Appendix B

I-73 South 2010 NEPA Re-evaluation

INTERSTATE 73 SOUTH
DILLON, HORRY, AND MARION COUNTIES, SOUTH CAROLINA

Final Environmental Impact Statement Re-evaluation

(Prepared pursuant to 23 CFR§771.129)

The Re-evaluation of the *Interstate 73: From I-95 to the Myrtle Beach Region Final Environmental Impact Statement* (I-73 South FEIS) analyzed the following proposed design changes to the Selected Alternative:

- I-95/I-73 Interchange Ramp Widening;
- S.C. Route 22/I-73 Interchange Ramp Re-design;
- Barnhill Road (S-26-309) Overpass Re-alignment;
- Elimination of Rest Areas;
- Derrick Road Re-alignment;
- Good Luck Road (S-26-569) Re-alignment; and
- J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment.

All other aspects of the Selected Alternative remain the same as it was presented in the I-73 South FEIS. Based on the studies conducted for this Re-evaluation as they pertain to the aforementioned proposed design changes, no new significant impacts were identified.

The South Carolina Department of Transportation requests that the Federal Highway Administration provide concurrence of the findings that no new significant impacts would result from the proposed design changes, and that a supplemental EIS is not required for this project.

Respectfully Submitted by:

Randall Williamson — 5/11/2010

Mr. Randall Williamson — Date
South Carolina Department of Transportation

Approved by:

Patrick L. Tyndall — 5-7-2010

Mr. Patrick Tyndall — Date
Federal Highway Administration

EXECUTIVE SUMMARY

This document provides a re-evaluation of the FEIS for the southernmost segment of the I-73 highway project, which nationally will provide a transportation corridor starting at Sault Ste. Marie, Michigan, and traversing portions of Ohio, West Virginia, Virginia, and North Carolina before terminating near Myrtle Beach, South Carolina. On February 8, 2008, the Federal Highway Administration (FHWA) and the U.S. Department of Transportation (USDOT) signed the Record of Decision (ROD) for the Interstate 73 Final Environmental Impact Statement (FEIS), from I-95 to the Myrtle Beach Region (I-73 South). The I-73 South project study area extends southeast from I-95, and is bounded to the northeast by the North Carolina/South Carolina state line, to the southeast by U.S. Route 17, and to the southwest by the eastern edge of the Great Pee Dee River floodplain, U.S. Route 378, and U.S. Route 501.

The purpose of the I-73 project is to provide an interstate link between I-95 and the Myrtle Beach region to serve residents, businesses, and tourists while fulfilling congressional intent in an environmentally responsible and community sensitive manner. The proposed project includes six interchanges with existing roadways and a six-lane typical section developed to accommodate corridors for future rail lines, and allowances for frontage roads where needed. Alternative 3 was identified as the Preferred Alternative in the 2008 FEIS and became the Selected Alternative with the signing of the ROD because it would have the fewest impacts to wetlands, lowest impacts to farmlands, least impact to cultural resources, lowest cost to construct, and would be the least disruptive to existing traffic patterns to construct.

Why is I-73 South being re-evaluated?

The purpose of this re-evaluation of the 2008 FEIS is to ensure that new information and circumstances relevant to the proposed action have been considered and would not result in significant environmental impacts not evaluated in the FEIS. This re-evaluation is necessary due to several design changes that have been proposed since approval of the ROD. In accordance with FHWA regulations, this re-evaluation includes a description of the proposed design changes, evaluation of how the proposed changes affect the previous environmental impact analysis, and a determination of whether a supplement to the FEIS or a new EIS is necessary.

How is the I-73 South Re-evaluation organized?

In addition to the Executive Summary, this re-evaluation is arranged into three sections. Section 1, Introduction, discusses the history of the I-73 project and the findings of the I-73 South FEIS and ROD. Section 2, Proposed Design Changes, includes a discussion of the Value Engineering (VE) study and an explanation of the proposed design changes. Section 3, Affected Resources and Potential Impacts from Proposed Design Changes, evaluates the potential environmental impacts that would result from the proposed design changes and provides an impact summary.

What are the proposed design changes?

This re-evaluation is necessary due to several design changes that have been proposed since approval of the ROD. These proposed changes include the following:

- I-95/I-73 Interchange Ramp Widening;
- S.C. Route 22/I-73 Interchange Ramp Re-design;
- Barnhill Road (S-26-309) Overpass Re-alignment;
- Elimination of Rest Areas;
- Derrick Road Re-alignment;
- Good Luck Road (S-26-569) Re-alignment; and
- J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment.

These changes are discussed in further detail in Section 2.2 (refer to page 10).

What are the potential impacts due to the proposed design changes?

Communities:

The proposed design changes occur within the community boundaries of Bakers Chapel, Joiner, Mallory, Mullins, and Methodist Rehobeth. Overall, the proposed design changes would not impact these communities.

Environmental Justice:

The proposed design changes would not disproportionately impact any environmental justice populations.

Cultural Resources:

The proposed design changes would not impact any eligible archaeological resources. While one National Register of Historic Places (NRHP) listed and two NHRP-eligible properties are within the vicinity of one proposed design change, no impacts are anticipated to these architectural resources. The State Historic Preservation Office has concurred that there would be no effect to archaeological or architectural resources due to the proposed design changes (refer to Appendix B).

Hazardous Materials:

The proposed design changes would not impact any known potentially hazardous materials sites. If contamination were discovered during construction, the removal and proper disposal of contaminated soil and/or groundwater in accordance with state and federal requirements would occur prior to proceeding with construction in that area.

Noise:

The proposed design changes would not result in any additional noise impacts to receptors.

Farmlands and Soils:

The proposed design changes would result in an increase of 9.19 acres of prime and statewide important farmland soils being impacted.

Wetlands:

The proposed design changes would result in a decrease of 0.26 acre of impacts to wetlands.

Federally Protected Species:

It is anticipated that the proposed design changes may affect, but are not likely to adversely effect one species, Kirtland's warbler. It is anticipated that the proposed design changes would have no effect on other federally protected species.

Floodplains:

The proposed design changes would not occur in 100-year floodplain; therefore, no impacts are anticipated.

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SECTION 1: INTRODUCTION

I-73 is a national highway project that will provide a transportation corridor starting at Sault Ste. Marie, Michigan, and traversing portions of Ohio, West Virginia, Virginia, and North Carolina before terminating near Myrtle Beach, South Carolina (refer to Figure 1-1).

At the national level, Michigan has upgraded some existing roads to interstate standards. However, the project is on hold indefinitely in the state.[1] Ohio has existing roadways that would duplicate the I-73 Corridor; therefore, Ohio has decided not to build a new facility and instead is addressing individual congestion issues along the existing roadways. West Virginia has completed a small portion of I-73, also known as the King Coal Highway and Tolsia Highway, and is waiting on additional funding prior to completing the I-73 Corridor project.[2]

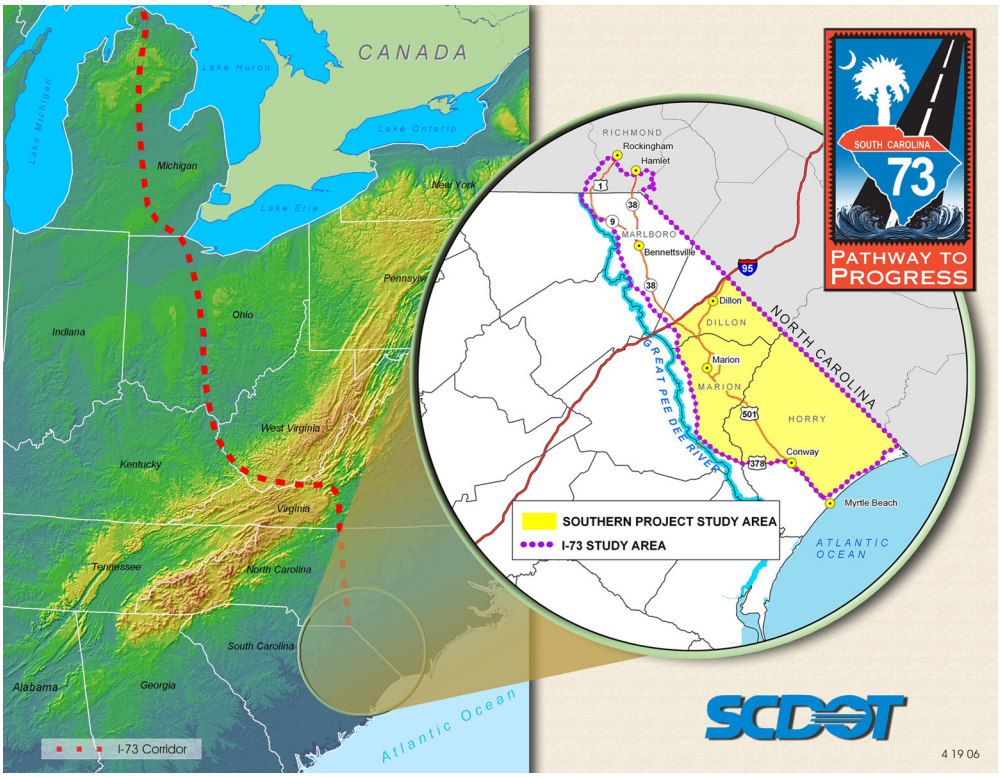


Figure 1-1: I-73 Project Corridor

The Federal Highway Administration (FHWA) signed a Record of Decision (ROD) for the I-73 Final Environmental Impact Statement (FEIS) in Virginia on March 30, 2007, allowing the final design process to begin for the project. However, the project is currently on hold pending litigation.[3] North Carolina has also completed portions of I-73 by the re-designation of existing roads as an interstate facility. The North Carolina Department of Transportation is currently completing environmental analyses, planning phases, and right-of-way acquisitions for its portion of I-73.[4]

[1] Kari Arend, Michigan DOT, Personal communication via email, February 10, 2009.
[2] Michael Mitchem, King Coal Highway Authority, Personal communication, February 10, 2009.
[3] Heidi Coy, VDOT, Personal communication via email, February 9, 2009.
[4] David Wasserman, NCDOT, Personal communication via email, February 26, 2009.

Within South Carolina, the FHWA and South Carolina Department of Transportation (SCDOT) signed the ROD for the Interstate 73 FEIS, from I-95 to the Myrtle Beach Region (I-73 South) on February 8, 2008. This segment of roadway comprises the southernmost portion of the national I-73 corridor. The I-73 South project study area extends southeast from I-95, and is bounded to the northeast by the North Carolina/ South Carolina state line, to the southeast by U.S. Route 17, and to the southwest by the eastern edge of the Great Pee Dee River floodplain, U.S. Route 378, and U.S. Route 501 (refer to Figure 1-1, page 1). The purpose of the I-73 South project is to provide an interstate link between I-95 and the Myrtle Beach region to serve residents, businesses, and tourists while fulfilling congressional intent in an environmentally responsible and community sensitive manner.

The 2008 FEIS proposed a typical section developed to accommodate a six-lane facility with corridors for future rail lines and frontage roads where needed. Interchanges with I-95, U.S. Route 501, S.C. Route 41A, U.S. Route 76, S-26-308, and S.C. Route 22 were proposed. Alternative 3 was selected as the Preferred Alternative in the 2008 FEIS because it had the fewest impacts to wetlands, lowest impacts to farmlands, least impact to cultural resources, lowest construction cost, and would be the least disruptive to existing traffic patterns during construction.

1.1 What is the history of the I-73 South Project?

The I-73 Corridor was identified as a High Priority Corridor by the U.S. Congress in the *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA). Congress designated high priority corridors as those that would provide the most efficient way of integrating regions, linking major population centers of the country, providing opportunities for increased economic growth, and serving the travel and commerce needs of the nation. The I-73 South project is a portion of the South Carolina segment of the I-73/I-74 High Priority Corridor, and is currently listed as number five on the National Highway System High Priority Corridors list.[5]

A corridor feasibility study was initiated by SCDOT in 1994 after ISTEA was approved by the U.S. Congress and identified the I-73/I-74 Corridor as a high priority. This study evaluated upgrading existing roads starting at U.S. Route 1 at the North Carolina state line and ending on the U.S. Route 17 Corridor near the city of Charleston, South Carolina (S.C.), in Charleston County.[6] The *Transportation Equity Act* (TEA-21), enacted in by Congress in 1998, built on what ISTEA had established, but shortened the I-73/I-74 High Priority Corridor by changing its terminus from Charleston, S.C., to the general vicinity of Myrtle Beach, Conway, and Georgetown, S.C., which was evaluated in a 2003 feasibility study.

The *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) was passed by Congress and signed into law on August 10, 2005. SAFETEA-LU acknowledges the prior purpose for, and designation of, I-73 as a High Priority Corridor along with designating it as a project of

[5] 23 U.S.C. §1105(c) (1991, as amended through P.L. 109-59).
[6] SCDOT, *I-73 Feasibility Study* (April 1997).

"national and regional significance."[7] In addition, SAFETEA-LU has provided substantial funding for the I-73 project in South Carolina.

At the state level, the S.C. General Assembly appropriated money to SCDOT for the proposed I-73. Between September of 2004 and June of 2006, two public scoping meetings, four public information meetings, and three public hearings were held that allowed interested members of the public to learn more about how the proposed interstate may impact their properties and/or communities and to provide input on the project. The FHWA and SCDOT approved the I-73 South FEIS on November 29, 2007. With the signing of the ROD on February 8, 2008, the FHWA and SCDOT approved the Selected Alternative and initiated the use of available federal funding for the acquisition of right-of-way.

1.2 What was determined in the FEIS and ROD for the I-73 South Project?

1.2.1 What is the Purpose and Need of I-73 South?

The purpose of the I-73 South project is to provide an interstate link between I-95 and the Myrtle Beach region to serve residents, businesses, and tourists while fulfilling congressional intent in an environmentally responsible and community sensitive manner.

As a major link from I-95 to the Myrtle Beach region, the proposed project would provide new opportunities for economic growth and development to counties that are at or below the nation's poverty standards. Dillon and Marion Counties have 24.2 percent and 23.2 percent, respectively, of their populations living below the national poverty standard. In addition, both counties have average median household incomes that are $10,500 below that of the state, and $15,400 below that of the nation. The link would also facilitate the movement of residents and tourists between the northeast region of South Carolina and the Midwestern United States and Canada.

The project would secondarily fulfill the need of expediting hurricane evacuation of residents and tourists from the Myrtle Beach region. I-73 South would provide a new hurricane evacuation route with controlled-access, lowering the evacuation times by more than ten hours. The project would also secondarily meet the needs of alleviating traffic congestion on state and local roads between I-95 and the Myrtle Beach region, and providing a corridor for future multimodal rail transportation.

1.2.2 What was the Preferred Alternative for I-73 South?

The Preferred Alternative was Alternative 3, which became the Selected Alternative with the signing of the ROD on February 8, 2008 (refer to Figure 1-2, page 4). The Selected Alternative starts at a new interchange with I-95 approximately 3.5 miles north of the existing S.C. Route 38/I-95 interchange. From there, it extends southeast on the western side of Latta where it would have an interchange with

[7] 23 U.S.C. §101(2005).

Lake View
Little Rock
Dillon
Loris
Mullins
Marion
Aynor
Conway
I-95/I-73 Interchange
Ramp Widening
Derrick Road Re-alignment
Barnhill Road (S-26-309)
Overpass Re-alignment
Good Luck Road (S-26-569)
Re-alignment
J.H. Martin Road at Joiner Swamp Road (S-26-45)
Frontage Road Re-alignment
S.C. Route 22/ I-73 Interchange
Ramp Re-design

Legend

- Interstate
- Highway
- Selected Alternative Construction Limit
- Municipal Boundary
- County Boundary

0 2.5 5 7.5 Miles

FIGURE 1-2

LOCATION OF PROPOSED DESIGN CHANGES

U.S. Route 501, crosses to the east immediately north of Temperance Hill, then extends southeast where it would have an interchange with S.C. Route 41A. It continues southeast and would have an interchange with U.S. Route 76 on the western side of Mullins. Once south of Mullins, it angles slightly east and crosses the Little Pee Dee River immediately adjacent to the south side of the existing S.C. Route 917. It would have an interchange with S-26-308, then continues southeast on new alignment to an interchange with S.C. Route 22 near Bakers Chapel, about two miles west of the U.S. Route 701/S.C. Route 22 interchange. Once connected with S.C. Route 22, it would follow S.C. Route 22 to its terminus with U.S. Route 17 near Briarcliff Acres.

1.2.3 What were the potential impacts to resources in the project study area by the Selected Alternative?

The Selected Alternative would have the lowest total wetland impacts (313 acres) and would avoid crossing Buck Swamp (refer to Table 1.1, page 6). It would have a crossing of Lake Swamp, which is located southeast of the Little Pee Dee River and is a tributary to that river. It is the alternative with the lowest cost ($1.290 billion in 2011 dollars), and have the lowest farmland impacts (1,915 acres) as well. Twenty-two streams would be crossed by the Selected Alternative, with a total of 3,860 linear feet of channel impact. Three of the streams are classified as Outstanding Resource Waters, while none of the streams are listed as impaired by South Carolina Department of Health and Environmental Control (SCDHEC). The proposed floodplain impacts were 114.2 acres for this alternative. It is one of three alternatives indicated as potentially preferred by the South Carolina Department of Natural Resources (SCDNR) and the United States Fish and Wildlife Service (USFWS). The State Historic Preservation Office (SHPO) has indicated it prefers this route due to lack of impacts to cultural resources.

The Selected Alternative would impact a Section 4(f) resource, the Vaughn tract, which is part of the Little Pee Dee River Heritage Preserve located next to the S.C. Route 917 crossing of the Little Pee Dee River. The project would be built parallel, and to the south of existing S.C. Route 917 where it crosses the Little Pee Dee River. The alignment was moved to this location, in consultation with the Agency Coordination Team (ACT), to avoid creating a new crossing of the Little Pee Dee River, which could lead to fragmentation of wildlife habitat. The Section 4(f) Evaluation was approved as part of the ROD in February 2008.

This Alternative would also cross from west to east in proximity to the Temperance Hill community. This community objected to any alternative that was located in close proximity to their community. It would also impact the Zion community, located along S.C. Route 41A, north of Mullins.

Additional environmental consequences associated with implementation of the proposed action include the relocation of seventy-four residences, three commercial establishments, and one government facility (a waste transfer station), and potential noise impacts to thirteen residences.

Table 1.1
SELECTED ALTERNATIVE IMPACT MATRIX
Interstate 73 FEIS: I-95 to the Myrtle Beach Region

	CATEGORY	UNIT OF MEASURE	PREFERRED ALTERNATIVE (Alternative 3)
PURPOSE AND NEED	System Linkage		Yes
	Economic Development		Yes
	Hurricane Evacuation		Yes
	Local Traffic Congestion		Yes
	Multimodal Planning		Yes
ENGINEERING CRITERIA	Length	Miles	43.5
	Design Criteria	Meets/Does Not Meet	Meets
	Constructability	Scale 1-6 (1 highest)	1
	Construction Cost (Year 2011)	Year 2011 Dollars (Billions)	1.290
NATURAL FEATURES	Threatened and Endangered Species	Yes (#) / No	No
	Species of Concern	Yes (#) / No	No
	Wetlands	Acres	313.0
	Fill	Acres	288.8
	Bridge	Acres	24.2
	Wetland Quality	Value	1,510.8
	Fill	Value	1,378.9
	Bridge	Value	131.9
	Streams		
	Total Crossings	# of Crossings (Linear Feet)	22
	Perennial	# of Crossings (Linear Feet)	13(3,155)
	Intermittent	# of Crossings (Linear Feet)	9 (705)
	Water Quality		
	Outstanding Resource Water	# of Crossings	3
	303(d) Impaired	# of Crossings	0
	Habitat	Unique	No
	Natural Upland Communities	Acres	576.5
	Floodplains	Acres	114.2
MAN-MADE FEATURES	Hazardous Material Sites	#	0
	Parks and Wildlife Refuges	Yes (#) / No	1
	Historical Structures	Yes (#) / No	0
	Noise (R= Residential)	#	13R
	Farmland	Acres	1,915
	Prime	Acres	1,186
	Statewide Important	Acres	729
SOCIOECONOMIC ISSUES	Community Impacts	Scale 1-6 (1 least impact)	2
	Total Relocations	#	78
	Residential Relocations	#	74
	Commercial and Government Facility Relocations	#	4 (3C, 1G)
	Environmental Justice	Yes / No	No
INFRASTRUCTURE	Airports	#	0
	Fire Stations	#	0
	Schools	#	0
	Churches	#	0
	Cemeteries	#	0

C= Commercial, G=Government

1.2.4 What mitigation was proposed to offset the potential impacts from I-73 South?

The following mitigation measures were included in the environmental commitments for I-73 South:

- Design considerations would be taken into account in the final interchange design at S.C. Route 41A to avoid Zion Grocery, an important community store and meeting place for the Zion Community.

- Bridges constructed to elevate roadways over the interstate would have 10-foot shoulders, which would accommodate pedestrian and bicyclists safely.

- Relocations will be conducted in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,* as amended. Relocation resources will be available to all relocates without discrimination. According to 49 CFR Part 24.205(A)-(F), relocation planning and service will be provided to businesses.

- In the event that previously unknown cultural resources are discovered during construction, the resources will be handled according to 36 CFR §800.11 in coordination with the SHPO and appropriate Tribal Historic Preservation Offices.

- Sufficient upland areas that could be utilized for borrow activities are present in close proximity to the Selected Alternative. Therefore, it appears that impacts to wetlands due to the borrowing activities could be avoided. Wetland delineations would be performed at the borrow pit sites and potential impacts to federally protected species and cultural resources would be evaluated prior to beginning excavation, in accordance with the SCDOT Engineering Directive.

- A Section 404 permit from the United States Army Corps of Engineers (USACE) and a Section 401 Water Quality Certification from SCDHEC will be obtained for unavoidable impacts to wetlands and other waters of the United States, and mitigation will be completed for these impacts.

- Where practicable, 2:1 side slopes were used that reduced the roadway footprint through wetlands and other sensitive areas and thus reduced the impacts.

- Properly sized pipes and culverts, as determined by the final hydraulic study, would be installed under the roadway to maintain the historic hydrologic connections of wetlands and prevent the drainage or excessive flooding of jurisdictional areas. Pipe and culvert bottoms would have to be recessed below the bottom of perennial stream channels to allow movement of aquatic species through the structure.

- Upon completion of the bridges, the temporary means of access would be removed and the area reseeded with native species to deter colonization by invasive species.

- Construction activities would be confined within the permitted limits to prevent the unnecessary disturbance of adjacent wetland areas.

- During construction, potential temporary impacts to wetlands would be minimized by implementing sediment and erosion control measures to include seeding of side slopes, silt fences, and sediment basins, as appropriate. Other best management practices (BMPs) would be required of the contractor to ensure compliance with the policies of 23 CFR 650B.

- SCDOT will implement a seasonal moratorium pertaining to the shortnose sturgeon, in the Little Pee Dee River, for all in-water work between February 1 and April 30 of each year. Work will not impede more than fifty percent of the channel between January 1 and April 30. No special measures will be employed outside this moratorium except for normal BMPs.

- A Spill Prevention, Control, and Countermeasures (SPCC) Plan will be developed to address potential impacts from construction activities.

1.3 Why is I-73 South being re-evaluated?

This re-evaluation of the 2008 FEIS is necessary due to several design changes that have been proposed since approval of the ROD. This re-evaluation is being completed to ensure that new information and circumstances relevant to I-73 South have been considered and would not result in significant environmental impacts not evaluated in the FEIS. These proposed changes include the following:

- I-95/I-73 Interchange Ramp Widening;
- S.C. Route 22/I-73 Interchange Ramp Re-design;
- Barnhill Road (S-26-309) Overpass Re-alignment;
- Elimination of Rest Areas;
- Derrick Road Re-alignment;
- Good Luck Road (S-26-569) Re-alignment; and,
- J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment.

