in the 2013 Corridor Study are listed in Table 4.8. If implemented as a stand-alone alternative, expanding and/or improving mass transit infrastructure does not meet the purpose and need of the project by increasing capacity adequately or improving operations. The total potential reduction of these improvement strategies is estimated to be 7.4% with the implementation of short-term transit and freight improvements. Additionally, the addition of mass transit does not enhance safety, nor improve freight mobility. Because mass transit does not meet the purpose and need as a standalone alternative, it is not carried forward as an alternative for the I-526 LCC WEST Corridor project.

While mass transit is not carried forward as a reasonable alternative based on its ability to meet the purpose and need on its own, Charleston County and BCDCOG are proactively funding a Bus Rapid Transit (BRT) project which will include a bus within a dedicated lane or right of way. The design work for this project is currently being scoped. The BRT corridor crosses the I-526 corridor within the median of Rivers Avenue. Assumptions have been made about the corridor width for purposes of providing adequate clearances with the I-526 improvement alternatives. The I-526 LCC WEST alternatives are developing an assumed clearance envelope for the BRT corridor where it is expected to pass through the I-526 LCC WEST study area. Infrastructure improvements are needed to support adding additional buses. Continued coordination with Charleston County will be required to fully implement as a successful mass transit system. Table 4.9 shows the travel demand alternatives which have been funded and implemented or are under development.

Table 4.8 Modal Strategies

Strategy	Traffic Reduction Potential
Improve Existing Transit Routes	0.3%
New Transit Routes	1.1%
Improve Connectivity to/from Transit	0.3%
Improve Transit Facilities and Equipment	0.3%
Public/Private Partnerships	0.6%
BRT, Commuter Rail, Light Rail	3.4%
Zoning/Transit Oriented Developments	0.0%
Increase Intermodal Split to Rail	3.5%
Expand Port Operating Hours	0.0%
Construct Near-Terminal Staging Areas	0.2%
Peak-Hour Incentives/Disincentives	0.2%
Truck Routes away from I-526	0.9%
<b>Total Modal Reduction Potential</b>	<b>7.4%</b>

Source: Adapted from *I-526 Corridor Analysis Between North Charleston and West Ashley*, Table ES4

Note: The BRT, Commuter Rail, Light Rail strategy is being funded by Charleston County

Table 4.9 Travel Demand Alternatives Evaluated & Implemented from 2013 Corridor Study

Strategy	Status
Carpools/Rideshare Matching Vanpools	Funded & Implemented
Telecommuting Compressed Work Week	Funded & Implemented
Work Flex Time Staggered Work Hours	Funded & Implemented
Education, Promotion	Funded & Implemented
Bus Rapid Transit	Project Under Development
Signal Improvements & Re-Timing	Funded & Implemented

## 4.1.6 Existing Corridor Improvements

Improving the existing I-526 LCC WEST mainline from Virginia Avenue to Paul Cantrell Boulevard is proposed to accommodate the current and future vehicular demands, as well as population and employment increases. This alternative could meet the purpose and need by increasing capacity and thereby reducing congestion. Improving the existing corridor is advanced and multiple options are being developed including two widening alternatives as well as five interchanges along I-526; the I-526 at Paul Cantrell Boulevard interchange; the I-26/I-526 System-to-System interchange; the I-526 at Rivers Avenue interchange; the I-526 at N Rhett Avenue interchange and the I-526 at Virginia Avenue interchange.



## 5 What are the Preliminary Alternatives?

Based on the screening previously described in Section 4, the range of alternatives are evaluated based on their ability to meet the purpose and need of the I-526 LCC WEST project. The following alternatives are identified as Preliminary Alternatives:

- No-Build
- Existing Corridor Improvements
  - > Mainline Interstate Alternatives
    - 6-lane widening
    - 8-lane widening
  - > Interchange Alternatives
    - I-526 at Paul Cantrell Boulevard
    - I-26/I-526 System-to-System
    - I-526 at Rivers Avenue
    - I-526 at N Rhett Avenue and Virginia Avenue (Due to proximity, these interchanges are combined.)

### 5.1 Screening of the Preliminary Alternatives

The Preliminary Alternatives are evaluated using the purpose and need of the project and the following criteria at a qualitative level:

- Acceptable Level of Service (LOS)
- Compatible with Adjacent Interchange
- Geometric Deficiencies Resolved
- Flexibility with Don Holt Bridge Replacement
- Constructability

Table 5.1 summarizes the screening of the Preliminary Alternatives and the details are included in Sections 5.1.1-5.1.7.

Table 5.1 Screening of the Preliminary Alternatives

	No Build	Mainline		I-526 at Paul Cantrell Blvd					Paul Cantrell Blvd at Magwood Dr							I-26/I-526 System-to System				I-526 at Rivers Ave		I-526 at N Rhett/Virginia Ave			
		6-lane	8-lane	1	2	3	4	5	1	2	3	4	5	6	7	1	2	3	4	1	2	1	2	3	4
Acceptable LOS	✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Compatible with Adjacent Interchange	-	-	-	✗	✓	✗	✓	✓	✗	✓	✗	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗
Geometric Deficiencies Resolved	✗	-	-	✓	✓	✓	✓	✓	-	-	-	-	-	-	-	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓
Flexibility with Don Holt Bridge Replacement	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓
Constructability	-	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✗	✓
Carried Forward as Reasonable Alternatives	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✓	✗	✗	✓	✓	✗	✗	✓	✓	✓	✓	✗	✗

## 5.1.1 No-Build

The No-Build is carried forward as a Preliminary Alternative. For additional information on the No-Build alternative, refer to section 4.1.1.

## 5.1.2 Mainline Interstate (I-526) Alternatives

### 6-Lane Widening

The 2013 Corridor Study recommended adding one lane in each direction on I-526, resulting in a 6-lane cross section through the study area. Subsequently, the CHATS model was updated to reflect higher regional growth, resulting in higher predicted traffic volumes in the corridor. The 6-lane widening alternative (3 lanes in each direction) is determined to be inadequate in providing an acceptable improvement in capacity. Based on traffic analysis, the 6-lane widening does not meet the purpose and need of the project to increase capacity and improve operations. Portions of I-526 would operate at a Level of Service (LOS) E or F approximately five years after construction. As shown in Table 5.2, traffic analysis is being used to compare the 6-lane and 8-lane alternatives. The 6-lane widening alternative is not carried forward for further evaluation because of a failing LOS. Refer to Figure 5.1 for description of LOS.

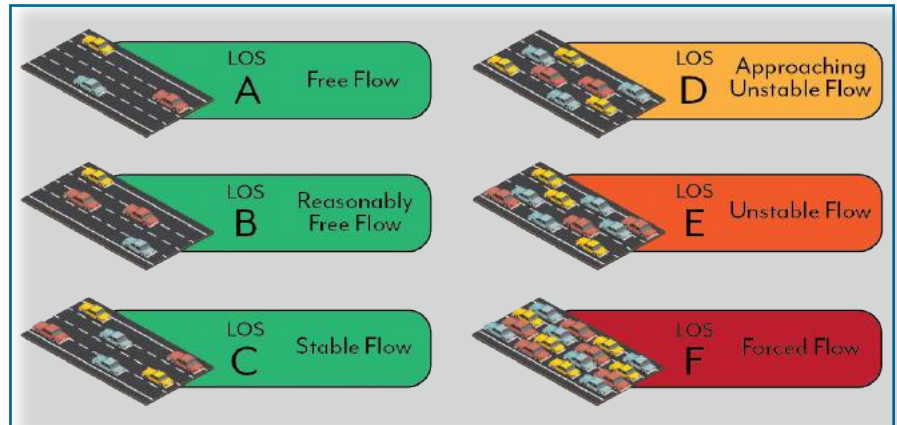


Figure 5.1 Level of Service (LOS)

Table 5.2 Traffic Analysis of I-526 LCC WEST

Segment Description	2015 AADT	No Build 2050 AADT	LOS	Build 2050 AADT	LOS	
					6-Lane	8-Lane
Sam Rittenberg to Paul Cantrell Blvd	39,400	59,800	C	68,500	B	B
Paul Cantrell Blvd to Leeds Ave	79,200	106,900	F	136,900	F	D
Leeds Ave to Dorchester Rd	78,800	106,400	F	134,000	F	D
Dorchester Rd to Montague Ave	80,700	108,900	F	127,300	E	C
Montague Ave to International Blvd	67,400	91,000	F	109,600	D	C
International Blvd to I-26	89,000	120,200	F	126,700	E	C
I-26 to Rivers Ave	77,200	104,200	F	116,100	D	C
Rivers Ave to N Rhett Ave	75,600	104,400	F	126,700	E	C
N Rhett Ave to Virginia Ave	80,500	122,200	F	148,400	F	D
East of Virginia Ave	68,900	110,100	F	133,800	F	D

### *8-Lane Widening*

West of I-26: Paul Cantrell Boulevard (Glenn McConnell Parkway) is a major arterial/expressway facility near the western end of I-526. The I-526 interchange at Paul Cantrell Boulevard is a logical terminus for the I-526 LCC WEST because of the volume of traffic that enters eastbound I-526 and exits westbound I-526 at this point. In the eastbound direction, the mainline widening begins at this location with a two-lane entrance ramp adding the lanes which comprise the four-lane eastbound lanes toward I-26. In the westbound direction, the widened four-lane mainline concept ends at this interchange. A new bridge carries the westbound lanes of Paul Cantrell Boulevard over the intersection with Magwood Drive and touches down on Glenn McConnell Parkway. The westbound exit ramp from I-526 is being widened and uses this new bridge to bypass the Magwood intersection, which currently causes traffic to back up onto I-526. The 8-lane widening of I-526 extends from Paul Cantrell Boulevard to I-26.

At I-26/I-526 System-to-System Interchange: Two of the four eastbound mainline lanes on I-526 serve as the westbound connection to eastbound and westbound I-26. The remaining two lanes extend through onto the existing alignment over I-26 and continue eastbound. In the westbound direction, two lanes are proposed as the ramp lanes from eastbound I-26.

East of I-26: The volume of traffic entering eastbound I-526 from I-26 is similar to the volume of through traffic coming over I-26. Similarly, the westbound I-526 traffic approaching I-26 is well balanced between the volume of traffic that continues west on I-526 and that which is destined for either eastbound or westbound I-26. For these reasons, the extension of collector distributor (C-D) roads from the system-to-system interchange eastward toward the Cooper River works well in reducing the weaving- related congestion that is currently prevalent today on I-526 from I-26, through the Rivers Avenue, N Rhett Avenue and Virginia Avenue interchanges.

I-526 east of Rivers Avenue: The eastern project terminus of Virginia Avenue is being selected based on the closely connected N Rhett Avenue interchange and the extensive traffic that backs onto I-526 from N Rhett Avenue. I-526 east of Rivers Avenue is on an elevated structure until it reaches Daniel Island. The existing structure continues to carry two through lanes for eastbound and westbound traffic on I-526, while the new C-D roads provide the needed additional capacity. The C-D roads also provide critical access after a major seismic event if the existing I-526 structure is not serviceable. The portion of elevated structure between Rivers Avenue and the Don Holt Bridge is not designed to resist seismic forces.

To summarize, the 8-lane widening alternative is being carried forward for a detailed impact evaluation. The additional two lanes in each direction meets the project purpose and need.



## 5.1.3 Interchange Alternatives

### *I-526 at Paul Cantrell Boulevard*

The interchange at the I-526 and Paul Cantrell Boulevard contributes to the congestion along on I-526 LCC WEST. Figures 5.2 - 5.6 show the five alternatives developed for the interchange of Paul Cantrell Boulevard at I-526.

#### **Alternative 1: Triple Lefts to I-526 eastbound with Improved Loops**

- Failed to provide an acceptable LOS
- Not compatible with adjacent interchange
- Not carried forward

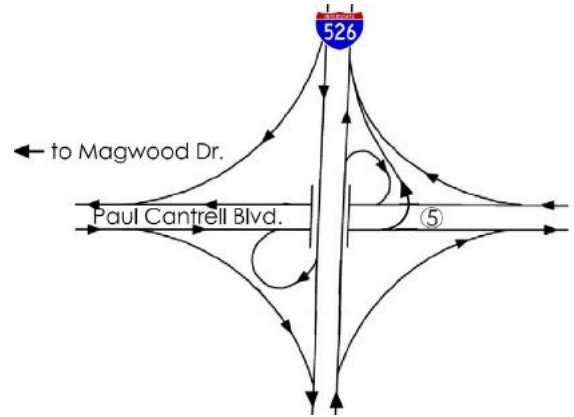


Figure 5.2 I-526 at Paul Cantrell Boulevard Alternative 1

#### **Alternative 2: Semi-Directional Ramp to I-526 eastbound with Improved Loops**

- Constructability issues with the westbound off-ramp system and the eastbound directional flyover on-ramp
- Not carried forward

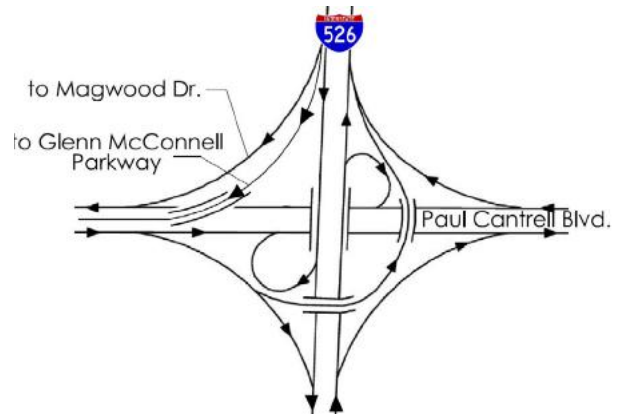


Figure 5.3 I-526 at Paul Cantrell Boulevard Alternative 2

### Alternative 3: Diverging Diamond Interchange

- Not compatible with adjacent interchange
- Not carried forward

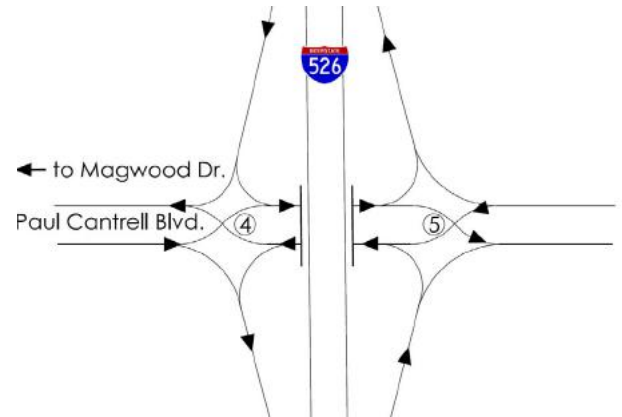


Figure 5.4 I-526 at Paul Cantrell Boulevard Alternative 3

### Alternative 4: Single Point Interchange with Semi-Directional Ramp to I-526 eastbound

- Constructability requires extensive redesign and construction of the interchange
- Not carried forward

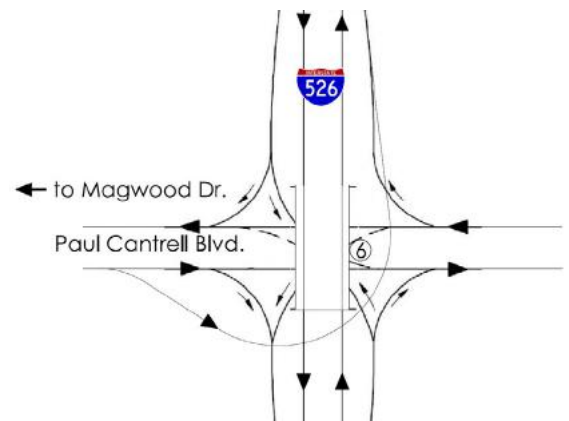


Figure 5.5 I-526 at Paul Cantrell Blvd Alternative 4

### Alternative 5: Semi-Directional Ramp to I-526 eastbound with Improved Loop Ramps and Left Turn to I-526 eastbound

- Acceptable LOS
- Compatible with adjacent interchange
- Carried Forward

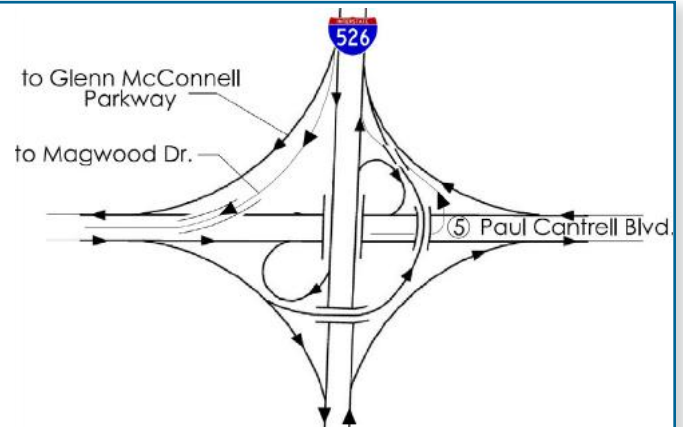


Figure 5.6 I-526 at Paul Cantrell Blvd Alternative 5

Prior to selection of an alternative for I-526 & Paul Cantrell Boulevard based on further analysis, the project goals were refined by SCDOT. These goals prioritized (1) I-526 mainline capacity, (2) improvement of the I-26 & I-526 system-to-system interchange, and (3) ensuring queues from ramp termini and adjacent intersections did not spill back onto the mainline. These priorities led to the selection of a modified Alternative 5, such that the westbound off-ramp system (with two-lanes to the separated overpass and one lane to the Paul Cantrell Boulevard surface street) was retained, but the eastbound directional flyover on-ramp was eliminated. The existing signalized intersection of Paul Cantrell Boulevard & I-526 EB on-ramp was retained. Refer to Figure 5.7 for the modified Alternative 5.

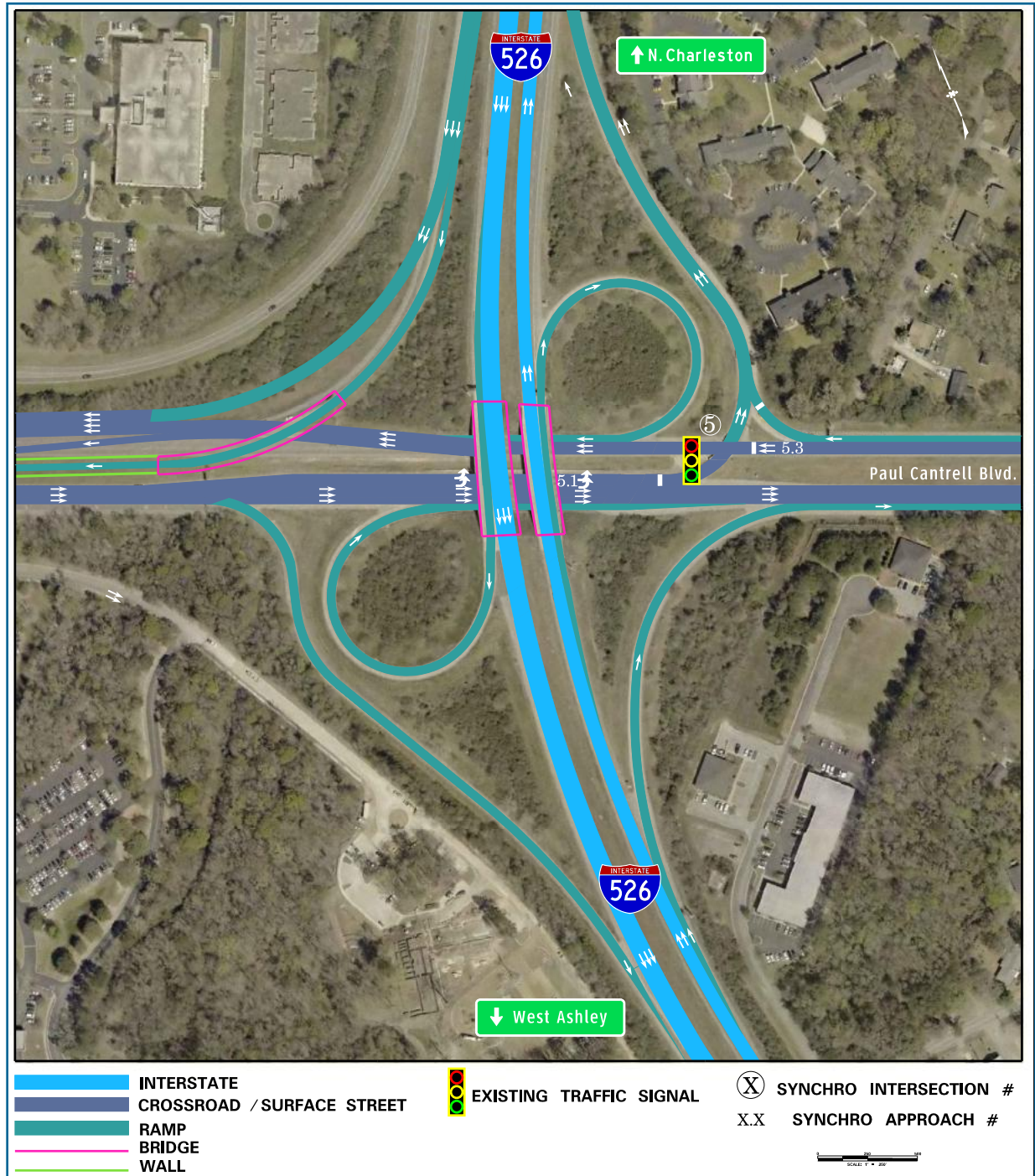


Figure 5.7 I-526 & Paul Cantrell Boulevard Interchange Improvement Alternative 5 (Carried Forward)

### *Paul Cantrell Boulevard at Magwood Drive*

Due to the proximity of Magwood Drive to the I-526 at Paul Cantrell interchange, alternatives were developed and screened to mitigate the existing congestion. Figures 5.8 - 5.14 show the seven alternatives developed for the intersection of Paul Cantrell Boulevard at Magwood Drive.

#### **Alternative 1: Diamond**

- Not compatible with adjacent interchange
- Not carried forward

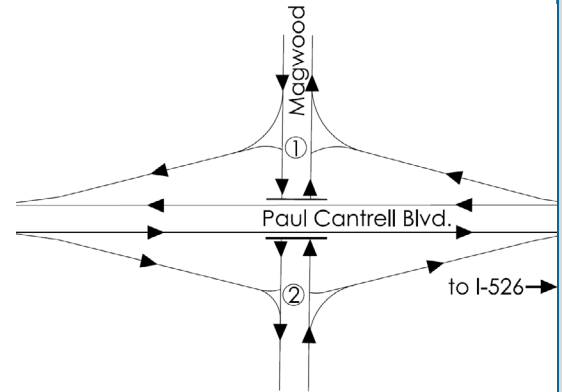


Figure 5.8 Paul Cantrell Boulevard at Magwood Drive Alternative 1

#### **Alternative 2: Diamond with Braided Ramps**

- Constructability issues with the replacement of the westbound overpass bridge to provide a free-flow exit
- Not carried forward

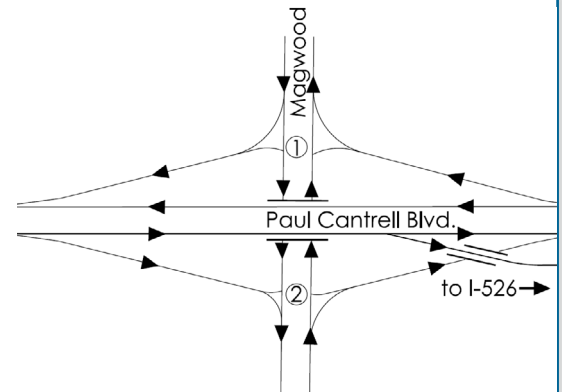


Figure 5.9 Paul Cantrell Boulevard at Magwood Drive Alternative 2

#### **Alternative 3: Single Point Interchange**

- Not compatible with adjacent interchange
- Not carried forward

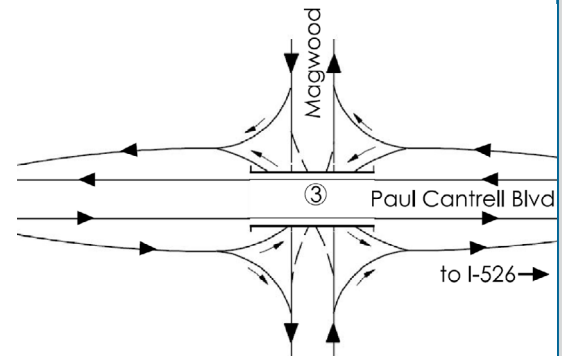


Figure 5.10 Paul Cantrell Boulevard at Magwood Drive Alternative 3



#### Alternative 4: Compressed Diamond with Phase Overlap

- Not compatible with adjacent interchange
- Not carried forward

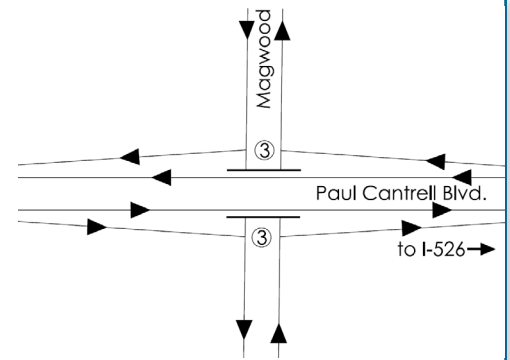


Figure 5.11 Paul Cantrell Boulevard at Magwood Drive Alternative 4

#### Alternative 5: Interchange with Separated Overpass Bridge

- Acceptable LOS
- Compatible with adjacent interchange
- Carried forward

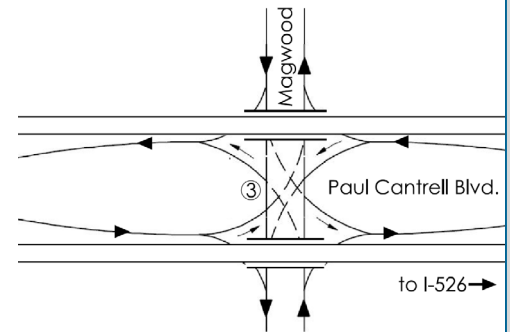


Figure 5.12 Paul Cantrell Boulevard at Magwood Drive Alternative 5

#### Alternative 6: Maximized At Grade Intersection

- Does not provide acceptable LOS
- Not carried forward

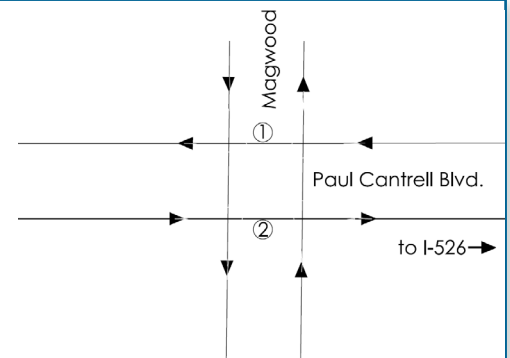


Figure 5.13 Paul Cantrell Boulevard at Magwood Drive Alternative 6

#### Alternative 7: Continuous Flow Intersection

- Does not provide acceptable LOS
- Not compatible with adjacent interchange
- Not carried forward

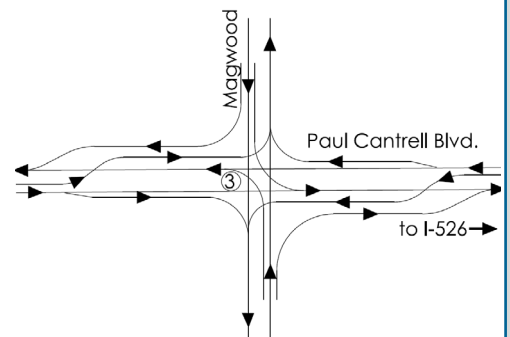


Figure 5.14 Paul Cantrell Boulevard at Magwood Drive Alternative 7

Prior to selection of a preferred alternative for Paul Cantrell Boulevard & Magwood Drive based on further analysis, the project goals were refined by SCDOT. These goals prioritized (1) I-526 mainline capacity, (2) improvement of the I-26 & I-526 system-to-system interchange, and (3) ensuring queues from ramps did not spill back onto the mainline. These priorities altered the alternative screening process for this interchange, leading to the selection of a modified Alternative 5, such that the westbound overpass bridge was retained (to provide free-flow for traffic exiting I-526) but the eastbound overpass bridge was eliminated (as it did not contribute to the three priorities). This geometry is shown in Figure 5.15.

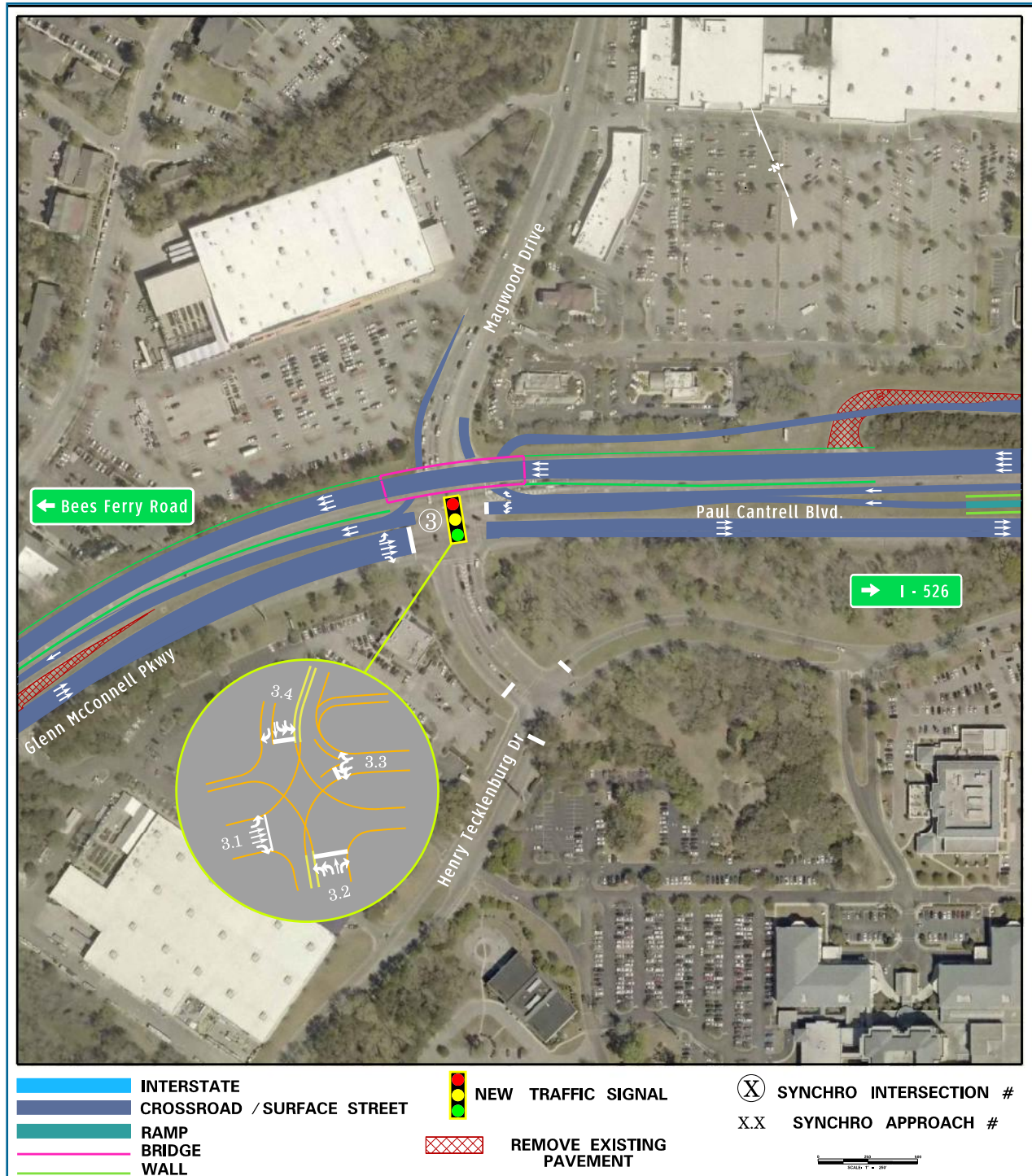


Figure 5.15 Paul Cantrell Boulevard & Magwood Drive Interchange Improvement Alternatives (Carried Forward)



## *I-26/I-526 System-to-System Interchange*

Alternatives were developed based on separating movements that create congestion caused by closely spaced ramps and inadequate lengths of merges and weaves.

### **Alternative 1: Semi-Directional Interchange**

- C-D roads added to north and south side of I-526 through Rivers Avenue interchange and on th N Rhett/Virginia Avenue
- Eastbound I-526 to westbound I-26 directional ramp moved to cross over I-26 north of I-526
- Carried forward as it meets an acceptable LOS, resolves existing geometric deficiencies and is compatible with adjacent interchanges

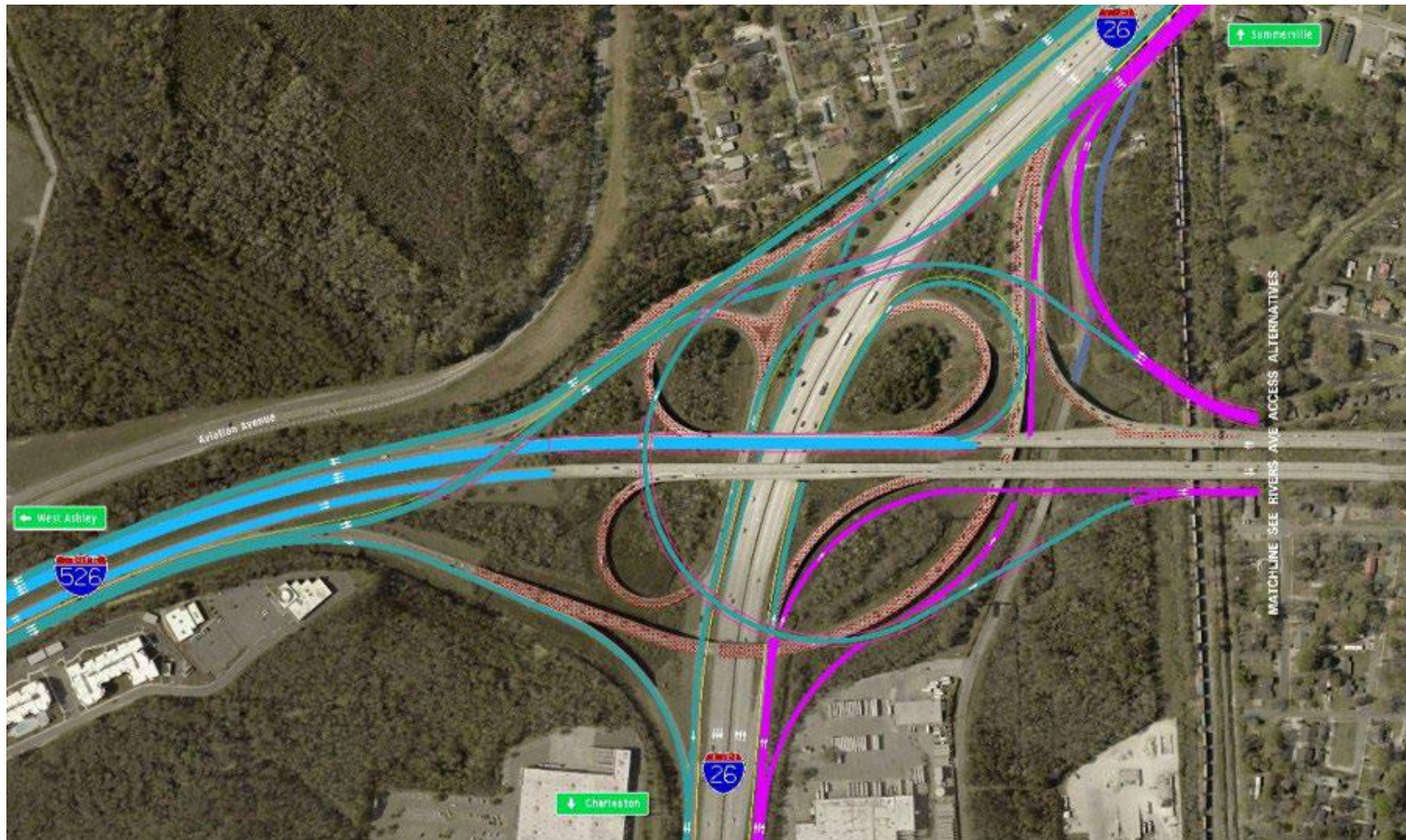


Figure 5.16 I-26/I-526 Alternative 1



### Alternative 2: Semi-Directional Interchange with 1 Loop Ramp Retained

- C-D roads added to north and south side of I-526 through Rivers Avenue interchange
- Eastbound I-526 to westbound I-26 uses existing directional ramp
- Carried forward as it has an acceptable LOS, resolves existing geometric deficiencies and is compatible with adjacent interchanges

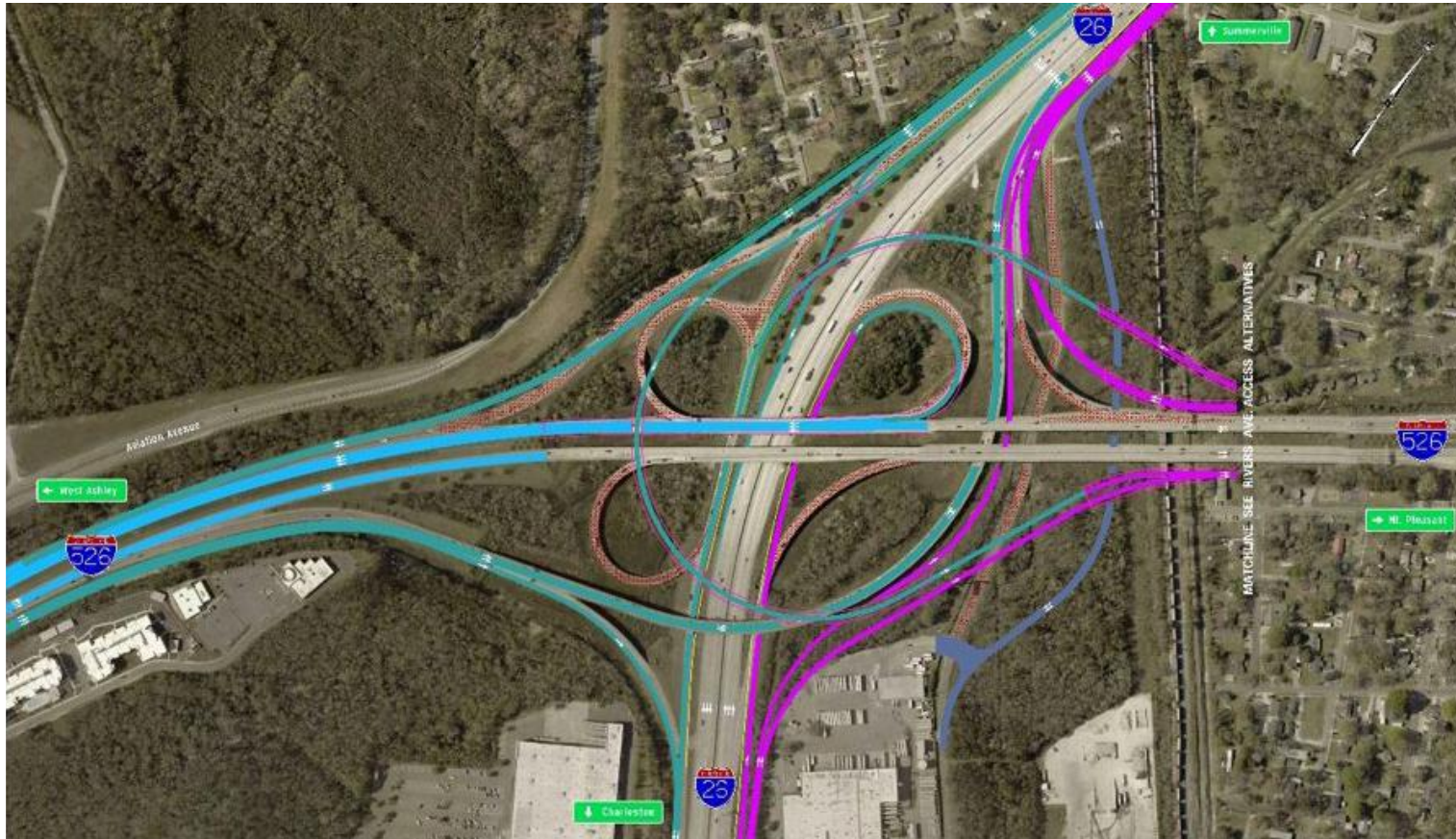


Figure 5.17 I-26/I-526 Alternative 2



### Alternative 3: Semi-Directional Turbine Interchange

- Not carried forward due to significantly larger footprint and impacts to federal properties as well as airport flight paths.

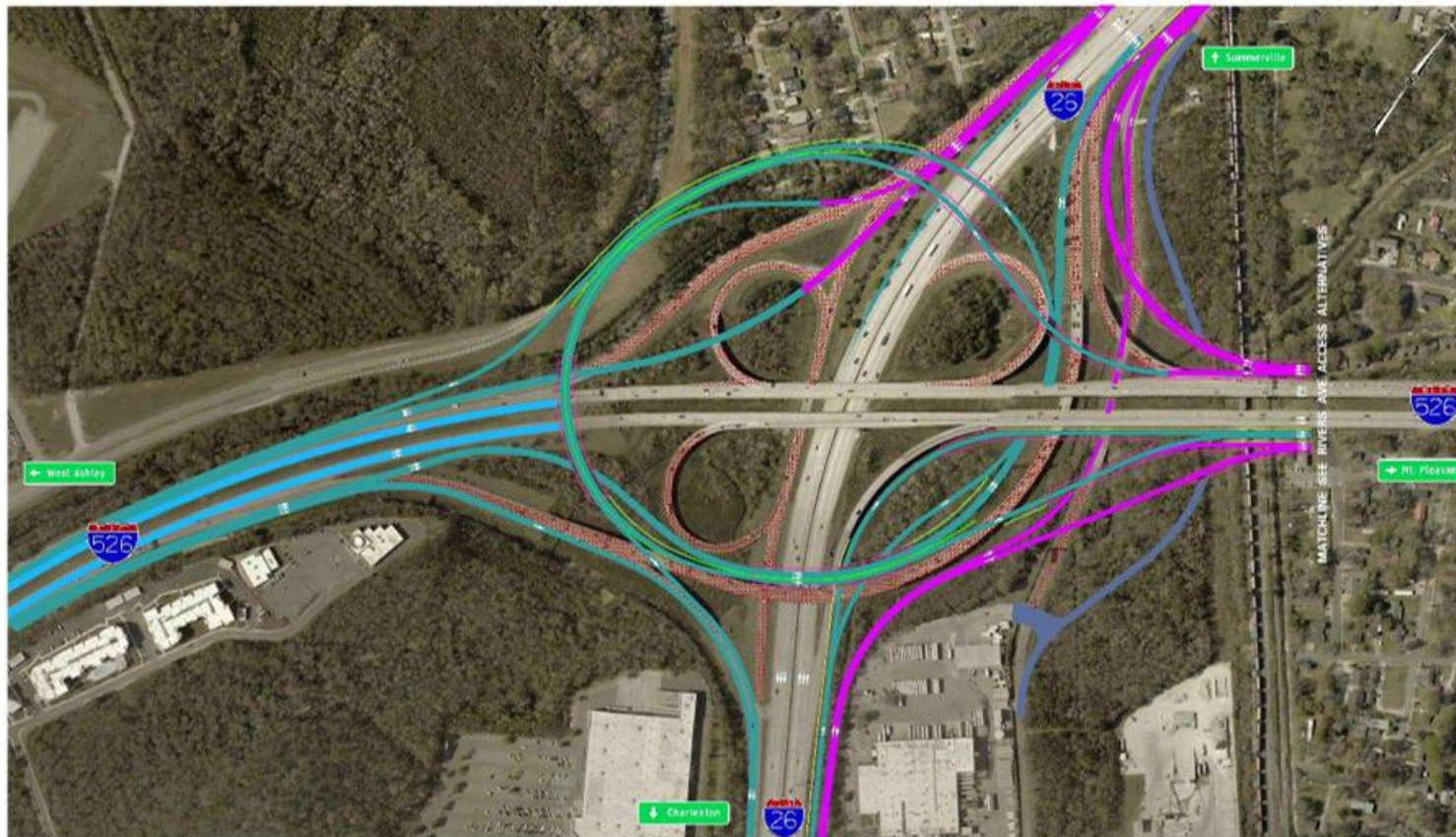


Figure 5.18 I-26/I-526 Alternative 3

#### Alternative 4: Semi-Directional with 3 Levels of Ramping

- Westbound I-26 to westbound I-526 loop ramp replaced with a directional ramp, creating 3-level-high interchange
- Not carried forward due to complex constructability

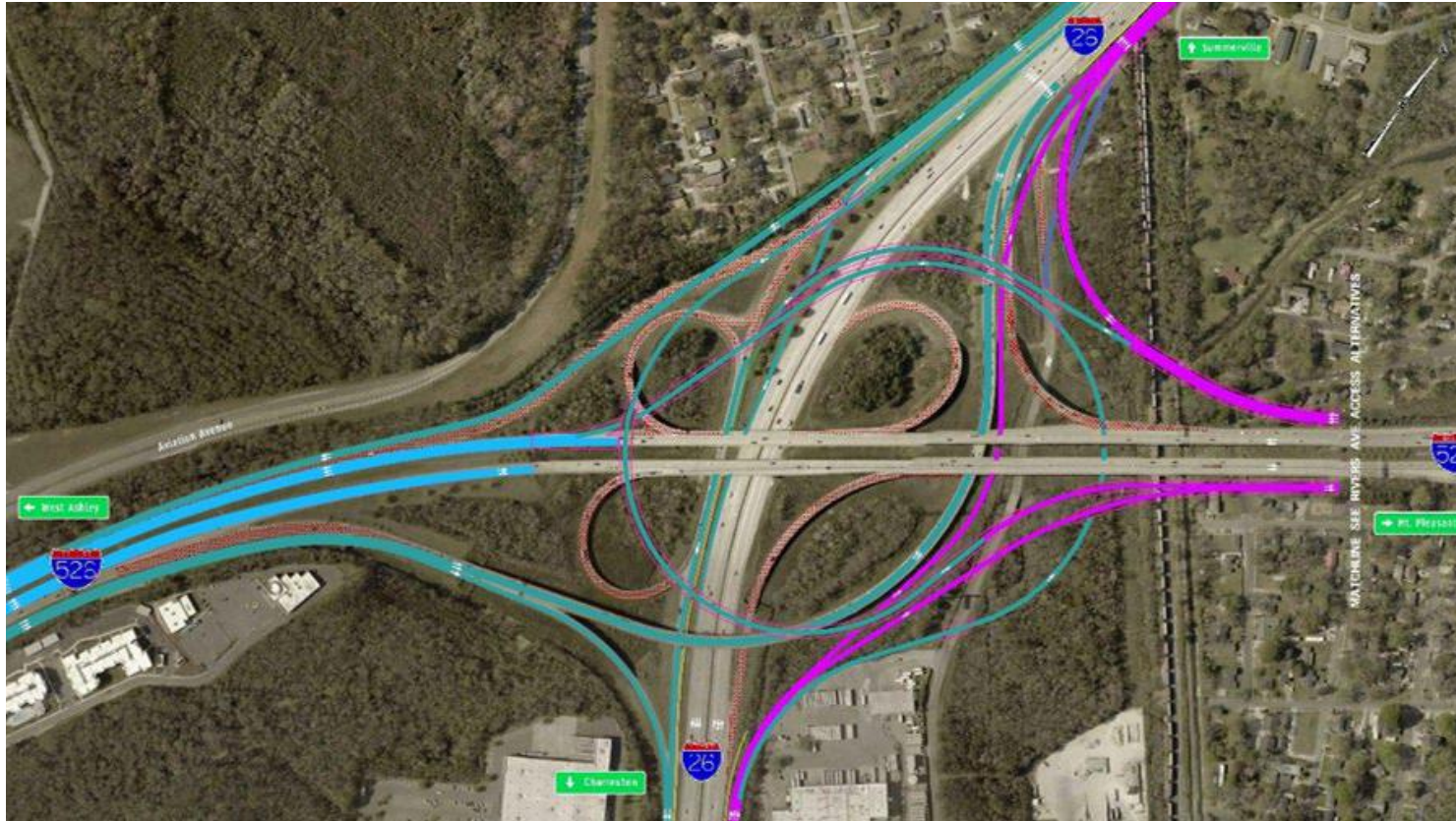


Figure 5.19 I-26/I-526 Alternative 4



## *I-526 at Rivers Avenue*

One interchange alternative was developed from the 2013 Corridor Study, the Partial Cloverleaf Rebuild. This alternative was developed based on separating movements that create congestion caused by closely spaced ramps and inadequate lengths of merges and weaves. The second alternative is a basic build scenario that proposes new C-D roads, but no improvements to the existing interchange.

### **Rivers Avenue: Basic Build**

- New C-D roads constructed over the existing eastbound and westbound Rivers Avenue interchange
- Direct access from Rivers Avenue to I-26 via I-526 is removed; access I-26 from the I-26 at Remount Road interchange to the north or at I-26 at Montague Avenue to the south
- Carried forward as it has acceptable LOS, resolves geometric deficiencies and is compatible with adjacent interchanges

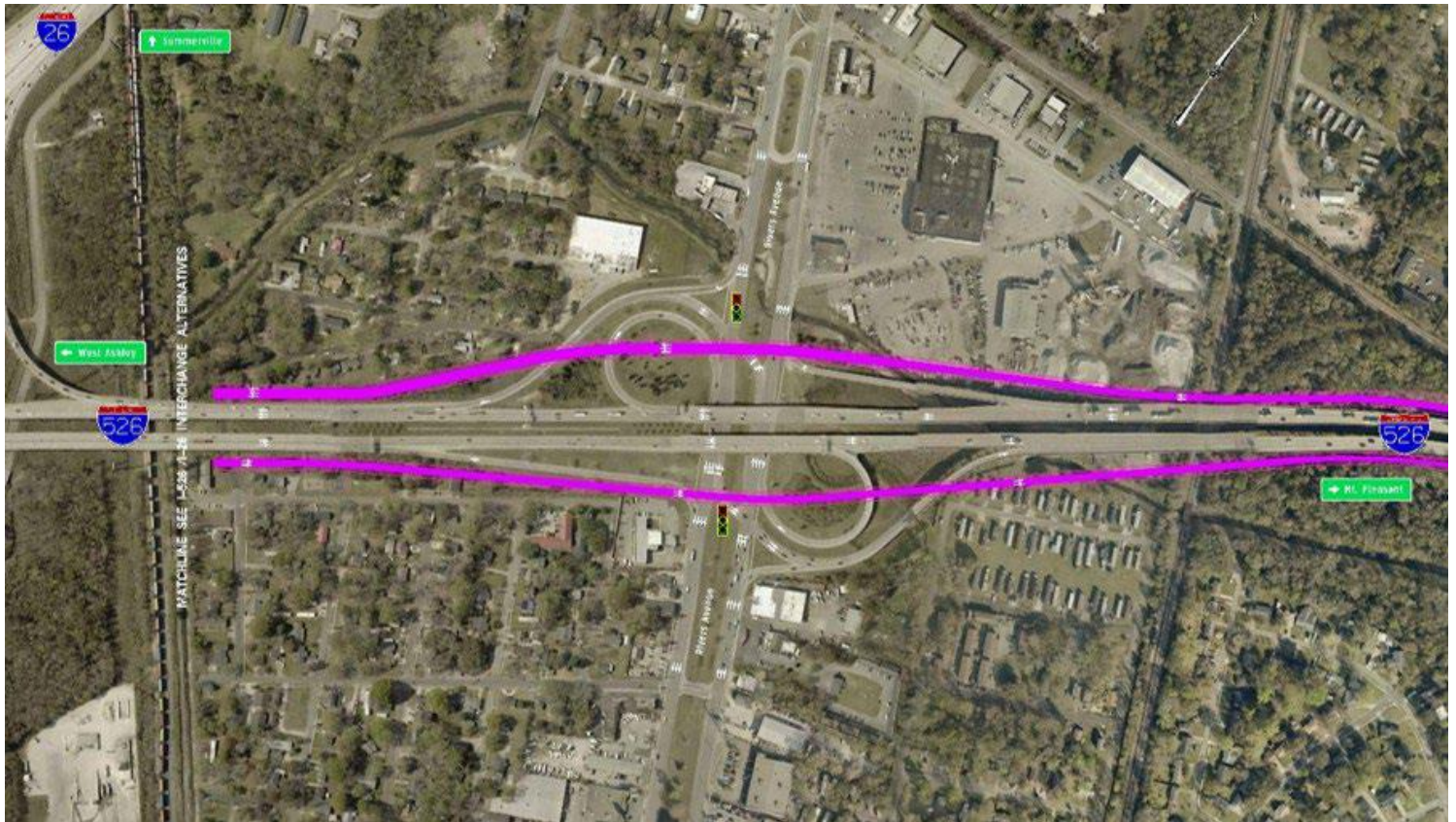


Figure 5.20 I-526 at Rivers Avenue Basic Build



## *I-526 at Rivers Avenue*

### **Rivers Avenue: Relocated Partial Cloverleaf**

- New C-D system constructed over Rivers Avenue
- Additional ramps constructed between Rivers Avenue and C-D system to maintain access to I-26 via I-526 from Rivers Avenue
- Carried forward as it has acceptable LOS, resolves geometric deficiencies and is compatible with adjacent interchanges