The locations of these changes are shown on Figure 1-2 (refer to page 4), and discussed in further detail in Section 2.2 (refer to page 10). In accordance with FHWA regulations,[8] the purpose of this re-evaluation is to describe the proposed design changes, to evaluate how the proposed changes affect the previous environmental impact analysis, and to determine whether a supplement to the FEIS or a new EIS is required.

[8] 23 CFR §771.129, and FHWA Technical Advisory 6640.8A.

SECTION 2: PROPOSED DESIGN CHANGES

2.1 Why is I-73 South being re-designed in some areas?

As the right-of-way plans were being developed for I-73 South, there were minor changes made to improve the design of the Selected Alternative. In addition, a value engineering study was performed that affected the design.

2.1.1 What is Value Engineering?

In 1995, the U.S. Congress passed the *National Highway System Designation Act,*[9] which included a requirement that value engineering (VE) studies/analyses be completed on projects on the National Highway System that have an estimated cost of $25 million or greater, or on federal-aid projects where there would be a great potential to reduce costs. In essence, VE "is an organized application of common sense and technical knowledge directed at finding and eliminating unnecessary costs in a project."[10]

The overall objectives of a VE study are the following:

- to reduce total ownership costs;
- reduce construction time by finding ways to make the project easier to construct;
- enhance project quality while maintaining safe operations; and,
- maintain environmental commitments.[11]

A VE study is a series of steps, known as a job plan, that are followed by a multi-disciplinary team that has not been previously involved in the project.[12] A project is selected, and the multi-disciplinary team begins investigating the project by reading through the project information to determine the function, cost, and worth of the project.[13] Once these are established, the team can determine which portions of the project are the high-cost elements, evaluate their functionality, and do a cost/worth comparison. The multi-disciplinary team then enters the speculation/creativity phase of the VE study, where the team develops alternatives to the high-cost elements that serve the same function. Once functional alternatives are identified, the advantages and disadvantages of each are evaluated and compared. The alternative that is selected as the best in terms of performance, cost, and schedule is further developed technically by design, cost estimates, and any other pertinent data to determine if the alternative

[9] 23 U.S.C. §§106, 302, 307, and 315.
[10] FHWA, "Value Engineering: The Value Engineering (VE) Process," http://www.fhwa.dot.gov/ve/veproc.cfm (May 6, 2010).
[11] FHWA, "Why Perform Value Engineering Reviews?," http://www.fhwa.dot/gov/ve/verev.cfm (May 6, 2010).
[12] FHWA, "The Value Engineering Process," http://www.fhwa.dot.gov/ve/veproc.cfm (May 6, 2010).
[13] *Ibid.*

is feasible.[14] If it is determined to be feasible and valid, the team develops recommendations to implement the alternative. The culmination of the VE study is a formal report and presentation to the SCDOT Value Engineering Board. This Board is charged with evaluating each proposed modification and verifying its incorporation into the design.

2.1.2 What happened during the I-73 South VE Study?

The VE Study Team for I-73 South was composed of SCDOT and FHWA employees, as well as employees from consulting engineering firms that were not originally involved in the design of I-73 South. A copy of the Final VE Study and Meeting Minutes can be found in Appendix A. The VE Study Team first met March 10 and 11, 2009. During this time, the Team was given a formal overview and presentation of the I-73 South project by the Project Design Team, and reviewed the proposed right-of-way plans for I-73 South. Based on the information presented and reviewed, the VE Study Team developed an initial list of ideas, some of which included evaluating the interchanges of I-73 South with I-95 and S.C. Route 22, reconfiguration/elimination of the rest areas, and evaluating the length and skew of bridges at overpasses. Once these ideas were further developed, the VE Study Team broke into smaller group sessions to determine if their ideas were feasible, and to identify the advantages and disadvantages of each one. The VE Study Team compiled a draft report and additional requests for information from the project designers. On April 7, 2009, the VE Study Team met to prepare the final report and formal presentation for the VE Study to the SCDOT's VE Committee. Of the nine recommendations proposed by the VE Study Team, four were accepted by the SCDOT and are evaluated in this document (refer to Appendix A, VE Meeting Minutes). In addition, three other design changes were proposed by the Design Team separate from the VE Study, and accepted by the SCDOT. All seven proposed design changes are discussed below.

2.2 What are the proposed design changes for the project?

2.2.1 I-95/I-73 Interchange Ramp Widening

Initially, the flyover ramps connecting I-95 northbound to I-73 northbound and I-95 southbound to I-73 southbound were proposed to have one 16-foot lane (refer to Figure 2-1, page 11). (This design change is also referred to as the Catfish Church Road shift, refer to Appendix B). The VE Study Team stated that the future traffic projections may have poor levels of service (LOS) in twenty-five to thirty years based on the design hour volumes, and recommended that these two flyover ramps have two 12-foot lanes instead, to accommodate the future traffic. LOS is a scale to describe the operational conditions within a traffic stream, with LOS A representing the best operational conditions, and LOS F representing the worst.[15] In support of this proposed design change, a traffic study was completed to provide a LOS comparison between the one 16-foot lane, and two 12-foot lanes.[16] Based on peak hour

[14] *Ibid.*
[15] Transportation Research Board, *Highway Capacity Manual 2000*, 3rd ed.
[16] The LPA GROUP INCORPORATED, *I-95 and I-73 Interchange Ramp Analysis Technical Memorandum,* March 20, 2009.

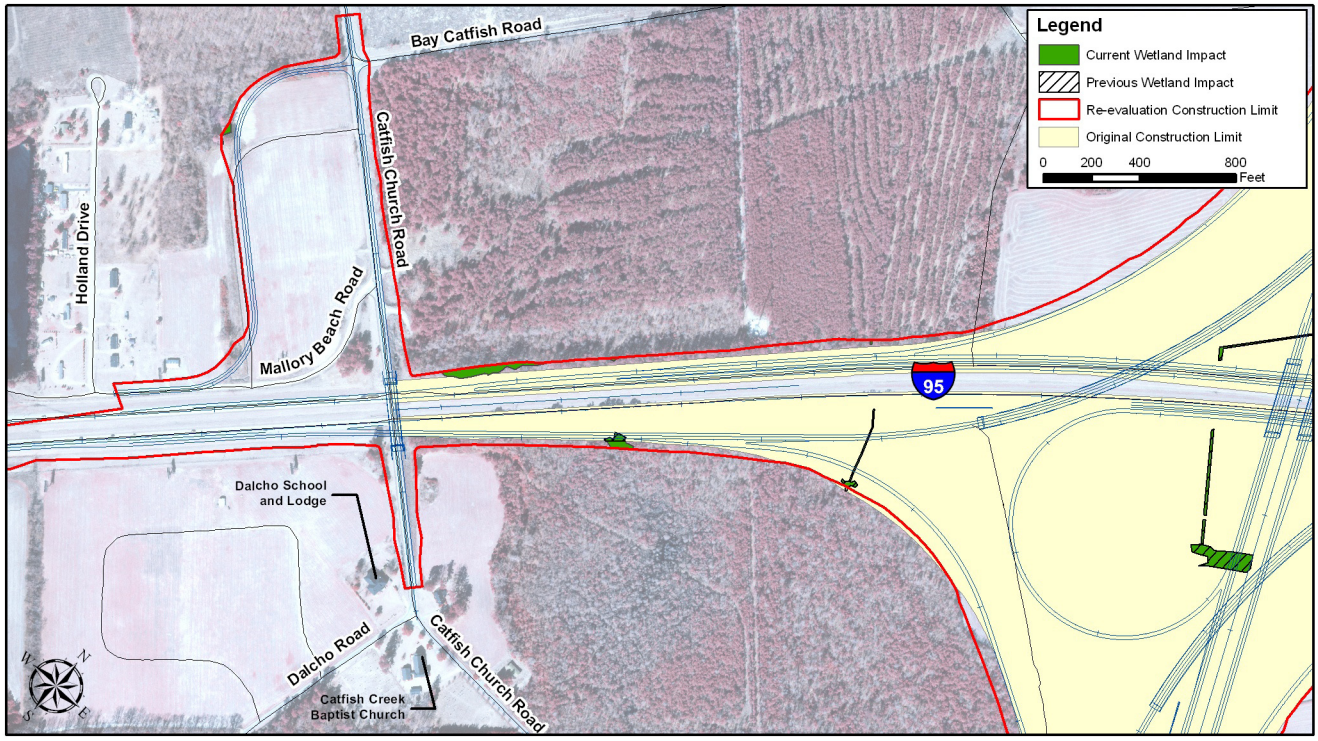


Figure 2-1: I-73/I-95 Interchange Ramp Widening

traffic operational analysis for the design year of 2035, the flyover ramp connecting I-95 northbound to I-73 northbound would operate at a LOS D, and be at capacity eighty percent of the time (refer to Table 2.1). In addition, based on the average annual traffic growth rate of 1.24 percent, traffic would exceed capacity on the flyover ramp by 2053, before the 75-year *useful life* of the flyover ramp has been reached.

Table 2.1
Design Year (2035) Peak Hour Traffic Operational Analysis (in LOS)

Location	One 16-foot lane	Two 12-foot lanes
I-95 northbound to I-73 northbound	D	B
I-95 southbound to I-73 southbound	B	A

Source: The LPA Group Incorporated, *I-95 and I-73 Interchange Ramp Analysis Technical Memorandum,* March 20, 2009.

If two 12-foot lanes were used instead, the LOS for the I-95 northbound to I-73 northbound flyover would improve to an LOS B. The I-95 southbound to I-73 southbound LOS would improve from a B with one 16-foot lane to an A with two 12-foot lanes. The traffic analysis recommended that two 12-foot lanes be constructed for both flyover ramps instead of the one 16-foot lane to accommodate

future traffic projections and ensure an acceptable LOS. While the I-95 southbound to I-73 southbound flyover would have acceptable LOS with either the one 16-foot lane or two 12-foot lanes, it was recommended that the two 12-foot lanes be constructed to provide several advantages.

The advantages of having two 12-foot lanes are that it would allow the flyover ramps to better accommodate truck traffic, allow for temporary lane closures for maintenance or if there were an accident, have a longer service life, eliminate future widening, accommodate emergency services, and improve hurricane evacuation. However, the proposed design changes would cost an estimated $6.4 million, and would require more right-of-way to be purchased.

To implement the proposed design change, the interchange footprint would be extended by approximately 3,300 feet south along the edges of I-95 to accommodate the additional lane on each side of the mainline of I-95 for the flyover ramps (refer to Figure 2-1, page 11). These lanes would be acceleration/merge lanes needed for the flyover ramps. The overpass bridge on Catfish Church Road (Road S-17-63) would need to be extended beyond the original design length to allow the additional lane width on I-95. Mallory Beach Road, which connects from Catfish Church Road to Holland Drive, would have to be relocated to maintain access to Catfish Church Road for residences.

2.2.2 S.C. Route 22/ I-73 Interchange Ramp Re-design

The original interchange ramp design connecting I-73 South to S.C. Route 22 was a three-level, system-to-system directional interchange, with multiple bridges. To reduce costs, the VE Study Team recommended that the interchange be changed to a two-lane trumpet design (refer to Figure 2-2, page 13). This would result in a two-level design.

The advantages of the proposed design change would be an estimated cost savings of $31.1 million by reducing the number of bridges. In addition, it would lessen the impact to Bakers Chapel Road (S-26-97), since the acceleration lane from the ramp onto I-73 northbound would be tapered down before reaching the Bakers Chapel Road overpass. This would result in a smaller overpass footprint at Bakers Chapel Road.

To implement the proposed design change, the interchange ramp would be expanded by approximately 1,000 feet to the east (refer to Figure 2-2, page 13). The ramp connecting S.C. Route 22 eastbound to I-73 northbound would be a loop ramp. Through traffic in the S.C. Route 22 westbound lane would follow a semi-loop around the northern edge of this loop ramp, and would continue westbound (refer to Figure 2-2). Traffic from S.C. Route 22 westbound would make a continuous movement to I-73 northbound. An acceleration/merge lane would be provided on I-73 northbound, but taper to two lanes prior to the Bakers Chapel Road overpass. This would shorten the bridge overpass length at Bakers Chapel Road, and require less fill embankment on either side of the overpass. Vehicles from I-73 southbound would make a continuous movement and merge from the left onto S.C. Route 22 eastbound. A ramp from I-73 southbound would accommodate traffic heading west onto S.C. Route 22.

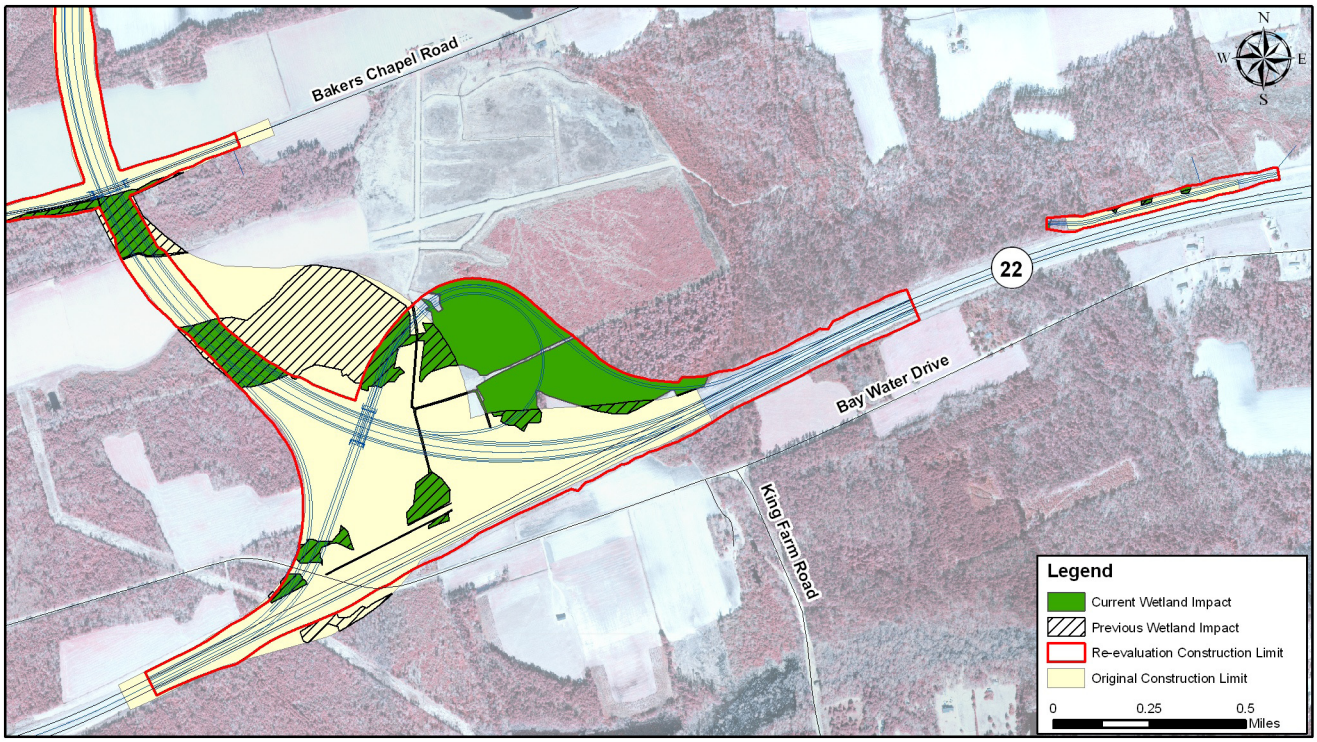


Figure 2-2: I-73/S.C. Route 22 Interchange Ramp Re-design

2.2.3 Barnhill Road (S-26-309) Overpass Re-alignment

Whenever a road crosses over another road at an angle greater than 90°, this is termed as a skewed crossing. The greater the variance from 90° the "heavier" the skew, and the longer the bridge length needed to cross over. The original overpass designed at Barnhill Road as part of the Selected Alternative crossed at a sharp angle, or "heavy" skew, which would result in longer span lengths which would dictate use of continuous structural steel superstructures (refer to Figure 2-3, page 14). Continuous structural steel superstructures are required on bridge spans that are greater than 140 feet in length, and are more costly when compared to pre-stressed concrete girders that could be used for bridge spans 140 feet or less. In addition, the "heavy" skew can result in less predictable behavior of the bridge during a seismic event. To reduce costs and the "heavy" skew, the VE Study Team recommended that the bridge be shortened and the skew be reduced so that pre-stressed concrete girders could be used.

The proposed design change would have an estimated cost savings of $1.1 million, and pre-stressed concrete girders would require less maintenance costs. In addition, the skew would be improved, which would result in more predictable behavior should a seismic event occur in the area.

Barnhill Road would be re-aligned to the north, with the overpass bridge approximately 400 feet north of the existing Barnhill Road (refer to Figure 2-3). The bridge would be straightened to reduce the skew, and be reduced by 4,286 square feet.

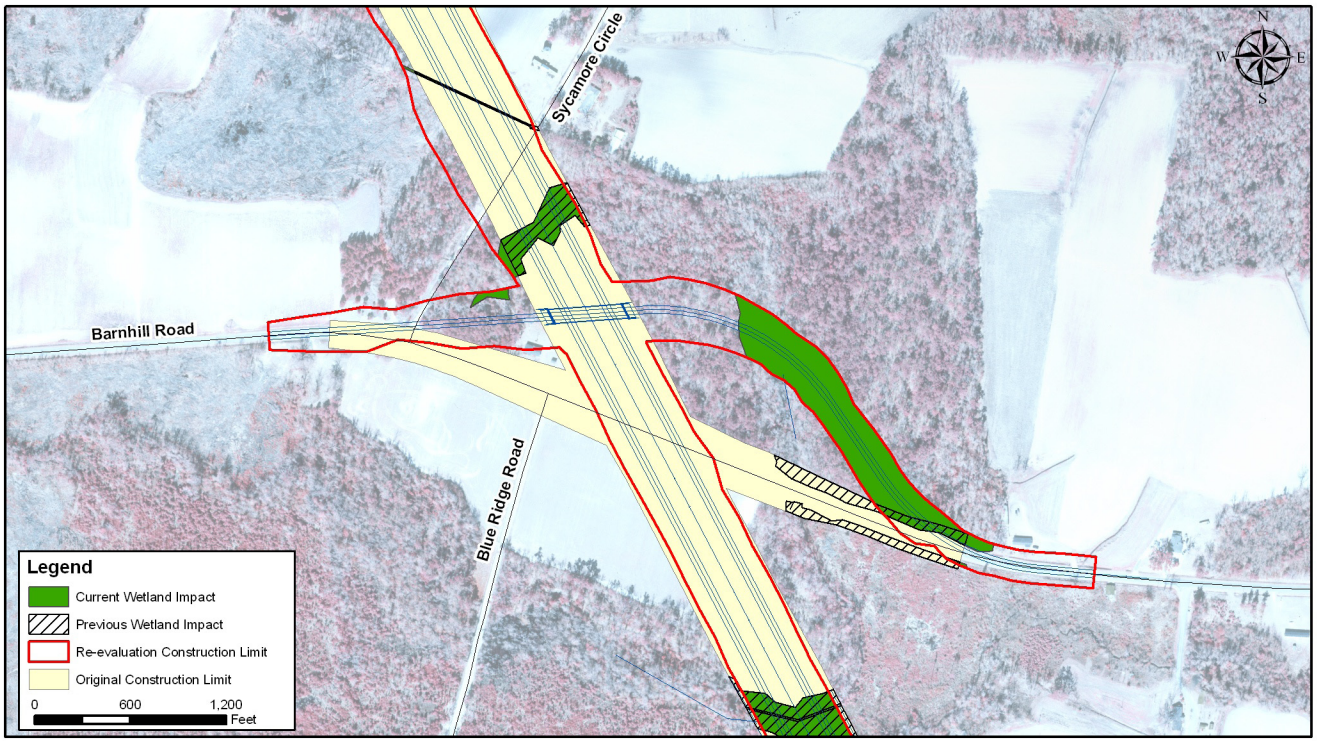


Figure 2-3: Barnhill Road Overpass Re-alignment

2.2.4 Elimination of Rest Areas

The VE Study Team recommended eliminating all rest areas on the project, since none were required. Originally, a rest area was proposed for the southbound lane of I-73 just south of Zion Road, and the rest area for the northbound lane of I-73 was just south of Harry Martin Road. The advantages of eliminating the rest areas would be a construction cost savings of approximately $20 million. In addition, yearly maintenance costs would be eliminated, as would potential utility right-of-way conflicts. It would also decrease SCDOT liability, since it would not be responsible for the rest area, as well as shorten the overpass bridge on Harry Martin Road.

2.2.5 Derrick Road Re-alignment

The Derrick Road Re-alignment, also referred to as the Watermill Road Shift (refer to Appendix B), is located northwest of Mullins. The original design would re-align Derrick Road adjacent to the western side of the alignment and connect to Watermill Road (refer to Figure 2-4, page 15). During the development of right-of-way plans, it was determined that this re-alignment would not meet design criteria. The Design Team proposed to move Derrick Road farther west of the mainline by approximately 450 feet to meet design criteria.

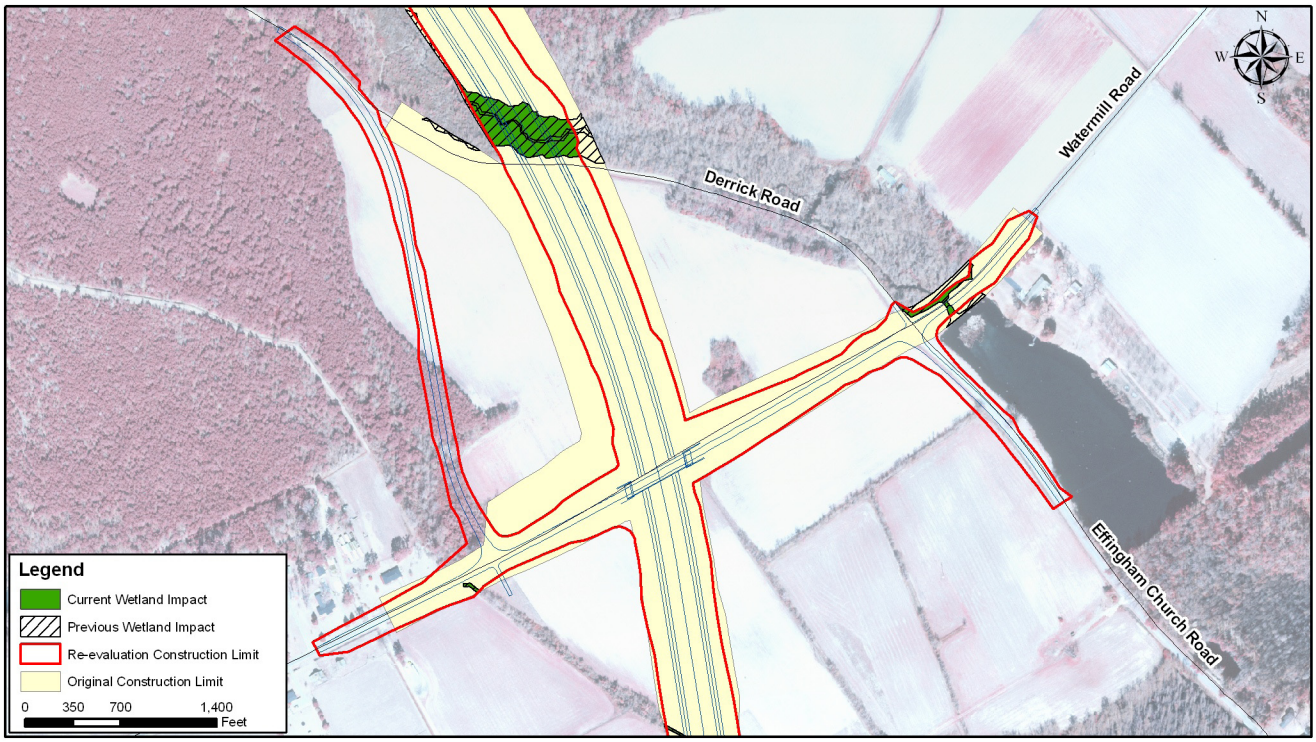


Figure 2-4: Derrick Road Re-alignment

2.2.6 Good Luck Road (S-26-569) Re-alignment

The original design of Good Luck Road involved two curves, on either side of the overpass bridge (refer to Figure 2-5, page 16). To improve the design and driver expectancy on Good Luck Road, the Design Team proposed a re-alignment east of the original alignment by approximately 650 feet at its farthest point, and cross the interstate approximately 1,450 feet south of where the original alignment crossed (refer to Figure 2-5, page 16).