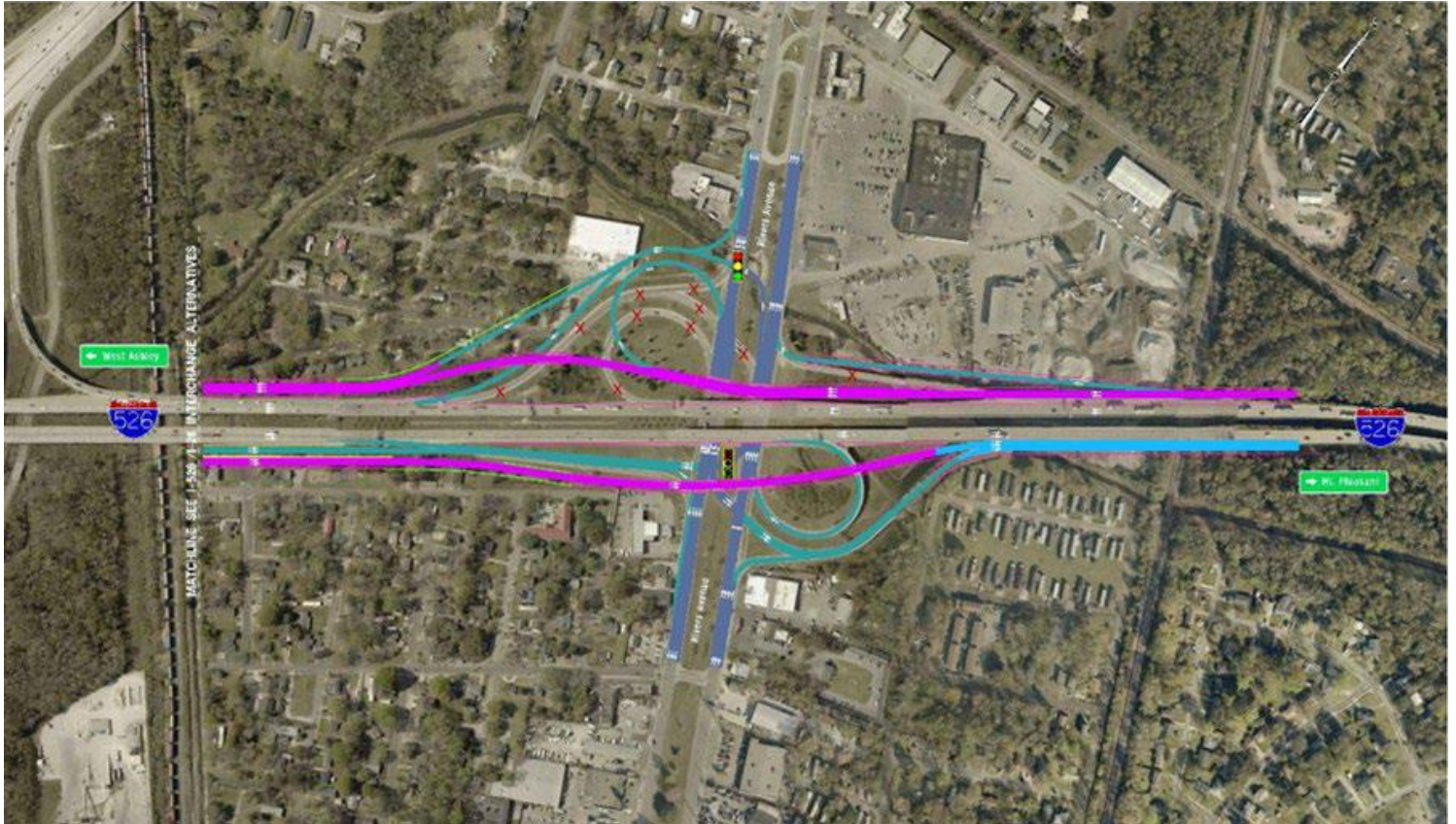


Figure 5.21 I-526 at Rivers Avenue Relocated Partial Cloverleaf



## I-526 at N Rhett/Virginia Avenue

Traffic patterns between the Don Holt Bridge and I-26 led the development of the N Rhett/Virginia Avenue interchange alternatives. Traffic projections indicate one-third of westbound traffic exits at N Rhett/Virginia Avenues, one-third exits to I-26 and one-third continues west on I-526 past I-26. Eastbound traffic over the Don Holt Bridge shows similar forecast comparisons with one-third originating west of I-526, one-third coming from I-26, and one-third from N Rhett/Virginia Avenues. Entering and exiting traffic at Rivers Avenue comprises a nominal portion of the traffic in each direction. A key component of the N Rhett/Virginia Avenue interchange concept development is providing connections to the C-D roads in a manner that accommodates forecasted traffic patterns. The forecasted traffic patterns support the use of C-D roads to provide additional capacity between I-26 and the Cooper River.

The capacity of the existing N Rhett/Virginia Avenue interchange is limited by geometric deficiencies. The existing loop ramps of the interchange have a 25-mph design speed with very short weave distances in both eastbound and westbound directions. To address these deficiencies and respond to future traffic demand, interchange improvement alternatives were developed for this interchange as part of the I-526 LCC WEST project. The major design constraints considered during alternative development included existing CSX and Norfolk Southern rail lines running adjacent to and underneath the interstate, as well as Filbin Creek, a major tributary to the Cooper River, flowing adjacent to the I-526 mainline and crossing under I-526 just west of N Rhett Avenue.

Four alternatives were developed for the initial screening process to accommodate anticipated traffic demand to a design LOS D or better. Traffic volumes utilizing Virginia Avenue on and off-ramps, particularly trucks accessing the North Charleston Port Terminal and other industrial land uses have expressed the need to retain access. Refer to Figures 5.22 - 5.25 for descriptions of the alternatives.

### Alternative 1: On-ramp from N Rhett Avenue to I-526 eastbound and westbound through one intersection along N Rhett Avenue with separate access to Virginia Avenue

- Compatible with adjacent interchange
- Flexible with Don Holt bridge replacement
- Does not provide direct access between Virginia Avenue and I-526 (traffic must travel through N Rhett Avenue intersection)
- Carried forward

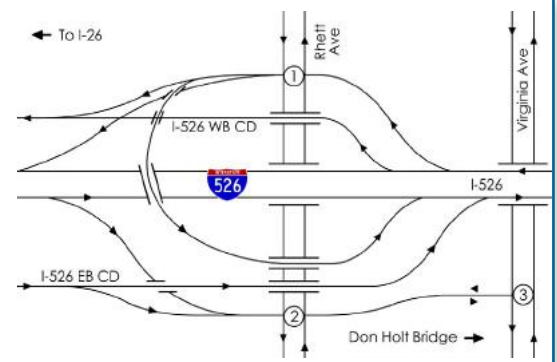


Figure 5.22 I-526 at N Rhett/Virginia Avenue Alternative 1

### Alternative 2: Diamond Interchange with access to Virginia Avenue

- Compatible with adjacent interchange
- Flexible with Don Holt bridge replacement
- Does not provide direct access between Virginia Avenue and I-526 (traffic must travel through N Rhett Avenue intersection)
- Carried forward

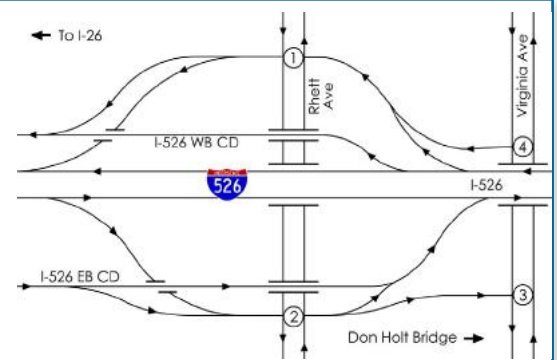


Figure 5.23 I-526 at N Rhett/Virginia Avenue Alternative 2

### Alternative 3: Improve existing Loop Ramps

- Not compatible with adjacent interchange
- Does not provide direct access between Virginia Avenue and I-526 (constructability issue due to removing the direct access to/from I-526 and Virginia Avenue, requiring these movements to be made via parallel routes)
- Not carried forward

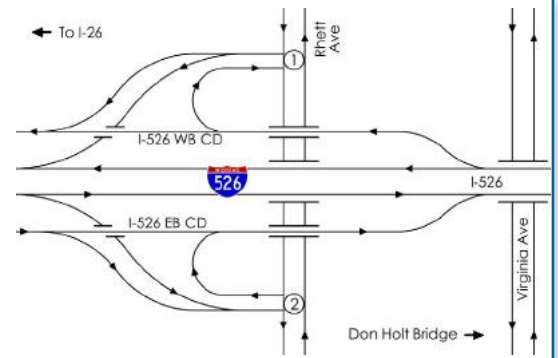


Figure 5.24 I-526 at N Rhett/Virginia Avenue Alternative 3

### Alternative 4: Directional ramps from northbound to southbound N Rhett Avenue traffic

- Not compatible with adjacent interchange
- Does not provide direct access between Virginia Avenue and I-526 (traffic must travel through N Rhett Avenue intersection)
- Not carried forward

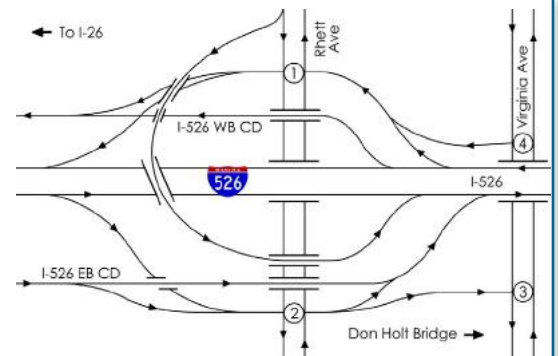


Figure 5.25 I-526 at N Rhett/Virginia Avenue Alternative 4

## 6 What are the Proposed Reasonable Alternatives Presented at the Public Information Meeting?

Based on the screening previously described in Section 5, the preliminary alternatives are evaluated based on their ability to meet the purpose and need, as well as additional criteria. Prior to the public meeting the following alternatives were identified as Proposed Reasonable Alternatives:

- No-Build
- Existing Corridor Improvements
  - > Mainline Interstate Alternatives
    - 8-lane widening
  - > Interchange Alternatives (Refer to Figure 6.1)
    - One alternative at I-526 at Paul Cantrell Boulevard that includes the intersection at Magwood Drive
    - Due to proximity of I-526 at I-26 and Rivers Avenue, these interchanges are combined. Four alternatives are being carried forward as Reasonable Alternatives
    - Two alternatives at I-526 at N Rhett/Virginia Avenue

### Preliminary Alternatives Screening Criteria:

- Acceptable LOS
- Compatible with Adjacent Interchange
- Geometric Deficiencies Resolved
- Flexibility with Don Holt Bridge Replacement
- Constructability





I-526 at Paul Cantrell Blvd



I-526 at I-26 and Rivers Ave: Alternative 1



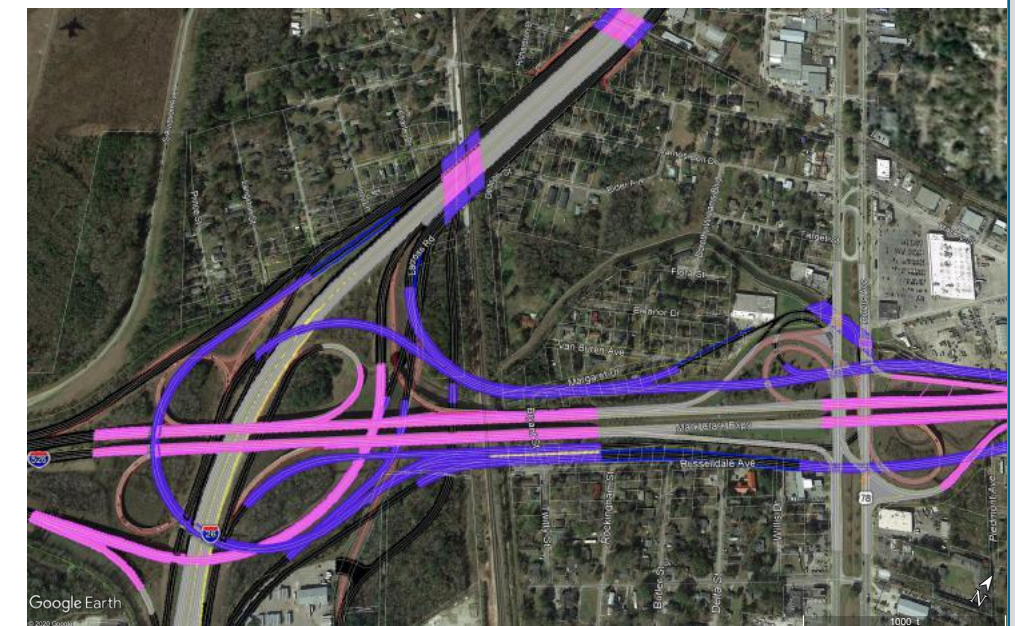
I-526 at I-26 and Rivers Ave: Alternative 1A



I-526 at N Rhett/Virginia Ave: Alternative 1



I-526 at I-26 and Rivers Ave: Alternative 2



I-526 at I-26 and Rivers Ave: Alternative 2A



I-526 at N Rhett/Virginia Ave: Alternative 2



Figure 6.1 I-526 LCC WEST Proposed Reasonable Interchange Alternatives



## 6.1 Public Input on Proposed Reasonable Alternatives

During the November 21, 2019 Public Information Meeting (PIM) and the Virtual Public Information Meeting (VPIM), the public were encouraged to provide feedback on the proposed reasonable alternatives. For more information about the PIM see Chapter 6, section 6.4.1.3 of the Environmental Impact Statement.

Following the I-526 WEST PIM, feedback was received about the I-526 / North Rhett Avenue and I-526 / Virginia Avenue interchange alternatives. Joint Base Charleston, State Ports Authority, and the City of North Charleston expressed concerns over the removal of direct access between Virginia Avenue and I-526 in the proposed alternatives. In the two alternatives presented at the I-526 WEST PIM access to/from Virginia Avenue from/to I-526 required processing through the ramp terminal intersections on N Rhett Avenue. Alternatives 5 and 6 were developed that incorporated a Texas U-Turn style ramp that traveled from Virginia Avenue, back to the west and under I-526 adjacent to N Rhett Avenue to provide direct access to I-526 eastbound. Access from I-526 westbound would also utilize the U-Turn ramp for direct access to Virginia Avenue. Existing access from Virginia Avenue to I-526 westbound was retained and new ramps will provide access from I-526 eastbound to Virginia Avenue.

In addition to public comments regarding direct access from I-526 and Virginia Avenue, regulatory and commenting agencies also expressed concerns with alternatives avoiding and minimizing impacts to environmentally sensitive areas within the alternative corridors. In an effort to evaluate an alternative that both met the purpose and need of the project and minimized impacts, an alternative that was a combination of reasonable alternatives 6 and 2 was developed. Alternative 2A, Alternative 5, and Alternative 6 were developed as proposed Reasonable Alternatives for the I-526 at N Rhett/Virginia Avenue interchange. Therefore, a total of five alternatives are being carried forward at the N Rhett/Virginia Avenue interchange. Refer to Figure 6.2 through 6.5 for Alternatives 2A, 5, and 6.

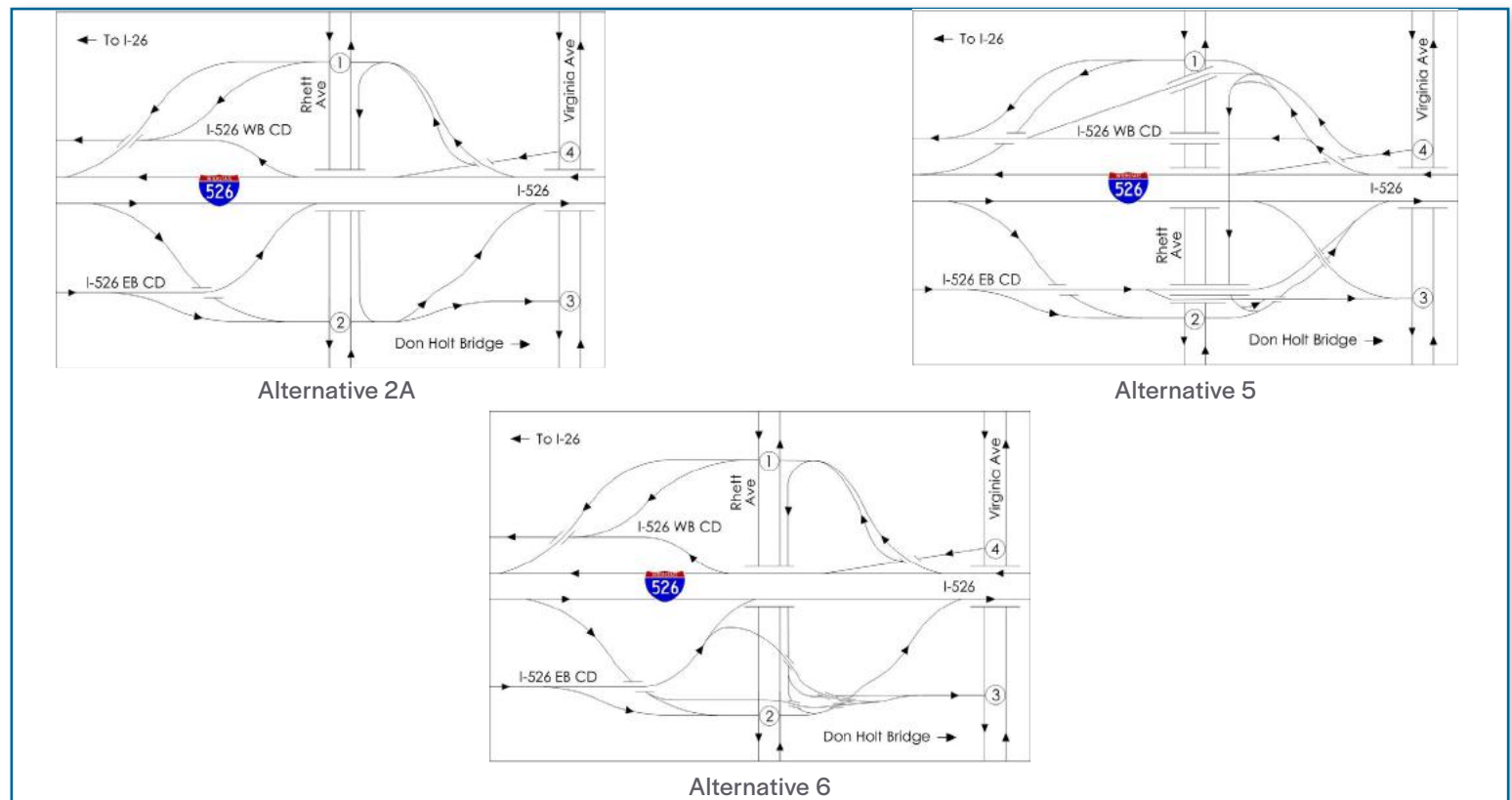


Figure 6.2 I-526 at N Rhett/Virginia Avenue Alternatives 2A, 5, and 6

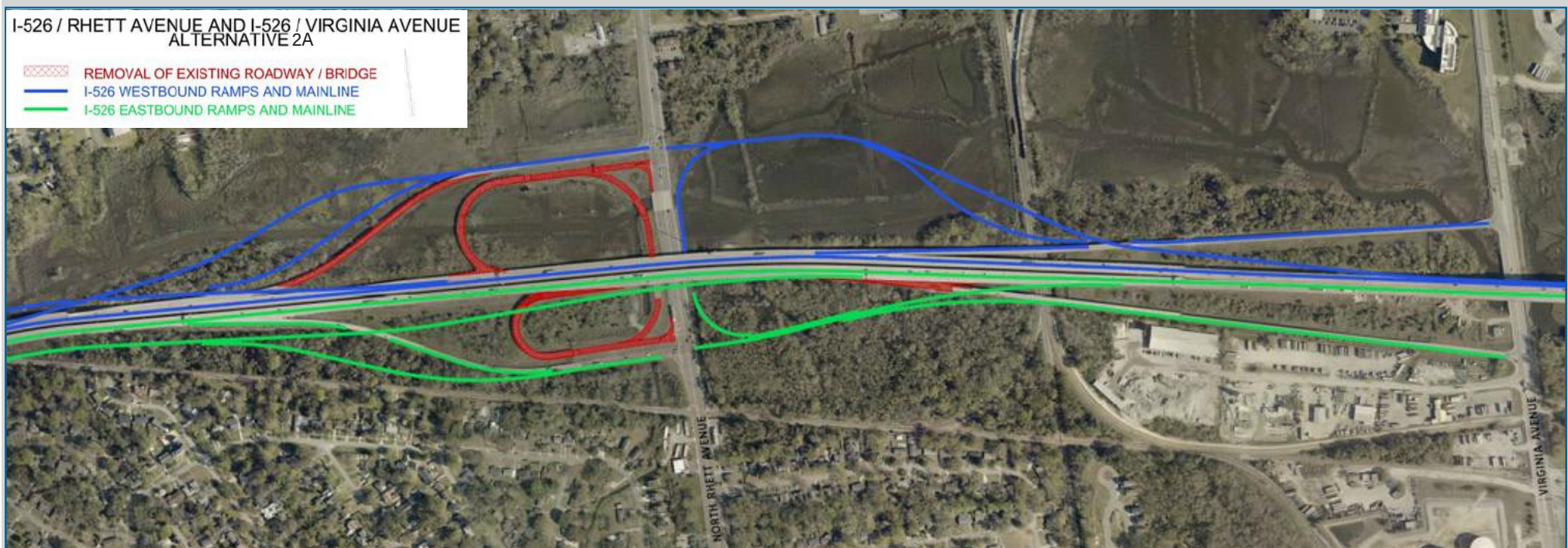


Figure 6.3 I-526 at N Rhett/Virginia Avenue Alternative 2A



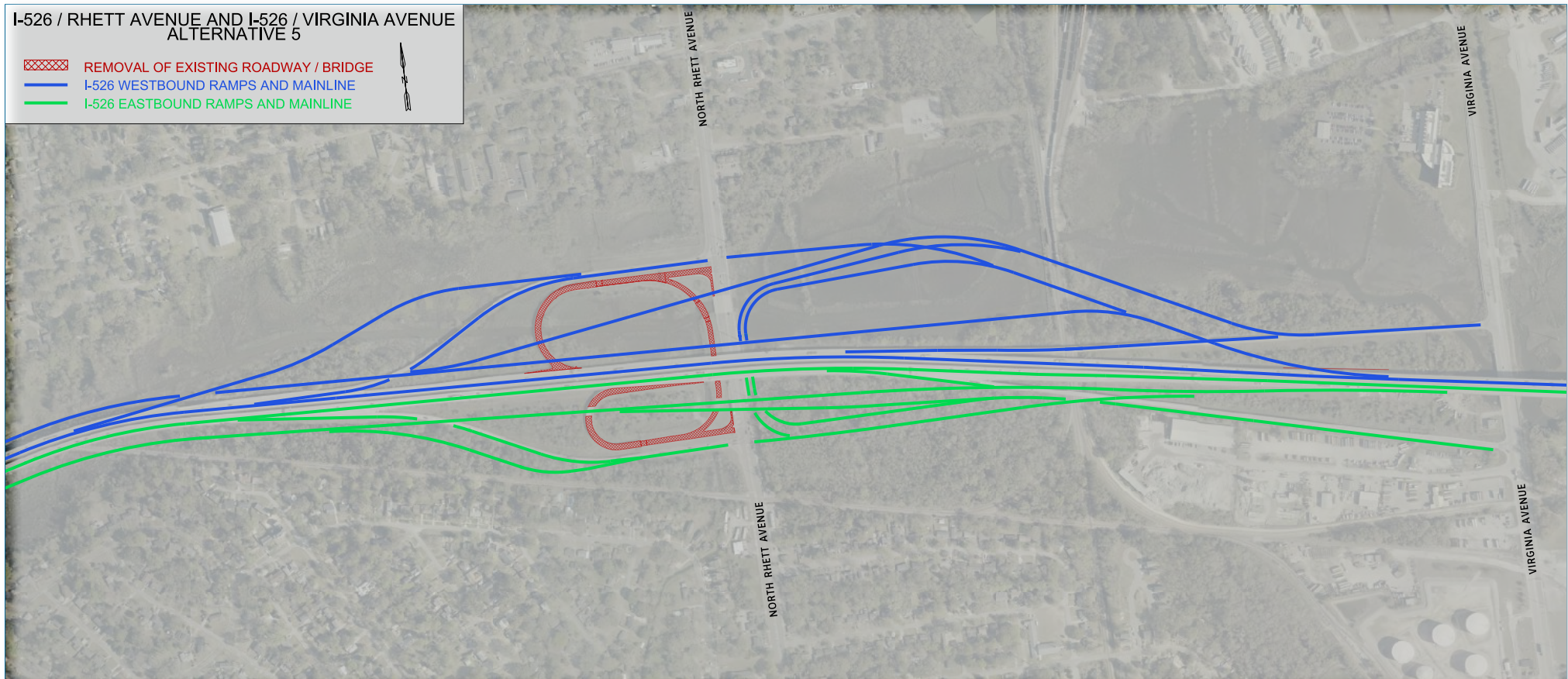


Figure 6.4 I-526 at N Rhett/Virginia Avenue Alternative 5



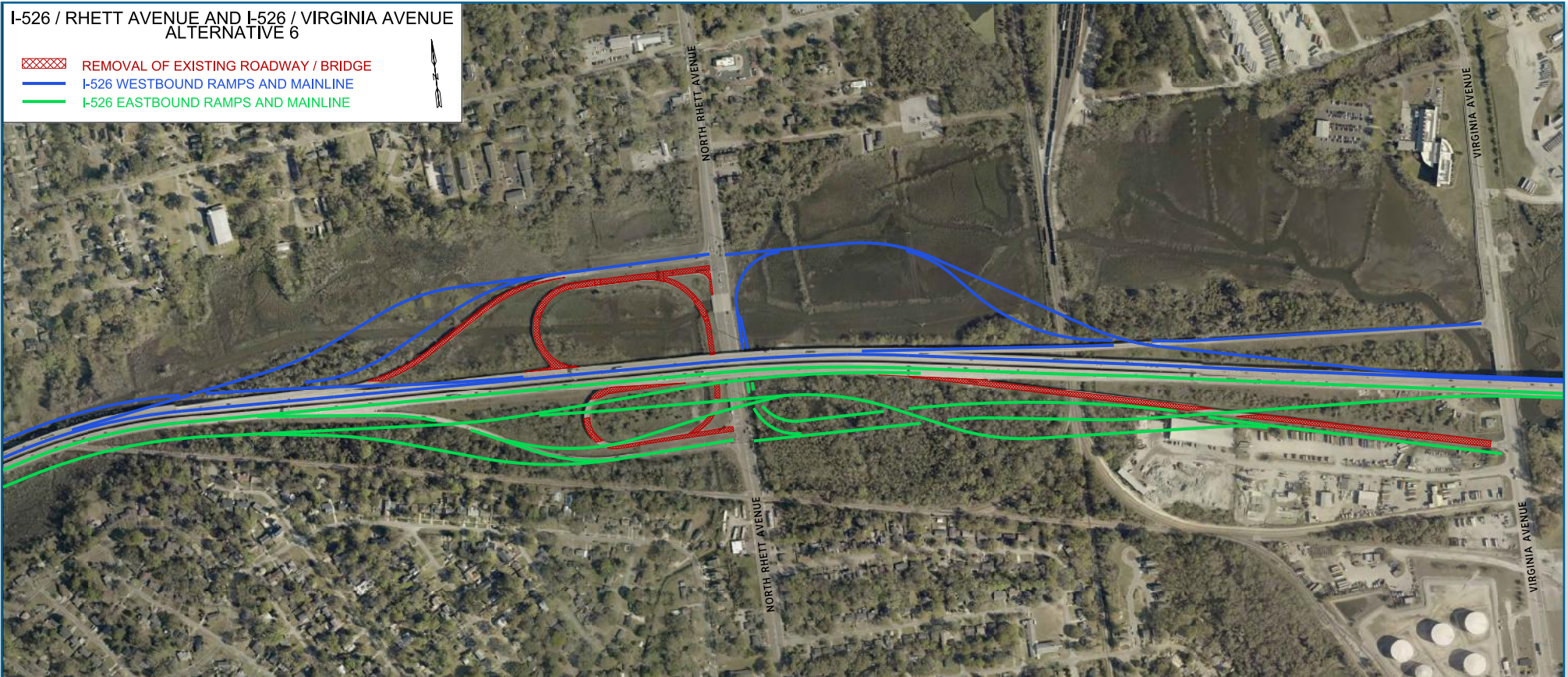


Figure 6.5 I-526 at N Rhett/Virginia Avenue Alternative 6



## 6.2 Detailed Impact Evaluation of Proposed Reasonable Alternatives

In summary, the Proposed Reasonable Alternatives include the following:

- No-Build
- Mainline Interstate 8-lane widening
- Interchange Alternatives
  - > One alternative at I-526 at Paul Cantrell Boulevard that includes the intersection at Magwood Drive
  - > Four alternatives at I-526 at I-26 and Rivers Avenue
    - Alternative 1
    - Alternative 1A
    - Alternative 2
    - Alternative 2A
  - > Five alternatives at I-526 at N Rhett/Virginia Avenue
    - Alternative 1
    - Alternative 2
    - Alternative 2A
    - Alternative 5
    - Alternative 6

In order to perform a detailed impact evaluation on the above alternatives, the widening of the mainline to 8-lanes was combined with the interchange alternatives into the following three sections and shown in Figure 6.6.