2.2.7 J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment

Originally, the frontage road for J.H. Martin Road at Joiner Swamp Road was located approximately 750 feet east of the centerline of I-73 South (refer to Figure 2-6, page 2-16). Recently, a new house was constructed in the construction footprint of the frontage road. To avoid relocating the residence, the Design Team proposed shifting the frontage road by approximately 300 feet east of the original alignment.

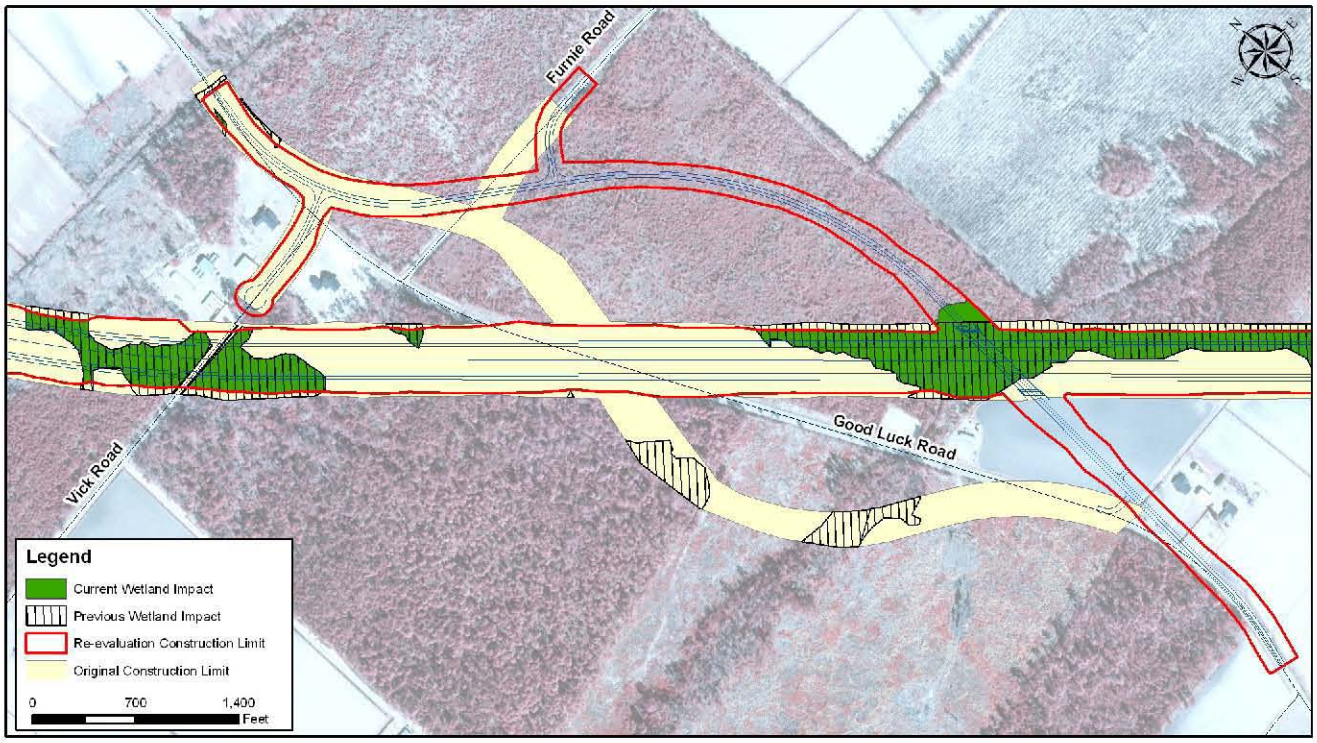


Figure 2-5: Good Luck Road Re-alignment

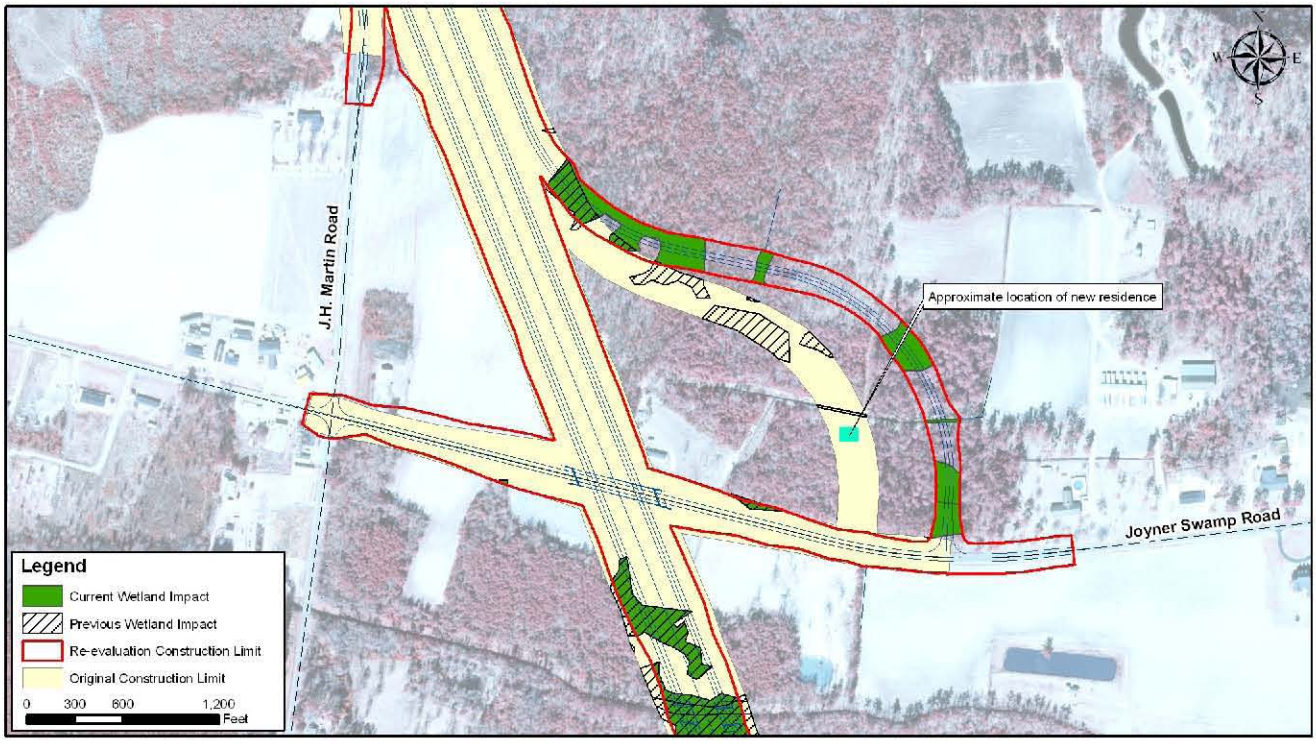


Figure 2-6: J.H. Martin Road at Joiner Swamp Road Frontage Road Re-alignment

SECTION 3: AFFECTED RESOURCES AND POTENTIAL IMPACTS FROM PROPOSED DESIGN CHANGES

3.1 Introduction

This section re-evaluates resources that could be potentially impacted by the proposed design changes, including communities and environmental justice, historic and cultural resources, hazardous materials, noise, farmlands, wetlands, federally protected species, and floodplains. It was determined that the other resources evaluated previously in the I-73 South FEIS would not be impacted to the extent that a re-evaluation would be necessary; therefore, these resources are not analyzed in this document.

3.2 Communities

3.2.1 Bakers Chapel

The proposed design change at the I-73/S.C. Route 22 interchange is located within the community of Bakers Chapel.

3.2.1.1 Where is Bakers Chapel located and what are the community's characteristics?

Bakers Chapel is a rural, residential area located approximately 11 miles southeast of Aynor and approximately 10 miles north of Conway. It is located just north of the Conway Bypass along Road S-26-97 (Bakers Chapel Road), between S.C. Route 319 and U.S. Route 701 (refer to Figure 3-1). The blue-shaded area indicates the community survey-defined boundary.

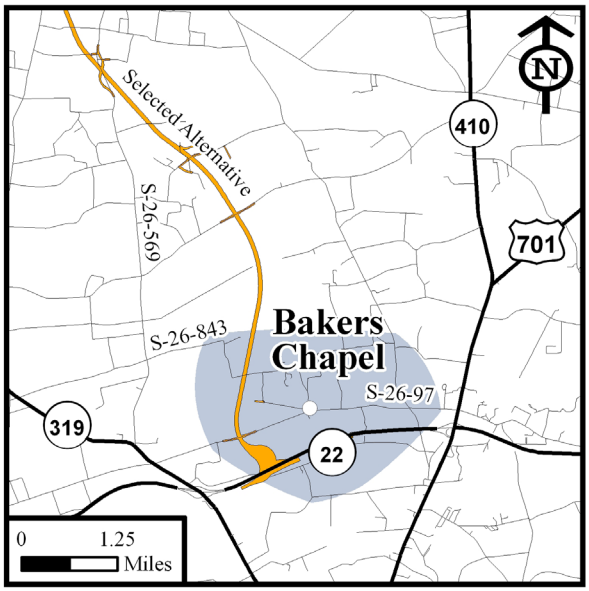


Figure 3-1: Bakers Chapel

Local churches in the area include Cool Spring Southern Methodist Church, Salem Baptist Church, and Bakers Chapel Missionary Baptist Church. According to the 2000 U.S. Census, Bakers Chapel has a population of 974 people, eleven percent of which are minorities, and twelve percent over the age of 65.[17] The median household income is almost $34,000, and eighteen percent of the population lives below the poverty level.

[17] U.S. Census Bureau, *2000 U.S. Census*, Census Tract 707, Block Group 1.

As noted in the responses from the surveys received, respondents of the Bakers Chapel area commented that they enjoy a very high quality of life and like living in a safe, quiet, country neighborhood. The majority of the respondents feel that the community is close knit, have family in the community, and interact often with their neighbors. The average length of residency for respondents is twenty-two years.

3.2.1.2 What impacts were anticipated to occur to Bakers Chapel as a result of I-73 South?

The Selected Alternative crosses through the Bakers Chapel community, but would not result in any relocations or noise impacts. Road S-26-843 (Hughes Gasque Road) would be bisected and converted to cul-de-sacs and the physical barrier may impact community cohesion and the rural visual landscape. Access would still be available to residents via other local roads and an overpass on Road S-26-97 (Bakers Chapel Road). The No-build Alternative is projected to have 80 acres of new development in the community by 2030, while the Selected Alternative would be expected to have one acre of additional development. This would result in a cumulative impact of approximately 81 acres of projected development to the community of Bakers Chapel.

3.2.1.3 What potential impacts would be anticipated to occur to the community from the proposed design change?

The proposed design change would expand the fully controlled access interchange connecting I-73 to S.C. Route 22 east approximately 1,000 feet of the original design (refer to Figure 2-2, page 13). The bridge overpass length at Bakers Chapel Road would be shortened, and require less fill embankment on either side of the overpass, which would reduce impacts to Bakers Chapel Missionary Baptist Church property, located to the west of the overpass. This shift in the proposed design change is in an uninhibited area and would not change the community access beyond what was discussed in the FEIS. Therefore, it would not result in any additional community impacts.

3.2.2 Joiner

The proposed design changes at Good Luck Road (S-26-569) and J.H. Martin Road would both be located in the community of Joiner.

3.2.2.1 Where is Joiner located, and what are the characteristics of the community?

Joiner is a rural, residential area located near Joyner Swamp (Joiner has been spelled both ways on maps and signs throughout the community) (refer to Figure 3-2, page 19). This community was included because numerous survey respondents identified Joiner as the community with which they associate themselves. There is a Joiner Fire Station located near the intersection of Road S-26-45 (Joyner Swamp Road) and Road S-26-569 (Good Luck Road). Residential development is widely scattered throughout the community with some concentration along Road S-26-45.

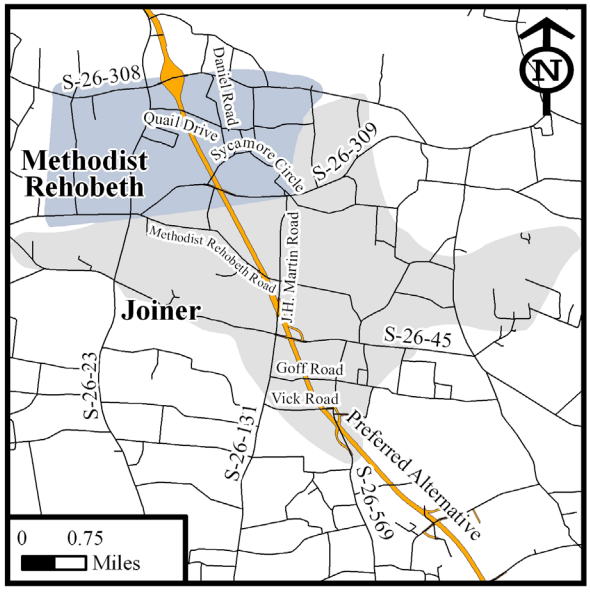


Figure 3-2: Joiner and Methodist Rehobeth

Infrastructure such as water, electricity, and sewer are not readily available. U.S. Census Data is included with Galivants Ferry and Methodist Rehobeth, since all three communities are located within the same Block Group. The population of the Block Group is 927, with nine percent of the population being minorities and eleven percent being over the age of 65.[18] The median household income for the area is $31,429 and fourteen percent of the population lives below the poverty level.

Based on the surveys, respondents feel that they have a high quality of life, that they live in a very safe environment, that it is a close-knit community, have other family members living within the same community, and regularly interact with their neighbors. Average length of residency among survey respondents was thirty-four years (individual surveys ranged from one to seventy-eight years).

3.2.2.2 What were the potential impacts by I-73 South to the community of Joiner?

The Selected Alternative crosses through the center of the Joiner community, impacting two residences. Two receivers would be impacted by noise as a result of the Selected Alternative and the construction of the interstate would alter the visual landscape of the rural community. While travel patterns would be altered within the community, access would be maintained and community cohesion would not be affected. Even though an interchange would be located at Road S-26-308 (McQueen Crossroads), which may encourage new development in the community, no new development was predicted from either the No-build Alternative or Selected Alternative in Joiner.

3.2.2.3 What are the potential impacts to the community if the proposed design changes were implemented?

3.2.2.3.A Good Luck Road

Good Luck Road would be re-aligned east of its current location, and access to Furnie Road would remain (refer to Figure 2-5, page 16). Vick Road would remain bisected and converted into cul-de-sacs, and there would continue to be no access to Good Luck Road from the portion of Vick Road west of the interstate. Instead, those wishing to reach Good Luck Road would

[18] U.S. Census Bureau, *2000 U.S. Census*, Census Tract 801, Block Group 1.

still have to use Edwards Road and then cross the interstate at an overpass on Joyner Swamp Road. The eastern portion of Vick Road would have access to the re-aligned Good Luck Road as originally proposed. While travel patterns would be altered for those on Vick Road on the western side of the interstate, connectivity would remain within the community; therefore, no changes would occur to community access or cohesion as a result of the design change. No other impacts are anticipated as a result of the proposed design change at Good Luck Road.

3.2.2.3.B J.H. Martin Road

The proposed design change would shift the re-aligned J.H. Martin Road approximately 300 feet east of the original alignment and connect with Joyner Swamp Road (refer to Figure 2-6, page 16). Connectivity would remain via an overpass on Joyner Swamp Road; therefore, no significant impacts are anticipated to community cohesion. In addition, no other impacts are anticipated as a result of the proposed design change at J.H. Martin Road.

3.2.3 Mallory

The proposed re-design of the I-37/I-95 interchange would move the alignment into the community of Mallory in Dillon County.

3.2.3.1 Where is Mallory located, and what are the community's characteristics?

Not previously discussed in the I-73 South FEIS, the community of Mallory is a small residential area centered at the crossroads of Bay Catfish Road and Catfish Church Road (S-17-63) (refer to Figure 3-3), approximately eight miles west of the City of Dillon. There is one active church, the Mallory Church of God, located on Bay Catfish Road (S-17-54). Residential development is predominantly located along Bay Catfish Road, Catfish Church Road (S-17-63), Holland Drive, and Orphanage Court. The total population of the Block Group encompassing Mallory is 856, with thirty-seven percent of the population being minorities and eight percent being over the age of 65.[19] The median household income for the area is $25,982 and nineteen percent of the population lives below the poverty level.

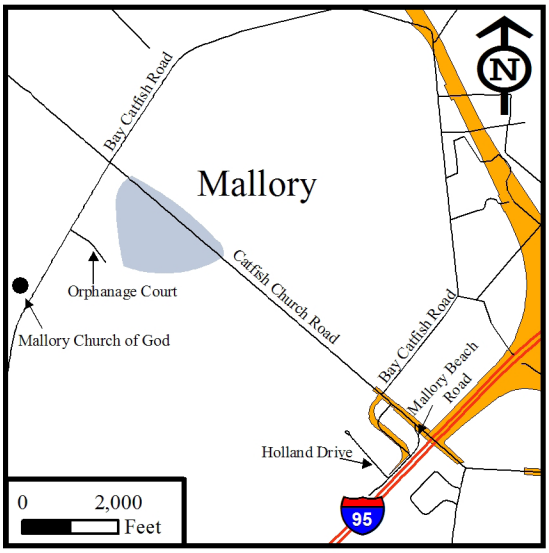


Figure 3-3: Mallory

[19] U.S. Census Bureau, *2000 U.S. Census*, Census Tract 9706, Block Group 001.

Three surveys were received from the community of Mallory during the I-73 North public involvement phase. The three survey respondents did not feel that Mallory was a close-knit community. However, two respondents reported regularly interacting with their neighbors, and one reported having family members in the community. Respondents stated they felt very safe in their community, and had an average quality of life. The average length of residency from survey responses was eleven years, with individual surveys ranging from one to twenty years.

3.2.3.2 What were the potential impacts to the community resulting from I-73?

I-73 South, as originally designed, would not impact the community of Mallory.

3.2.3.3 What would the potential impacts be to the community of Mallory from the proposed design change?

The widening of I-95 to six lanes to provide merge/acceleration lanes and the increased length of the Catfish Church Road overpass bridge impede access to Mallory Beach Road (refer to Figure 2-1, page 11). Mallory Beach Road currently connects from Catfish Church Road to Holland Drive and provides access to residences along Holland Drive (refer to Figure 3-3, page 20). Without this road, residents of Holland Drive would not be provided access. The intersection of Catfish Church Road (S-17-63) and Mallory Beach Road would be relocated approximately 900 feet northwest of the original intersection, and Mallory Beach Road would be re-aligned to connect with Catfish Church Road opposite Bay Catfish Road, and would provide access to residences along Holland Drive. No impacts are anticipated as a result of the proposed design change.

3.2.4 Methodist Rehobeth

The proposed design change at Barnhill Road (S-26-309) would be located within the community of Methodist Rehobeth.

3.2.4.1 Where is the community of Methodist Rehobeth located, and what are the characteristics of the community?

Methodist Rehobeth is a rural, agricultural-based, family-farm area in western Horry County located between Joyner Swamp and Lake Swamp (refer to Figure 3-2, page 19). The community takes its name from three centrally-located churches in the community. The nearest convenience store is Vaught's Grocery located on Road S-26-23 (Nichols Highway) at Road S-26-308 (McQueen Crossroads), which has served the community for several decades. The area is primarily rural and residential. U.S. Census data was combined with the community of Joiner, and is previously discussed in Section 3.2.2.1 (refer to page 18).

Surveys received from Methodist Rehobeth indicate a close-knit community, with many respondents living here on farms that have been in their families for many generations. Respondents reported having a high quality of life and feeling safe in their community. The majority of respondents reported having family in the area and regularly interacting with their neighbors. Average length of residency from survey responses was forty-three years, with individual surveys ranging from twenty-three to eighty-two years.

3.2.4.2 What were the potential impacts to the community resulting from I-73?

The Selected Alternative would pass through the center of the Methodist Rehobeth community, relocating two residences. No noise impacts are anticipated; however, the visual landscape of the community would be altered by the Selected Alternative. While travel patterns would be modified within the community, access would still be maintained and cohesion would not be impacted. While some development may occur at the Road S-26-308 (McQueen Crossroads) interchange with the Selected Alternative, no new development was predicted to result from either the No-build Alternative or Selected Alternative within Methodist Rehobeth.

3.2.4.3 What would be the potential impacts of the proposed design changes to Methodist Rehobeth?

The proposed design change would relocate the proposed overpass of Barnhill Road to the north of the original design by approximately 400 feet (refer to Figure 2-3, page 14). The proposed design change would move Barnhill Road closer to two additional residences (two mobile homes) on the eastern of the interstate, but not result in relocations. No other impacts are anticipated to the community of Methodist Rehobeth as a result of the proposed design change at Barnhill Road.

3.2.5 Mullins

The proposed design change that would re-align Derrick Road to connect to Watermill Road is located in the community of Mullins.

3.2.5.1 Where is the City of Mullins located, and what is its history and characteristics?

The City of Mullins covers approximately three square miles and is located in the northeastern portion of Marion County, five miles east of the county seat of Marion (refer to Figure 3-4, page 23). Mullins is named for the second president of the Wilmington to Manchester railroad. Mullins grew from a railroad depot to become the largest tobacco center in South Carolina in the 1890's.[20]

[20] City of Mullins Government, "History", http://www.mullinssc.us/history.html (August 25, 2009).

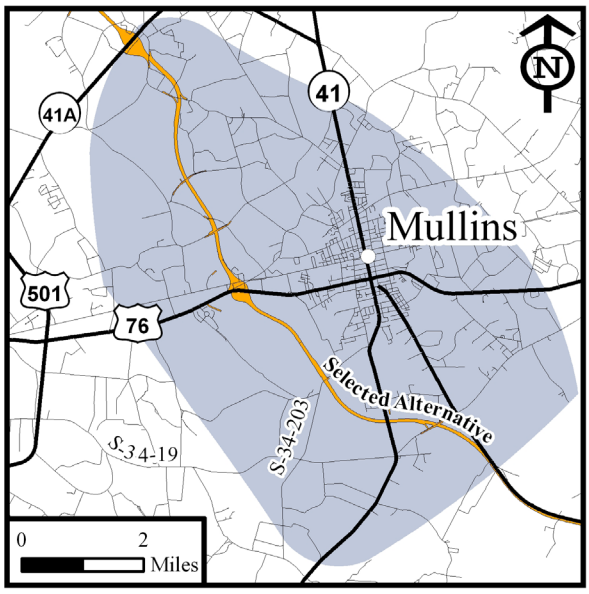


Figure 3-4: Mullins

Mullins has many community services and facilities to offer including the Greater Mullins Chamber of Commerce, the South Carolina Tobacco Museum, the Mullins Public Library, and the Gapway Recreational Complex and Miles Recreational Center, which offers senior activities. The citizens of Mullins are serviced by the Mullins Fire Department and Mullins Police Department. According to the 2000 U.S. Census, the population of Mullins is 5,029, with sixty-three percent being minority, and seventeen percent of the population being over the age of 65. The median household income is approximately $20,000 and twenty-nine percent of the population lives below the poverty level.