- Paul Cantrell Boulevard to International Boulevard
- International Boulevard to Rivers Avenue
- Rivers Avenue to Virginia Avenue

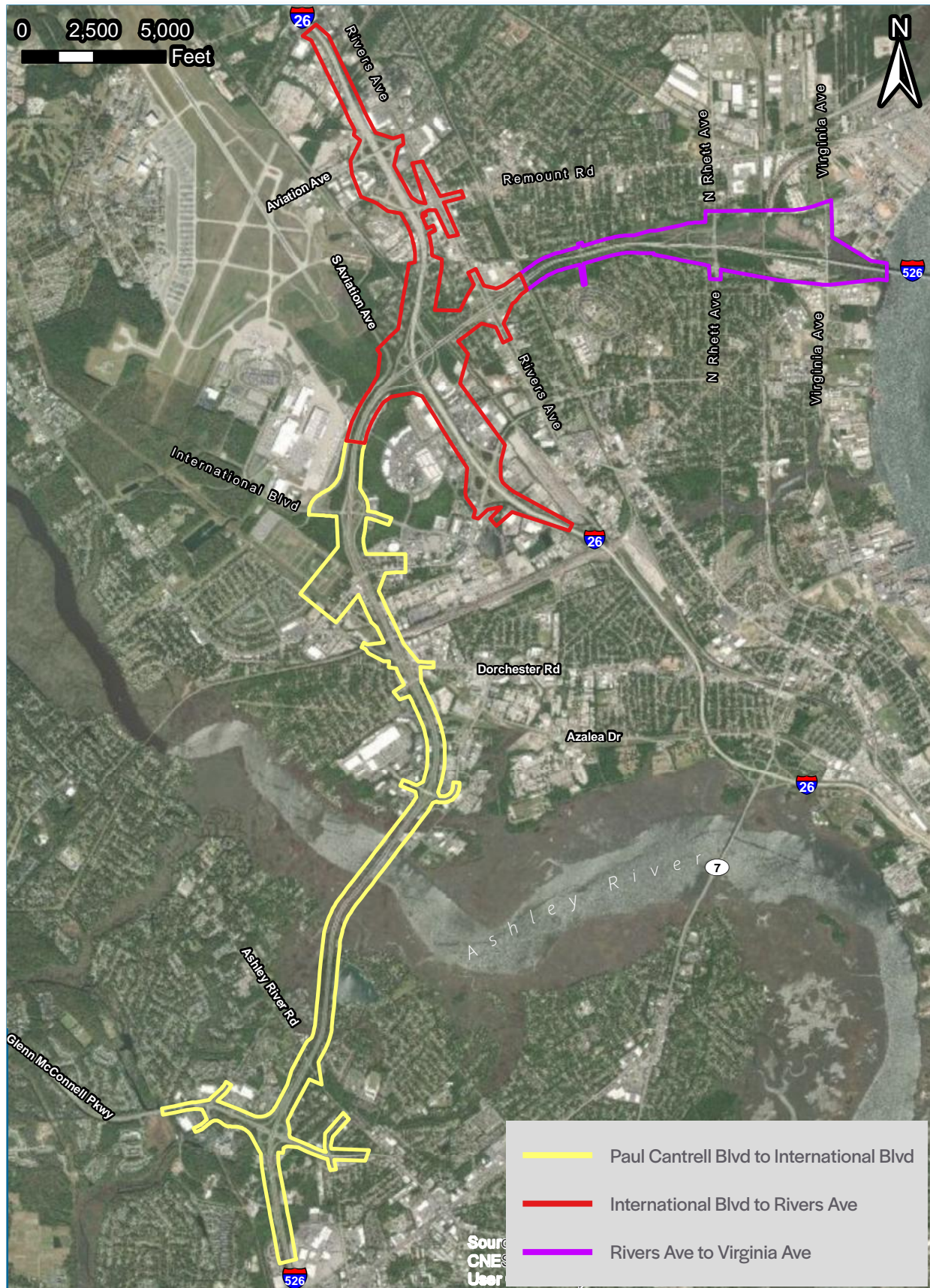


Figure 6.6 Proposed Reasonable Alternatives Sections of I-526 LCC WEST

Each section was then evaluated based on the following criteria:

- Purpose and Need: 2050 Traffic Analysis
  - > Geometric Deficiencies Resolved
  - > Provides Direct Access to/from I-526
  - > Provides Direct Access to/from I-26
  - > Weighted v/c Ratio
  - > Intersection LOS/Delay
  - > Mainline LOS
- Wetlands
  - > Freshwater Impact Based on Right-of-Way
  - > Critical Area Impact Based on Right-of-Way
  - > Critical Area (Ashley River) Bridge Construction Temporary Access Based on Right-of-Way
  - > Pond Impact Based on Right-of-Way
  - > Freshwater Stream Impact Based on Right-of-Way
- Relocations
  - > Residential
  - > Businesses
  - > Churches
  - > Community Facilities
- Environmental Justice
- Threatened & Endangered Species
- Essential Fish Habitat
- Cultural Resources
- Section 4(f) & 6(f)
- Utilities
- Cost

**Weighted v/c Ratio** A way to measure the efficiency of the alternatives for moving traffic within the interchange

**AADT = Average Annual Daily Traffic**

**LOS = Level of Service** Way to describe roadway operating conditions based on speed, travel time, maneuverability, delay and safety

**v/c Ratio = volume to capacity Ratio** Compares roadway demand (volume) with roadway supply (capacity)

Refer to Chapter 2, section 2.1.2.



## 6.2.1 Paul Cantrell Boulevard to International Boulevard

This alternative encompasses the interchange at Paul Cantrell Boulevard and I-526, the intersection at Paul Cantrell Boulevard and Magwood Drive, and the widening of I-526 from Paul Cantrell Boulevard to International Boulevard, refer to Figure 6.7.

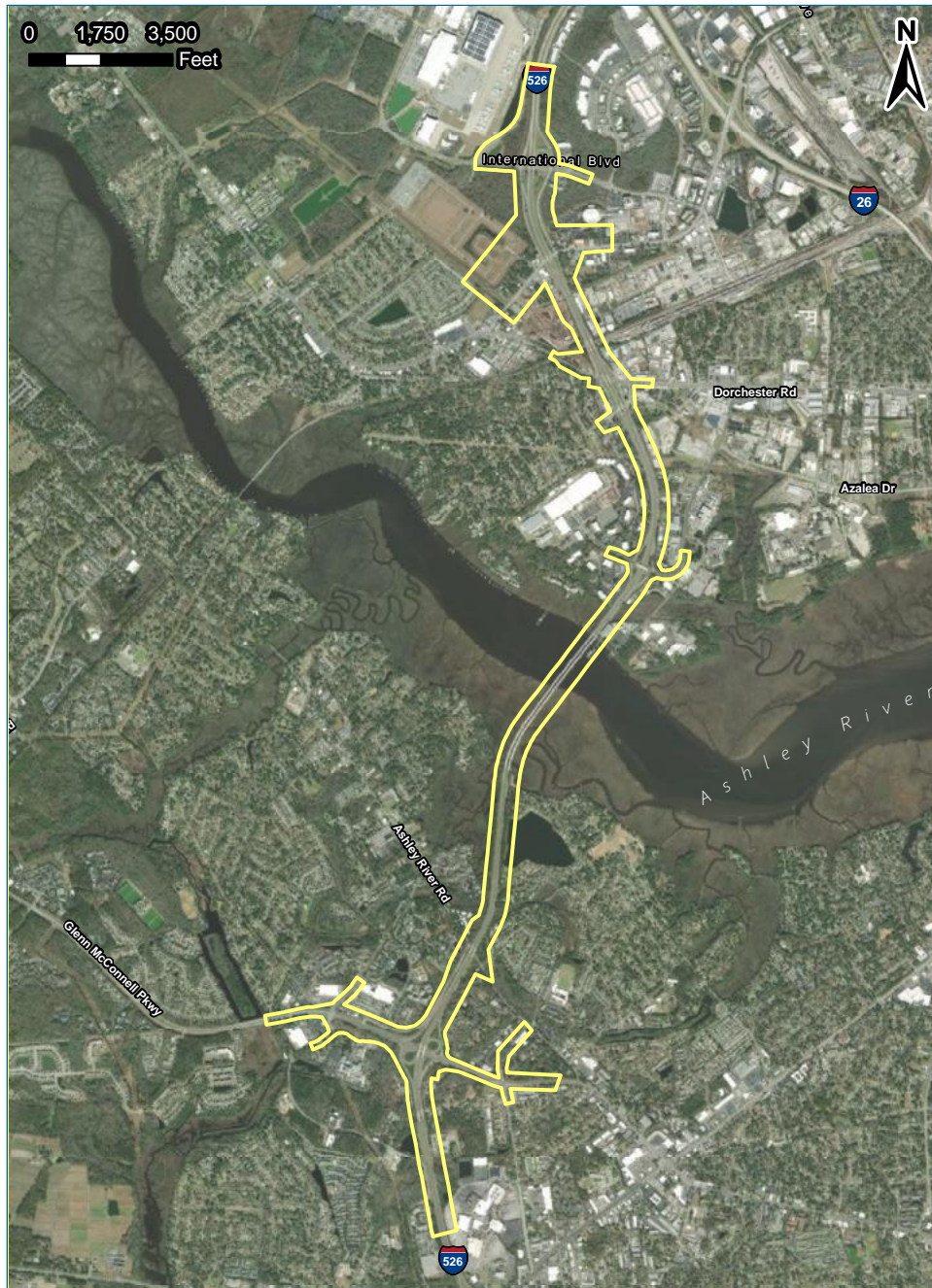


Figure 6.7 I-526 LCC WEST Section from Paul Cantrell Boulevard to International Boulevard

As shown in Table 6.1, the proposed alternative would resolve 15 out of the 16 identified geometric deficiencies as compared to the No-Build Alternative. The proposed alternative would also improve the weighted v/c ratio and the mainline LOS as compared to the No-Build.

**Geometric Deficiency is the consideration of the inadequacies of roadway design. For more details refer to Chapter 2, section 2.1.5.**



Table 6.1 Proposed Reasonable Alternatives Screening Matrix : Paul Cantrell Blvd to International Blvd

		No-Build	Paul Cantrell Blvd to International Blvd
Purpose & Need: 2050 Traffic Analysis	Geometric Deficiencies Resolved	0/16	15/16
	Provides Direct Access to/ from I-526 (Yes/No)	Yes	Yes
	Provides Direct Access to/ from I-26 (Yes/No)	N/A	N/A
	Weighted v/c Ratio	1.74   2.50   2.90   3.11	0.72   0.75   0.72   0.67
	Intersection Delay/LOS	N/A	N/A
	Mainline LOS	F	D/D/C/C
Freshwater Wetland Impact Based on R/W	(Acres)	0	19.3
Critical Area Impact Based on R/W	(Acres)	0	15.5
Critical Area (Ashley River) Bridge Construction Temporary Access Based on R/W	(Acres)	0	9.1
Pond Impact Based on R/W	(Acres)	0	0.03
Freshwater Stream Impact Based on R/W	(Feet)	0	327.0
Relocations	Residential	0	4 Single-Family Homes; 2 Multi-Family Complexes, 6 Units Total
	Businesses	0	8
	Churches	0	0
	Community Facilities	0	0
	Total	0	18
Environmental Justice	Yes/No	No	No
Threatened & Endangered Species		0	May Effect, Not Likely to Adversely Affect
Essential Fish Habitat	Yes/No	No	Yes
Cultural Resources	Eligibility for Listing on NRHP	No Effect	No Effect: Indeterminate Eligibility Underwater Resource 006-1
Section 4(f) & 6(f)	Yes/No	No	No
Utilities	\$	\$0	\$12,901,540
Cost	\$	\$0	\$108,600,000
<b>Preferred Alternative</b>	<b>Yes/No</b>	<b>No</b>	<b>Yes</b>

This “weighted v/c ratio” was calculated for the purposes of summarizing and comparing the segment v/c ratio results in a simplified manner to rank each. This method weights each individual v/c ratio according to the volume processed in that movement. The weighted v/c ratio is a way to measure the efficiency of the alternatives for moving traffic within the interchange.

## 6.2.2 International Boulevard to Rivers Avenue

Table 6.2 shows the detailed evaluation of the four Proposed Reasonable Alternatives from International Boulevard to Rivers Avenue, including the I-526/I-26 interchange and the widening of I-526, refer to Figure 6.8. Alternative 2 is recommended as the preferred alternative between International Boulevard and Rivers Avenue. Although Alternative 1 and 2 would remove access from Rivers Avenue to I-26, using I-526, they would result in lower relocations and potential impact to environmental justice populations than Alternative 1A or 2A. Alternative 1 would require a traffic movement or weave that may result in overcapacity and failing LOS in the segment. The over-congestion of this segment in Alternative 1 may cause upstream backups along I-526 eastbound and I-526 westbound. Alternative 2 does not require this traffic movement or weave, which reduces the number of vehicles which must weave compared to Alternative 1. This results in traffic operations which are under capacity and with acceptable LOS C. Alternative 2 is the recommended preferred alternative between International Boulevard and Rivers Avenue.

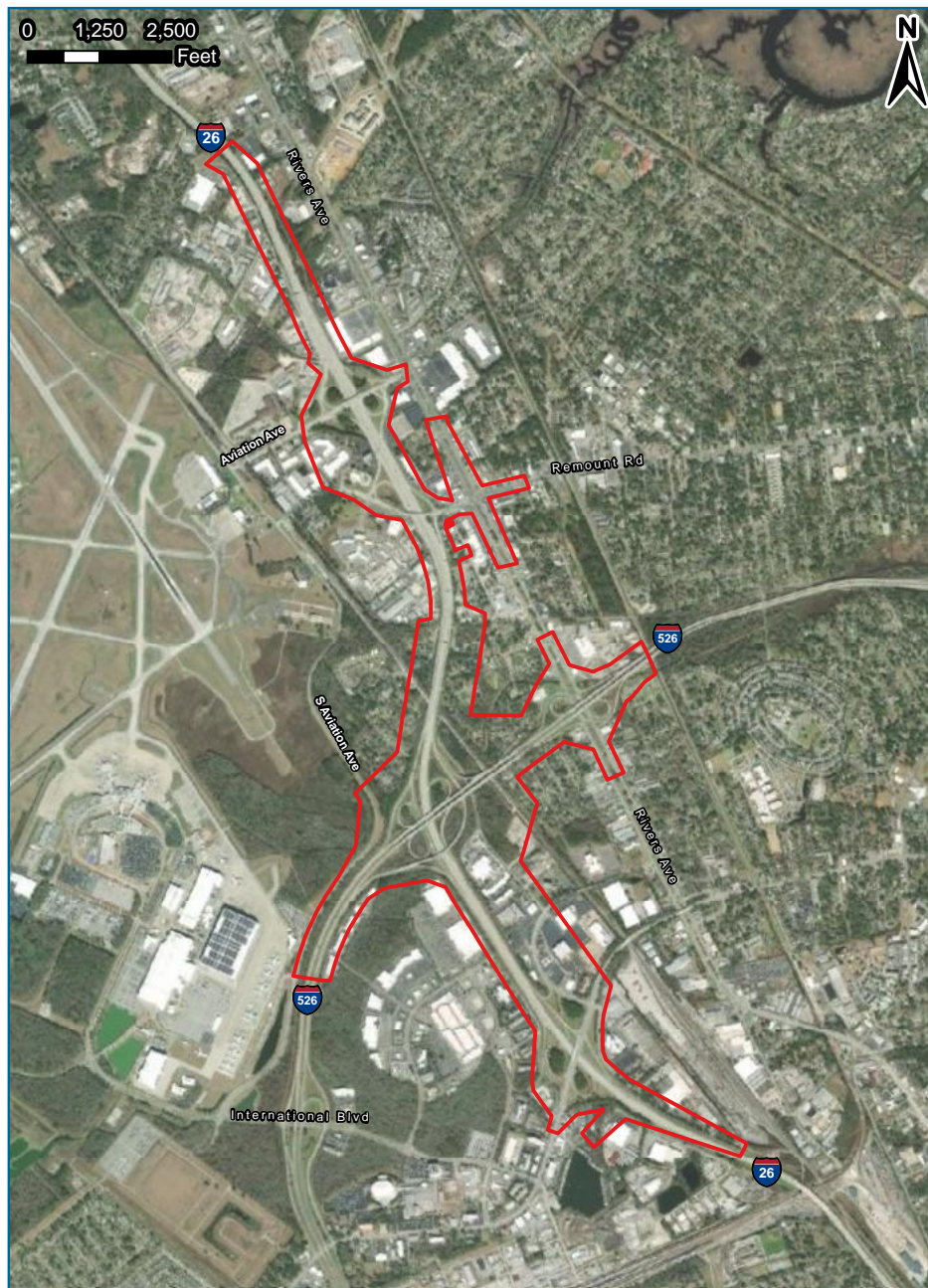


Figure 6.8 I-526 LCC WEST Section from International Boulevard to Rivers Avenue

Table 6.2 Proposed Reasonable Alternatives Screening Matrix : International Blvd to Rivers Ave

		No-Build	I-26/I-526 System-to System & I-526 at Rivers Avenue			
			1	2	1A	2A
Purpose & Need: 2050 Traffic Analysis	Geometric Deficiencies Resolved	0/11	8/11	8/11	9/11	9/11
	Provides Direct Access to/ from I-526 (Yes/No)	Yes	Yes	Yes	Yes	Yes
	Provides Direct Access to/ from I-26 (Yes/No)	N/A	No	No	Yes	Yes
	Weighted v/c Ratio	1.09	0.74	0.71	0.77	0.74
	Intersection Delay/LOS	N/A	N/A	N/A	N/A	N/A
	Mainline LOS	F	C	C	C	C
Freshwater Wetland Impact Based on R/W	(Acres)	0	28.5	28.5	28.5	28.5
Critical Area Impact Based on R/W	(Acres)	0	0	0	0	0
Critical Area (Ashley River) Bridge Construction Temporary Access Based on R/W	(Acres)	N/A	N/A	N/A	N/A	N/A
Pond Impact Based on R/W	(Acres)	0	0	0	0	0
Freshwater Stream Impact Based on R/W	(Feet)	0	13,327.1	13,327.1	13,327.1	13,327.1
Relocations	Residential	0	35 Single-Family Homes; 15 Mobile Homes; 14 Multi-Family Complexes, 41 Units Total	35 Single-Family Homes; 15 Mobile Homes; 14 Multi-Family Complexes, 41 Units Total	39 Single-Family Homes; 16 Mobile Homes; 20 Multi-Family Complexes, 60 Units Total	39 Single-Family Homes; 16 Mobile Homes; 20 Multi-Family Complexes, 60 Units Total
	Businesses	0	12	12	13	13
	Churches	0	1 - Enoch Chapel Methodist	1 - Enoch Chapel Methodist	2 - Enoch Chapel Methodist, Life Changers Covenant Ministries	2 - Enoch Chapel Methodist, Life Changers Covenant Ministries
	Community Facilitites	0	2 - Highland Terrace-Liberty Park Community Center, Russelldale Community Center	2 - Highland Terrace-Liberty Park Community Center, Russelldale Community Center	2 - Highland Terrace-Liberty Park Community Center, Russelldale Community Center	2 - Highland Terrace-Liberty Park Community Center, Russelldale Community Center
	Total	0	106	106	132	132
Environmental Justice	Yes/No	No	Yes (94)	Yes (94)	Yes (120)	Yes (120)
Threatened & Endangered Species		No Effect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect	May Effect, Not Likely to Adversely Affect
Essential Fish Habitat	Yes/No	No	No	No	No	No
Cultural Resources	Eligibility for Listing on NRHP	No Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect
Section 4(f) & 6(f)	Yes/No	No	Yes Highland Terrace-Liberty Park Community Center - 4(f) & 6(f); Russelldale Community Center - 4(f)	Yes Highland Terrace-Liberty Park Community Center - 4(f) & 6(f); Russelldale Community Center - 4(f)	Yes Highland Terrace-Liberty Park Community Center - 4(f) & 6(f); Russelldale Community Center - 4(f)	Yes Highland Terrace-Liberty Park Community Center - 4(f) & 6(f); Russelldale Community Center - 4(f)
Utilities	\$	\$0	\$37,082,500 (includes Alternative 1 or 2 at N Rhett/Virginia Ave interchange)	\$37,082,500 (includes Alternative 1 or 2 at N Rhett/Virginia Ave interchange)	\$43,582,500 (includes Alternative 1 or 2 at N Rhett/Virginia Ave interchange)	\$43,582,500 (includes Alternative 1 or 2 at N Rhett/Virginia Ave interchange)
Cost	\$	\$0	\$950,000,000	\$979,000,000	\$1,068,000,000	\$1,066,000,000
Preferred Alternative	Yes/No	No	No	Yes	No	No



## 6.2.3 Rivers Avenue to Virginia Avenue

The five Proposed Reasonable Alternatives from Rivers Avenue to Virginia Avenue, including the I-526 at N Rhett interchange, and the widening of I-526, are shown in Table 6.3 and Figure 6.9. Alternative 2A is estimated to have the lowest potential impact to wetlands, streams, and relocations as compared to the other four alternatives. Alternative 2A is the recommended preferred alternative between Rivers Avenue and Virginia Avenue.