Comments received from the surveys indicated that the majority of respondents interact regularly with their neighbors and have other family members living in Mullins. Average length of residency for survey respondents is nine years, although individual surveys ranged from one year to 40 years.

Survey respondents were supportive of long-term jobs and thought the proposed project was needed to bring more jobs and growth to the area. Many stated that any development around Mullins would be a boost to the economy, and improved access brought by the interstate would produce positive changes. Other respondents thought the proposed project could be a tool to recruit businesses and industry to the area, creating much needed jobs. Respondents were also concerned about impacts to their farms and land, and several favored a corridor that closely followed U.S. Route 501.

3.2.5.2 What were the potential impacts to Mullins resulting from I-73 South?

The Selected Alternative would pass through the western portion of the survey-defined community, relocating twenty-two residences and one business. Six receivers would be impacted by noise and visual landscape impacts may result. Community cohesion would not be hindered as traditional travel routes would be maintained within the community. The No-build Alternative would result in 132 acres of new development in the community, while the Selected Alternative is projected to add 221 additional acres of development, for a net 353 acres of new development in the community.

3.2.5.3 What would be the potential impacts of the proposed design changes to Mullins?

Originally, Derrick Road would have been re-aligned adjacent to the mainline, and then along the edge of the overpass on Watermill Road before connecting to Watermill Road. The proposed

design change would re-align Derrick Road farther east of the mainline by approximately 450 feet east, still connecting to Watermill Road (refer to Figure 2-4, page 15). This proposed design change would have no impact to Mullins.

3.2.6 Summary

Overall, the proposed re-design of the interchange at I-73/S.C. Route 22 would not impact the community of Bakers Chapel. The proposed design changes in the community of Joiner would re-align both Good Luck Road and J.H. Martin Road, but access would be maintained through other roads in the community, as evaluated in the EIS. Therefore, these changes would not impact community cohesion in Joiner. In the community of Mallory, the proposed design change would maintain access to residents along Holland Drive to the rest of the community by re-aligning Mallory Beach Road, and no impacts are anticipated to the community. The shifting of the Barnhill Road overpass to the north in the community of Methodist Rehobeth would not impact the Methodist Rehobeth community. The proposed design change in the community of Mullins would maintain access to Derrick Road from Watermill Road, thereby resulting in no additional impacts to the community.

3.3 Environmental Justice

Executive Order 12898: *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* requires that each Federal agency shall, to the greatest extent by law, administer and implement its programs, policies, and activities that affect human health or the environment to identify and avoid "disproportionately high and adverse" effects on minority and low-income populations.

3.3.1 Were any environmental justice populations disproportionately impacted by I-73 South?

The Selected Alternative would pass through nineteen block groups, twelve of which meet or exceed the established national thresholds to qualify as low-income and/or minority. Of the twelve block groups, two are located in Dillon County, six in Marion County, and four in Horry County. Nine block groups of the twelve have a minority population over their respective thresholds, including two in Dillon County, five in Marion County, and two in Horry County. Six block groups out of twelve have low-income populations over their respective thresholds, two are located in Dillon County, two are within Horry County, and two are in Marion County.

Sixty-four percent of all block groups evaluated in the I-73 South FEIS have low-income or minority populations that meet environmental justice thresholds. Of the 19 block groups impacted by the Selected Alternative, 63 percent are composed of low-income or minority populations that meet environmental justice thresholds. Therefore, the percentage of environmental justice populations impacted by the Selected Alternative would not be disproportionate when compared to the study area as a whole.

In addition, it was determined there would not be disproportionate impact in terms of relocations, community cohesion, economic impacts, access and mobility, noise, visual and aesthetic character, or impacts to parks or community facilities in environmental justice communities by the I-73 South project.

3.3.2 Are there any environmental justice populations located within the communities the proposed design changes are located?

To identify minority and low-income populations, information from the 2000 U.S. Census was collected for each block group within the aforementioned communities. Delineated by the U.S. Census Bureau, a block group is the smallest geographic unit for which demographic data are readily available. Demographic data are the physical characteristics of a population such as age, sex, race, marital status, family size, education, geographic location, and occupation. The information collected for each block group included the total population, total minority population, and total population living below the poverty level. From this data, the percentage of persons classified as minority and the percentage of persons below the poverty level were calculated. For the purposes of identifying low-income populations in the communities, the U.S. Department of Health and Human Services poverty thresholds were used.

Once the baseline minority and low-income populations were identified, the block group data was compared to the populations within county and the area of each county where the community is located. Executive Order 12898 states that the appropriate unit of analysis for environmental justice may be "a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as not to artificially dilute or inflate the affected minority population." The percentage of minority and low-income populations within the each individual county was used as a threshold for determining if a block group contained high concentrations of environmental justice populations. This was chosen as the unit of analysis so as not to artificially dilute or inflate the affected populations, as stated per Executive Order 12898. Table 3.1 (refer to page 26) compares the Block Group data for each community with the respective counties within which these communities are located. Based on the comparison, Bakers Chapel and Mullins both have environmental justice populations, with both having low-income populations equal that of their respective counties.

3.3.3 Would there be any potential environmental justice impacts as a result of the proposed design changes?

Based on the proposed design changes, there would be no disproportionate impacts to the low-income populations in the Bakers Chapel or Mullins communities. The proposed design changes would not require any relocations, impact community cohesion, inhibit access or mobility within the community, or cause any additional noise impacts. In addition, no economic impact (positive or negative) would be anticipated with the proposed design change to the community. Therefore, no potential environmental justice impacts would result from the proposed design changes in these communities.

Table 3.1
Comparison of Low-income and Minority Populations in Communities with their Respective Counties

Design Change	Block Group	Percent Minority Population	Percent Low-income Population	Environmental Justice Populations Present?
-	**Dillon County**	52	24	-
• **I-73/I-95 Interchange Ramp Widening**	**Mallory – Block Group 706001**	37	19	No
-	**Horry County**	26	18	-
• **S.C. Route 22/I-73 Interchange Ramp Re-design**	**Bakers Chapel – Block Group 707001**	11	18	Yes, Low-income
• **Barnhill Road Overpass Re-alignment** • **Good Luck Road Re-alignment** • **J.H. Martin Road at Joiner Swamp Road Frontage Road Re-alignment**	**Joiner/Methodist Rehobeth – Block Group 801001**	9	14	No
-	**Marion County**	60	23	-
• **Derrick Road Re-alignment**	**Mullins – Block Group 503002**	56	23	Yes, Low-income

Source: U.S. Census Bureau, *2000 U.S. Census*.

3.4 Historic Resources

Section 106 of the *National Historic Preservation Act of 1966* requires federal agencies to review the effects of any proposed actions on historic resources. Prior to undertaking a project, federal agencies conduct archival research and field surveys to assess resources that are currently listed or might be eligible for listing on the National Register of Historic Places (NRHP). Based on their findings, agencies make recommendations on resources in the project study area to the SHPO. SHPO makes determinations as to whether a resource is eligible for listing on the NRHP and what effect the project would have on eligible or listed resources in the area. The NRHP is a list of all historic resources that have been determined to be significant. There are four criteria to determine if a resource should be listed on the NRHP:[21]

[21] NPS, *National Register Bulletin #15: How to Apply the National Register Criteria for Evaluation,* 1995.

- Association with a significant event(s) or broad pattern(s) of history;
- Association with a significant person(s);
- Conveys unique or distinctive architecture of high artistic value; or,
- Has the potential to yield information important to history or prehistory.

In addition to the criteria, most sites are generally required to be at least fifty years of age for listing on the NRHP.

3.4.1 What aboveground historic resources or archaeological resources were determined to be impacted by the I-73 alignment?

An intensive aboveground historic resources field survey was completed for I-73 South between July and September 2005 following guidelines established by the South Carolina Department of Archives and History (SCDAH). The guidelines were followed to identify and document architectural resources over fifty years of age for NRHP eligibility consideration. Archival research was conducted and included a literature review and records check at SCDAH and the South Carolina Institute of Archaeology and Anthropology. The South Carolina Historical Society in Charleston, various public libraries in the respective counties, and the University of South Carolina's Caroliniana Library were consulted to identify, assess, and interpret the aboveground historical resources located in the project study area, as well as to develop historic contexts for the region. Local and regional resources were also consulted to identify persons and events significant to local history and to uncover their associations with potential archaeological sites or historic resources.

A Phase I shovel testing was completed for a 600-foot wide corridor, extending 300 feet on both sides of the centerline of the Selected Alternative. Based on the literature survey and Phase I shovel testing, it was determined that no aboveground historic resources or archaeological resources would be impacted by the Selected Alternative for I-73 South.[22] SHPO concurred with this determination on August 17, 2007 and August 27, 2007.

3.4.2 Would any aboveground historic resources or archaeological resources be impacted by the proposed design changes?

A cultural resources survey of six proposed design changes on I-73 South was conducted on July 20 through 28, 2009.[23] The proposed design changes evaluated include the I-73/I-95 interchange re-design in Dillon County; Derrick Road re-alignment in Marion County; and, the Barnhill Road, J.H. Martin Road, Good Luck Road re-alignments and the I-73/S.C. Route 22 interchange re-design in Horry County. The other proposed design change, eliminating the rest areas, would not result in any additional right-of-way being acquired or shifting of the alignment, and therefore, was not surveyed.

[22] SCDOT, *Interstate 73 Final Environmental Impact Statement: From I-95 to the Myrtle Beach Region,* November 29, 2007, p. 3-104.
[23] Brockington and Associates, *Cultural Resources Survey of the Proposed I-73 Corridor, Dillon and Horry Counties, South Carolina,* Volume III: Archaeological Survey, Draft Addendum Report III, August 2009.

Two archaeological sites, 38DN167 (I-73/I-95 Interchange Ramp Widening also referred to as the Catfish Road shift) and 38MA218 (Derrick Road Re-alignment or also referred to as the Watermill Road shift) were identified and recommended not eligible for the NRHP. No further management of these archaeological sites were warranted since they have been recommended as not eligible for the NRHP. The SHPO concurred with this finding in its March 12, 2010 letter (refer to Appendix B).

The effects of the I-73/I-95 interchange re-design were evaluated for one NRHP-listed property, Catfish Creek Baptist Church (NRIS Number 75001697 and Resource 0002.00), and two NRHP-eligible properties, Catfish Baptist Church Cemetery (Resource 0002.01) and Dalcho School and Lodge (Resource 71) (refer to Figure 2-1, page 11). The resources associated with Catfish Baptist Church and the Dalcho School are located approximately 350 to 1,000 feet to the south of I-95. In that the rural setting of the school, cemetery, and church were disturbed by the construction of I-95 and that the construction of the alignment shift will not take any new land from the resources, a finding of no effect on these three historic properties was received from the SHPO (refer to Appendix B).

In the event that previously unknown cultural resources are discovered during construction, the resources would be handled according to 36 CFR §800.11 in coordination with the SHPO and appropriate Tribal Historic Preservation Offices.

3.5 Hazardous Materials

A hazardous material is generally defined as any material that has or will have, when combined with other materials, a harmful effect on humans or the natural environment. Characterized as reactive, toxic, infectious, flammable, explosive, corrosive, or radioactive, a hazardous material may be in the form of a solid, sludge, liquid, or gas.[24] Hazardous waste is a hazardous material that has been used and discarded. Hazardous materials and waste sites are regulated primarily by the *Resource Conservation and Recovery Act of 1976*, (as amended); the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*; and the *Superfund Amendments and Reauthorization Act of 1986*.

3.5.1 Would I-73 South impact any known potentially hazardous material/waste sites?

The 400-foot corridor of the Selected Alternative would potentially impact three known hazardous materials/waste sites:

- Lanes Convenience Store, U.S. Route 301 & U.S. Route 501, Latta;
- Luther Martin Grocery and C&M Convenience, 3842 Joiner Swamp Road, Galivants Ferry (Now Harold's Convenience Store); and,
- Penske Truck Leasing, 4520 U.S. Route 301 South, Latta.

[24] RCRA Subtitle C, 40 CFR Part 251.

While all three sites have had releases, all have since been classified as either inactive or received a letter from SCDHEC stating that no further action was required.

3.5.2 Would the proposed design changes impact any known potentially hazardous material/waste sites?

The I-73 South *Hazardous Material Technical Memorandum*[25] identified potentially hazardous sites within one mile from the Reasonable Alternatives that were evaluated. Based on review of this information, no known hazardous material/waste sites exist within the right-of-way of the proposed design changes. Therefore, no impacts to hazardous material/waste sites are anticipated as a result of the proposed design changes. However, if contamination were discovered during construction, the removal and proper disposal of contaminated soil and/or groundwater in accordance with state and federal requirements would occur prior to proceeding with construction in that area.

3.6 Noise

Noise or sound is a pressure on the ear drum that is measured on a scale from one to one billion. To simplify this scale, engineers and scientists have established a decibel scale (dB) of 1 to 180 through a mathematical process called a logarithm, which is easier to use. The human ear can only hear certain frequencies of noise, so, in order to show only the level or frequencies that can be heard by the human ear, the scale is given an A-weighting, designated by dBA. The scale of 1 to 180 dB provides a range for the sound levels that fall within a human's normal range of hearing for various types of noises.

The FHWA has developed noise abatement criteria (NAC) and procedures to be used in planning and design of a road to determine whether roadway noises are compatible with various land uses in a project area. The criteria and procedures are found in 23 CFR Part 772, and a summary of FHWA's NAC for various land uses is found in Table 3.2 (refer to page 30).

An established network of roadways and, as a result, background traffic noises already exist throughout the project study area. Existing traffic and background noises were measured at 16 different locations within the project study area using a dosimeter. The time and resources it would take to provide existing noise level readings for each receptor in the project study area would be very expensive. In view of this, the FHWA-developed Traffic Noise Model (TNM) was used to take into account the factors from current and future traffic volumes and composition, topography, buildings, and roadways. The three-dimensional model calculates noise levels for an entire area and can predict both existing and future noise levels using various criteria and information included in the model.

A noise analysis was performed for the project study area. This analysis was completed in accordance to FHWA's 23 CFR §772.15 "Procedures for Abatement of Highway Traffic Noise and Construction Noise."

[25] SCDOT, *Interstate 73: From I-95 to the Myrtle Beach Region, Hazardous Materials Technical Memorandum.*

Noise impacts from roadway traffic can occur in two ways. When noise levels approach, or are within 1 dBA of the NAC criteria for each land use category or meet/exceed the NAC level, then it would be considered to impact a receptor. The second type of noise impact would occur when there has been a substantial increase (by 15 dBA or greater) in the future noise levels when compared to existing levels.

Table 3.2
FHWA Noise Abatement Criteria

Activity Category	dBA	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties, or activities not included in categories A or B above.
D	-	Undeveloped lands
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: 23 CFR §772, USDOT, FHWA.

Traffic data for 2005 and 2030 peak-hour volumes, which would generate the most noise, were used to provide a worst-case scenario. Noise levels were predicted for the No-build and Selected Alternatives and compared to the NAC and the existing noise levels to determine potential impacts.

Since the project study area was so large, locations were picked throughout to provide a uniform representation as to what the sound levels would be and what potential areas would be impacted. These sites were chosen because of their distance to the existing and proposed roadways and due to the number of structures that were around them and the types of land uses for each of the locations. Table 3.3 (refer to page 31) lists the approximate distances to each of these NAC land use categories for the Selected Alternative.

Detailed land use data and structural information for the project study area was collected in a GIS format. In order to analyze and compare specific categories of noise impacts associated with the Selected Alternative, contour distances were determined by the TNM model and applied to the GIS data. This provided the ability to calculate the number and types of structures that fell within the contours associated with each NAC category for the Selected Alternative.

Table 3.3
Approximate Distance to NAC Contour (feet)

Location	Preferred Alternative
I-95 to U.S. Route 301	
A (56 dBA)	490
B (66 dBA)	160
C (71 dBA)	100
U.S. Route 301 to S.C. Route 41A	
A (56 dBA)	510
B (66 dBA)	160
C (71 dBA)	90
S.C. Route 41A to U.S. Route 76	
A (56 dBA)	540
B (66 dBA)	190
C (71 dBA)	120
U.S. Route 76 to S.C. Route 41	
A (56 dBA)	650
B (66 dBA)	220
C (71 dBA)	130
S.C. Route 41 to State Routes S-99/S-308	
A (56 dBA)	640
B (66 dBA)	220
C (71 dBA)	130
State Routes S-99/S-308 to S.C. Route 22	
A (56 dBA)	590
B (66 dBA)	200
C (71 dBA)	120

3.6.1 What were the anticipated noise impacts from the Selected Alternative?

Category A receivers are identified as lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. The Little Pee Dee Heritage Preserve was evaluated to determine if it met the NAC as a Category A receiver. However, since it is immediately adjacent to the existing S.C. Route 917 and hunting is allowed on the preserve, it currently experiences traffic and other noises while serving its recreational purpose. Therefore, it is not considered a Category A receiver for these reasons. Since no Category A receivers were identified adjacent to the Selected Alternative, the two contours of concern are the 66 dBA contour (Category B) and the 71 dBA contour

(Category C). The GIS analysis provided a more detailed picture of where impacts are located along the alignment. The analysis determined that 13 Category B (residential) receivers and no Category C receivers would be impacted by the Selected Alternative.

In addition to the original noise study, a supplemental noise analysis was completed for the six interchanges of the Selected Alternative. The impact contours indicated that the amount of traffic on the ramps associated with the interchanges would not create any additional noise impacts.

Areas along the Selected Alternative could be affected by noise generated from various construction activities. The major construction elements of this project are expected to be earth moving, hauling, grading, and paving. General construction noise impacts to individuals living or working near the project would be expected. Overall, construction noise impacts are expected to be minimal since construction noise would be relatively short in duration and could be restricted to daytime hours.

3.6.2 Would there be any noise impacts as a result of the proposed design changes?

Noise contours for the Selected Alternative were evaluated in relation to the proposed design changes to determine if any additional noise receptors would be impacted. Most receptors within the vicinity of the proposed design changes would either be relocated during the acquisition of right-of-way, or already impacted by noise from the mainline of I-73 South.

3.6.2.1 I-95/I-73 Interchange Ramp Widening

Receptors in the vicinity of this proposed design change are already impacted by noise from the mainline of I-95 (refer to Figure 2-1, page 11). The component of the proposed design change closest to receptors is the re-alignment of Mallory Beach Road. Since it is a limited-access road that ends to a cul-de-sac on Holland Drive, traffic would be limited on Mallory Beach Road. Therefore, no additional noise impacts are anticipated from the proposed design change.

3.6.2.2 S.C. Route 22/I-73 Interchange Ramp Re-design

This proposed design change would shift the entire interchange east by approximately 1,000 feet (refer to Figure 2-2, page 13). The nearest receptor would be approximately 1,500 feet from the new construction limits of the proposed design change. Based on the NAC Contours shown in Table 3.3 (refer to page 31), the receptor would not be impacted by noise. Therefore, no noise impacts would result from this proposed design change.

3.6.2.3 Barnhill Road (S-26-309) Overpass Re-alignment

The proposed design change would re-align Barnhill Road so that the overpass bridge would be approximately 400 feet north from the original Barnhill Road (refer to Figure 2-3, page 14).

Traffic volumes would not change on Barnhill Road as a result of the proposed design change. Therefore, no noise impacts are anticipated from the proposed design change.

3.6.2.4 Elimination of Rest Areas

The elimination of rest areas would reduce the construction footprint of I-73 South, and decrease the distance noise would be heard in the vicinity of these rest areas. No noise impacts are anticipated as a result of this proposed design change.

3.6.2.5 Derrick Road Re-alignment

Derrick Road would be re-aligned farther west of the mainline, connecting to Watermill Road (refer to Figure 2-4, page 15). This would move Derrick Road to within approximately 350 feet east of a residence. Based on the NAC Contours listed in Table 3.3 (refer to page 31), the noise receptor would fall outside the impact zone for Category B receivers. Therefore, no noise impacts are anticipated from the proposed design change.

3.6.2.6 Good Luck Road (S-26-569) Re-alignment

The proposed design change would move Good Luck Road to the east of the I-73 South alignment (refer to Figure 2-5, page 16). Receptors in the vicinity of this proposed design change would be acquired for right-of-way or already be impacted by noise from the I-73 South alignment. Therefore, no noise impacts are anticipated from the proposed design change.

3.6.2.7 J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment

The proposed design change would shift a frontage road east of the original alignment by 350 feet (refer to Figure 2-6, page 16). The frontage road was shifted to avoid a recently constructed house. The distance of the house to the mainline of I-73 South is approximately 600 feet, which is outside the NAC Contours shown in Table 3.3 for Category B receivers (refer to page 31). Therefore, it would not be impacted by noise from the mainline of I-73 South. The shifted frontage road is located between this new house and additional houses to the east. Since the frontage road is providing access for local traffic traveling from Methodist Rehobeth Road to Joiner Swamp Road, traffic would be minimal on this roadway. Therefore, impacts to noise receptors would not be anticipated.

3.7 Farmlands and Soils

Congress recognized the importance of farmlands and passed the *Farmland Protection Policy Act* in 1981. The purpose of this statute is to prevent the conversion of farmlands to non-agricultural uses by minimizing the impacts that federal agencies have on farmlands. Prior to farmland being used for a federal project, an

assessment must be completed to determine if prime, unique, or statewide or locally important farmlands would be converted to non-agricultural uses. If the assessment determines the use of farmland is in excess of the parameters defined by the Natural Resources Conservation Service (NRCS), which is an agency of the U.S. Department of Agriculture (USDA), then the federal agency must take measures to minimize the impacts to these farmlands.

The NRCS is the lead agency that determines the suitability of farmlands. NRCS characterizes eligible farmland as being "prime", "unique", or of "statewide or local significance". The designations are based on NRCS soil type and are protected by federal legislation.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, or oil-seed and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor without intolerable soil erosion (7 U.S.C. §4201(c)(1)(A)). Prime farmland includes land that possesses the above characteristics and may include land currently used as cropland, pastureland, rangeland, or forestland. Prime farmland does not include land already in or committed to urban development or water storage.

Unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops (7 U.S.C. §4201(c)(1)(B)). It has the special combination of soil quality, location, growing season, and moisture supply needed for acceptable farming methods to economically produce high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Examples of such crops include lentils, nuts, annually cropped white wheat, cranberries, citrus and other fruits, olives, and vegetables.

Statewide or locally important farmland is land that has been designated of state or local importance for the production of food, feed, fiber, forage, or oil-seed crops, but is not of national significance (7 U.S.C. §4201(c)(1)(C)).

3.7.1 What were the impacts to farmlands and soils as a result of the Selected Alternative?

Formal consultation with the NRCS for compliance with the *Farmland Protection Policy Act* was completed. An evaluation utilizing the Farmland Impact Conversion Rating Form for Corridor Type Projects form (NRCS-CPA-106) was performed for the Selected Alternative. The purpose of the farmland conversion impact rating form is to help identify and approximate the amount of farmland conversion that would be associated with the Selected Alternative.

Potential impacts to farmlands have been quantitatively assessed for the Selected Alternative based on the three counties' prime and farmland of statewide importance. The NRCS required that a separate farmland conversion impact rating form be submitted for each county, since each has different ratings for their prime and statewide important soils. As explained previously, no unique farmland is located within the project study area.

Two values, the relative value and the corridor assessment value, were determined. The *relative value* category was completed by the NRCS, on a scale of 0-100, the relative value of farmland to be converted by the Selected Alternative ranged from 71 to 86 points, depending on county. The *corridor assessment value* pertains to the use of land, the availability of farm support services, investments in existing farms, and the amount of land that could be rendered non-farmable due to construction of the Selected Alternative. The corridor assessment value had a scale of 0-160 points, the Selected Alternative ranged from 56 in Horry County to 70 in Dillon County. By totaling the relative value and the corridor assessment value, it was determined that the total threshold set by NRCS, 160 points, was not exceeded by the Selected Alternative in any of the three counties. The total value was 156 points in Dillon County, 127 points in Horry County and 142 points in Marion County. Since the 160-point threshold was not exceeded for any county by the Selected Alternative, mitigation actions would not be required.