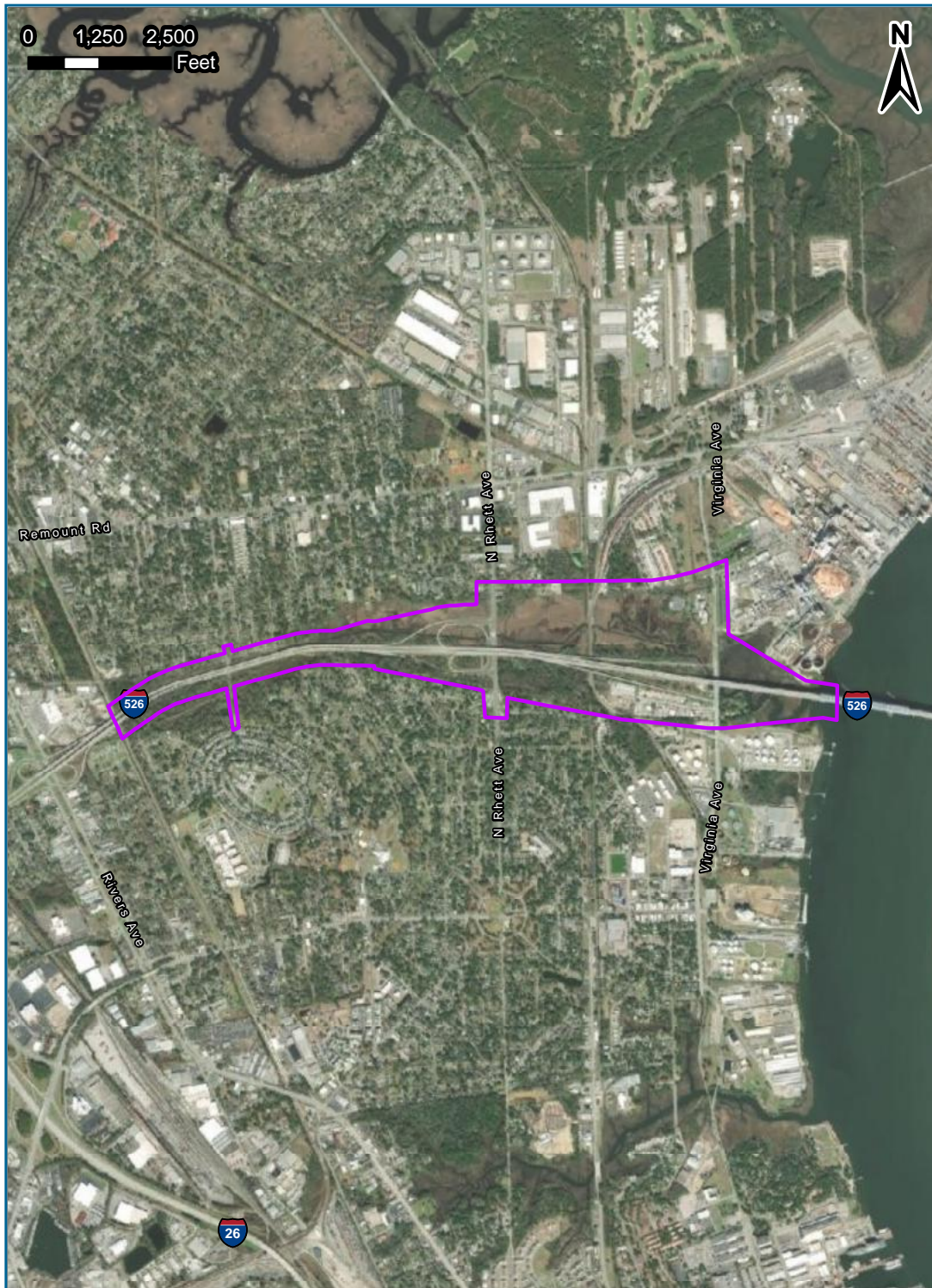


Figure 6.9 I-526 LCC WEST Section from Rivers Avenue to Virginia Avenue

Table 6.3 Proposed Reasonable Alternatives Screening Matrix : Rivers Ave to Virginia Ave

		No-Build	I-526 at N Rhett/Virginia Ave																			
			1				2				2A				5				6			
Purpose & Need: 2050 Traffic Analysis	Geometric Deficiencies Resolved	0/3	3/3				3/3				3/3				3/3				3/3			
	Provides Direct Access to/from I-526 (Yes/No)	Yes	526 EB to Virginia No	526 WB to Virginia No	Virginia to 526 EB No	Virginia to 526 WB No	526 EB to Virginia No	526 WB to Virginia No	Virginia to 526 EB No	Virginia to 526 WB No	526 EB to Virginia No	526 WB to Virginia Yes	Virginia to 526 EB Yes	Virginia to 526 WB Yes	526 EB to Virginia Yes	526 WB to Virginia Yes	Virginia to 526 EB Yes	Virginia to 526 WB Yes	526 EB to Virginia Yes	526 WB to Virginia Yes	Virginia to 526 EB Yes	Virginia to 526 WB Yes
	Provides Direct Access to/from I-26 (Yes/No)	N/A	N/A				N/A				N/A				N/A				N/A			
	Weighted v/c Ratio	1.14	1.00				0.99				0.91				0.86				0.91			
	Intersection Delay/LOS	N/A	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			EB C/22.7	WB F/155.8	EB D/37.3	WB F/195.3	EB F/102.9	WB D/43.8	EB E/67.1	WB D/37.8	EB C/30.1	WB B/18.6	EB C/30.7	WB B/11.6	EB C/30.3	WB B/18.4	EB C/31.1	WB B/11.6	EB C/30.3	WB B/18.4	EB C/31.1	WB B/11.6
	Mainline LOS	F	C/D				C/D				C/D				C/D				C/D			
Freshwater Wetland Impact Based on R/W	(Acres)	0	54.5				51.3				49.9				57.3				50.8			
Critical Area Impact Based on R/W	(Acres)	0	2.3				2.3				2.4				2.8				2.7			
Critical Area (Ashley River) Bridge Construction Temporary Access Based on R/W	(Acres)	N/A	N/A				N/A				N/A				N/A				N/A			
Pond Impact Based on R/W	(Acres)	0	0				0				0				0				0			
Freshwater Stream Impact Based on R/W	(Feet)	0	5,159.6				5,169.1				4,977.6				5,197.4				5,205.9			
Relocations	Residential	0	1 Single-Family Home				1 Single-Family Home				1 Single-Family Home				1 Single-Family Home				1 Single-Family Home			
	Businesses	0	3				3				0				3				3			
	Churches	0	0				0				0				0				0			
	Community Facilitites	0	0				0				0				0				0			
	Total	0	4				4				1				4				4			
Environmental Justice	Yes/No	No	Yes (1)				Yes (1)				Yes (1)				Yes (1)				Yes (1)			
Threatened & Endangered Species		No Effect	May Effect, Not Likey to Adversely Affect				May Effect, Not Likey to Adversely Affect				May Effect, Not Likey to Adversely Affect				May Effect, Not Likey to Adversely Affect				May Effect, Not Likey to Adversely Affect			
Essential Fish Habitat	Yes/No	No	Yes				Yes				Yes				Yes				Yes			
Cultural Resources	Eligibility for Listing on NRHP	No Effect	No Effect: No Potentially Eligible Resources				No Effect: No Potentially Eligible Resources				No Effect: No Potentially Eligible Resources				No Effect: No Potentially Eligible Resources				No Effect: No Potentially Eligible Resources			
Section 4(f) & 6(f)	Yes/No	No	No				No				No				No				No			
Utilities	\$	\$0	See Utility Costs Under I-526/I-26/Rivers Avenue Alternatives								+ Approx. \$3.5 Million in Transmission Line Relocations				+ Approx. \$3.5 Million in Transmission Line Relocations				+ Approx. \$3.5 Million in Transmission Line Relocations			
Cost	\$	\$0	\$336,000,000				\$338,000,000				\$341,000,000				\$473,000,000				\$461,000,000			
Preferred Alternative	Yes/No	No	No				No				Yes				No				No			

6.3 Recommended Preferred Alternative

Table 6.4 shows the recommended preferred alternative by the previously discussed sections, while Table 6.5 provides a summary of all the combined potential impacts.

Table 6.4 Proposed Reasonable Alternatives Screening Matrix : Recommended Preferred Alternative

		No-Build	Paul Cantrell Blvd to International Blvd	I-526 at I-26 including Rivers Ave: Alternative 2	I-526 at N Rhett/Virginia Ave: Alternative 2A
Purpose & Need: 2050 Traffic Analysis	Geometric Deficiencies Resolved	0/30	15/16	8/11	3/3
	Provides Direct Access to/from I-526 (Yes/No)	Yes	Yes	Yes	526 EB to Virginia No 526 WB to Virginia Yes Virginia to 526 EB Yes Virginia to 526 WB Yes
	Provides Direct Access to/from I-26 (Yes/No)	N/A	N/A	No	N/A
	Weighted v/c Ratio	> 1.00	0.72   0.75   0.72   0.67	0.71	0.91
	Intersection Delay/LOS	N/A	N/A	N/A	AM Peak Hour
					PM Peak Hour
	Mainline LOS	F	D/D/C/C	C	C/D
Freshwater Wetland Impact Based on R/W	(Acres)	0	19.3	28.5	49.9
Critical Area Impact Based on R/W	(Acres)	0	15.5	0	2.4
Critical Area (Ashley River) Bridge Construction Temporary Access Based on R/W	(Acres)	0	9.1	N/A	N/A
Pond Impact Based on R/W	(Acres)	0	0.03	0	0
Freshwater Stream Impact Based on R/W	(Feet)	0	327.0	13,327.1	4,977.6
Relocations	Residential	0	4 single-family homes; 2 multi-family complexes, 6 units total	35 Single-Family Homes; 15 Mobile Homes; 14 Multi-Family Complexes, 41 Units Total	1 Single-Family Home
	Businesses	0	8	12	0
	Churches	0	0	1 - Enoch Chapel Methodist	0
	Community Facilitites	0	0	2 - Highland Terrace-Liberty Park Community Center, Russelldale Community Center	0
	Total	0	18	106	1
Environmental Justice	Yes/No	No	No	Yes (94)	Yes (1)
Threatened & Endangered Species		0	May Effect, Not Likey to Adversely Affect	May Effect, Not Likey to Adversely Affect	May Effect, Not Likey to Adversely Affect
Essential Fish Habitat	Yes/No	No	Yes	No	Yes
Cultural Resources	Eligibility for Listing on NRHP	No Effect	No Effect: Potentially Eligible Underwater Resource 006-1	No Adverse Effect	No Effect: No Potentially Eligible Resources
Section 4(f) & 6(f)	Yes/No	No	No	Yes Highland Terrace-Liberty Park Community Center - 4(f) & 6(f); Russelldale Community Center - 4(f)	No
Utilities	\$	\$0	\$12,901,540	\$37,082,500 (includes Alternative 1 or 2 at N Rhett/Virginia Ave)	+ Approx. \$3.5 Million in Transmission Line Relocation
Cost	\$	\$0	\$108,600,000	\$979,000,000	\$341,000,000
Preferred Alternative	Yes/No	No	Yes	Yes	Yes



Table 6.5 Proposed Reasonable Alternatives Screening Matrix: Recommended Preferred Alternative

		No-Build	Preferred Alternative
Purpose & Need: 2050 Traffic Analysis	Geometric Deficiencies Resolved	0/30	26/30
	Provides Direct Access to/from I-526 (Yes/No)	Yes	Yes
	Provides Direct Access to/from I-26 (Yes/No)	Yes	No
	Weighted v/c Ratio	> 1.00	< 1.00
	Intersection Delay/LOS	N/A	N Rhett/Virginia Ave, Refer to Table 6.4
	Mainline LOS	F	D/D/C/C/C/C/D
Freshwater Wetland Impact Based on R/W	(Acres)	0	97.7
Critical Area Impact Based on R/W	(Acres)	0	17.9
Critical Area (Ashley River) Bridge Construction Temporary Access Based on R/W	(Acres)	0	9.1
Pond Impact Based on R/W	(Acres)	0	0.03
Freshwater Stream Impact Based on R/W	(Feet)	0	18,631.7
Floodplains	(Acres)	0	950
Relocations	Residential	0	104
	Businesses	0	31
	Churches	0	1
	Community Facilities	0	2
	Total	0	138
Environmental Justice	Yes/No	No	Yes (95)
Threatened & Endangered Species		0	May Effect, Not Likely to Adversely Affect
Essential Fish Habitat	Yes/No	No	Yes
Cultural Resources	Eligibility for Listing on NRHP	No Effect	No Effect
Section 4(f) & 6(f)	Yes/No	No	Yes
Utilities	\$	\$0	\$49.5 M
Cost	\$	\$0	\$1.43 B

## References Cited

- 1 Corridor Analysis for I-526 Between North Charleston and West Ashley, SCDOT, October 2013.
- 2 Congestion Management Process, Berkeley-Charleston-Dorchester Council of Governments, January 2019

## **Appendix C.2**

### Shared Use Path Evaluation for Ashley River Bridge





# SHARED USE PATH EVALUATION FOR ASHLEY RIVER BRIDGE FINAL REPORT

Prepared for:



Prepared by:



October 5, 2020

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The purpose of this study is to evaluate alternatives for incorporating a shared used path (SUP) into the planned widening of the I-526 Bridge over the Ashley River. This report supplements the study to evaluate the roadway widening alternatives for the I-526 Bridge Widening over the Ashley River.

The Ashley River Bridge is a dual structure with a separate bridge carrying eastbound (EBL) and westbound (WBL) traffic. The roadway design for the I-526 Low Country Corridor Project (LCC) involves adding two additional lanes in each direction to the bridge over the Ashley River. Public input resulting from the I-526 LCC Public Information Meeting held on November 21, 2019 and local stakeholder coordination has resulted in the need to add a 14-ft wide SUP for pedestrian and bicycle traffic to the corridor crossing the river. Stantec evaluated the roadway widening alternatives to determine which were suitable for the addition of an SUP, resulting in data being developed for seven viable alternatives to add an SUP to the Ashley River Bridge.

Impacts and costs are quantified in this report for each of the alternatives providing a framework for identifying Option 2A as the recommended alternative for inclusion in the Draft Environmental Impact Statement.

## 2.0 IDENTIFICATION OF ALTERNATIVES

The identification of the alternatives for the SUP study utilizes alternatives developed during the roadway widening study. Alternatives considered for incorporating the SUP in an alternatives analysis are described below:

### Alternatives Considered but Eliminated

- Widening each of the bridges toward the median only
  - This alternative would provide insufficient room to construct even the required roadway widening to the median, which would not meet the purpose and need of the project. Therefore, this alternative was not reasonable or feasible and was eliminated and is not considered for further SUP study.
- Widening each of the bridges in both directions
  - This alternative proved to be the costliest roadway alternative and resulted in greater environmental impacts. Therefore, this alternative was deemed not reasonable or feasible and eliminated and not considered for further SUP study.
- Widening each of the bridges to the outside only
  - This alternative results in the logical location for the SUP to be in the median between EBL and WBL traffic. Providing pedestrian access to the median on each end of the bridge would be difficult, involving switch-back ramping systems passing beneath one of the bridges. Locating pedestrians in the center of high-speed traffic raises safety concern about pedestrians being in the center of high-speed traffic, and their exposure to potentially high noise levels. It also results in the least aesthetically pleasing configuration for the SUP. The recent Ravenel Bridge in Charleston has an SUP located on the downstream side of the bridge, as public comment expressed a preference for the path to be located on the exterior of the bridge for unobscured views of the scenic vistas. For these reasons, this alternative was deemed not reasonable or feasible and eliminated and not considered for further SUP study.

### Alternatives Considered for Further Study

- Widening each of the bridges in upstream direction only

- This alternative allows for an SUP to be located on either the exterior (upstream) side of the WBL bridge or the exterior (downstream) side of the EBL bridge. This alternative was deemed reasonable and feasible and carried forward for further analysis..
- Widening each of the bridges in the downstream direction only
  - This alternative also allows for an SUP to be located on either the exterior (upstream) side of the WBL bridge or the exterior (downstream) side of the EBL bridge. This roadway alternative was deemed reasonable and feasible and carried forward for further analysis..

### Alternatives Development

The two selected roadway alternatives result in the four alternatives for locating the SUP on the bridges, detailed in Appendix A:

Option 1: Roadway widening performed on the downstream side of the EBL and WBL bridges with the SUP added to the upstream side of the WBL bridge.

Option 2: Roadway widening performed on the upstream side of the EBL and WBL bridges with the SUP added to the upstream side of the WBL bridge.

Option 3: Roadway widening performed on the downstream side of the EBL and WBL bridges with the SUP added to the downstream side of the EBL bridge.

Option 4: Roadway widening performed on the upstream side of the EBL and WBL bridges with the SUP added to the downstream side of the EBL bridge.

Consideration of the location of the SUP on the roadway approaches expands each of these four options to two, resulting in a total of eight alternatives to advance the study and develop the evaluation matrix. For this study, the southern approach is the one on the Ashley Harbor side of the river and the northern approach is the one on the Marina side of the river:

Option 1A: Option 1 bridge configuration with SUP approaches on the upstream (WBL) side of I-526 on the Ashley Harbor approach and upstream (WBL) side of the I-526 on the Marina approach.

Option 1B: Option 1 bridge configuration with SUP approaches on the downstream (EBL) side of I-526 on the Ashley Harbor approach and upstream (WBL) side of the I-526 on the Marina approach.

Option 2A: Option 2 bridge configuration with SUP approaches on the upstream (WBL) side of I-526 on the Ashley Harbor approach and upstream (WBL) side of the I-526 on the Marina approach.



Option 2B: Option 2 bridge configuration with SUP approaches on the downstream (EBL) side of I-526 on the Ashley Harbor approach and upstream (WBL) side of the I-526 on the Marina approach.

Option 3A: Option 3 bridge configuration with SUP approaches on the upstream (WBL) side of I-526 on the Ashley Harbor approach and upstream (WBL) side of the I-526 on the Marina approach.

Option 3B: Option 3 bridge configuration with SUP approaches on the downstream (EBL) side of I-526 on the Ashley Harbor approach and upstream (WBL) side of the I-526 on the Marina approach.

Option 4A: Option 4 bridge configuration with SUP approaches on the upstream (WBL) side of I-526 on the Ashley Harbor approach and downstream (EBL) side of the I-526 on the Marina approach.

Option 4B: Option 4 bridge configuration with SUP approaches on the downstream (EBL) side of I-526 on the Ashley Harbor approach and downstream (EBL) side of the I-526 on the Marina approach.

## 3.0 SELECTION OF EVALUATION CRITERIA

The planned SUP crossing of the Ashley River is being accommodated as part of the I-526 Low Country Corridor Project within limits critical to SCDOT construction and maintenance operations. Outside of those limits, the SUP is being planned and built by other local governmental agencies as part of a more extensive SUP system within the Charleston area.<sup>1</sup> The extent of SCDOT involvement is dictated by the need to provide ingress and egress points for a specific SCDOT inspection vehicle to enter the path and exit from it during bridge inspection operations. Access to this path is required for the inspection vehicle to enable bridge inspections to be conducted as needed. The width of the bridge, combined with the limitations of the vehicle, makes inspection without SUP access not feasible. For these reasons, the alternatives analysis has been developed using parameters within these SCDOT SUP construction limits. Any portion of the SUP outside of those limits will not have an undue influence on the selection of a preferred alternative, as impacts and construction costs for the SUP connecting to Ashley River Road or Leeds Avenue will be an order of magnitude less than those for the SCDOT section of the SUP and should be relatively the same for all alternatives.

The seven selected alternatives have been evaluated for the following design considerations:

- Critical Area Wetland Impacts
  - Each alternative impacts a different amount of wetland acreage within the evaluation area. The acreage of critical area impacts is quantified in the matrix.
- Rights-of-way impacts
  - In some cases, an SUP alternative requires additional right of way. These additional ROW areas are included in the matrix and a cost is shown calculated at \$325,000 per acre.
- Construction costs
  - Bridge and roadway costs are included using unit prices consistent with those used for the LCC opinion of probable costs. While the amount of construction in terms of area of bridge and roadway is similar for all alternatives, some alternatives require three stages of construction rather than two, thus adding time and the amount of needed temporary

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<sup>1</sup> WALK BIKE BCD, 2017 <https://www.walkbikebcd.com/documents.html>

trestle. Option 3B requires the construction of the free-standing SUP structure on the marina side of the river, adding cost.

- Stakeholder concerns
  - As access points vary between alternatives, there may be different levels of convenience for the public depending on the alternative chosen.
- Maintenance concerns
  - Each alternative provides for maintenance access, but some alternatives involve more constraints than others.
- Construction concerns
  - Factors beyond just cost are noted for consideration in the evaluation

Analysis of these alternatives is provided in Section 4 and the evaluation matrix is provided in Tables 5.1 and 5.2 in Section 5 of this report, populated with numerical values where applicable.



Options 2B, and 4B locate the Ashley Harbor SUP approach on the downstream side of I-526. This places the SUP immediately adjacent to the Ashley Harbor community and would require additional right of way (ROW). The risk involved in obtaining ROW from Ashley Harbor property is significant. The cost could easily exceed the average ROW costs in Table 5.1 and cause significant delay to the project. In addition, other alternatives are equal or better across all other evaluation criteria. Therefore, neither of these alternatives were considered as the recommended alternative.

To enable an SUP configuration with an upstream approach on the Ashley Harbor side of the river and a downstream approach on the Marina side of the river ( or conversely, a downstream approach on the Ashley Harbor side of the river and an upstream approach on the Marina side of the river), crossover points must be provided as part of the SUP alignment. For Options 1B and 4A an at-grade path beneath the second span of the bridge provides a crossover point parallel to Bull Creek. The elevation of the path beneath the bridge provides 8 feet of headroom and stays above the 100-year flood elevation of approximately Elev. 11.0 (NAVD88). However, these alternatives are two of the highest cost alternatives and remaining alternatives are equal or better across all other evaluation criteria. Option 4A has the highest critical area wetland impacts. Therefore, neither of these alternatives were considered as the recommended alternative.

Option 3B is a special case. Having the roadway widening on the downstream side of the EBL bridge, the limits of construction encroach within approximately 10 feet of the Marina property line. A retaining wall is necessary adjacent to the building already to maintain the 10-foot offset, considered the minimum for periodic maintenance access. There is no room to accommodate an additional 14 feet wide SUP exiting the bridge on that side. For this reason, a free-standing SUP structure is needed to direct the path users beneath the bridge before they infringe on the marina or adjacent boat slips so that they can exit on the upstream side on the marina side of the river. Appendix A contains details of this free-standing SUP structure. This option severely limits bridge inspection and maintenance operations, as the required inspection vehicle will not be able to traverse the full length of the bridge being unable to navigate the free-standing section of the SUP. It will have to reverse back along the SUP to exit. Also, the SUP section located beneath the bridge may impose additional restrictions on access

to the boat slips at the Marina. Therefore, this alternative was deemed not reasonable and was eliminated from additional analysis.

Option 3A is essentially the same as Option 1A, except the SUP passes underneath the bridge twice merely to accommodate the SUP on the downstream side of the EBL bridge. As the SUP cannot exit the bridge on the downstream side on the marina side of the river when the roadway widening occurs in that direction, Option 3A offers no advantage over Option 1A. Therefore, this alternative was deemed not reasonable and was eliminated from additional analysis.

Option 1A has the bridge widening for the roadway section on the downstream side of each of the bridges. This location brings the construction close to the Marina facility and to the Ashley Harbor community. A retaining wall is required adjacent to the Marina's boat storage building that will require future maintenance, which is a concern. Construction is more difficult and costly for Option 1A, as it requires three stages of construction, compared to only two stages for Option 2A. More ROW will be acquired from the Ashley Harbor community for Option 1A than for the remaining alternative, Option 2A. Option 2A does impact more critical area wetlands than Option 4A, but it is not the highest of all the alternatives and there are opportunities to explore minimization and avoidance strategies, if required.

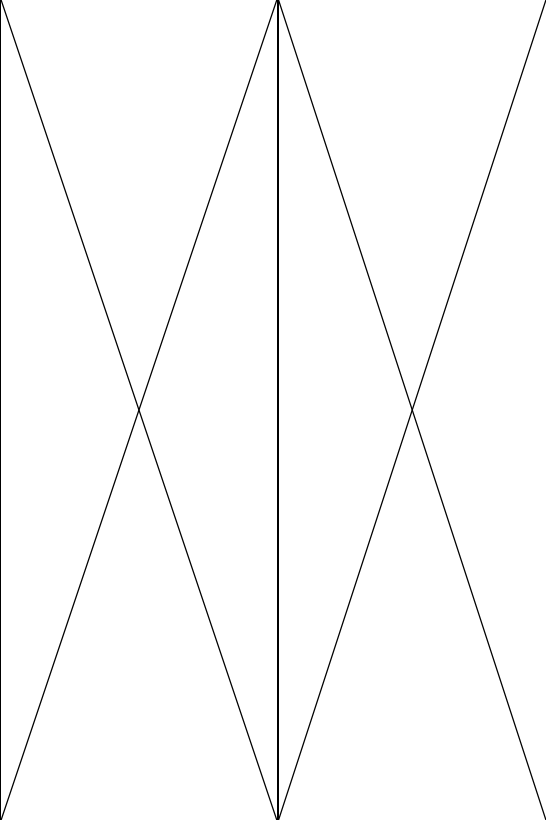
From this analysis, Option 2A is the recommended alternative to adopt for the project.