Construction of the Selected Alternative would result in the direct conversion of 1,915 acres of prime and statewide important farmland soils to a transportation facility. Within the project study area, 55 percent of the land is comprised of prime farmland or farmland of statewide importance. The conversion of farmland to right-of-way due to the construction of the interstate would convert 0.003 percent of the total agriculture land and would not be detrimental to the agricultural activities in the project study area.

3.7.2 How would the proposed design changes impact farmlands and soils?

Mapping of prime and statewide important farmland soils was evaluated in relation to the proposed design changes to determine if any additional acreage would be impacted. As indicated in Table 3.4 (refer to page 36), the proposed design changes at the S.C. Route 22/I-73 Interchange Ramp and Good Luck Road would result in a decrease in overall impacts. Collectively, potential impacts to prime and statewide farmland soils would increase based on the proposed design changes in the four other locations. The proposed design changes would result in an additional 1.48 acres of impacts to prime farmlands and 7.71 acres of additional impacts to farmland of statewide importance.

The proposed design changes would increase the previous total acreage of prime farmland or farmland of statewide importance within the Selected Alternative corridor from 1,915 acres to just over 1,924 acres. In that the previous 1,915 acres constituted only 0.003 percent of the project study area, the 9.19 acre increase would not constitute a major increase. The largest increase in potential farmland impact acreage would occur in Dillon County with 7.27 acres at the proposed I-95/I-73 Interchange Ramp Widening. Even though the farmland conversion impact rating form for Dillon County was the closest of the three affected counties to the 160-point threshold, the proposed increase in potential impacts would not significantly change the rating, as the previous total of 922 acres of farmland in the corridor constituted just 0.3 percent of the farmland in Dillon County. No farmlands protected under the Wetland Reserve Program or Farm and Ranch Lands Protection Program would be impacted by the proposed design changes.

Table 3.4
Change in Impacts to Prime Farmland and Farmland of Statewide Importance (in acres)

Location	Prime Farmland	Farmland of Statewide Importance	Total Acreage
I-95/I-73 Interchange Ramp Widening	5.42	1.85	7.27
S.C. Route 22/1-73 Interchange Ramp Re-design	-3.76	0.7	-3.06
Barnhill Road (S-26-309) Overpass Re-alignment	0.91	3.37	4.28
Derrick Road Re-alignment	0.99	2.46	3.45
Good Luck Road (S-26-569) Re-alignment	-2.46	-0.99	-3.45
J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment	0.38	0.32	0.7
Total Acreage	**1.48**	**7.71**	**9.19**

Notes:
"+/-" indicates increase or decrease in impacts as compared to 2008 FEIS Selected Alternative
Calculation based on right-of-way boundary.

3.8 Wetlands

The USACE and USEPA define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands typically include swamps, marshes, bogs, and similar areas."[26]

The USACE, through Section 404 of the *Clean Water Act,* has regulatory authority over waters of the United States, including wetlands. This authority empowers the USACE to identify wetland/upland boundaries and to regulate alterations of jurisdictional wetlands. These boundaries are established in accordance with the methodology in the *1987 Corps of Engineers Wetlands Delineation Manual*.[27] An area must exhibit evidence of wetland vegetation, wetland soil, and wetland hydrology to be considered a wetland.

3.8.1 How were wetlands impacted by I-73 South?

The Selected Alternative for I-73 South would directly impact 313 acres of wetlands, of which 24.2 acres would be clearing impact and 288.8 acres would be filling impact. Wetland communities

[26] U.S. Army, Waterways Experimental Station Environmental Laboratory, *Corps of Engineers Wetlands Delineation Manual* (Washington, D.C.: Department of the Army, USACE, 1987) Technical Report Y-87-1; (33 CFR§328.3[b]) and 40 CFR §230.3(t).
[27] *Ibid.*

impacted included bay forests, bottomland hardwoods, deciduous shrub swamps, freshwater marshes, wet flatwoods, ponds and borrow pits, and wooded swamps. The Selected Alternative would be anticipated to have 272.4 acres of indirect impacts, while the No-build Alternative would be expected to indirectly impact 222 acres of wetlands in the I-73 South project study area.

3.8.2 What wetland communities were identified within the proposed design change study areas?

Wetlands and other waters of the United States were categorized by general types according to various standard classification systems including *The Classification of Wetlands and Deepwater Habitats of the United States*[28] and Nelson's *The Natural Communities of South Carolina.*[29] All of the wetlands and other waters of the United States that occur within the study areas for the proposed design changes are palustrine (freshwater). During the delineation, the boundary between the wetland and the adjacent upland was identified and mapped using sub-meter accuracy Global Positioning System (GPS) equipment. The delineation of those new areas was submitted to the USACE for review and approval, and are included in the pending Section 404 permit application. The following wetland communities as described by Nelson were identified in the study areas along the proposed design changes:

- Bottomland hardwoods;
- Deciduous shrub swamp;
- Pine wet flatwoods; and,
- Ponds and borrow pits.

The types of wetlands identified within the proposed design change study areas during the wetland delineation are described in the following subsections.

3.8.2.1 Bottomland hardwoods

Bottomland hardwoods are typically associated with floodplains of streams, but may also occur in low areas and along small surface drainages that are temporarily flooded or saturated during the growing season. Flooding or saturation usually occurs in the winter or early spring. Typical tree species found within bottomland hardwood communities include red maple (*Acer rubrum*), sweet-gum (*Liquidambar styraciflua*), swamp tupelo (*Nyssa sylvatica* var. *biflora*), and loblolly pine (*Pinus taeda*). Shrubs include red-bay (*Persea borbonia*), wax-myrtle (*Myrica cerifera*), dog-hobble (*Leucothoe axillaris*), and sweet-bay (*Magnolia virginiana*). Vines such as yellow jessamine (*Gelsemium sempervirens*), muscadine (*Vitis rotundifolia*), poison-ivy (*Toxicodendron radicans*), and several species of catbrier (*Smilax laurifolia*, S. *glauca*, and *S. rotundifolia*) are

[28] L.M. Cowardin, , V. Carter, F.C. Golet, and E.T. LaRoe, *Classification of Wetlands and Deepwater Habitats of the United States,* prepared for the USDI-FWS. FWS/OBS-79/31, Washington, D.C., (1979).
[29] Nelson, John B, *The Natural Communities of South Carolina: Initial Classification and Description*. (Columbia, SC: S.C. Wildlife & Marine Resources, Department Division of Wildlife and Freshwater Fisheries, 1986).

abundant. Herbaceous plants such as cinnamon fern (*Osmunda cinnamomea*), netted chain fern (*Woodwardia areolata*), royal fern (*Osmunda regalis*), false nettle (*Boehmeria cylindrica*), lizard's tail (*Saururus cernuus*), jack-in-the-pulpit (*Arisaema triphyllum*), and giant cane (*Arundinaria gigantea*) are common. Bottomland hardwood wetlands are present throughout the I-73 South project study area; however, they are primarily concentrated northwest of the Little Pee Dee River. GIS analysis indicates that those within the I-73 South project study area southeast of the Little Pee Dee River are scattered rather than being associated with streams. These are likely remnants of larger areas that have been partially drained.

3.8.2.2 Deciduous shrub swamps

Deciduous shrub swamps are low lying areas dominated by woody vegetation typically less than twenty feet in height. Deciduous shrub swamp habitats are often formed due to some type of disturbance, either natural or man-made. They may be an early successional stage of the forested swamp, or they may be in a stable system. In the I-73 South project study area, deciduous shrub swamps are primarily the result of clear-cutting, which results in a number of root- or stump-sprouts of the more opportunistic tree species such as sweet-gum, red maple, and sweet-bay. Also, short-lived woody species such as black and/or Carolina willow (*Salix nigra*, *S. caroliniana*), button-bush (*Cephalanthus occidentalis*), and elderberry (*Sambucus canadensis*) are able to take advantage of the open canopy. Blackberry (*Rubus argutus*) is almost always present, as well as catbriers (*Smilax* spp.). Marsh dwellers, such as soft rush (*Juncus effusus*) and bulrush (*Scirpus cyperinus*), also occur here, taking advantage of the (temporarily) open sun. Deciduous shrub swamp communities are scattered throughout the I-73 South project study area. GIS analysis indicates that many of the larger areas of this wetland type appear to be associated with streams, while the smaller areas have no apparent association.

3.8.2.3 Pine wet flatwoods

Pine wet flatwoods are wetland areas that have a high water table for a period of time during the growing season and are dominated by pine species, including longleaf pine (*Pinus palustris*), pond pine (*Pinus serotina*), and loblolly pine. Generally no understory is present in pine wet flatwoods communities, or if present, it is very sparse. Typical herbaceous species include *Aristida* spp., toothache grass (*Ctenium aromaticum*), nutrushes (*Scleria* spp.), and beak rushes (*Rhynchospora* spp.). When wildfires are not suppressed in these areas, and where long leaf pines of sufficient maturity are present, these wetlands provide habitat for the federally protected red-cockaded woodpecker. Pine wet flatwoods are scattered throughout the I-73 South project study area, although the larger areas of these wetlands appear to be located primarily southeast of the Little Pee Dee River based upon the results of the GIS analysis of the NWI maps. These communities are generally found in flat landscapes with poor drainage. Most pine wet flatwoods found in the I-73 South project study area have been previously impacted draining and converting for silviculture and agriculture purposes. Irrigation and cattle watering ponds are often excavated in these wetland

communities. Because these systems are typically saturated to the surface and rarely inundated, the excavation of drainage ditches can sufficiently convert them to uplands, depending on the soil types that are present.

3.8.2.4 Ponds and borrow pits

Ponds and borrow pits are typically man-made, open water, freshwater habitats. These water bodies are generally created by excavation activities, that have altered stream or surface drainage flow. According to NWI mapping, and for purposes of this re-evaluation, water bodies less than twenty acres in size fall into this category. Other freshwater systems are often found associated with ponds and borrow pits in the form of fringe wetlands.

Based on observations during the wetland delineation, most of the wetlands that would be impacted by the proposed design changes have been previously impacted. The impacts identified consist of the following:

- clear cutting of large tracts of trees that creates a temporary habitat change;
- permanent habitat conversion caused by fire suppression resulting in dense undergrowth in bay forests;
- the creation of monoculture pine stands in wetlands; drainage ditches that have affected the site hydrology to the point that these areas barely meet the wetland criteria; and,
- fill material from existing roads and development adjacent to the proposed crossings.

Although these impacted wetlands still meet the basic criteria for jurisdictional wetlands, many of the important functions that wetlands provide, such as flood storage and water quality functions, have been diminished in these wetland communities.

3.8.3 What kind of wetland impacts would occur as a result of the proposed design changes?

Wetland impacts associated with the proposed design change study areas would include the placement of clean fill material into wetlands and temporary clearing of vegetation. To construct the roadbed, fill material would be required and would result in the permanent conversion of wetlands within the construction limits. Temporary clearing of wetlands would be required along the toe of fill to allow for maintenance of the silt fencing, which is required to protect the adjacent wetlands from siltation during the construction period. The cleared wetland areas would be re-seeded with native wetland vegetation.

3.8.4 How were the potential wetland impacts calculated?

To calculate the potential impacts associated with construction of the proposed design changes, the construction limits were overlain onto the wetland mapping. The wetland mapping was derived from the wetland delineation and was used to calculate potential wetland impacts. It should be noted that all of the wetland impacts along the alignment were reevaluated utilizing construction limits developed with the aid of survey data and the impacts are more accurate compared to the impacts reported in the FEIS, which were based on conceptual construction limits overlain onto USGS topographic mapping. In addition to the proposed design changes, additional temporary wetland impacts associated with the maintenance of drainage outfalls along the alignment were evaluated and added to the total impacts. Wetlands are shown on Figures 2-1 to 2-6 (refer to pages 11 to 16).

3.8.5 How many acres of wetland would be impacted by the proposed design changes?

Table 3.5 (refer to page 41) provides the original and current wetland impacts associated with each proposed design change and the estimated net difference between the impacts for the Selected Alternative in the FEIS and the current impacts from the proposed design changes. For the purpose of this comparison fill, clearing, and excavation impacts were combined to provide the total potential impact at each proposed design change. All of the wetlands affected by the proposed design changes occur in pine wet flatwood communities. Table 3.6 (refer to page 41) provides a breakdown of the type of impact that would occur at each of the proposed design change locations.

As indicated in Table 3.5 (refer to page 41), some of the proposed design changes would result in an increase in wetland impacts and others would result in a reduction in impacts. The elimination of the rest areas would not affect wetland impacts. The proposed design changes do not impact new wetland systems, but would impact different portions of the same wetlands evaluated in the FEIS. The re-alignment of Good Luck Road would result in the greatest increase in wetland impacts when compared to the original alignment, at 2.78 acres. The S.C. Route 22/I-73 Interchange Ramp re-design would reduce wetland impacts by 7.38 acres. Overall, the proposed design changes would result in a net decrease of 0.26 acre of wetland impacts. Wetland impacts reported in the FEIS totaled 313 acres and the current wetland impacts total 296 acres for I-73 South. This decrease is due to the use of actual construction limites instead of estimated limited to determine impacts (refer to Section 3.8.4).

3.8.6 What kind and how much impact would occur in streams as a result of the proposed design changes?

The proposed design changes would not result in additional stream impacts.

Table 3.5
Original and Current Wetland Impacts Associated with the Proposed Design Changes (in acres)

Location	FEIS Impacts	Permit Impacts Prior to VE	Current Permit Impacts	Net Difference (FEIS minus Current Impacts)
I-95/I-73 Interchange Ramp Widening	0.04	0.0	0.38	+0.34
S.C. Route 22/I-73 Interchange Ramp Re-design	37.64	24.59	30.26	-7.38
Barnhill Road (S-26-309) Overpass Re-alignment	0.74	0.81	3.4	+2.66
Derrick Road Re-alignment	0.04	0.04	0.0	-0.04
Good Luck Road (S-26-569) Re-alignment	1.71	1.69	4.49	+2.78
J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment	0.81	3.95	2.19	+1.38
TOTAL	**40.98**	**31.08**	**40.72**	**-0.26**

Notes:
"+/-" indicates increase or decrease in impacts as compared to 2008 FEIS Selected Alternative.
Source: The LPA Group Incorporated (2009).

Table 3.6
Wetland Impacts by Type (in acres)

Location	Fill Impacts	Temporary Clearing Impacts	Excavation Impacts	Total
I-95/I-73 Interchange Ramp Widening	0.29	0.09	0	**0.38**
S.C. Route 22/I-73 Interchange Ramp Re-design	13.67	16.22	0.37	**30.26**
Barnhill Road (S-26-309) Overpass Re-alignment	2.86	0.54	0	**3.40**
Good Luck Road (S-26-569) Re-alignment	4.37	0.12	0	**4.49**
J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment	1.81	0.38	0	**2.19**
TOTAL	**23.00**	**17.35**	**0.37**	**40.72**

Source: The LPA Group Incorporated (2009).

3.9 Federally Protected Species

Federally protected species are plants and animals whose protection is federally mandated by the *Endangered Species Act of 1973* and the *Bald and Golden Eagle Protection Act of 1940* (as amended). None of the proposed design changes would occur in marine or beachfront habitat; therefore, federally protected species requiring these habitats were not evaluated further.

3.9.1 Would I-73 South impact any federally protected species?

Based on field studies conducted for I-73 South from July 2006 to May 2007, it was determined that the project would have no effect to the American chaffseed, bald eagle, Canby's dropwort, pondberry, red-cockaded woodpecker, or the wood stork. It was determined that the I-73 South project may affect, but was not likely to affect the Kirtland's warbler and the shortnose sturgeon.

3.9.2 Would the proposed design changes impact any federally protected species?

Table 3.7 (refer to page 43) contains the non-marine or non-beachfront federally protected species identified in the FEIS as occurring or potentially occurring in Dillon, Horry, and Marion Counties. The species occurrence list was updated by the USFWS in April 2010. While no new species have been added to the list, the Kirtland's warbler (*Dendroica kirtlandii*) has been removed from the list for all three counties in the project study area.

Table 3.7
Non-marine and Non-beachfront Federally Protected Species Known to Occur or Possibly Occur in Dillon, Horry, and Marion Counties, South Carolina

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	COUNTY
Plants			
Schwalbea americana	American chaffseed	Endangered	Horry (possible)
Oxypolis canbyi	Canby's dropwort	Endangered	Horry (possible), Marion
Lindera melissifolia	Pondberry	Endangered	Horry (possible), Marion
Animals			
Haliaeetus leucocephalus	Bald eagle	Protected	Dillon, Horry, Marion
Picoides borealis	Red-cockaded woodpecker	Endangered	Dillon, Horry, Marion
Acipenser brevirostrum	Shortnose sturgeon	Endangered	Dillon (possible), Horry, Marion
Mycteria americana	Wood stork	Endangered	Horry, Marion (possible)

Source: USFWS, *South Carolina Distribution Records of Endangered, Threatened, Candidate, and Species of Concern, April, 2010.*

Typically, federally protected species require specific conditions, or habitats, to sustain them. A literature search was performed to determine the habitat requirements and descriptions of federally protected species, which would aid in identification during field surveys. Important sources of reference information included natural resource agency data and published reports, various botanical and faunal literature, and available USFWS Recovery Plans. The descriptions of the federally protected species listed in Table 3.7, and their habitat requirements are found in the I-73 South FEIS (refer to Section 3.15, page 3-189).

Field surveys were conducted from April through July 2009 to evaluate the presence or absence of federally protected species within the project study areas for the proposed design changes. No federally protected species were found within or adjacent to the study areas for the proposed design changes during the field surveys.

It is anticipated that the proposed design changes would have no effect on American chaffseed, Canby's dropwort, pondberry, the red-cockaded woodpecker, the shortnose sturgeon, or the wood stork. Additionally, the bald eagle would not be affected. A Biological Assessment was prepared with these findings and submitted to the SCDOT.

3.10 Floodplains

Floodplains are low-lying areas located adjacent to the channel of a river, stream, or other type of waterbody. These areas are subject to periodic flooding during heavy rains and/or long periods of wet weather. The flood prone area of a stream or river system is twice the height of its maximum bankfull depth.

In accordance with Executive Order 11988: *Floodplain Management*, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities."

The National Flood Insurance Program is administered by the Federal Emergency Management Agency (FEMA), with the SCDNR serving as the state National Flood Insurance Program Coordinating Office. Through the assistance of FEMA and SCDNR, Dillon, Horry, and Marion Counties have performed Flood Insurance Studies to identify flood hazards for the purposes of floodplain management and insurance determinations. The National Flood Insurance Program produces map zones of flooding risk, Flood Insurance Rate Maps that can be obtained from FEMA. The limits of floodplains are determined by forecasting the elevation to which flood waters may rise during a 100-year storm event and then overlaying them onto a map showing the existing topography. A 100-year floodplain is the area adjacent to a waterbody that has a one percent chance of flooding in any given year. Zone A is the flood insurance rate zone that corresponds to 100-year floodplains determined by approximate methods and has a one percent chance of flooding in any given year.

3.10.1 What floodplains were affected by the Selected Alternative?

Flood Insurance Rate Maps identifying the 100-year floodplain were used to determine impacts associated with the Selected Alternative. The Selected Alternative has five floodplain crossings, with a total of 17,605 feet of linear impacts and 114.2 acres of floodplain encroachment. These crossings are located where the Selected Alternative intersects with Joiner Swamp, Lake Swamp, the Little Pee Dee River, Little Reedy Creek, and Maidendown Swamp.

As discussed previously, the mapped areas within the project study area are all shown as Zone A, which does not provide base flood elevations. However, an engineering analysis of the floodplain impacts was conducted for the Selected Alternative. Some bridge lengths were revised based on detailed topographic information from site visits of the Selected Alternative crossings and comparing those to bridges both upstream and downstream of the proposed crossings. Furthermore, the proposed crossings of the Little Pee Dee River and Lake Swamp were located adjacent to existing road crossings to minimize additional impacts to the floodplain.

Floodplain encroachments were not likely to increase the flooding in the area since bridge structures will be designed to meet FEMA standards, which require less than a one-foot rise in the base flood elevation for certification. During the final design phase of the project, a detailed hydrological study was completed. Bridge and culvert designs conform to the requirements in 23 CFR 650, Subpart A, *Location and Hydraulic Design of Encroachment on Floodplains*. This analysis included establishing base flood elevations and adjusting bridge and culvert designs to minimize the risk of flooding upstream to less than one foot of rise, as required by FEMA. Ongoing design efforts and coordination with resource and regulatory agencies have minimized floodplain impacts during the final design process.

3.10.2 How would the proposed design changes impact floodplains?

Flood Insurance Rate Maps were reviewed in the areas of the proposed design changes. None of the proposed design changes fall within the designated 100-year floodplain; therefore, the proposed design changes would not impact floodplains.

3.11 Summary of Impacts from Proposed Design Changes

Based on evaluation of the resources that could be potentially impacted by the proposed project, there would be no impacts to environmental justice populations, historic resources, potentially hazardous material sites, noise receptors, or floodplains. The proposed design changes would not impact the communities of Bakers Chapel, Joiner, Mallory, Methodist Rehobeth, or Mullins. The proposed design changes would impact a total of 9.19 acres of additional prime or statewide important farmlands soils. In addition, a total of wetland impacts would be reduced by 0.26 acre as a result from the proposed design changes. The proposed project would have no effect on the American chaffseed, Canby's dropwort, pondberry, bald eagle, red-cockaded woodpecker, shortnose sturgeon or wood stork. However, the proposed design

changes may affect but are not likely to affect the Kirtland's warbler. A summary of impacts is shown below in Table 3.8. Mitigation of wetland impacts would be included in the overall impacts from the Selected Alternative. No other mitigation measures or environmental commitments beyond what was included for the Selected Alternative would be needed.

Table 3.8
Summary of Impacts from Proposed Design Changes

Location	Community Impacts	Impacts to Protected Farmlands (in acres)	Net Impacts to Wetlands (in acres)	Federally Protected Species	Other Resources
I-95/I-73 Interchange Ramp Widening	None	7.27	+0.34	The proposed design changes would not affect the American chaffseed, Canby's dropwort, pondberry, bald eagle, red-cockaded woodpecker, or shortnose sturgeon.	There would be no impacts anticipated to communities, environmental justice communities, historic resources, potentially hazardous material sites, noise receptors, or floodplains as a result of the proposed design changes.
S.C. Route 22/1-73 Interchange Ramp Re-design	None	-3.06	-7.38		
Barnhill Road (S-26-309) Overpass Re-alignment	None	4.28	+2.66		
Derrick Road Re-alignment	None	3.45	-0.04		
Good Luck Road (S-26-569) Re-alignment	None	-3.45	+2.78		
J.H. Martin Road at Joiner Swamp Road (S-26-45) Frontage Road Re-alignment	Avoided 1 relocation	0.7	+1.38		
Total Acreage Increase/ Decrease from Original Design	**-**	**+9.19**	**-0.26**		

Notes:
"+/-" indicates increase or decrease in impacts as compared to 2008 FEIS Selected Alternative.
Calculation based on right-of-way boundary.

Appendix A

I-73 South

Value Engineering Study

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

Conducted for: South Carolina Department of Transportation

Subject: I-73 South Section Right of Way Plans

Meeting Dates: March 10, 2009
March 11, 2009
April 7, 2009

Core Team Members:

Name	Company	Telephone	E-Mail
Rob Bedenbaugh	SCDOT	803-737-1134	bedenbaugr@scdot.org
Ben Clopper	Florence & Hutchinson	770-428-0157	bclopper@flohut.com
Scott Davenport	SCDOT	803-737-1355	davenports@scdot.org
Wilson Elgin	SCDOT	803-737-1827	elginwc@scdot.org
Preston Helms	SCDOT	803-737-1723	helmspw@scdot.org
Ron Hinson	SCDOT	803-737-2822	hilsonre@scdot.org
Alan King	Wilbur Smith Associates	407-896-5851	aking@wilbursmith.com
Lucero Mesa	SCDOT	803-737-1765	mesale@scdot.org
Jeff Powers	Florence & Hutchinson	770-428-0157	jpowers@flohut.com
Greg Rikard	SCDOT	803-737-5005	rikardgs@scdot.org
Jake Sherman	The LPA Group Incorporated	850-205-0460	jpsherman@lpagroup.com
Todd Stegall	SCDOT	803-737-1308	steagallrt@scdot.org
Alice Travis	FHWA	803-253-3881	alice.travis@dot.gov
Dawn Watkins	SCDOT	803-737-6391	watkinsdl@scdot.org
Chris Wood	The LPA Group Incorporated	843-296-0826	cwood@ccroadwise.com
Elham Farzam	The LPA Group Incorporated	803-231-3800	efarzam@lpagroup.com

Additional Participants:

Name	Company	Telephone	E-Mail
Dennis Townsend	SCDOT	843-661-4710	townsenddl@scdot.org
Mike Thomas	Florence & Hutchinson	803-254-5800	mthomas@flohut.com
David Montgomery	Florence & Hutchinson	803-254-5800	dmontgomery@flohut.com
Mitchell Metts	SCDOT	803-737-1421	mettsmd@scdot.org
Charlie Stearns	Wilbur Smith Associates	803-758-4555	cstearns@wilbursmith.com
Freddy Kicklighter	The LPA Group Incorporated	803-231-3890	fkicklighter@lpagroup.com
Quazi Masood	The LPA Group Incorporated	803-231-3898	qimasood@lpagroup.com
Gus Kretschmer	The LPA Group Incorporated	704-665-9935	gkretschmer@lpagroup.com
Ed Owens	Florence & Hutchinson	803-254-5800	eowens@flohut.com
Carla Shealy	Wilbur Smith Associates	803-758-4551	cshealy@wilbursmith.com
Steve Swygert	The LPA Group Incorporated	803-231-3902	sswygert@lpagroup.com
Cameron Nations	The LPA Group Incorporated	803-231-3992	cnations@lpagroup.com
Mark Breeland	The LPA Group Incorporated	803-231-3804	mbreeland@lpagroup.com
Rob Dubnicka	The LPA Group Incorporated	803-231-4042	rdubnicka@lpagroup.com

Over a two-day period, March 10-11, 2009, the Value Engineering Study Team reviewed the Right of Way Plans for the southern section of the proposed, new Interstate 73. The study began with an overview of the project and presentations from the design team.

Facts presented include:

- The proposed, new Interstate 73 (I-73) is 43 miles long;
- The highway will have a minimum radius of 3,000 feet;
- Median widths will be 96 feet;
- Minimum grade will be 0.3%;
- Clear zone will be 34 feet;
- Minimum separation of 158 feet between the centerline of I-73 and the cross roads;
- No vertical clearance for rail.

Construction is estimated at approximately $1 Billion and it is expected that the project will be constructed as a design/build project.

Following presentations from the design team, the VE Study Team brainstormed ideas that might present cost-savings and efficiency opportunities for SCDOT. While the VE Study Team was concerned with value for SCDOT, they acknowledged that the new highway must employ the highest design criteria. Keeping in mind these considerations, the Team developed the following list of initial ideas for study:

Item	Comments
I-95/I-73 Interchange	Connection to I-73 northbound
I-73/SC 22 interchange	Ramp 1(flyover); overall interchange layout; MOT during construction.
Median Width (96 feet)/Erosion Control	Look at narrowing median at STA 42.00+00 – 43.60+00
Dillon Rest Area	Blended/Combined–add loop to return; additional environmental investigation may be required.
Structures	Length, Skew
Accommodation of Railroad Envelope	Interchanges and Overpasses
Overall Drainage Concept	Quantify 6 lanes vs. 8 to 10 lanes
Secondary Road Footprint	Revisit pavement width and shoulders
ROW Acquisition	Damages (rest area potential); Relocation (Segment B at 76 – new church)
ROW Easement	Utilities
I-73/US301 (Relocate)	Flip the crossing
MOT on Secondary Road	Particularly Segment A3 where the secondary roads are close together
8-Lane Widening	Bridges; Median Barriers

Once these ideas were developed, the VE Study Team broke out into smaller teams to further study and develop these ideas. These sessions resulted in a report to the design team and requests for additional information. The report is included for the VE Committee's review as Appendix A.

On April 7, 2009, the VE Study Team reconvened to prepare the final recommendations to SCDOT's VE Committee. These recommendations follow:

Recommendation 1

I-95/I-73 Interchange
Widen the two main interchange ramps from one, 16' lane to two, 12' lanes.

Traffic projections show that the two main interchange fly-over's may fail in 25 to 30 years according to the high DHV's (based on a non-tolled facility).

Northbound Ramp

Pros	Cons
Two lanes will better accommodate truck traffic	Additional, initial cost of $3.2 million
Ease of maintenance (will allow lane closures)	Over-design for toll road scenario (60% reduction traffic with tolls)
Achieve **LOS B** for design year 2035	Increased right of way costs (estimated at $10,000)
Longer service life	
Eliminate future widening	
Accommodate emergency services	
Improve hurricane evacuation	

Southbound Ramp

Pros	Cons
Two lanes will better accommodate truck traffic	Additional, initial cost of $3.2 million
Ease of maintenance (will allow lane closures)	Over-design for toll road scenario (60% reduction traffic with tolls)
Achieve **LOS A** for design year 2035 (**LOS B** for single lane)	Increased right of way costs (estimated at $10,000)
Longer service life	
Eliminate future widening	
Accommodate emergency services	
Improve hurricane evacuation	

Recommendation 2

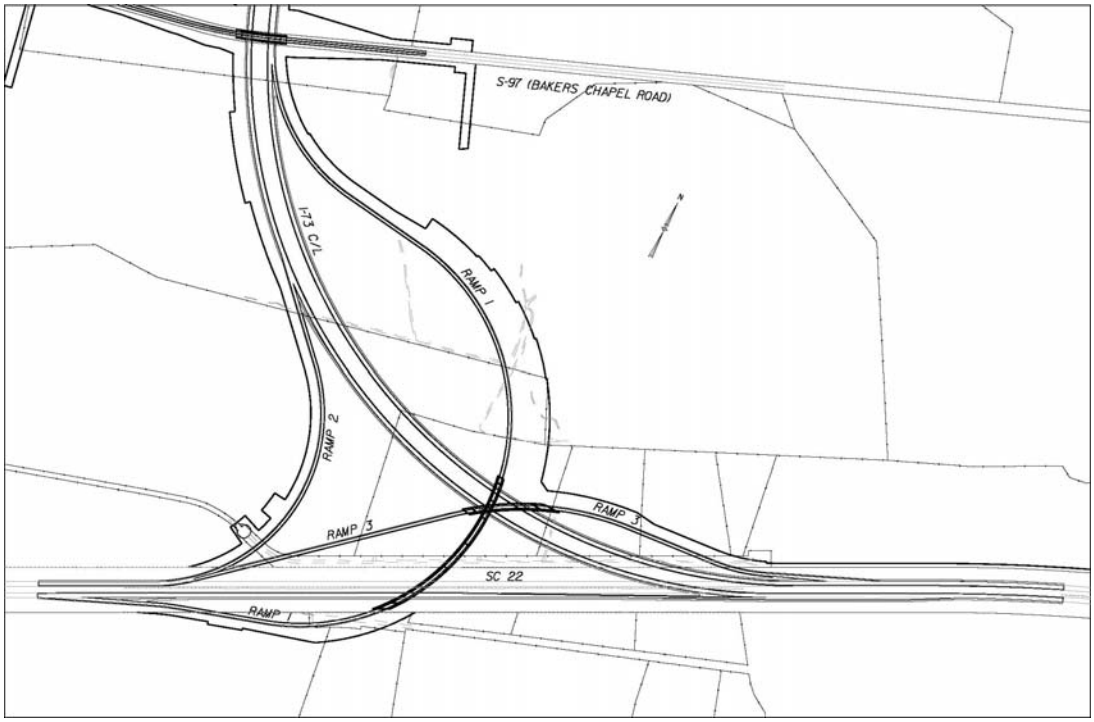
I-73/SC22 Interchange
Revise current three-level, multiple structure interchange to a T-type, trumpet design.

I-73 adjoins SC22 just east of the SC22/SC319 interchange and will continue eastward towards Conway. The VE Study Team discussed the possibility of revising the I-73/SC22 Interchange to a one-lane or two-lane trumpet design instead of a system-to-system directional interchange. The design team was asked to provide cost estimates and schematic drawings of each option.

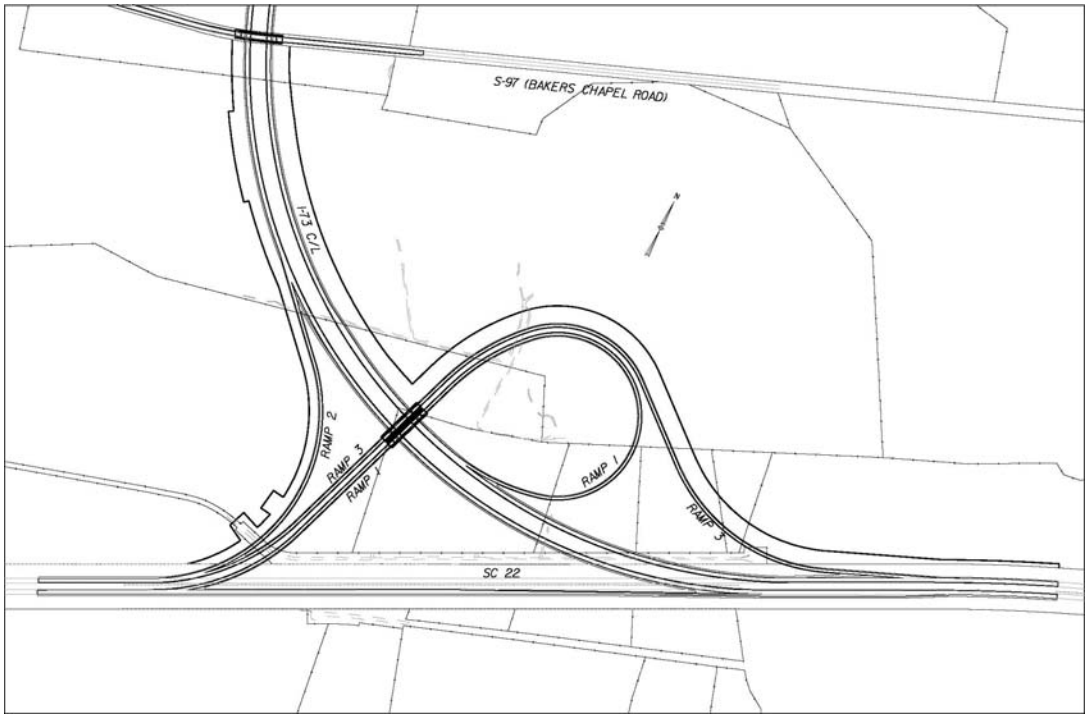
Fred Kicklighter requested a traffic analysis for these options. This analysis is included as Appendix B.

Pros	Cons
Reduce ramp fill heights and bridge requirements for a cost savings estimated at $31.1 Million	Safety issues with loop design
Lessen length of Bakers Chapel Road crossing bridge (end acceleration lane prior to crossing under the Bakers Chapel Road bridge)	Two of the four ramps will have reduced (60-40-60 mph) design speeds. Directional ramps are all at 55 mph
No conflict with hurricane evacuation	May require reopening the EIS to assess impacts
Handle estimated volumes at design year (with projected SELL project volumes)	

Original Directional Interchange



One-Lane Trumpet Interchange
VE Proposed Option



SC 22 INTERCHANGE ORGINAL STUDY DESIGN

I-73 SEGMENT C-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
SC 22 Interchange Original

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	1	INTERCHANGES
NUMBER OF CROSSOVER ROADS		CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.00	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.00	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.00	MILES
TOTAL LENGTH (RAMPS)	3.29	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.30	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	2.98	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$3,001,000.00	$3,001,000
2	UNCLASSIFIED EXCAVATON	10,970	CY	$10.50	$115,185
3	BORROW EXCAVATION	922,788	CY	$15.50	$14,303,214
4	FINE GRADING	55,985.20	SY	$5.00	$279,926
5	MAINLINE & RAMP PAVEMENT	52,154.64	SY	$49.50	$2,581,655
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT		SY	$48.50	$0
7	DRAINAGE	2.98	MI	$150,000.00	$447,325
8	EROSION CONTROL	2.98	MI	$50,000.00	$149,108
9	PAVEMENT MARKINGS (MAINLINE)	0.00	MI	$19,000.00	$0
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	3.29	MI	$19,000.00	$62,419
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	3.29	MI	$75,000.00	$246,390
12	FENCING	0	LF	$12.50	$0
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$1,819,000.00	$1,819,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	0	SF	$150.00	$0
14.b	STEEL GIRDER BRIDGE	62,392	SF	$250.00	$15,597,913
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$3,860,000.00	$3,860,000
I	**Total Estimated Construction Cost (ECC)**				$42,463,134
II	**Engineering Design Fees (12% of ECC)**				$5,096,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	87	AC	$7,500.00	$648,800
V	**Wetland Mitigation**	30.9	AC	$40,000.00	$1,235,556
VI	**Construction Administration & Inspection (12% of ECC))**				$5,096,000
	TOTAL ESTIMATED COST (2009 Dollars)				$54,540,000

SC 22 INTERCHANGE VE STUDY DESIGN

I-73 SEGMENT C-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
SC 22 Interchange VE 40 mph (one-lane) Loop Ramp

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	1	INTERCHANGES
NUMBER OF CROSSOVER ROADS		CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.00	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.00	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.00	MILES
TOTAL LENGTH (RAMPS)	3.26	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.11	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	3.15	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$1,193,000.00	$1,193,000
2	UNCLASSIFIED EXCAVATON	12,203	CY	$10.50	$128,133
3	BORROW EXCAVATION	204,362	CY	$15.50	$3,167,603
4	FINE GRADING	59,056.09	SY	$5.00	$295,280
5	MAINLINE & RAMP PAVEMENT	54,649.74	SY	$49.50	$2,705,162
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT		SY	$48.50	$0
7	DRAINAGE	3.15	MI	$150,000.00	$471,861
8	EROSION CONTROL	3.15	MI	$50,000.00	$157,287
9	PAVEMENT MARKINGS (MAINLINE)	0.00	MI	$19,000.00	$0
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	3.26	MI	$19,000.00	$61,928
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	3.26	MI	$75,000.00	$244,455
12	FENCING	0	LF	$12.50	$0
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$723,000.00	$723,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	22,161	SF	$150.00	$3,324,122
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$1,247,000.00	$1,247,000
I	**Total Estimated Construction Cost (ECC)**				$13,718,831
II	**Engineering Design Fees (12% of ECC)**				$1,646,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	89	AC	$7,500.00	$667,700
V	**Wetland Mitigation**	36.5	AC	$40,000.00	$1,460,897
VI	**Construction Administration & Inspection (12% of ECC))**				$1,646,000
	TOTAL ESTIMATED COST (2009 Dollars)				$19,140,000
				Savings	$35,400,000

SC 22 INTERCHANGE VE STUDY DESIGN

I-73 SEGMENT C-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
SC 22 Interchange VE 40 mph (two-lane) Loop Ramp

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	1	INTERCHANGES
NUMBER OF CROSSOVER ROADS		CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.00	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.00	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.00	MILES
TOTAL LENGTH (RAMPS)	3.30	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.11	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	3.19	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$1,176,000.00	$1,176,000
2	UNCLASSIFIED EXCAVATON	11,622	CY	$10.50	$122,031
3	BORROW EXCAVATION	194,630	CY	$15.50	$3,016,765
4	FINE GRADING	59,918.08	SY	$5.00	$299,590
5	MAINLINE & RAMP PAVEMENT	55,350.10	SY	$49.50	$2,739,830
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT		SY	$48.50	$0
7	DRAINAGE	3.19	MI	$150,000.00	$478,749
8	EROSION CONTROL	3.19	MI	$50,000.00	$159,583
9	PAVEMENT MARKINGS (MAINLINE)	0.00	MI	$19,000.00	$0
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	3.30	MI	$19,000.00	$62,686
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	3.30	MI	$75,000.00	$247,446
12	FENCING	0	LF	$12.50	$0
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$713,000.00	$713,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	25,802	SF	$150.00	$3,870,282
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$1,289,000.00	$1,289,000
I	**Total Estimated Construction Cost (ECC)**				$14,174,962
II	**Engineering Design Fees (12% of ECC)**				$1,701,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	86	AC	$7,500.00	$646,100
V	**Wetland Mitigation**	35.3	AC	$40,000.00	$1,413,673
VI	**Construction Administration & Inspection (12% of ECC))**				$1,701,000
	TOTAL ESTIMATED COST (2009 Dollars)				$19,637,000

Savings (Org) **$34,903,000**
Savings(60-40-60) **-$497,000**

Recommendation 3

Rest Area
Eliminate Rest Area on I-73 currently proposed to be located near Harry Martin Road.

Pros	Cons
Save initial cost of approximately $20 Million	No Rest Area on I-73
Eliminate maintenance costs	Will need to find alternative location for ITS Sub Station and SHEP Maintenance Shed along I-73
Eliminate potential wetlands impacts	
Eliminate a potential utility conflict	
Allow potential for private development truck stop	
Decrease SCDOT liability	
Shorten bridge crossing length at Harry Martin Road	

VE Recommendation for Reducing Skew of Crossing Bridges

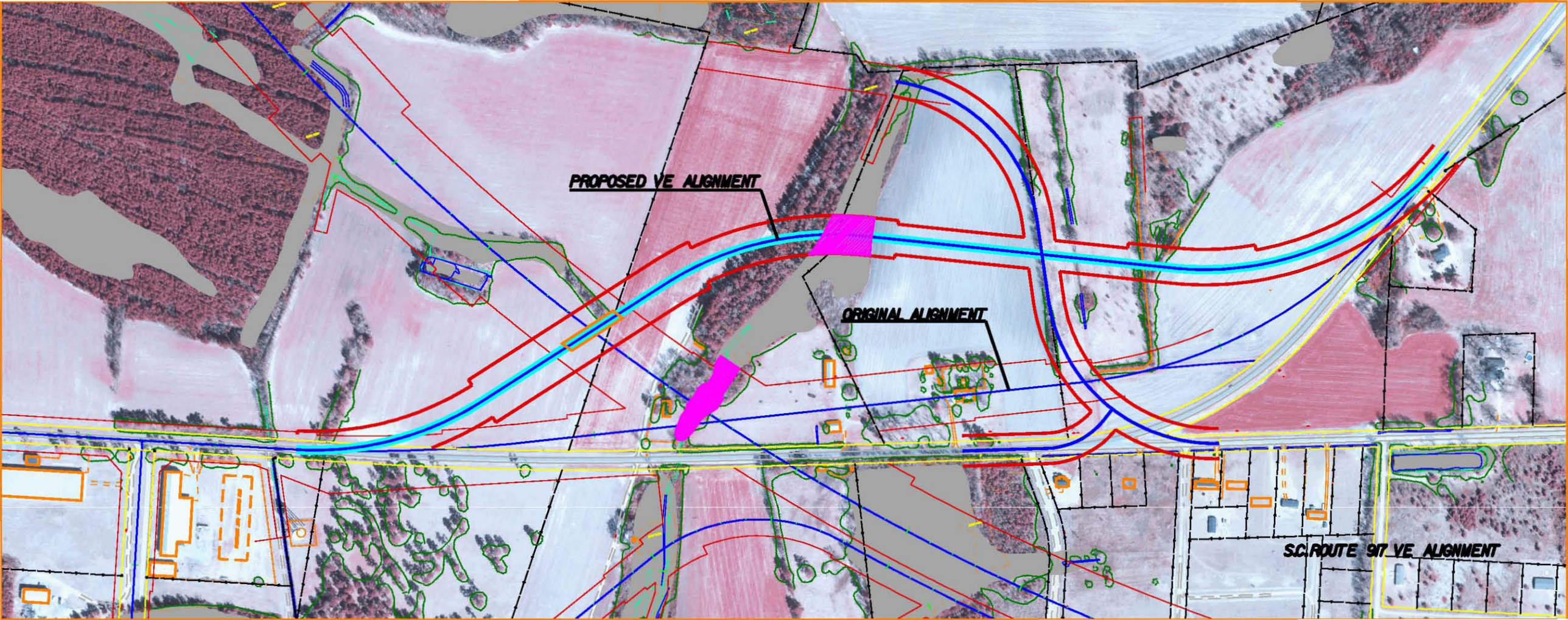
The VE Study Team reviewed bridge crossings at SC917, US301, S198, S27, and S309 and determined that each of these bridges have heavy skews that have resulted in continuous structural steel superstructures. The VE Team requested that the design team review each of these bridges to determine if the skews could be reduced such that the span length is 140' or less. The reduction in length would allow the bridges to be constructed with the more cost effective Prestressed Concrete Girders rather than Structural Steel Girders. Cost estimates of the original design and the proposed design are included in Appendix C. Additionally, reduction of skew would enhance the performance of the structure during a seismic event.

Discussions on these bridge crossings follow in recommendations four through seven.

Recommendation 4

Bridge 7D Crossing at SC917
Reconfigure the bridge to reduce the heavy skew.

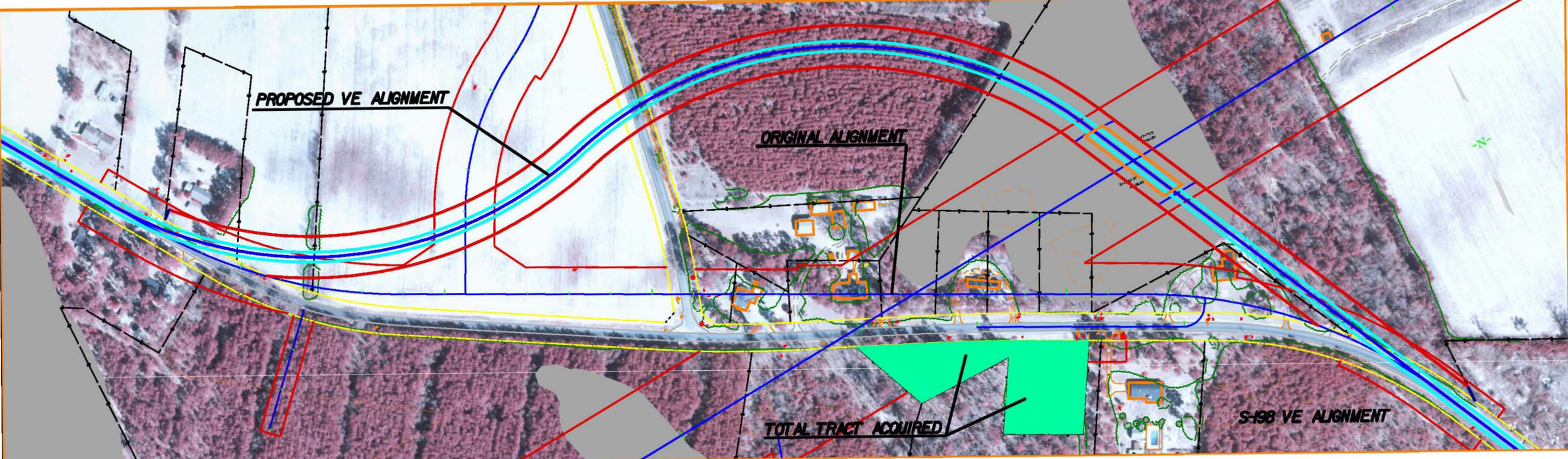
Pros	Cons
Cost savings of $1.6 Million in bridge construction	Would require reopening the EIS document to assess the impacts
Avoid displacement	Less desirable roadway alignment
Significantly reduce skew	Multiple horizontal curves introduced on SC197
Concrete girders require less maintenance than steel girders	Anything changed at this point will be controversial with the community
More predictable seismic behavior	Increased wetland impact of 0.7 acres.