## 5.0 EVALUATION MATRIX FOR ALTERNATIVES

I-526 ASHLEY RIVER BRIDGE WIDENING AND SUP OPTIONS PRELIMINARY COST ESTIMATES								
Bridge Configuration	OPTION 1		OPTION 2		OPTION 3 *		OPTION 4	
	WIDEN DOWNSTREAM / SUP UPSTREAM		WIDEN UPSTREAM / SUP UPSTREAM		WIDEN DOWNSTREAM / SUP DOWNSTREAM		WIDEN UPSTREAM / SUP DOWNSTREAM	
Alternative	OPTION 1A	OPTION 1B	OPTION 2A	OPTION 2B	OPTION 3A	OPTION 3B	OPTION 4A	OPTION 4B
Ashley Harbor Side Approach Path	UPSTREAM	DOWNSTREAM	UPSTREAM	DOWNSTREAM	UPSTREAM	DOWNSTREAM	UPSTREAM	DOWNSTREAM
Marina Side Approach Path	UPSTREAM	UPSTREAM	UPSTREAM	UPSTREAM	UPSTREAM	UPSTREAM	DOWNSTREAM	DOWNSTREAM
Needs Bull Creek Path?	No	Yes	No	Yes	Yes	No	Yes	No
Needs Independent SUP Structure Near Marina?	No	No	No	No	Yes	Yes	No	No
Stages of Bridge Construction /Trestles	3	3	2	2	2	2	3	3
Critical Area Wetland Impact (acre)	1.24	1.70	2.06	2.52			2.56	1.76
Length of Wall to Mitigate Property Impacts (feet)	475	475	0	0			0	0
Increased Anomaly Concern	No	No	No	No			No	No
Regular ROW Takes (Acres)	12.0	12.5	12.7	13.2			13.8	13.4
ROADWAY COSTS (INCLUDING BULL CREEK RAMP/PATH, WHEN NEEDED)	\$466,000.00	\$523,000.00	\$477,000.00	\$536,000.00			\$756,000.00	\$642,000.00
BRIDGE CONSTRUCTION COSTS (WITHOUT SUP)	\$63,450,000.00	\$63,450,000.00	\$63,347,000.00	\$63,347,000.00			\$63,347,000.00	\$63,347,000.00
BRIDGE CONSTRUCTION COSTS (INCLUDING SUP STRUCTURE, WHEN NEEDED)	\$79,995,000.00	\$79,995,000.00	\$72,908,000.00	\$72,908,000.00			\$79,893,000.00	\$79,893,000.00
ENVIRONMENTAL MITIGATION COSTS	\$1,227,000.00	\$1,692,000.00	\$2,122,000.00	\$2,580,000.00			\$2,615,000.00	\$1,789,000.00
RIGHT OF WAY COSTS	\$3,887,000.00	\$4,059,000.00	\$4,134,000.00	\$4,284,000.00			\$4,495,000.00	\$4,355,000.00
<b>TOTAL COST*</b>	<b>\$85,575,000.00</b>	<b>\$86,269,000.00</b>	<b>\$79,641,000.00</b>	<b>\$80,308,000.00</b>			<b>\$87,759,000.00</b>	<b>\$86,679,000.00</b>

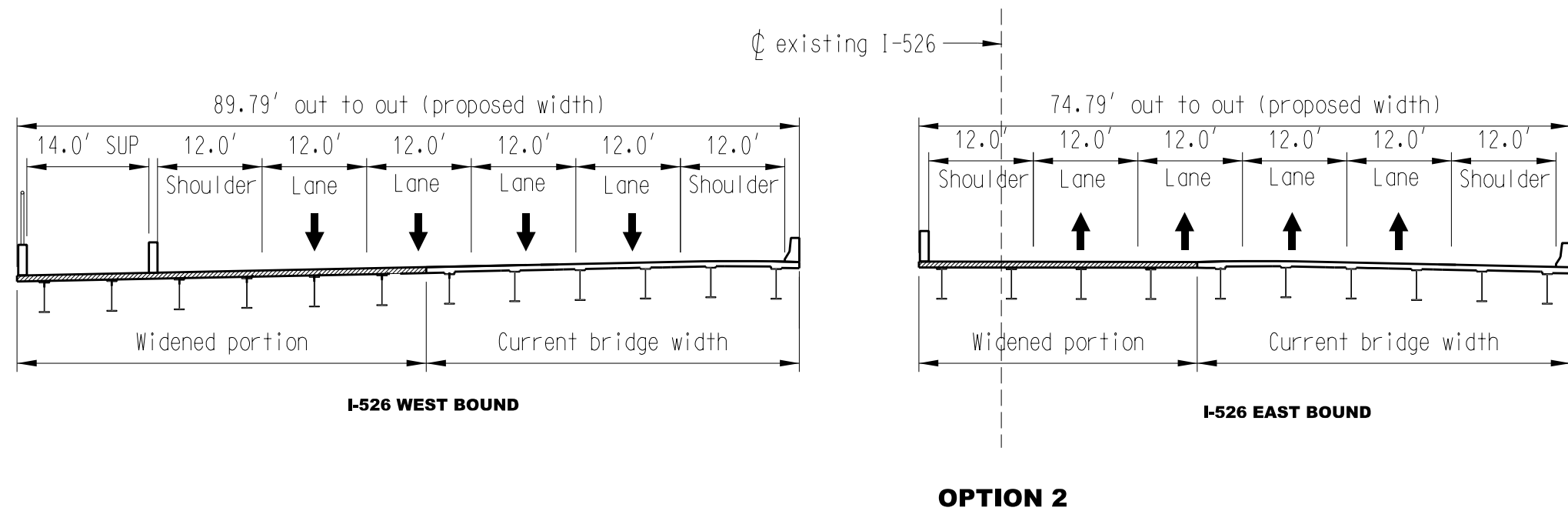
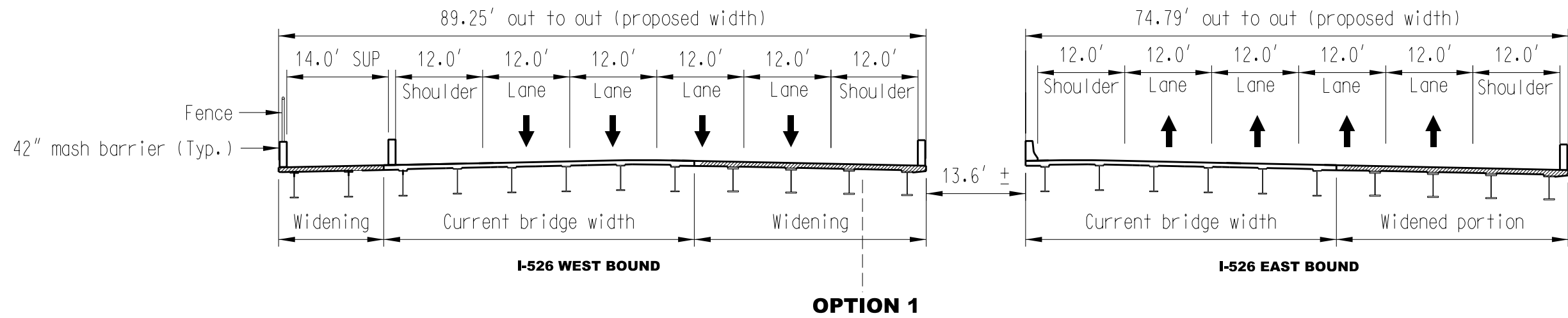
\* Option 3 eliminated from consideration. See discussion on Page 3-2



Table 4.2 - I-526 ASHLEY RIVER BRIDGE WIDENING AND SUP OPTIONS EVALUATION FACTORS								
Bridge Configuration	OPTION 1		OPTION 2		OPTION 3		OPTION 4	
	WIDEN DOWNSTREAM / SUP UPSTREAM		WIDEN UPSTREAM / SUP UPSTREAM		WIDEN DOWNSTREAM / SUP DOWNSTREAM		WIDEN UPSTREAM / SUP DOWNSTREAM	
Alternative	OPTION 1A	OPTION 1B	OPTION 2A	OPTION 2B	OPTION 3A	OPTION 3B	OPTION 4A	OPTION 4B
STAKEHOLDER CONCERNS	Access advantage to stakeholders upstream from bridge	Access advantage to stakeholders downstream of bridge SUP located adjacent to Ashley Harbor community	Access advantage to stakeholders upstream from bridge	Access advantage to stakeholders downstream of bridge SUP located adjacent to Ashley Harbor community			Access advantage to stakeholders downstream of bridge SUP located adjacent to Ashley Harbor community	Access advantage to stakeholders downstream of bridge SUP located adjacent to Ashley Harbor community
MAINTENANCE CONCERNS	Ensure walkway is designed to carry inspection vehicle Ensure exterior fence is 8 feet high, max. Ensure access is provided for entrance and egress for inspection vehicle onto path	Ensure walkway is designed to carry inspection vehicle Ensure exterior fence is 8 feet high, max. Ensure access is provided for entrance and egress for inspection vehicle onto path	Ensure walkway is designed to carry inspection vehicle Ensure exterior fence is 8 feet high, max. Ensure access is provided for entrance and egress for inspection vehicle onto path	Ensure walkway is designed to carry inspection vehicle Ensure exterior fence is 8 feet high, max. Access is provided for entrance and egress for inspection vehicle onto path			Ensure walkway is designed to carry inspection vehicle Ensure exterior fence is 8 feet high, max. Ensure access is provided for entrance and egress for inspection vehicle onto path	Ensure walkway is designed to carry inspection vehicle Ensure exterior fence is 8 feet high, max. Ensure access is provided for entrance and egress for inspection vehicle onto path
CONSTRUCTION CONCERNS	Requires three stages of construction	Requires three stages of construction Requires Bull Creek path		Requires Bull Creek path			Requires three stages of construction Requires Bull Creek path	Requires three stages of construction

\* Option 3 eliminated from consideration. See discussion on Page 3-2

## **APPENDIX A – Location Alternatives for the SUP on the Bridge Structures**



CIVIL ENGINEERING  
CONSULTING SERVICES, INC.

SOUTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

BRIDGE STAGING  
WIDEN TWIN BRIDGES OVER  
BULL CREEK AND ASHLEY RIVER  
ALONG I-526 (MARK CLARK EXPRESSWAY)

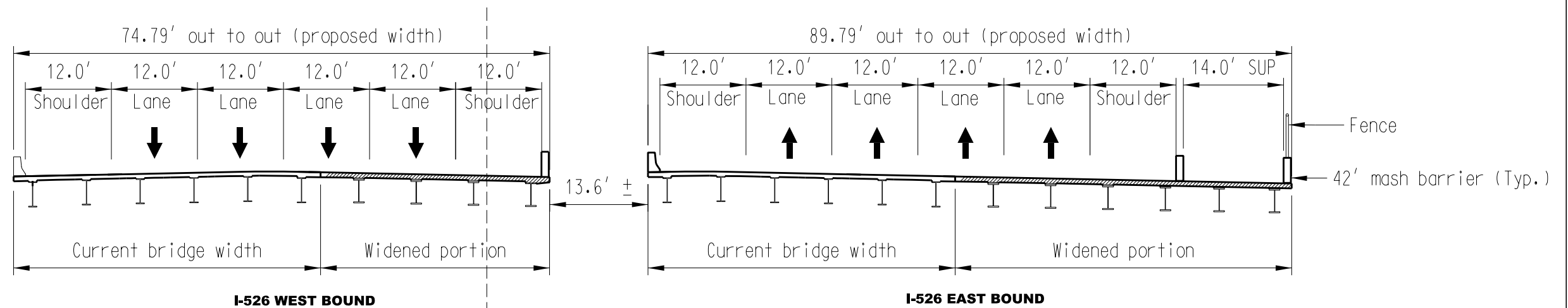
COUNTY CHARLESTON ROUTE I-526

NOT FOR  
CONSTRUCTION

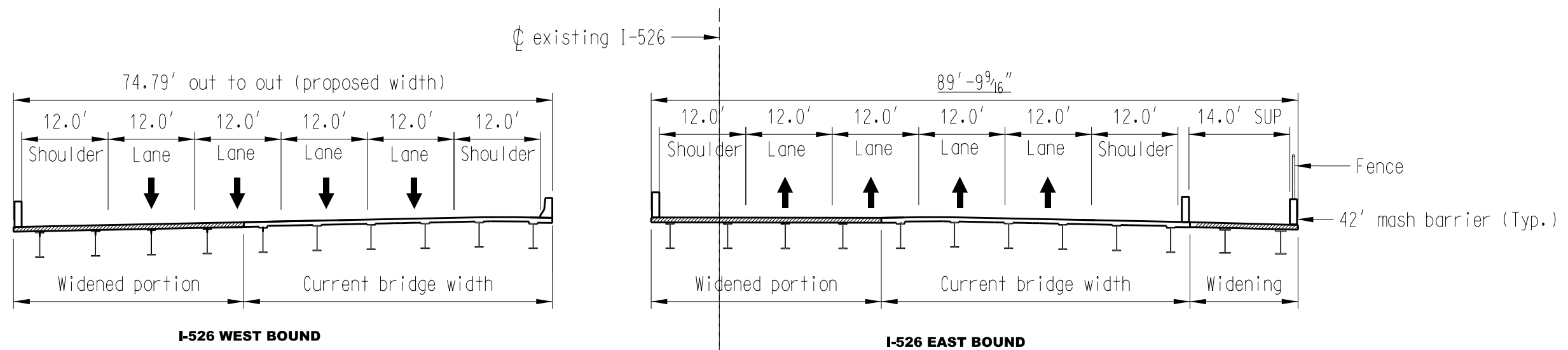
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REVIEWED			
QUAN.			
DR.			
DES.			
BY	CHK.	DATE	

DR-WING NO.





OPTION 3



OPTION 4

CIVIL ENGINEERING  
CONSULTING SERVICES, INC.

SOUTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

**BRIDGE STAGING**  
WIDEN TWIN BRIDGES OVER  
BULL CREEK AND ASHLEY RIVER  
ALONG I-526 (MARK CLARK EXPRESSWAY)

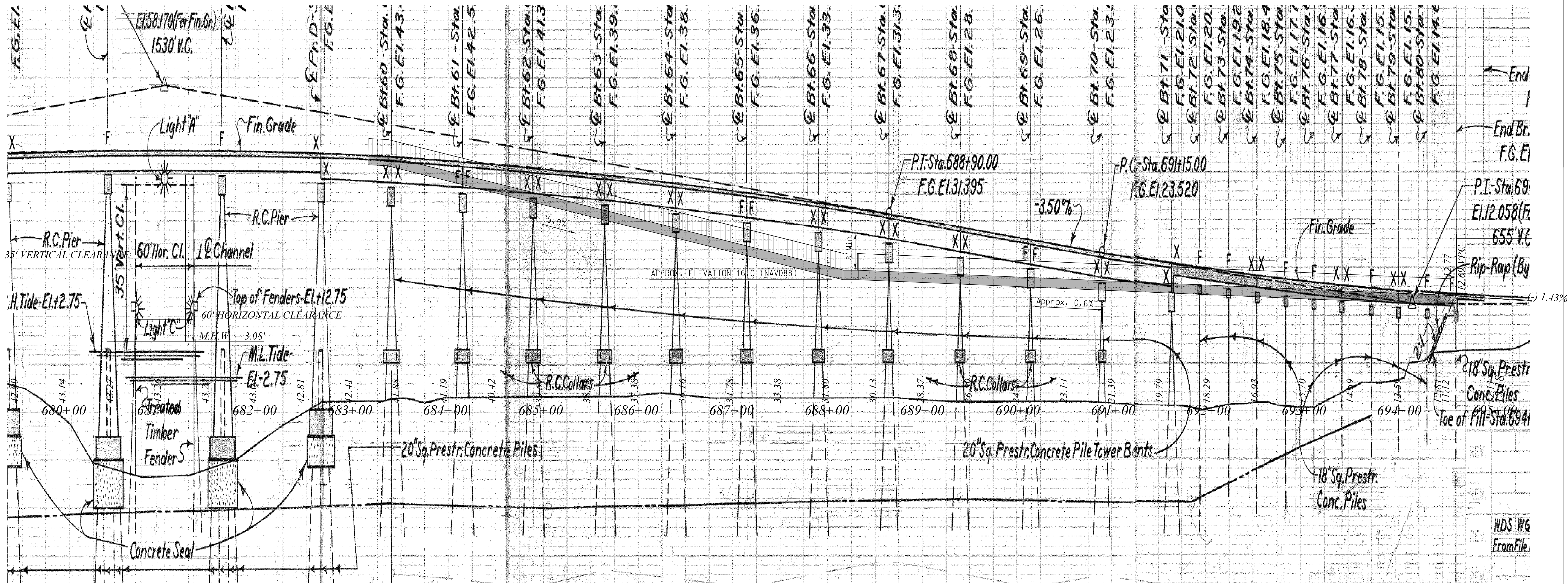
COUNTY CHARLESTON ROUTE I-526

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CONSTRUCTION

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REVIEWED			
QUAN.			
DR.			
DES.			
BY	CHK.	DATE	

DR-WING NO.





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CONSTRUCTION



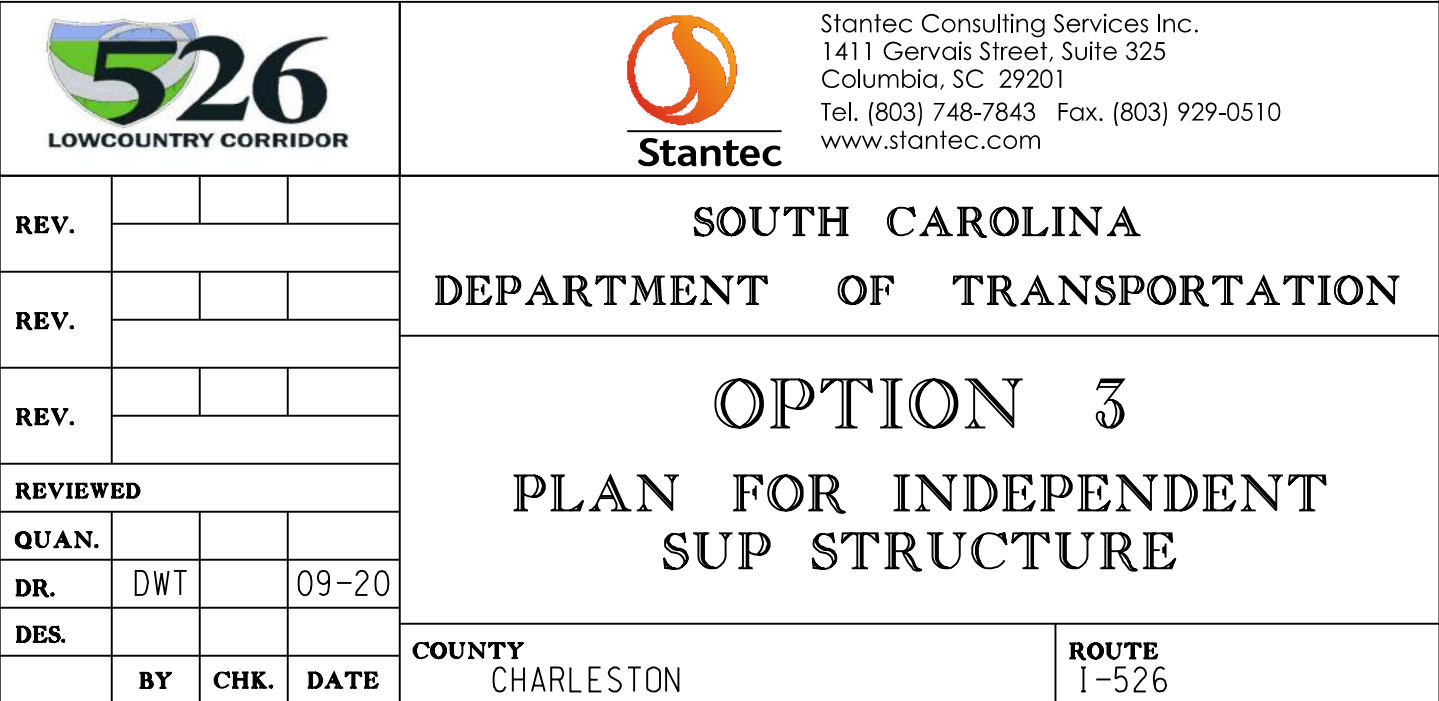
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QUAN.		
DR.	DWT	09-20
DES.		
BY	CHK.	DATE



Stantec Consulting Services Inc.  
1411 Gervais Street, Suite 325  
Columbia, SC 29201  
Tel. (803) 748-7843 Fax. (803) 929-0510  
www.stantec.com

SOUTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
  
OPTION 3  
ELEVATION FOR INDEPENDENT  
SUP STRUCTURE  
  
COUNTY CHARLESTON ROUTE 1-526




















**NOT FOR  
CONSTRUCTION**

## **APPENDIX B – Cross-Sections for SUP Location on Roadway Approaches**



FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	CHARLESTON	P027507		



LEGEND		FUNCTIONAL CLASSIFICATION	
①  12" PCC PAVEMENT	⑩  MILL 1.5" TO REMOVE OGFC		
②  HOT MIX ASPHALT CONCRETE SURFACE COURSE, TYPE "C" (175 lbs/sy)	⑪  MILL 2"		
③  HOT MIX ASPHALT CONCRETE SURFACE COURSE, TYPE "B" (200 lbs/sy)	⑫  8% FULL-DEPTH PATCHING, DIAMOND GRINDING, AND JOINT SEALING		
④  LEVELING - HOT MIX ASPHALT CONCRETE SURFACE COURSE, TYPE "A" (VAR)	⑬  RETAIN EXISTING PAVEMENT		
⑤  HOT MIX ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE "B" (200lbs/sy)	⑭  NEW 10' WIDE 12" ASPHALT SHOULDER FOR TRAFFIC CONTROL, TO REPLACE 8" GABC	DESIGN SPEED	
⑥  HOT MIX ASPHALT CONCRETE BASE COURSE, TYPE "A" (450 lbs/sy)	⑮  EXISTING PAVEMENT REMOVAL	ROUTE	MPH
⑦  HOT MIX ASPHALT CONCRETE BASE COURSE, TYPE "A" (900 lbs/sy)			
⑧  NEW 8" GABC BASE COURSE,			
⑨  NEW 10" GABC BASE COURSE,		EXCEPTIONS TO DESIGN SPEED	



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North Charleston, SC 29418  
Tel: 843.740.7700  
Fax: 843.740.7707  
[www.stantec.com](http://www.stantec.com)



4			
3			
2			
1			
REV. NO.	BY	DATE	DESCRIPTION OF REVISION
TOPO. _____	DATE _____		
DWG. _____	DATE _____	GROUP _____	- _____
R/W _____	DATE _____		

## TYPICAL SECTIONS

SCALE I°V=	SCALE I°H=	RTE./RD.
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FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	CHARLESTON	P027507		



PLANS PREPARED BY:

 **Stantec**

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North Charleston, SC 29418  
Tel: 843.740.7700  
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION		
I-526 LOWCOUNTRY CORRIDOR WEST TYPICAL SECTIONS		
SCALE 1"=	SCALE 1"=	RTE./RD.

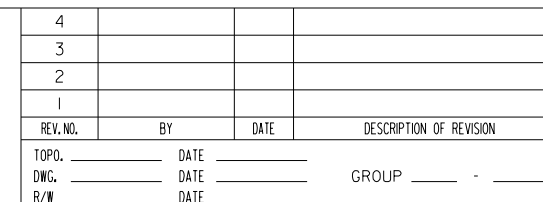
FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	CHARLESTON	P027507		



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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION		
I-526 LOWCOUNTRY CORRIDOR WEST TYPICAL SECTIONS		
SCALE 1"=	SCALE 1"=	RTE./RD.

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	CHARLESTON	P027507		



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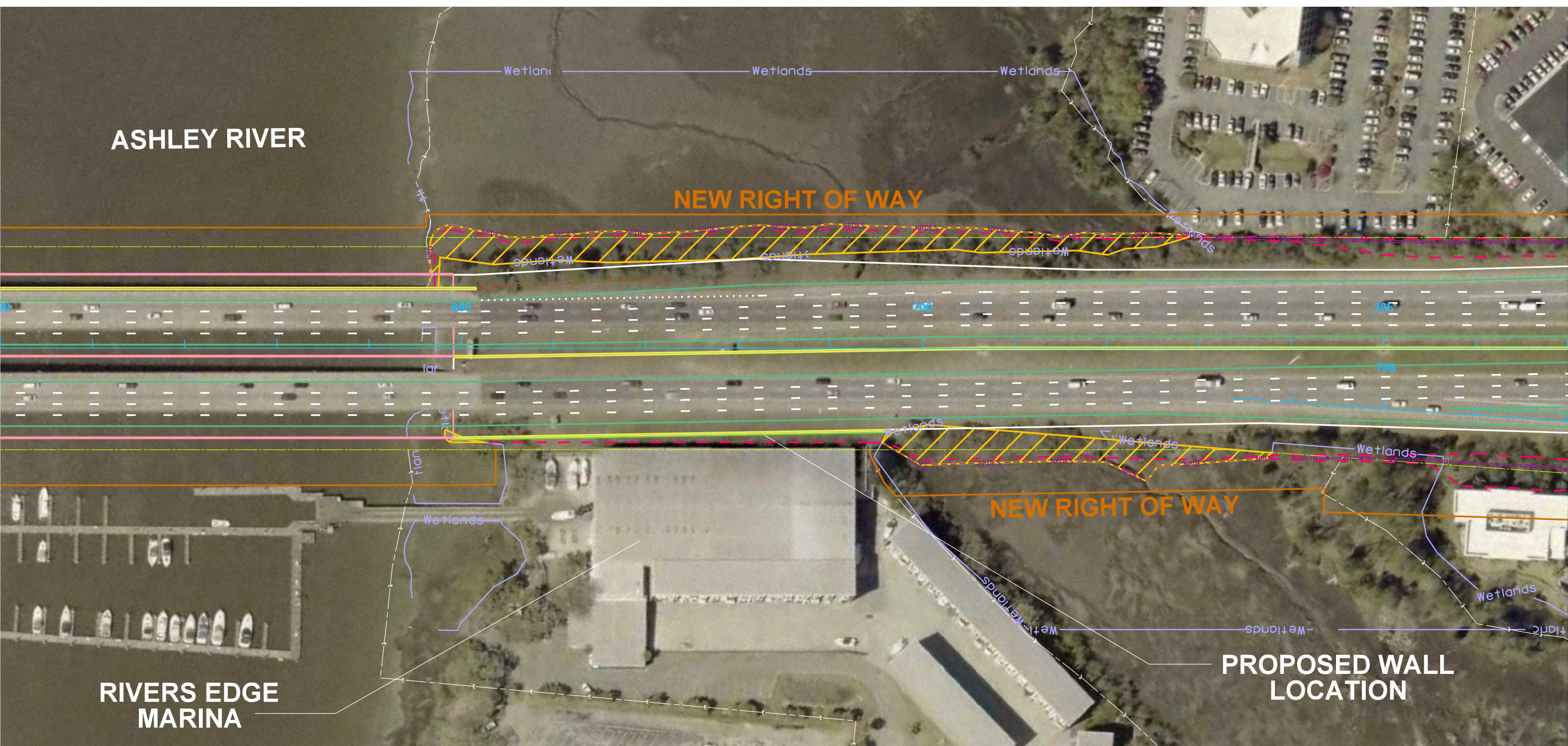
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Fax: 843.740.7707  
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4				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION  I-526 LOWCOUNTRY CORRIDOR WEST  TYPICAL SECTIONS
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	
TOPO. _____ DATE _____ DWG. _____ DATE _____ GROUP ____ - ____ R/W _____ DATE _____				SCALE 1"=      SCALE 1"=      RTE./RD.