PROPOSED VE ALIGNMENT
ORIGINAL ALIGNMENT
S.C. ROUTE 917 VE ALIGNMENT

Recommendation 5

Bridge 14D Crossing at S198
Reconfigure the bridge to reduce the heavy skew.

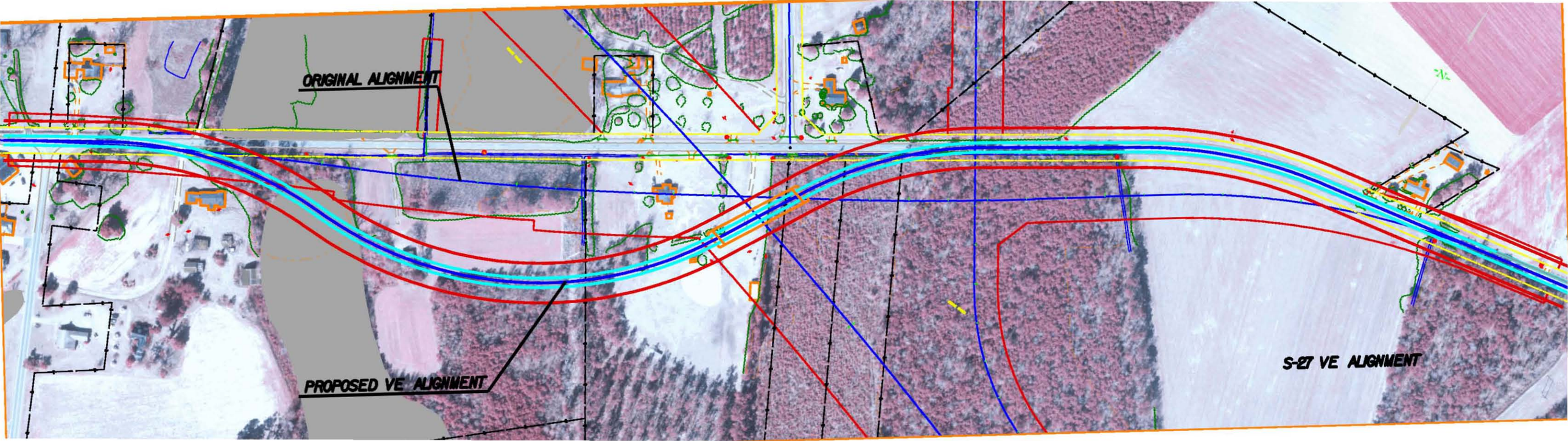
Pros	Cons
Cost savings of $2.3 Million in bridge construction	Would require reopening the EIS document to assess the impacts
Eliminate need for run-around	Additional wetlands impact (.8 acres)
Skew improved	Some total-take tracts have already been acquired by SCDOT
Concrete girders require less maintenance than steel girders	
More predictable seismic behavior	


PROPOSED VE ALIGNMENT
ORIGINAL ALIGNMENT
TOTAL TRACT ACQUIRED
S-198 VE ALIGNMENT

Recommendation 6

Bridge 15D Crossing at S27
Reconfigure the bridge to reduce the heavy skew.

Pros	Cons
Cost savings of $1.3 Million in bridge construction	Would require reopening the EIS document to assess the impacts
Skew improved	Additional wetlands impact (.3 acres)
Concrete girders require less maintenance than steel girders	Less desirable horizontal alignment for S27
More predictable seismic behavior	May cause additional displacement (structures on Tract 150)

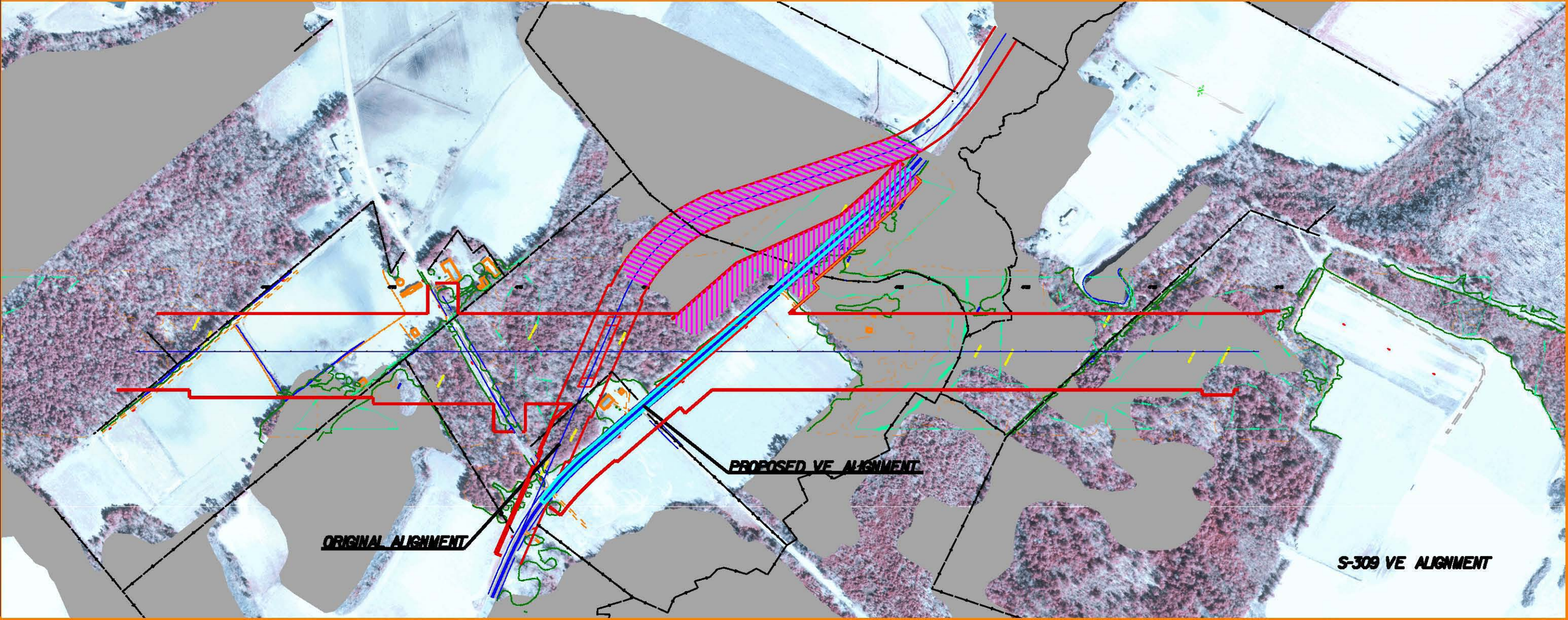

ORIGINAL ALIGNMENT
PROPOSED VE ALIGNMENT
S-27 VE ALIGNMENT

Recommendation 7

Bridge 56D Crossing at S309
Reconfigure the bridge to reduce the heavy skew.

Pros	Cons
Cost savings of $1.1 Million in bridge construction	Would require reopening the EIS document to assess the impacts
Skew improved	Additional wetlands impact of 3.2 acres
Concrete girders require less maintenance than steel girders	
More predictable seismic behavior	

End of discussion on reducing bridge crossings skew.


PROPOSED VE ALIGNMENT
ORIGINAL ALIGNMENT
S-309 VE ALIGNMENT

Recommendation 8

Secondary Road Footprints
Revise secondary road footprints from 12' lanes and 10' shoulder to 11' lanes and 6' shoulders.

The VE Study Team was informed that the EIS committed to 10' shoulders over the interstate. It was agreed that if the EIS is reopened, the consideration should be given to redesign for functional classifications. It is recognized that some locations may require widths greater than the functional classification in order to accommodate specialized farm equipment.

Pros	Cons
Costs savings of $791,000 per mile	Would require reopening the EIS document to assess the impacts
	Bridge crossing would need to be evaluated individually to determine the need to accommodate specialized farm equipment

The following cost analysis was performed to estimate the cost savings per mile of reducing 2" of asphalt and 8' of earthwork.

Secondary Crossover Road Per Mile Reduction

I-73

ESTIMATED COST SAVINGS OF CONCEPTUAL ROADWAY CONSTRUCTION

Reduction of 2' asphalt & 8' earthwork reduction on secondary roads per mile

NUMBER OF LANES (MAINLINE)	2	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	0	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.00	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.00	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.00	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$75,000.00	$75,000
2	UNCLASSIFIED EXCAVATON	0	CY	$10.50	$0
3	BORROW EXCAVATION	25,000	CY	$15.50	$387,500
4	FINE GRADING	1,200	SY	$5.00	$6,000
5	MAINLINE & RAMP PAVEMENT	1,200	SY	$49.50	$59,400
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	0	MI	$150,000.00	$0
8	EROSION CONTROL	0	MI	$50,000.00	$0
9	PAVEMENT MARKINGS (MAINLINE)	0	MI	$19,000.00	$0
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0	MI	$19,000.00	$0
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	0	MI	$75,000.00	$0
12	FENCING	0	LF	$12.50	$0
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$45,000.00	$45,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	0	SF	$150.00	$0
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$57,000.00	$57,000
I	**Total Estimated Construction Cost (ECC)**				$629,900
II	**Engineering Design Fees (12% of ECC)**				$76,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	1	AC	$7,500.00	$9,000
V	**Wetland Mitigation**	0.0	AC	$40,000.00	$0
VI	**Construction Administration & Inspection (12% of ECC))**				$76,000
	TOTAL ESTIMATED COST (2009 Dollars)				$791,000

Recommendation 9

MOT on Secondary Roads
Evaluate the staging of adjacent closures and increasing the detour limit of five miles to six or seven miles, thus reducing the number of temporary run-arounds required during construction.

The VE Study Team questioned the use of temporary run-arounds in various locations. It was thought that some of these run-arounds could be eliminated by closing the road and showing a detour.

The Team was informed that the District Engineers were evaluating the feasibility of detours and would recommend eliminating the temporary run-arounds when geometrics and length were conducive to detours. The following locations are recommended for this review:

Segment	Secondary Road
A1	SC917
A2	US301, US501
A3	S197, S198, S27
A4	41A
B1	S84
B2	SC41, SC31

During the course of the Value Engineering review, there were several ideas that were considered, but rejected for various reasons.

For example, the VE Study Team considered recommending that Bridge 12D be reconfigured to reduce the heave skew. Because of the resulting geometry, this suggestion was rejected.

Bridge 12D Crossing at US 501

Reconfigure the bridge to reduce the heavy skew.
REJECTED

Pros	Cons
Cost savings of $1.9 Million in bridge construction	Would require reopening the EIS document to assess the impacts
Skew improved	Increased impacts to wetlands (0.5 acres)
Concrete girders require less maintenance than steel girders	Greater impact on residences
More predictable seismic behavior	**Less desirable geometry to mainline and US 501**

US 301
Shift the alignment of US 301 to the east in order to eliminate a structure.
REJECTED

In order to reduce the number of bridge structures, it was assumed in the layout of the horizontal alignment that the secondary road would always be placed over the mainline unless this configuration was prevented by other obstacles. Bridges 10C and 11C (crossing at US 301) were placed on the mainline because of vertical profile constraints (the CSX crossing west of the crossing). The majority of the VE Study Team voted to reject this recommendation.

Pros	Cons
Cost savings of $3.97 Million in bridge construction	Would require reopening the EIS document to assess the impacts
Only one bridge to maintain	Additional wetlands impact (4.4 acres)
	Additional 6 acres of ROW impacts.
	Possible impacts for truck access to Signode and Smurfit Container.
	Possible impacts to apartment complex
	Maintenance of frontage road and US 301

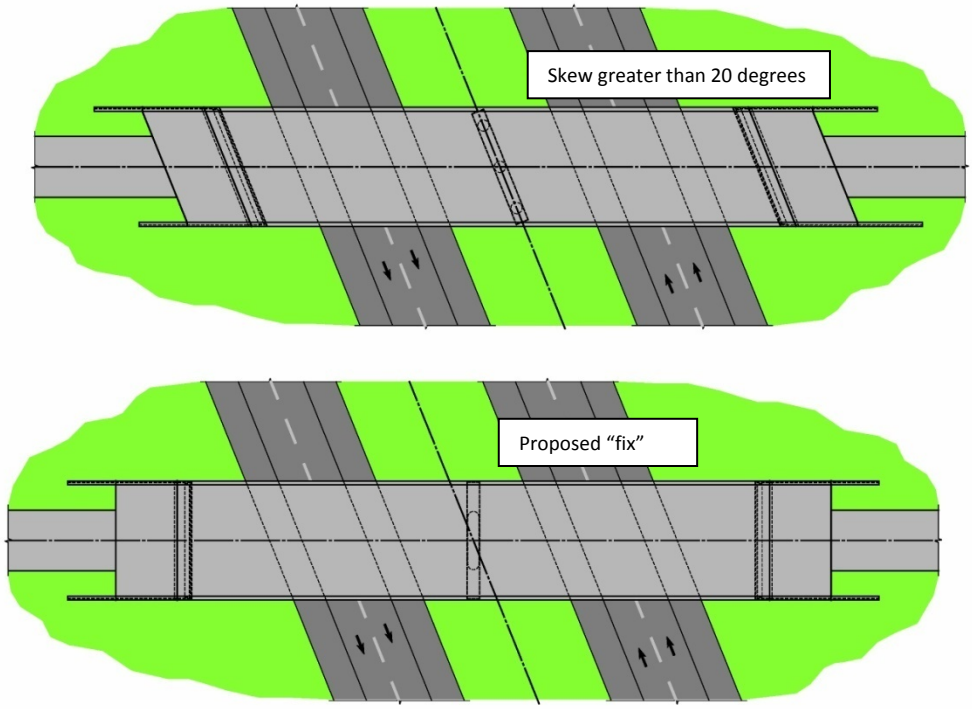
Justification for the S308 Interchange

The VE Study asked the design team to provide justification for the S308 interchange and for the location chosen for that interchange. Here are their responses:

- Without the S308 interchange, there was no access between US 701 and US 76 interchange, a distance of over 25 miles.
- Other potential locations are at S23 (South Nichols Highway) or S99 (Lake Swamp Road). The communities at S23 and S99 did not want the interchange at those locations, fearing an interchange would alter the character of the community.
- There would be additional relocation impacts at either S23 or S99.
- Ketchup Town, located on S99, is considered to be a local landmark and would be impacted significantly by the interchange.
- Horry County requested the S308 location for the interchange to provide more direct access to the Cool Springs Industrial Park.

Additional Bridge Skew Issues

In those instances of bridge locations where the skew was greater than 20 degrees, but less than the skew considered in Recommendations 4 through seven, the Study Team suggested that the designers "square up" the ends of the bridges to increase performance in case of a seismic event (see figures on . After evaluating the economics of reducing the skew, it appeared that the costs outweigh the benefits.



Rest Area Options

The VE Study Team considered the following options for a Rest Area on I-73:

1. One suggestion was to combine the two rest areas into one that would service both northbound and southbound traffic.
    a) A costly interchange would be required
    b) Cost savings on building size would be minimal
    c) The savings on maintenance costs would not be sufficient to justify the cost of the interchange
    d) Wetlands impacts would be increased by approximately 10 acres.
    e) **The VE Study Team does not recommend this option.**

2. Another suggestion was to move the Rest Area closer to Floydale, approximately three miles down the highway.
    a) Initially, it was thought that this location might have sewer capacity available to service the Rest Area. However, there is no sewer line available at this location.
    b) It appears that this location will allow for the ramp to be constructed of Prestressed Concrete Girders in lieu of Structural Steel.

c) One of the drawbacks to the current location is its close proximity to an interchange. This location would place it farther away. However, the drawbacks to this location may outweigh the positive aspects.

In conclusion, the recommendation to eliminate the rest area on I-73 (Recommendation 3) appears to be the best option.

The Value Engineering Study Team appreciate the opportunity to review the design by the Engineering Team and would like to congratulate them on a well-designed project. Our thanks, as well, to SCDOT and the Value Engineering Committee for the excellent work they do to improve highway design and conserve our state's limited financial resources.

Appendix A
VE Study Team
Report to Design Teams

I-73 Value Engineering Report to the Design Teams
and
Requests for Additional Information.

Next Meeting: **April 7, 2009**

Location: **THE LPA GROUP INCORPORATED**
Belle Vista Room, 2nd Floor

General comments to the design teams

It is not really possible in this VE Study's format to examine every aspect of the design presented and offer specific alternatives; nor would it be expected that the VE Team be expected to know or appreciate the years of evaluation of all the alternatives that have preceded this study.

We have not examined: every profile in detail to see if a different vertical curve length would create a benefit; whether a turn-lane may or may not be needed; drainage calculations to see if pipes or culverts could be sized or spaced differently; whether the use of a different radius would be of benefit; etc.

The approach taken for this VE Study was to review the current plans and offer more general observations of potential ways that project costs could be reduced without sacrificing value or quality. It is also understood by the VE Team that the majority of the comments offered here have most likely already been considered by the design firms, but we specifically ignored that possibility.

1. **I-95/I-73 Interchange**

   It is the opinion of the study team that the ramp configuration appears to be adequate to accommodate the anticipated traffic patterns, although the determination of whether individual ramps need to be single lane or double lane may need further evaluation with regard to the DHVs. From a VE standpoint, we offer the following challenge:

   A. For Flyovers 13 and 31, reduce the bridge lengths at all four ends to that length required to meet anticipated clear zone requirements only.

   B. Create two bridges out of each long bridge, with a section of embankment in between.

   C. Utilize MSE walls where appropriate and beneficial to do so.

   D. Determine the cost difference, and/or specific reasons why this cannot, or should not be accomplished.

   E. Traffic projections show that the two main interchange fly-over's may fail in 25-30 years according to the high DHV's. The ramps should be widened from the currently proposed one, 16' lane to two, 12-foot lanes. The fly-over's can be marked as one-lane until the two-lanes are needed. The bridges are designed for 75 years. The VE team would like Rob Dubnicka to evaluate this proposal.

2. **I-73/SC 22 Interchange**

   Currently, this interchange is three-level, with multiple structures. The VE Team recommends revising the interchange to a trumpet design (T-type). A rough schematic is

attached for consideration. This type of interchange would: eliminate costly structures; handled the estimated volumes; have no conflict with hurricane evacuation; have no impacts to the twin bridges on SC 22; and, lessen the impact to Bakers Chapel Road because the acceleration lane could be tapered out before the bridge.

3. **Median Width (96') through the three-mile section (4200+00 to 4360+00) at the Little Pee Dee River**

Due to higher fill heights associated with this region, the idea of whether the median width could be reduced, to reduce the volume of embankment, was raised. From a VE standpoint, we offer the following challenge:

Provide an overall cost analysis that addresses the following items:

A. Reducing the four-lane median width to 72';

B. Analyze the cost, safety, and maintenance aspects of then having to add median cable barrier;

C. Potential reduction in wetland impacts;

D. Potential reduction in right-of-way width:

E. Impacts to drainage related to a reduced median width in a super-elevated section.

4. **Rest Area**

We began by discussing whether there was a specific need to provide a rest area within the confines of this project. It was decided that specific to this corridor (not knowing what the future holds in regard to I-73 being constructed north of I-95), it would be appropriate to construct a rest area, but that one did not appear to specifically be required. Not constructing a rest area at this time could, in itself, be a VE consideration. Our discussions were more specifically related to what type of rest area should be built, with the main thought that building one larger rest area, accessible to both northbound and southbound traffic, was cheaper to maintain than by taking the traditional approach of building two separate rest areas, each serving a direction of travel. It is understood that to accomplish this will have a higher initial roadway/bridge costs to consolidate rest area traffic onto one side of the highway, but that there will also be numerous economies of scale related to building one larger facility instead of two smaller facilities. From a VE standpoint, we offer the following challenge:

A. Create and cost the design to construct a single-type rest area, versus the cost to construct two traditional rest areas. Include right-of-way costs.

B. Perform a benefit/cost analysis of the additional construction costs (assuming that the single-type rest area is more expensive to construct than two smaller ones) using the annual maintenance savings of $100,000 for a single.

C. If a benefit is determined to exist, find a more appropriate location for the single-type rest area than the area currently shown for the traditional rest areas.

5. **Structures**

A. Bridges at the following crossings have heavy skews which have resulted in Continuous Structural Steel Superstructures:

- Bridge 7D Crossing at SC917
- Bridge 12D Crossing at US501
- Bridge 14D Crossing at S198
- Bridge 15D Crossing at S92
- Bridge 56D Crossing at S309

Evaluate whether or not the skews can be reduced such that the bridge span length is 140' or less so that more cost effective Prestressed Concrete Girders can be used in lieu of Structural Steel. Irregular geometry and foundations on soft soils can exhibit dynamic response that are not obvious and may not be captured in the analysis Reducing the skews will simplify the bridge detailing and may also improve the performance during a seismic event.

Rough sketches are attached as a reference. If skews cannot be reduced, would two, single-span, prestressed concrete bridges on the mainline be less expensive than a two-span continuous structural steel bridge (i.e. flip the crossing)?

B. The exit Ramp of the rest area near bridge 20D (Crossing at Harry Martin) has lengthened one of the bridge spans which in turn has resulted in a Continuous Steel Superstructure.
Evaluate whether or not the ramp or the entire rest area can be shifted so that the Span length is 140' or less so that Prestressed Concrete Girders can be used in lieu of Structural Steel. A rough sketch is attached.

C. In order to reduce the number of bridge structures, it was assumed in the layout of the horizontal alignment that the secondary road would always be placed over the mainline unless this configuration was prevented by other obstacles. Bridges 10C and 11C (Crossing at US 301) were placed on the mainline because of vertical profile constraints (the CSX crossing west of the crossing). Evaluate whether or not US 301 can be shifted east so that the crossing can be flipped (US 301 over mainline) to eliminate a structure. Evaluate whether or not this is cost effective. A rough sketch is attached.

D. In addition to the bridges in Item 1. The following additional bridges have higher skews than what is desirable from a seismic deign viewpoint:

- Bridge 28C and 29C Crossing at US76
- Bridge 34D Crossing at SC41
- Bridge 35D Crossing at S31

Evaluate whether or not the skew at these sites can be reduced. Actions to reduce skew may decrease or may increase construction costs. While initial construction costs may be higher there is value in reducing the skew because the structure will perform better in the event of seismic activity. Evaluate economics of reducing the skew.

6. **Accommodation of Railroad Envelope**

We actually spent more time discussing this issue than anyone would have anticipated, with the discussion centered on whether or not the plans adequately accommodate future railroad. We reviewed the design criteria, the plans, and the commitments shown in the environmental document. We finally concluded that although the accommodation of railroad is less than perfect, the plans fulfill the intent of the approved environmental document. We then shifted the focus of our review to whether there was a VE component to the railroad issue that we should address. Considering the outcome of our initial review, we determined that the only potential savings would come in the form of reduced right-of-way costs should the railroad be eliminated from consideration; but that since we are not suggesting that the railroad be eliminated, we do not now believe that any further action related to this issue be undertaken.