**I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 1A**  
**WIDEN BRIDGES DOWNSTREAM (EAST) / SUP UPSTREAM (WEST)**  
**NORTH CHARLESTON APPROACH**



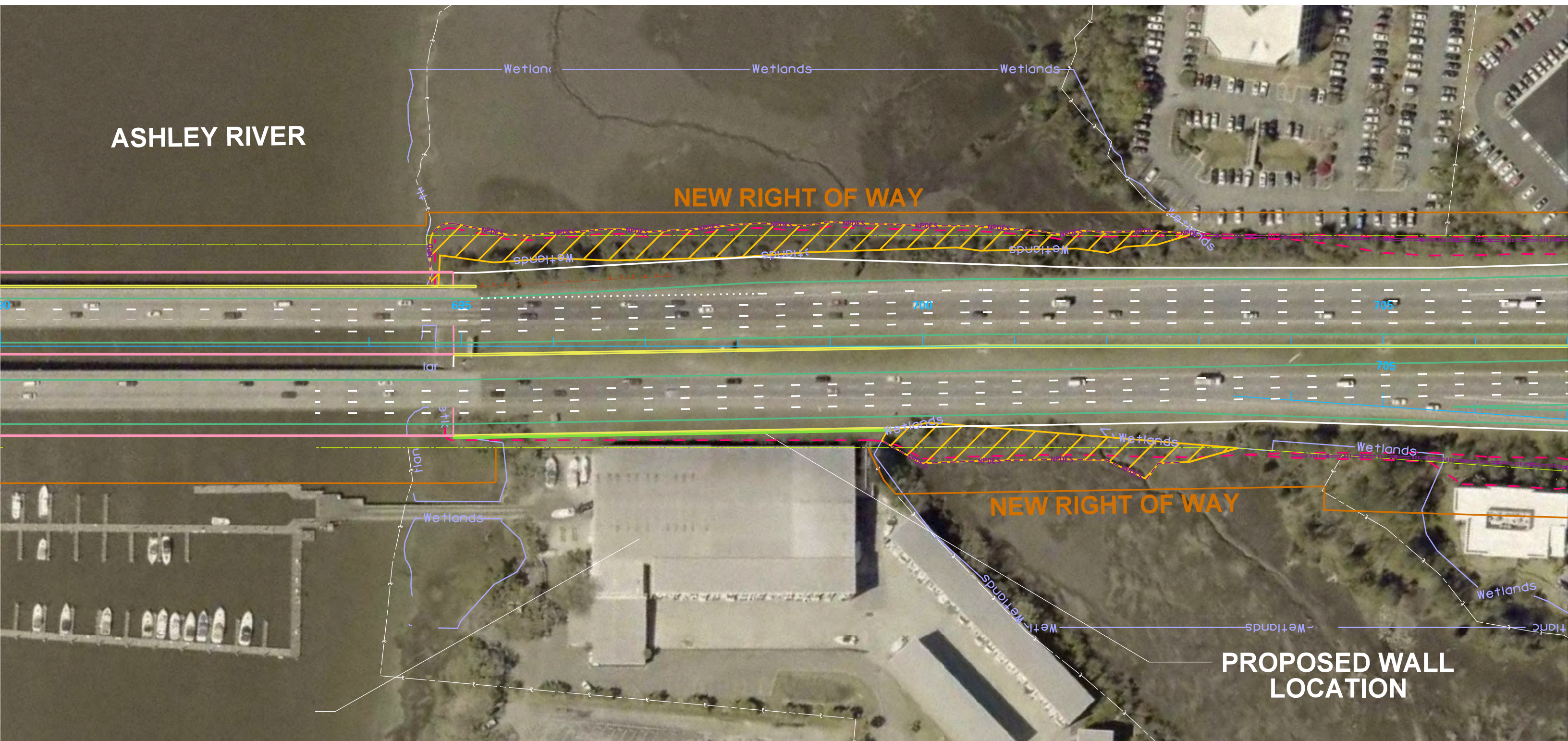
CRITICAL WETLAND IMPACTS







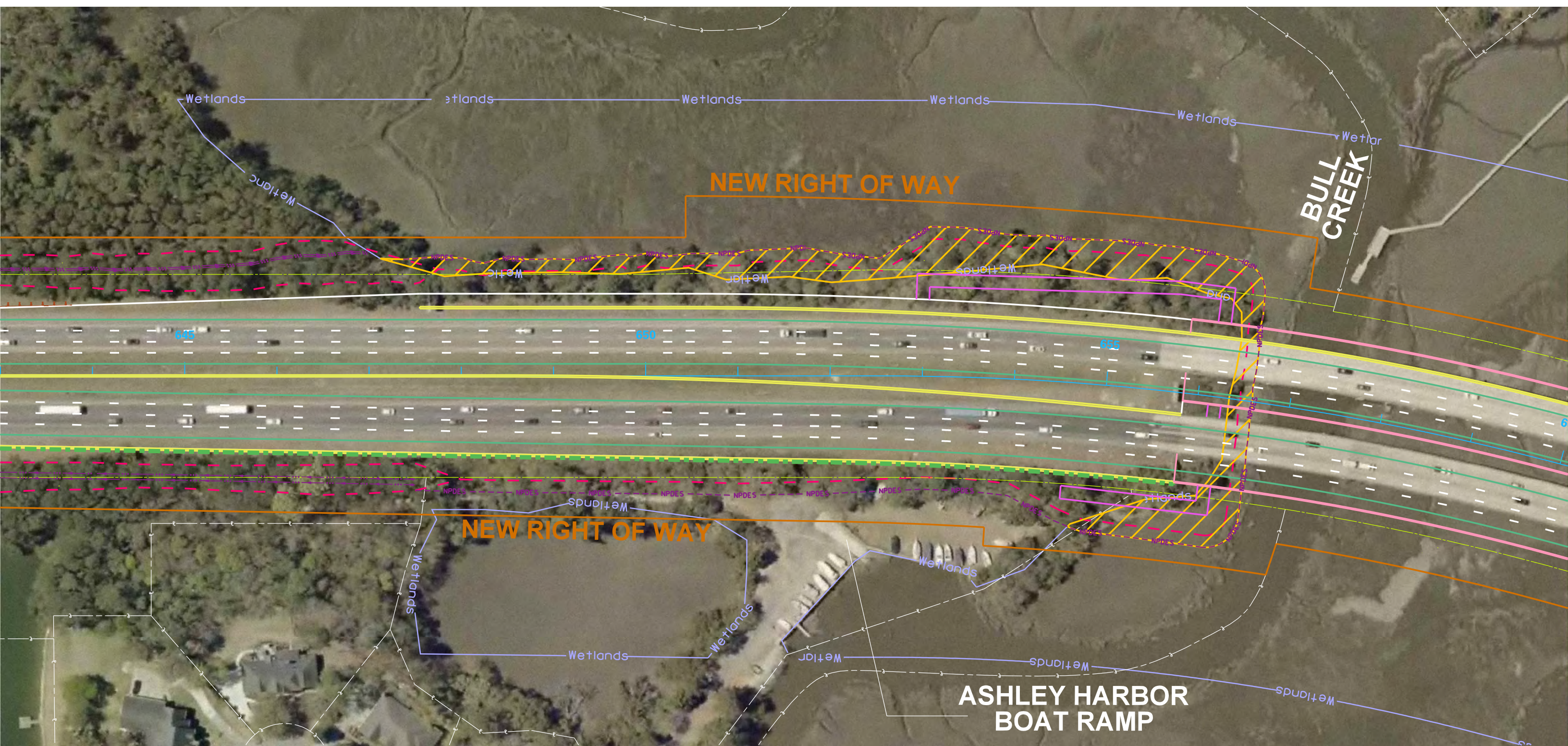
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**WIDEN BRIDGES DOWNSTREAM (EAST) / SUP UPSTREAM (WEST)**  
**NORTH CHARLESTON APPROACH**



CRITICAL WETLAND IMPACTS



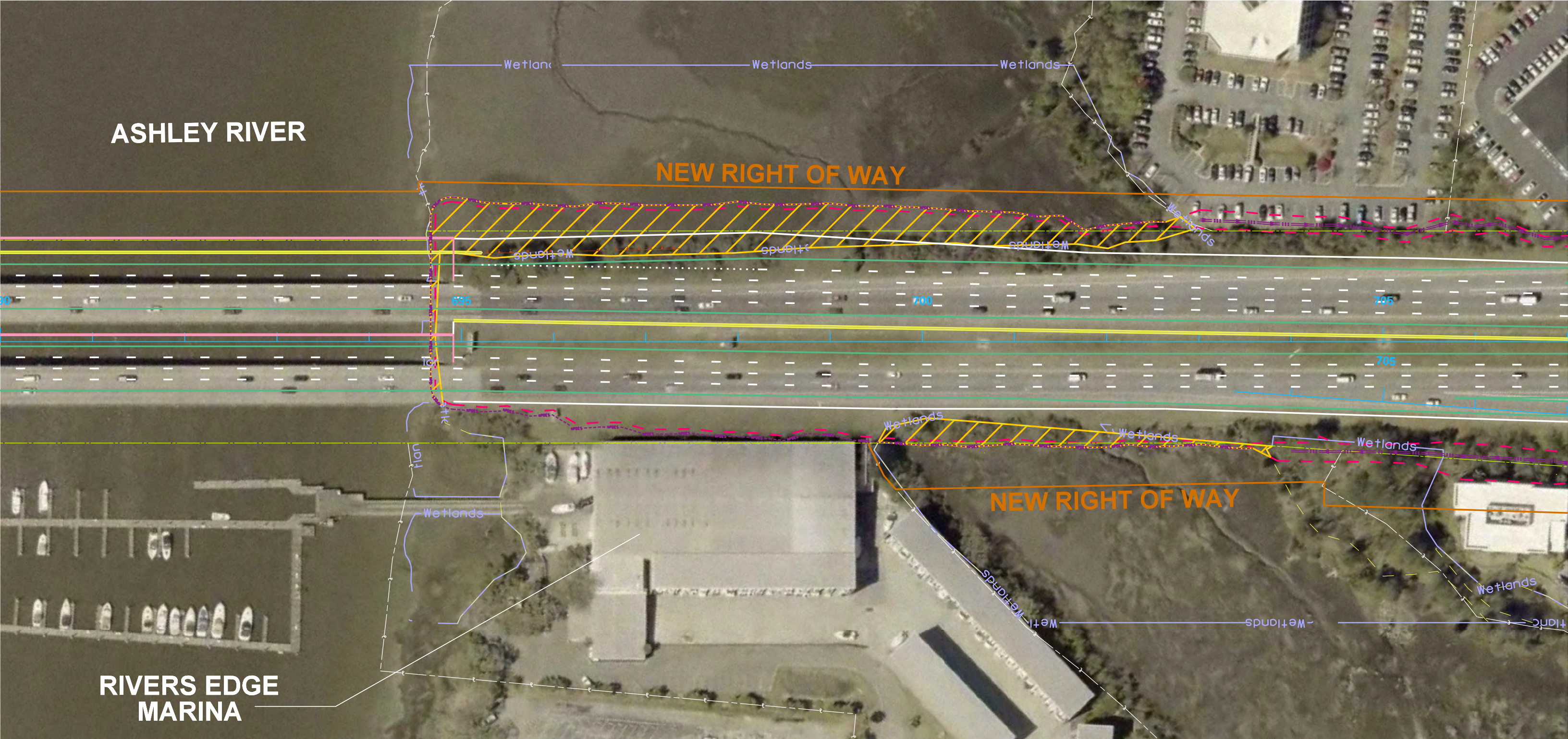
**I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 1B**  
**WIDEN BRIDGES DOWNSTREAM (EAST) / SUP UPSTREAM (WEST)**  
**WEST ASHLEY APPROACH**



CRITICAL WETLAND IMPACTS



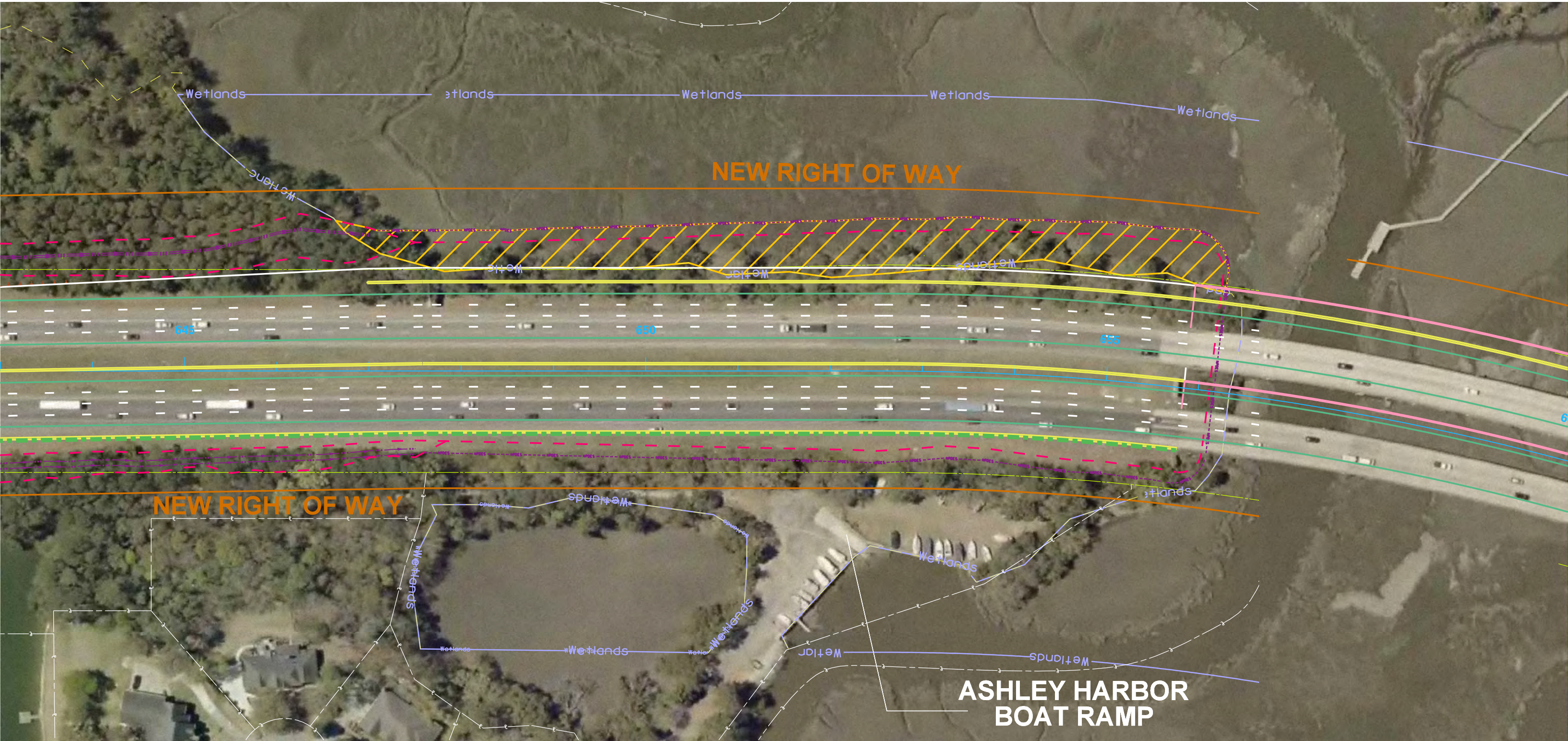
**I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 2A**  
**WIDEN BRIDGES UPSTREAM (WEST) / SUP UPSTREAM (WEST)**  
**NORTH CHARLESTON APPROACH**



CRITICAL WETLAND IMPACTS



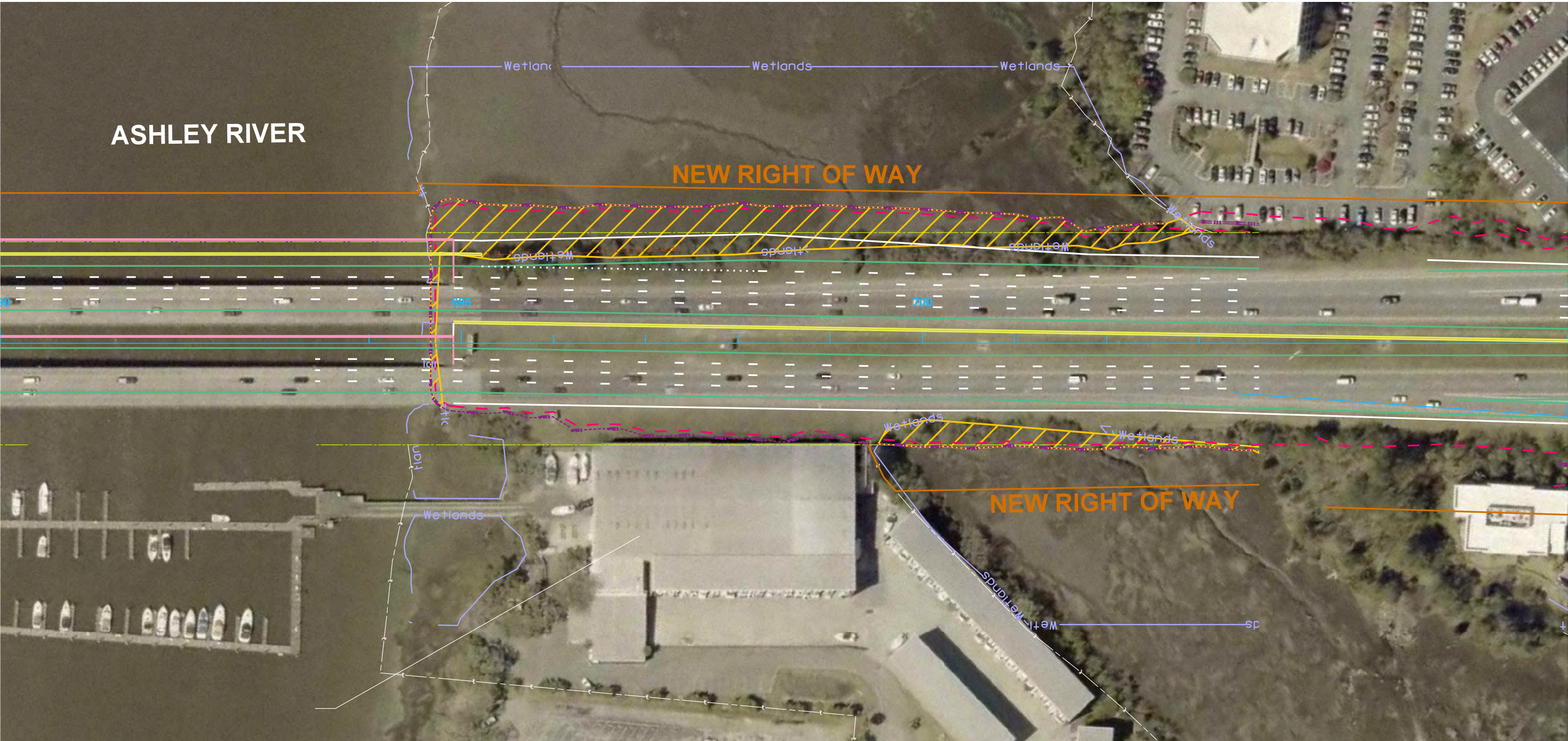
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**WIDEN BRIDGES UPSTREAM (WEST) / SUP UPSTREAM (WEST)**  
**WEST ASHLEY APPROACH**



CRITICAL WETLAND IMPACTS



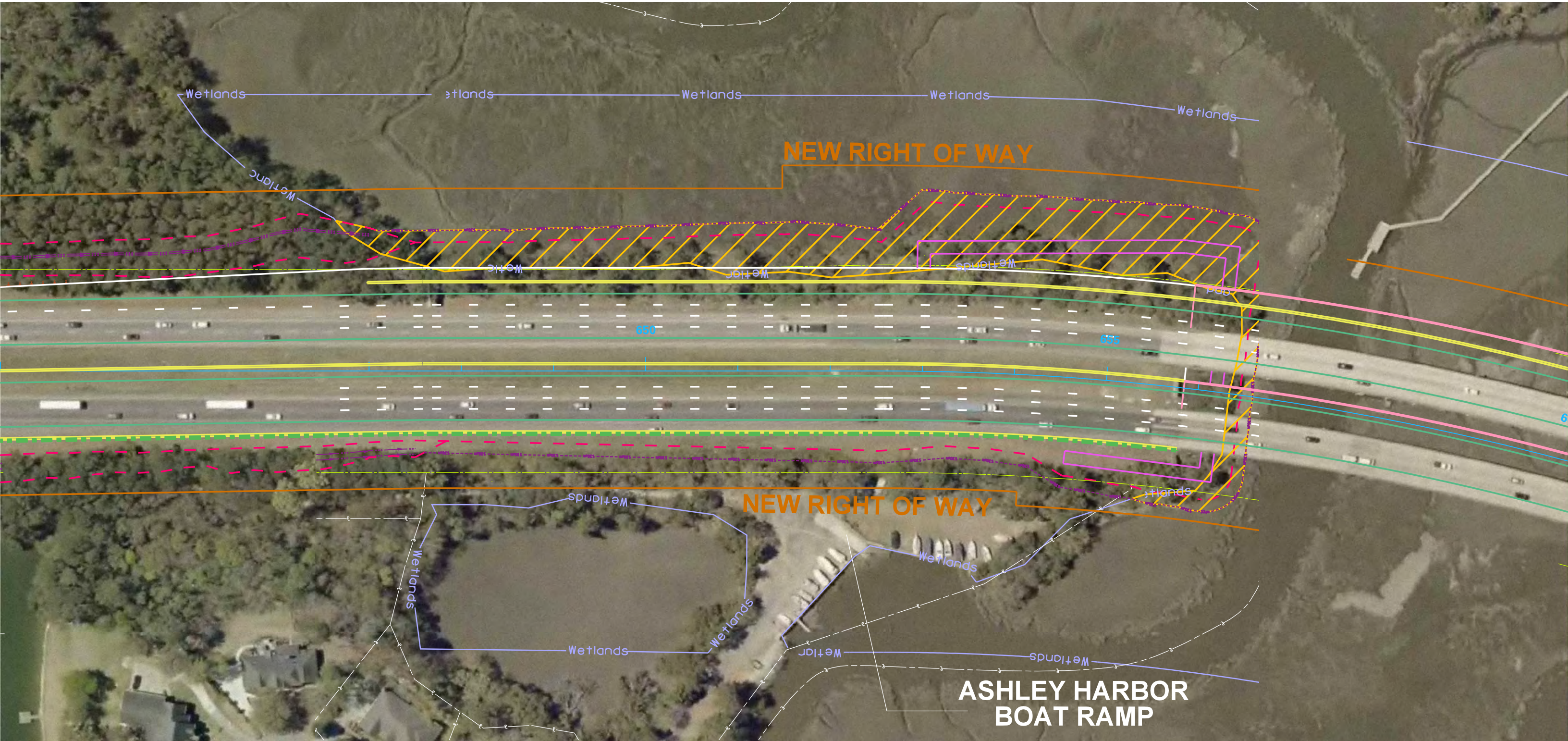
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WIDEN BRIDGES UPSTREAM (WEST) / SUP UPSTREAM (WEST)  
NORTH CHARLESTON APPROACH



CRITICAL WETLAND IMPACTS



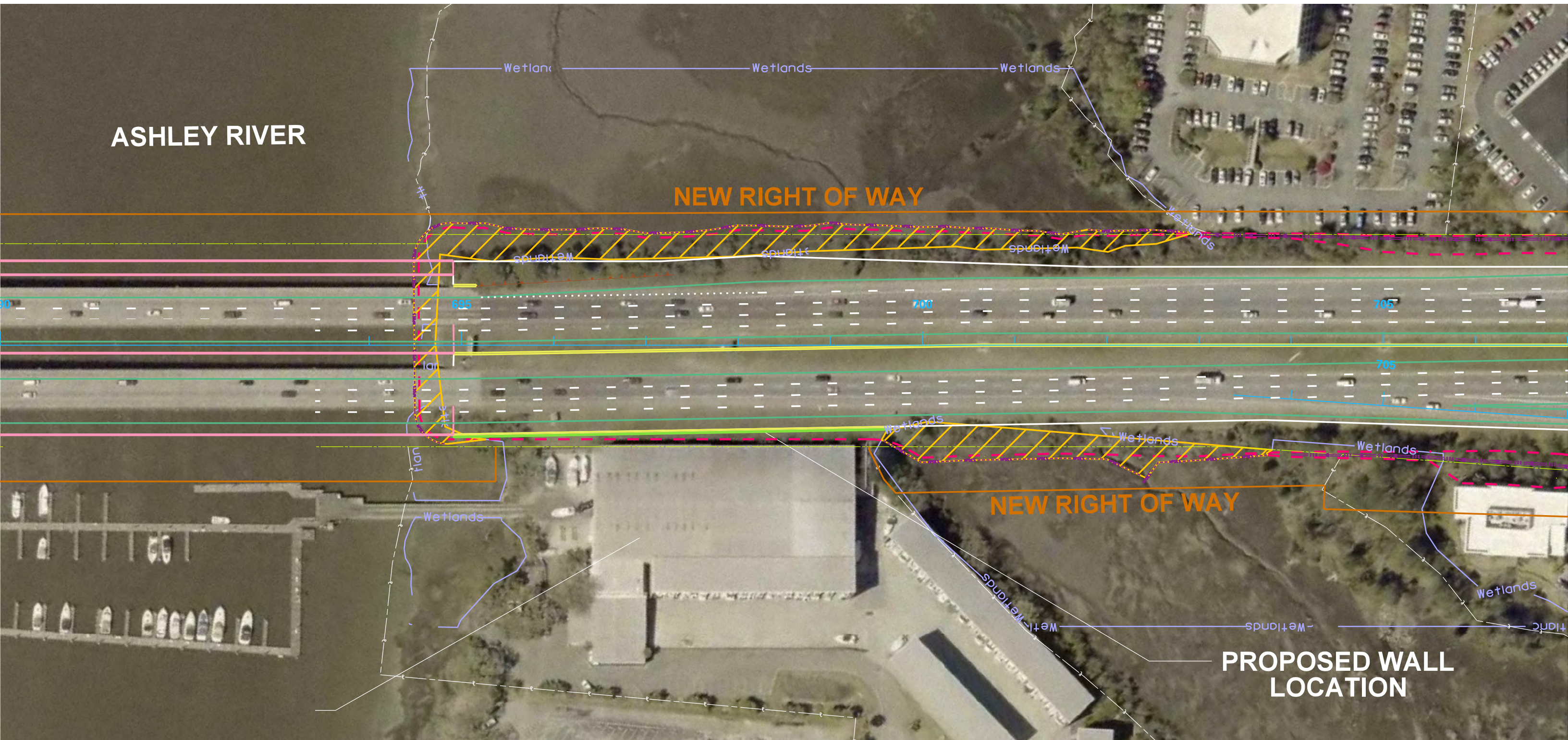
I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 2B  
WIDEN BRIDGES UPSTREAM (WEST) / SUP UPSTREAM (WEST)  
WEST ASHLEY APPROACH



CRITICAL WETLAND IMPACTS



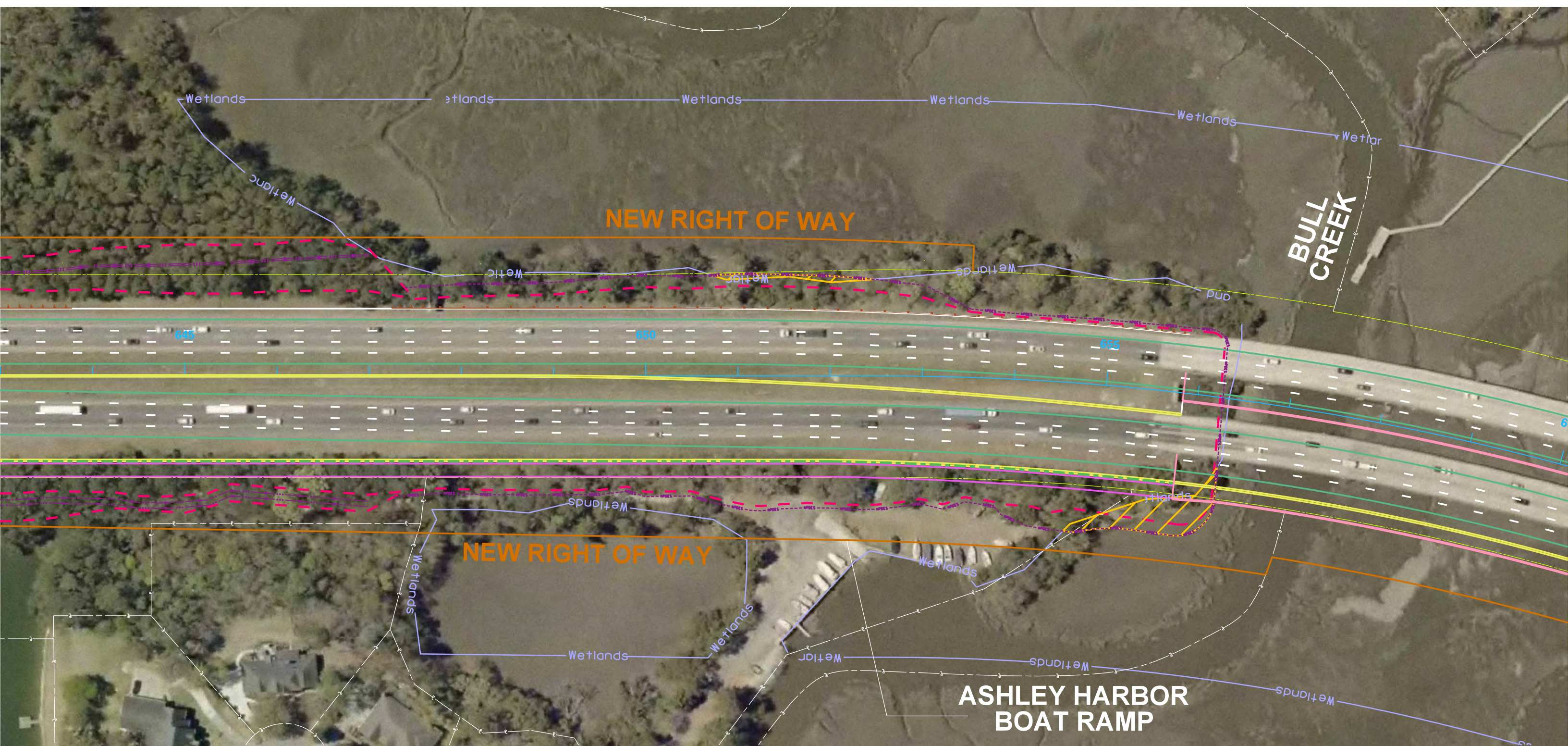
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**WIDEN BRIDGES DOWNSTREAM (EAST) / SUP DOWNSTREAM (EAST)**  
**NORTH CHARLESTON APPROACH**



CRITICAL WETLAND IMPACTS



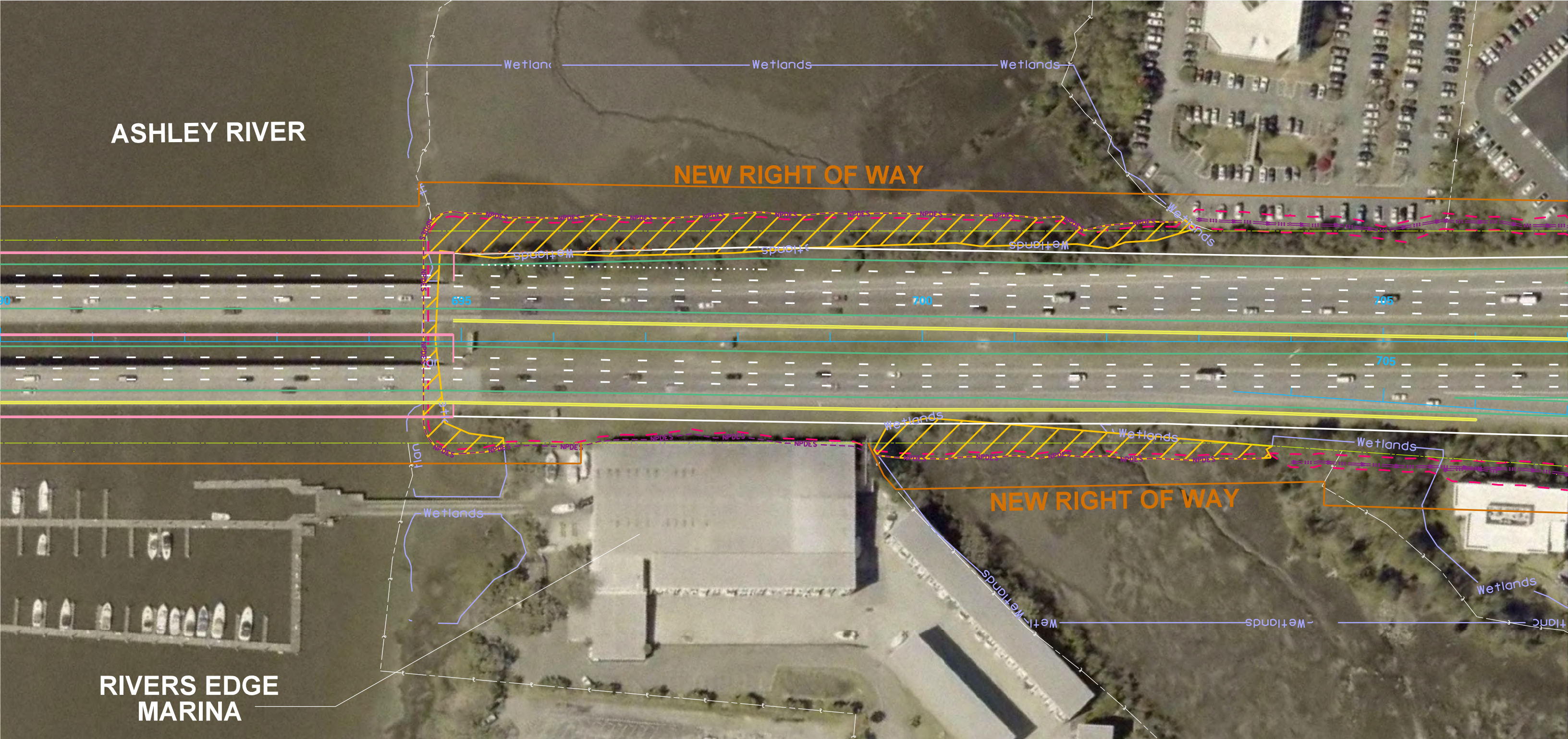
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**WIDEN BRIDGES DOWNSTREAM (EAST) / SUP DOWNSTREAM (EAST)**  
**WEST ASHLEY APPROACH**



CRITICAL WETLAND IMPACTS



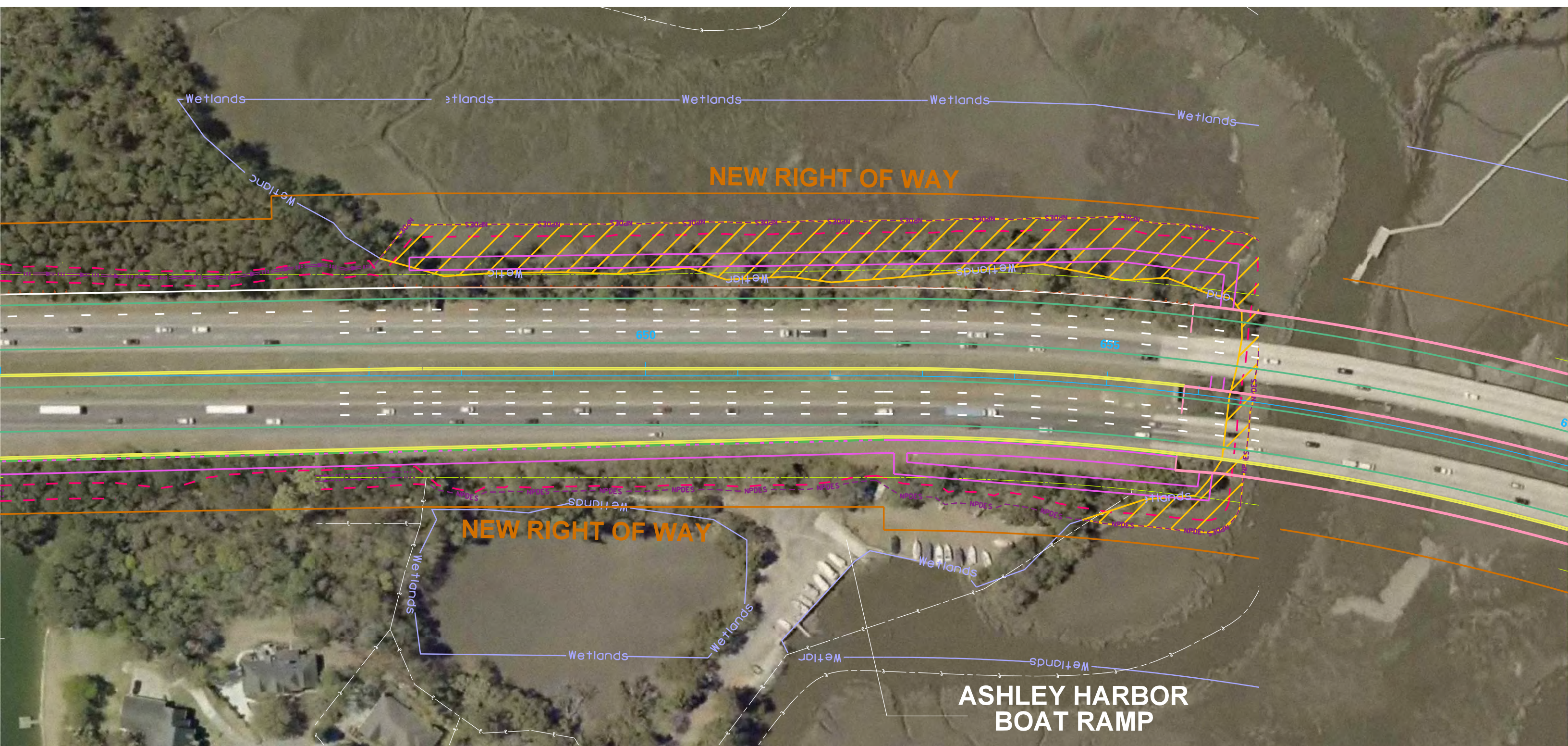
I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 4A  
WIDEN BRIDGES DOWNSTREAM (EAST) / SUP UPSTREAM (WEST)  
NORTH CHARLESTON APPROACH



CRITICAL WETLAND IMPACTS



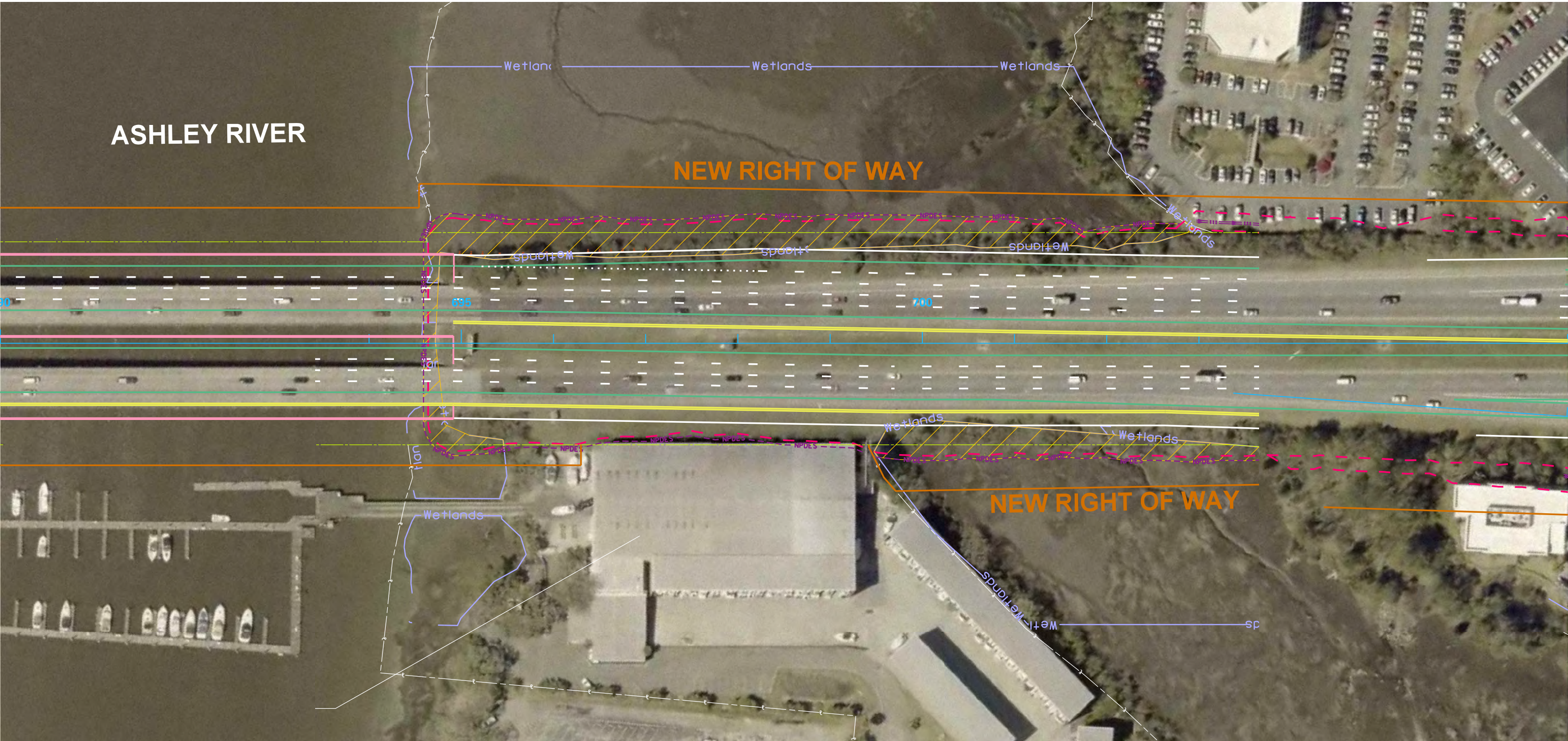
**I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 4A**  
**WIDEN BRIDGES DOWNSTREAM (EAST) / SUP UPSTREAM (WEST)**  
**WEST ASHLEY APPROACH**



**CRITICAL WETLAND IMPACTS**



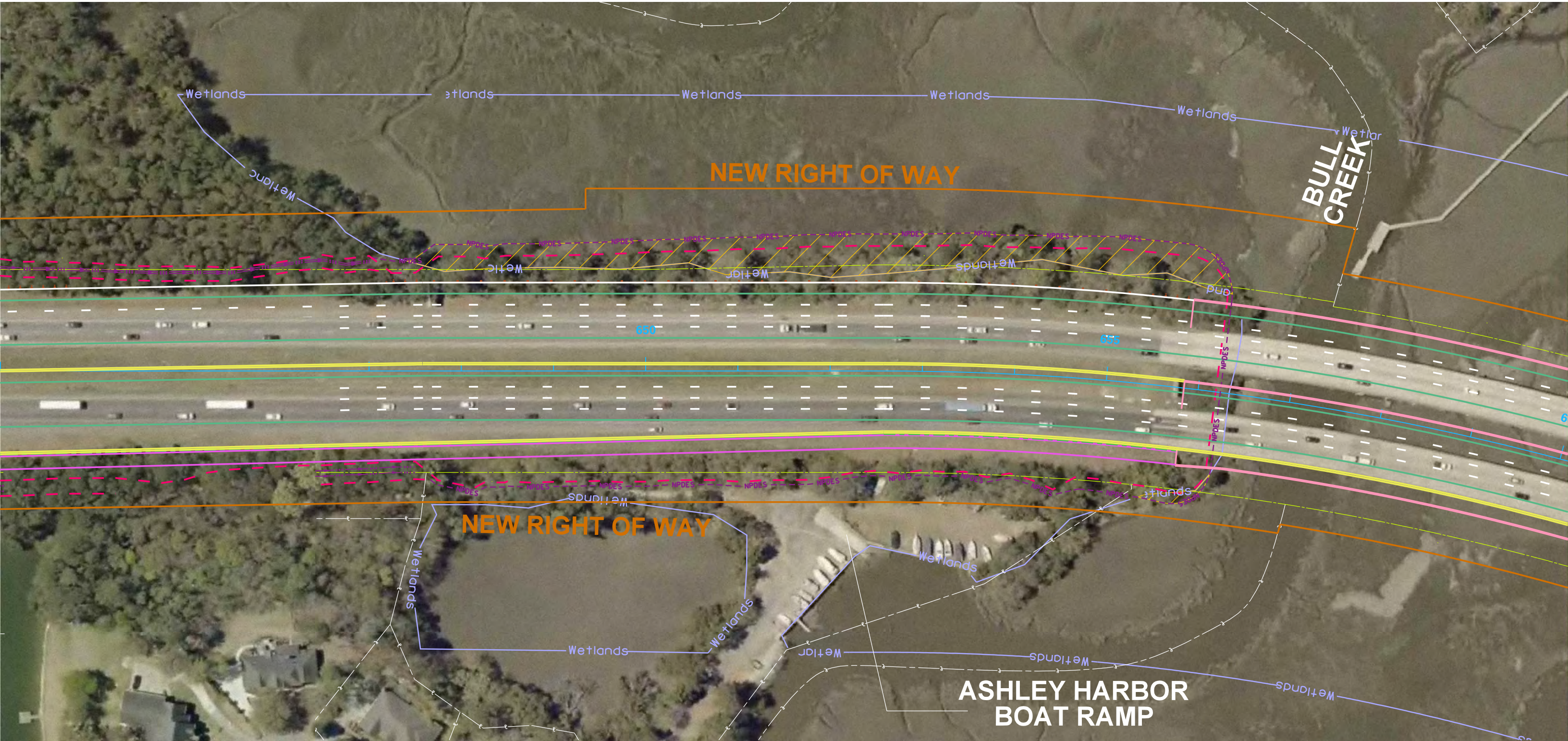
I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 4B  
WIDEN BRIDGES DOWNSTREAM (EAST) / SUP UPSTREAM (WEST)  
NORTH CHARLESTON APPROACH



CRITICAL WETLAND IMPACTS



**I-526 ASHLEY RIVER BRIDGE SUP WIDENING - OPTION 4B**  
**WIDEN BRIDGES DOWNSTREAM (EAST) / SUP UPSTREAM (WEST)**  
**WEST ASHLEY APPROACH**



CRITICAL WETLAND IMPACTS



## **APPENDIX C – Support Documentation for Cost Summary**

### I-526 ASHLEY RIVER BRIDGE WIDENING AND SUP OPTIONS PRELIMINARY COST ESTIMATES

ESTIMATED COSTS	OPTION 1A WIDEN DOWNSTREAM / SUP UPSTREAM	OPTION 2A WIDEN UPSTREAM / SUP UPSTREAM	OPTION 3A WIDEN DOWNSTREAM / SUP DOWNSTREAM	OPTION 4A WIDEN UPSTREAM / SUP DOWNSTREAM
CONSTRUCTION COSTS	\$80,460,493.55	\$73,385,361.89	N/A	\$80,650,421.43
ENVIRONMENTAL MITIGATION COSTS	\$1,227,077.31	\$2,121,677.84	N/A	\$2,614,908.24
RIGHT OF WAY COSTS	\$3,885,700.00	\$4,135,365.00	N/A	\$4,495,530.00
<b>TOTAL COST*</b>	<b>\$85,573,270.86</b>	<b>\$79,642,404.73</b>	<b>\$0.00</b>	<b>\$87,760,859.67</b>

ESTIMATED COSTS	OPTION 1B WIDEN DOWNSTREAM / SUP UPSTREAM	OPTION 2B WIDEN UPSTREAM / SUP UPSTREAM	OPTION 3B WIDEN DOWNSTREAM / SUP DOWNSTREAM	OPTION 4B WIDEN UPSTREAM / SUP DOWNSTREAM
CONSTRUCTION COSTS	\$80,518,032.11	\$73,444,050.78	\$75,467,677.22	\$80,535,120.60
ENVIRONMENTAL MITIGATION COSTS	\$1,692,302.63	\$2,580,018.68	\$1,036,528.35	\$1,789,137.51
RIGHT OF WAY COSTS	\$4,058,047.50	\$4,284,605.00	\$3,907,020.00	\$4,354,610.00
<b>TOTAL COST*</b>	<b>\$86,268,382.24</b>	<b>\$80,308,674.46</b>	<b>\$80,411,225.57</b>	<b>\$86,678,868.11</b>

\*utility costs would be constant across all options and predominantly consist of SCDOT owned ITS fiber in median



**I-526 ASHLEY RIVER WIDENING OPTIONS PRELIMINARY  
BRIDGE AND WALL CONSTRUCTION COSTS<sup>+</sup>**

BRIDGE, WALL AND ROADWAY ITEMS	OPTION 1A WIDEN DOWNSTREAM / SUP UPSTREAM		OPTION 2A WIDEN UPSTREAM / SUP UPSTREAM		OPTION 3A WIDEN DOWNSTREAM / SUP DOWNSTREAM		OPTION 4A WIDEN UPSTREAM / SUP DOWNSTREAM	
NEW BRIDGE DECK (\$175/s.f.)	\$	65,093,000.00	\$	65,093,000.00	N/A	\$	65,093,000.00	
BRIDGE WIDENING PREP. 3908' x \$1000.00/l.f. = \$4,000,000	\$	11,723,000.00	\$	7,815,000.00	N/A	\$	11,723,000.00	
WALL COSTS (\$43.00/s.f.) Average 5' height	\$	102,125.00	\$	-	N/A	\$	-	
Addl Const. Costs*	\$	3,076,725.00	\$	-	N/A	\$	3,076,725.00	
SUP CONCRETE PAVEMENT (\$5.55/s.f.)	\$	129,842.21	\$	135,924.71	N/A	\$	408,538.74	
SUP CONCRETE MEDIAN (\$70/l.f.)	\$	335,801.34	\$	341,437.18	N/A	\$	349,157.69	
<b>TOTAL</b>	\$	80,460,493.55	\$	73,385,361.89	\$	-	\$	80,650,421.43

*\*Cost per s.f new deck increased to \$210/s.f. = 20% increase. Costs attributed to 1) additional construction phase 2) added trestle each side 3) 6 months longer construction period due to additional phase.*

**I-526 ASHLEY RIVER BRIDGE WIDENING OPTIONS  
PRELIMINARY ENVIRONMENTAL MITIGATION COSTS**

**OPTION 1A - Widen Each Bridge Downstream, SUP Upstream**

Wetlands	Total Impacts	Mitigation Factor	Est Credit Need	Unit Cost (current rate)	Total Cost	15% increase*
Critical Area Wetland Fill (acre)	0.80	14.5	11.63625	\$65,000.00	\$756,356.25	\$869,809.69
Critical Area Wetland Clearing (acre)	0.43	11	4.7795	\$65,000.00	\$310,667.50	\$357,267.63
					<b>\$1,067,023.75</b>	<b>\$1,227,077.31</b>

**OPTION 1B - Widen Each Bridge Downstream, SUP Upstream**

Wetlands	Total Impacts	Mitigation Factor	Est Credit Need	Unit Cost (current rate)	Total Cost	15% increase*
Critical Area Wetland Fill (acre)	1.14	14.5	16.4575	\$65,000.00	\$1,069,737.50	\$1,230,198.13
Critical Area Wetland Clearing (acre)	0.56	11	6.182	\$65,000.00	\$401,830.00	\$462,104.50
					<b>\$1,471,567.50</b>	<b>\$1,692,302.63</b>

**OPTION 2A - Widen Each Bridge Upstream, SUP Upstream**

Wetlands	Total Impacts	Mitigation Factor	Est Credit Need	Unit Cost (current rate)	Total Cost	15% increase*
Critical Area Wetland Fill (acre)	1.63	14.5	23.60745	\$65,000.00	\$1,534,484.25	\$1,764,656.89
Critical Area Wetland Clearing (acre)	0.43	11	4.7762	\$65,000.00	\$310,453.00	\$357,020.95
					<b>\$1,844,937.25</b>	<b>\$2,121,677.84</b>

**OPTION 2B - Widen Each Bridge Upstream, SUP Upstream**

Wetlands	Total Impacts	Mitigation Factor	Est Credit Need	Unit Cost (current rate)	Total Cost	15% increase*
Critical Area Wetland Fill (acre)	1.95	14.5	28.3069	\$65,000.00	\$1,839,948.50	\$2,115,940.78
Critical Area Wetland Clearing (acre)	0.56	11	6.2084	\$65,000.00	\$403,546.00	\$464,077.90
					<b>\$2,243,494.50</b>	<b>\$2,580,018.68</b>

**OPTION 3 - Widen Each Bridge Downstream, SUP Downstream**

Wetlands	Total Impacts	Mitigation Factor	Est Credit Need	Unit Cost (current rate)	Total Cost	15% increase*
Critical Area Wetland Fill (acre)	0.77	14.5	11.2288	\$65,000.00	\$729,872.00	\$839,352.80
Critical Area Wetland Clearing (acre)	0.24	11	2.6378	\$65,000.00	\$171,457.00	\$197,175.55
					<b>\$901,329.00</b>	<b>\$1,036,528.35</b>

**OPTION 4A - Widen Each Bridge Upstream, SUP Downstream**

Wetlands	Total Impacts	Mitigation Factor	Est Credit Need	Unit Cost (current rate)	Total Cost	15% increase*
Critical Area Wetland Fill (acre)	1.96	14.5	28.37215	\$65,000.00	\$1,844,189.75	\$2,120,818.21
Critical Area Wetland Clearing (acre)	0.60	11	6.6099	\$65,000.00	\$429,643.50	\$494,090.03
					<b>\$2,273,833.25</b>	<b>\$2,614,908.24</b>

\*Shown to account for possibility of rise in mitigation credit costs from time of estimation to time of purchase.



**I-526 ASHLEY RIVER BRIDGE WIDENING OPTIONS  
PRELIMINARY RIGHT OF WAY IMPACT COSTS AT BRIDGE APPROACHES**

<b>OPTION 1A - Widen Each Bridge Downstream, SUP Upstream</b>				
<b>Right of Way</b>	<b>Number of Properties</b>	<b>ACRES</b>	<b>UNIT COST</b>	<b>TOTAL COST</b>
Regular Take	14	11.96	\$ 325,000.00	<b>\$3,885,700.00</b>

<b>OPTION 1B - Widen Each Bridge Downstream, SUP Upstream</b>				
<b>Right of Way</b>	<b>Number of Properties</b>	<b>ACRES</b>	<b>UNIT COST</b>	<b>TOTAL COST</b>
Regular Take	15	12.49	\$ 325,000.00	<b>\$4,058,047.50</b>

<b>OPTION 2A - Widen Each Bridge Upstream, SUP Upstream</b>				
<b>Right of Way</b>	<b>Number of Properties</b>	<b>ACRES</b>	<b>UNIT COST</b>	<b>TOTAL COST</b>
Regular Take	12	12.72	\$ 325,000.00	<b>\$4,135,365.00</b>

<b>OPTION 2B - Widen Each Bridge Upstream, SUP Upstream</b>				
<b>Right of Way</b>	<b>Number of Properties</b>	<b>ACRES</b>	<b>UNIT COST</b>	<b>TOTAL COST</b>
Regular Take	12	13.18	\$ 325,000.00	<b>\$4,284,605.00</b>

<b>OPTION 3B - Widen Each Bridge Downstream, SUP Downstream</b>				
<b>Right of Way</b>	<b>Number of Properties</b>	<b>ACRES</b>	<b>UNIT COST</b>	<b>TOTAL COST</b>
Regular Take	15	12.02	\$ 325,000.00	<b>\$3,907,020.00</b>

<b>OPTION 4A - Widen Each Bridge Upstream, SUP Downstream</b>				
<b>Right of Way</b>	<b>Number of Properties</b>	<b>ACRES</b>	<b>UNIT COST</b>	<b>TOTAL COST</b>
Regular Take	15	13.83	\$ 325,000.00	<b>\$4,495,530.00</b>

<b>OPTION 4B - Widen Each Bridge Upstream, SUP Downstream</b>				
<b>Right of Way</b>	<b>Number of Properties</b>	<b>ACRES</b>	<b>UNIT COST</b>	<b>TOTAL COST</b>
Regular Take	15	13.40	\$ 325,000.00	<b>\$4,354,610.00</b>