7. **Overall Drainage Concept**

The design of this four-lane highway is, in large part, based on the potential need to widen it to six-lanes in the future. Therefore, it had previously been decided to also base the proposed drainage on the future six-lane needs. From a VE standpoint, we considered whether it would be worthwhile to base the proposed drainage on something greater than a six-lane section. We reviewed the available data which included the projected traffic demands, and we were able to determine that the need to widen to anything greater than six-lanes was too remote to be a worthwhile effort and would not be a cost-effective approach to the design of the project. We also considered whether even designing for a six-lane section was cost effective. We decided it was, since the possibilities of needing to widen to six-lanes is a foreseeable possibility, and the fact that many of the proposed pipes that have been sized for six lanes are the minimum diameter of 18" already.

8. **Secondary Road Footprints**

All secondary roads and frontage roads are designed for 12’ lanes and 10’ shoulders. The VE team recommends that the design be evaluated so that it is in accordance with SCDOT HDM-functional classification.

The EIS committed to 10’ shoulders on the interstate; however, we suggest that the approaches and travel lanes be evaluated on a case-by-case basis so the secondary roads may be designed for a smaller footprint, i.e. 11’ lanes and 6’ shoulders.

9. **ROW Acquisition vs. ROW Easements**

Very little time was spent in discussion on this topic once the SCDOT representatives made it clear that acquisition was the Department's method of choice.

10. **MOT on Secondary Roads**

The current design utilizes "run-arounds" to stage construction. Some of these temporary run-arounds can be eliminated by closing the road and showing a detour. The VE team recommends evaluating the staging of adjacent closures and increasing the detour limit of five miles to six or seven miles, which will result in fewer "run-arounds".

Minimize interaction of staged traffic with I-73 construction at the following locations:

MOT Locations	Segment
S-197, S-198, S-27	A3
S-22, S-36, S-27	A4
SC41, SC-31	B2
S-423, S-23, S-99, S-308	C1 and partially B2

11. **Utilities**

The VE team suggest that the design teams utilize the forthcoming utility/SUE information to develop cost-effective solutions that will minimize impacts to utility facilities, particularly the large transmission lines that may be affected.

12. **S-308 Interchange**

What is the justification for the S-308 Interchange? Please include reasons for the interchange and its location, as well as the cost estimates.

Appendix B
I-95 and I-73
Interchange Ramp Analysis

THE LPA GROUP

TECHNICAL MEMORANDUM

TO: Fred Kicklighter, P.E.

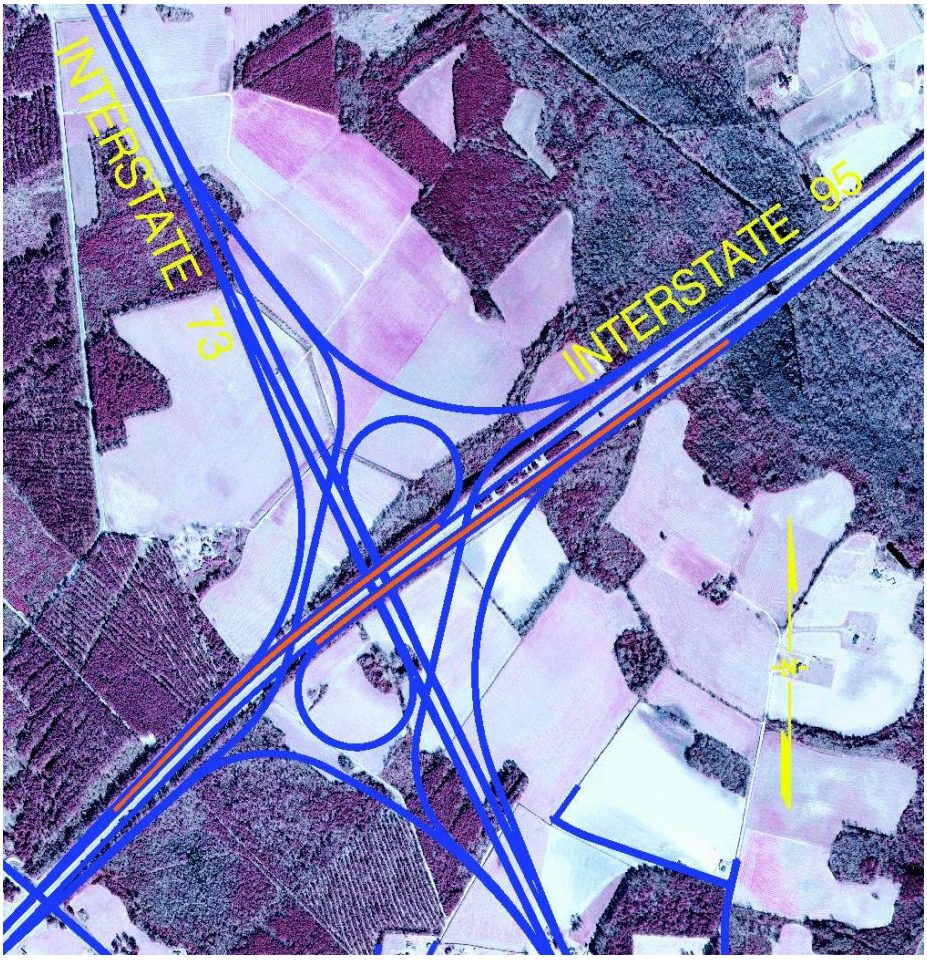
FROM: Quazi Masood, P.E.

SUBJECT: I-95 and I-73 Interchange Ramp Analysis

DATE: March 20, 2009

We have completed the design year (year 2035) capacity analysis of the two flyover ramps (I-95 northbound to I-73 northbound and I-95 southbound to I-73 southbound) at the proposed I-73 interchange with I-95. The primary intent of this analysis is to determine whether or not the single lane concept on the flyover ramps would provide an acceptable operating condition. The proposed interchange layout is shown in **Figure 1**.

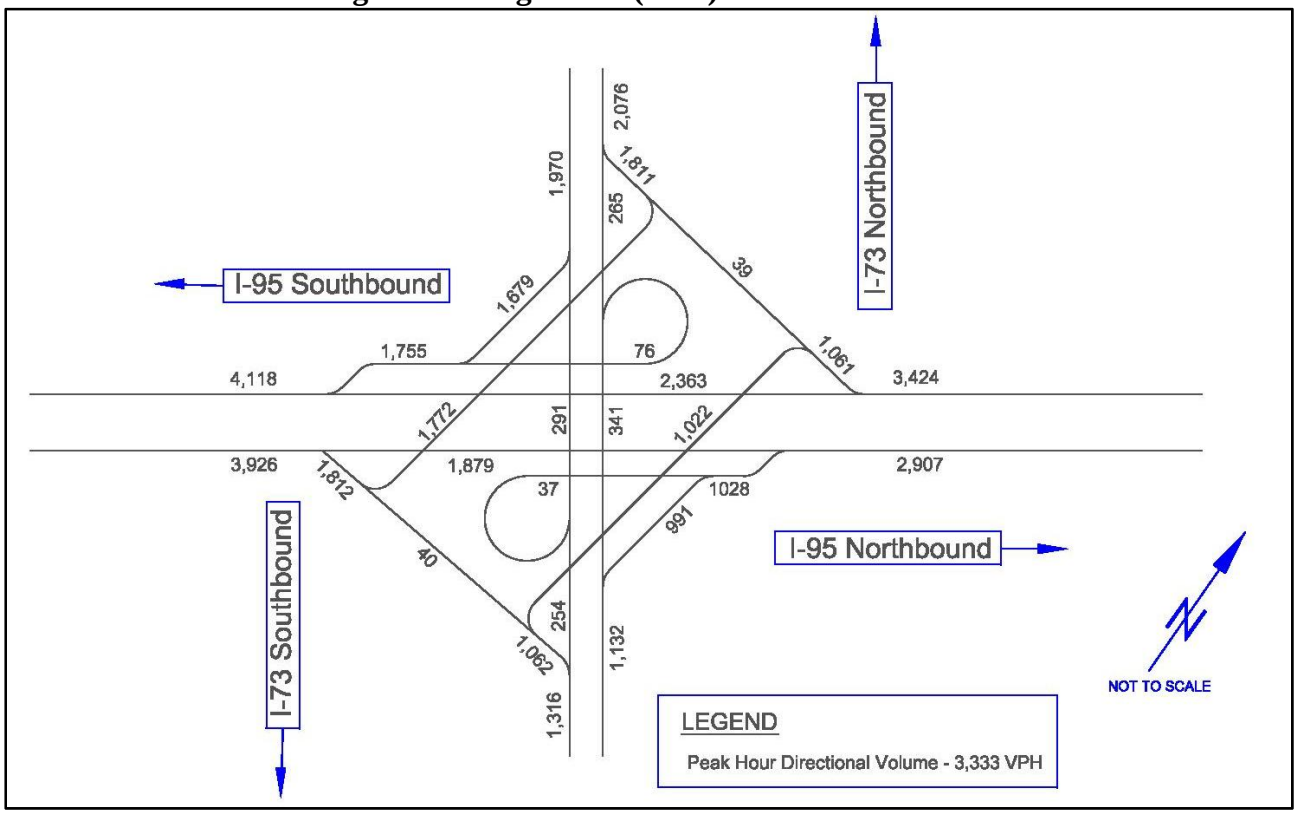
Figure 1: Proposed I-95/I-73 Interchange Layout



Traffic Data

The design year peak hour traffic volumes used in this analysis was obtained from the *I-95/I-73 Interchange Justification Report (IJR), February 2009*. **Figure 2** shows the design year traffic volumes.

Figure 2: Design Year (2035) Traffic volume



Traffic Parameters

A design speed of 70 mph was used for freeways, I-95 and I-73. The design speed on the flyover and loop ramps are 55 mph and 40 mph, respectively. The design speed on the C/D Road is 60 mph. A value of 22% and 9% was used to account for the heavy vehicle on I-95 and I-73 respectively. A default peak hour factor value of 0.9 was used for this analysis. In the SimTraffic animation, a 10 min of seeding time and 60 min of recording time was used.

Traffic Operational Analysis

A traffic micro-simulation program (Synchro) was run at the proposed interchange to determine the operating condition on the flyover ramps with the design year traffic. For comparison purposes, a second lane configuration concept of the flyover ramps (dual lane flyover ramps) was also analyzed. The two different scenarios are:

- Scenario 1: Single lane on both flyover ramps
- Scenario 2: Two-lane on both flyover ramps

A screen capture of the Synchro network (SimTraffic) for scenario 1 and scenario 2 is shown in **Figure 3** and **Figure 4** respectively.

Figure 3: Synchro network (Scenario 1)

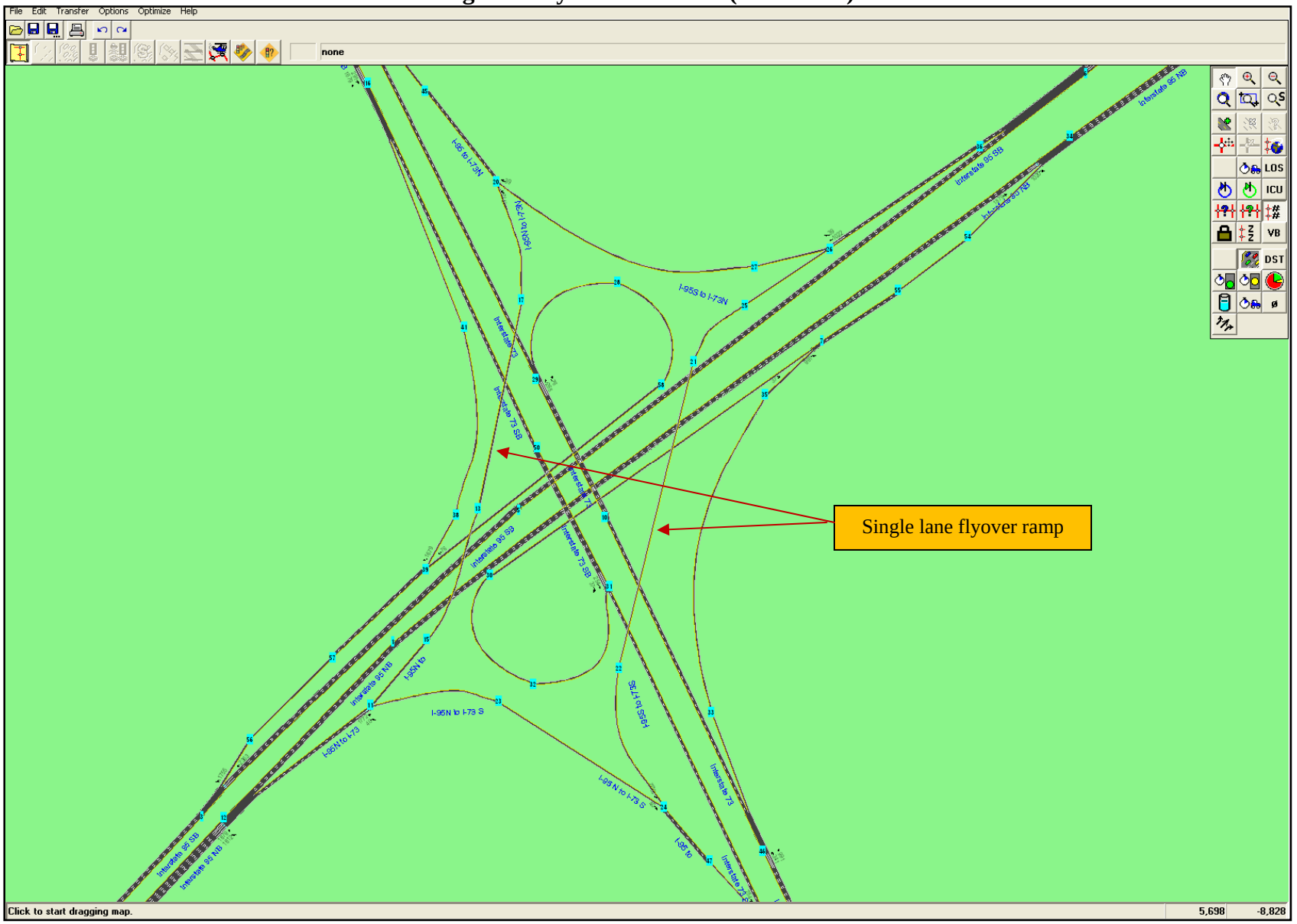
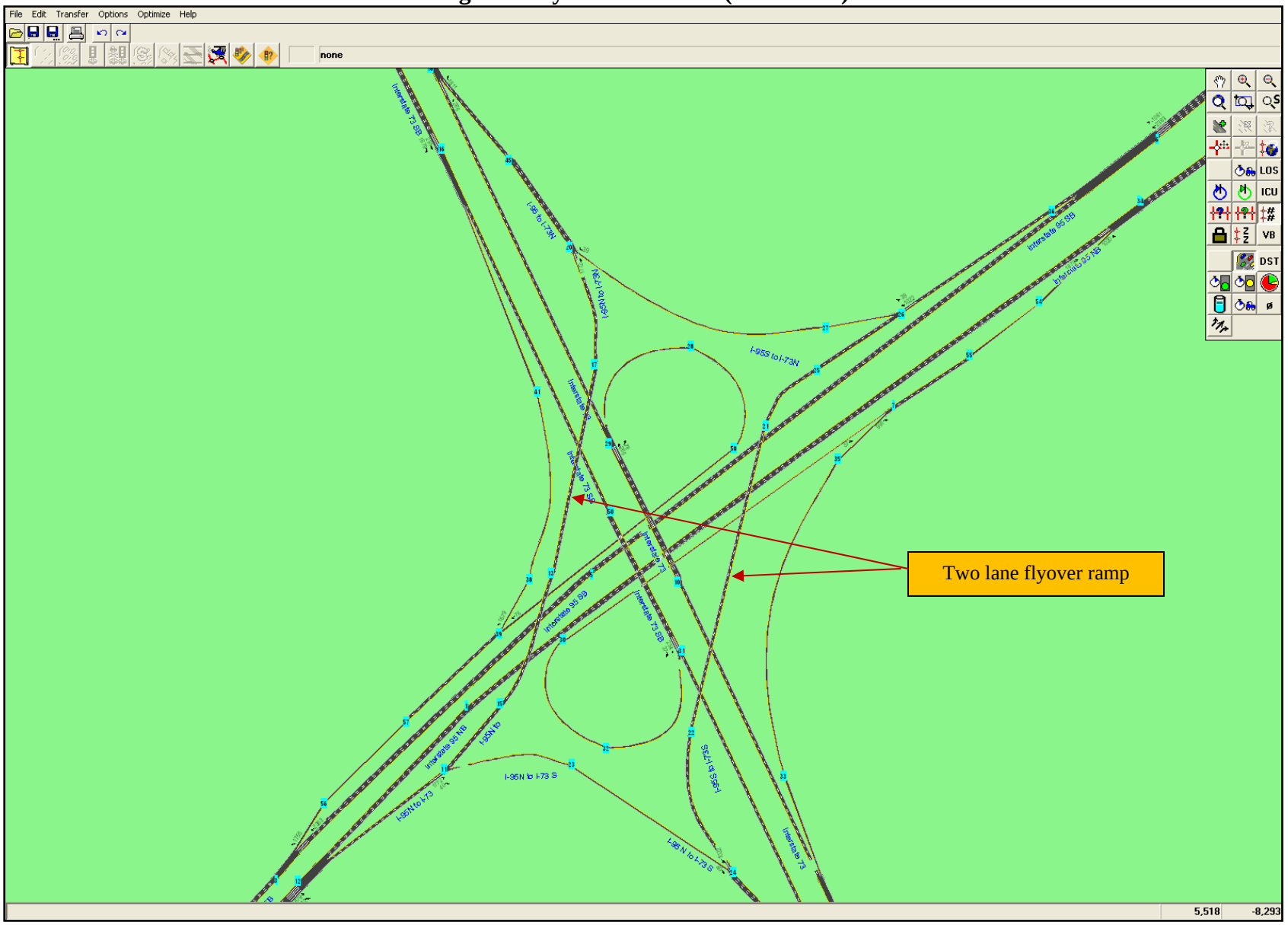


Figure 4: Synchro network (Scenario 2)



The results of the design year peak hour Synchro analysis for both scenarios are summarized below in **Table 1**.

Table 1: Design Year (2035) Peak Hour Traffic Operational Analysis

Location	Scenario 1: Single Lane Concept		Scenario 2: Two-Lane Concept	
	Density (pc/mi/lane)	LOS	Density (pc/mi/lane)	LOS
I-95 northbound to I-73 northbound	28.19	D	14.09	B
I-95 southbound to I-73 southbound	16.25	B	8.13	A

LOS is defined as a quality measure describing the operational conditions within a traffic stream. Six LOS Letter Grades (A through F) are designated to evaluate the condition of the facility, where 'LOS A' representing the best operating condition and 'LOS F' the worst.

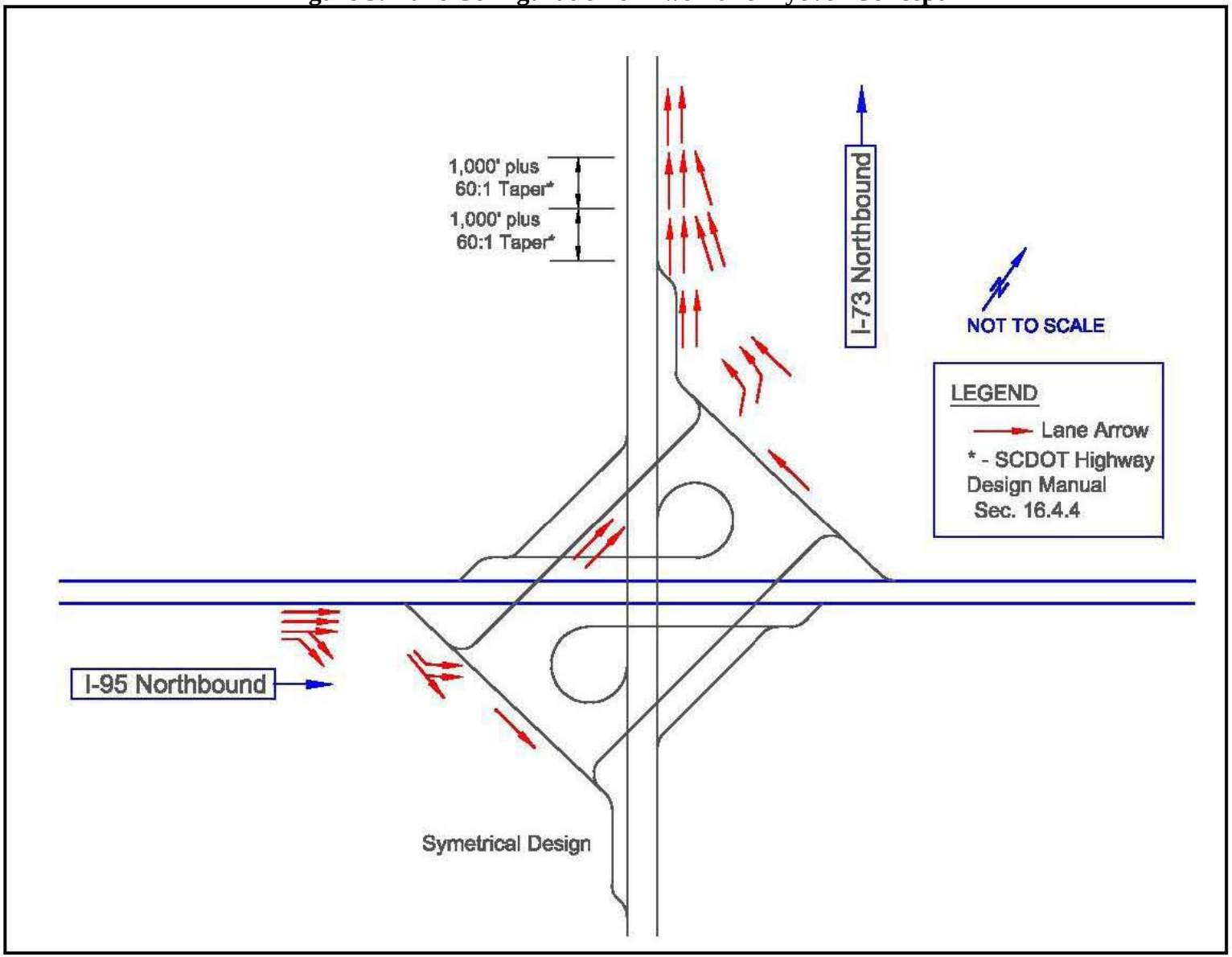
Maximum density for LOS D is 34 pc/mi/lane (ref: Exhibit 25-4, HCM)

Scenario 1: The analysis results indicate that I-95 northbound to I-73 northbound ramp would operate at 80% of the capacity at LOS D with a single lane. The other flyover ramp I-95 southbound to I-73 southbound operates at a much better condition at LOS B with a single lane.

Scenario 2: The analysis results indicate that the operating condition for both the flyover ramps would improves significantly and operates at LOS B or better with two lanes. The lane configuration of the two lane flyover concept is provided in **Figure 5**. A symmetrical design should be followed for both flyover ramps.

I-95 northbound to I-73 northbound two lane flyover ramp will connect with a single lane I-95 southbound to I-73 northbound off-ramp and travel with three lanes. The outer lane of the three lane section will drop and merge into a two lane segment before intersecting I-73 northbound. The two acceleration lanes on I-73 northbound will eventually be dropped as per the standards outlined in the *2003 SCDOT Highway Design Manual (section 16.4.4)*. The dimensions are shown in **Figure 5**.

Figure 5: Lane Configuration of Two Lane Flyover Concept



SimTraffic Animation Snapshots

The snapshots of the SimTraffic animation program for the single lane and two lane flyover concepts are shown in **Figure 6** and **Figure 7** respectively. The snapshots were captured after a complete one hour simulation run.

The snapshot shows that a heavy congestion on I-95 northbound to I-73 northbound ramp for the single lane flyover. The congestion problem is reduced significantly with the two lane flyover ramp concept.

Figure 6: SimTraffic Snapshot for Single Lane Flyover Concept

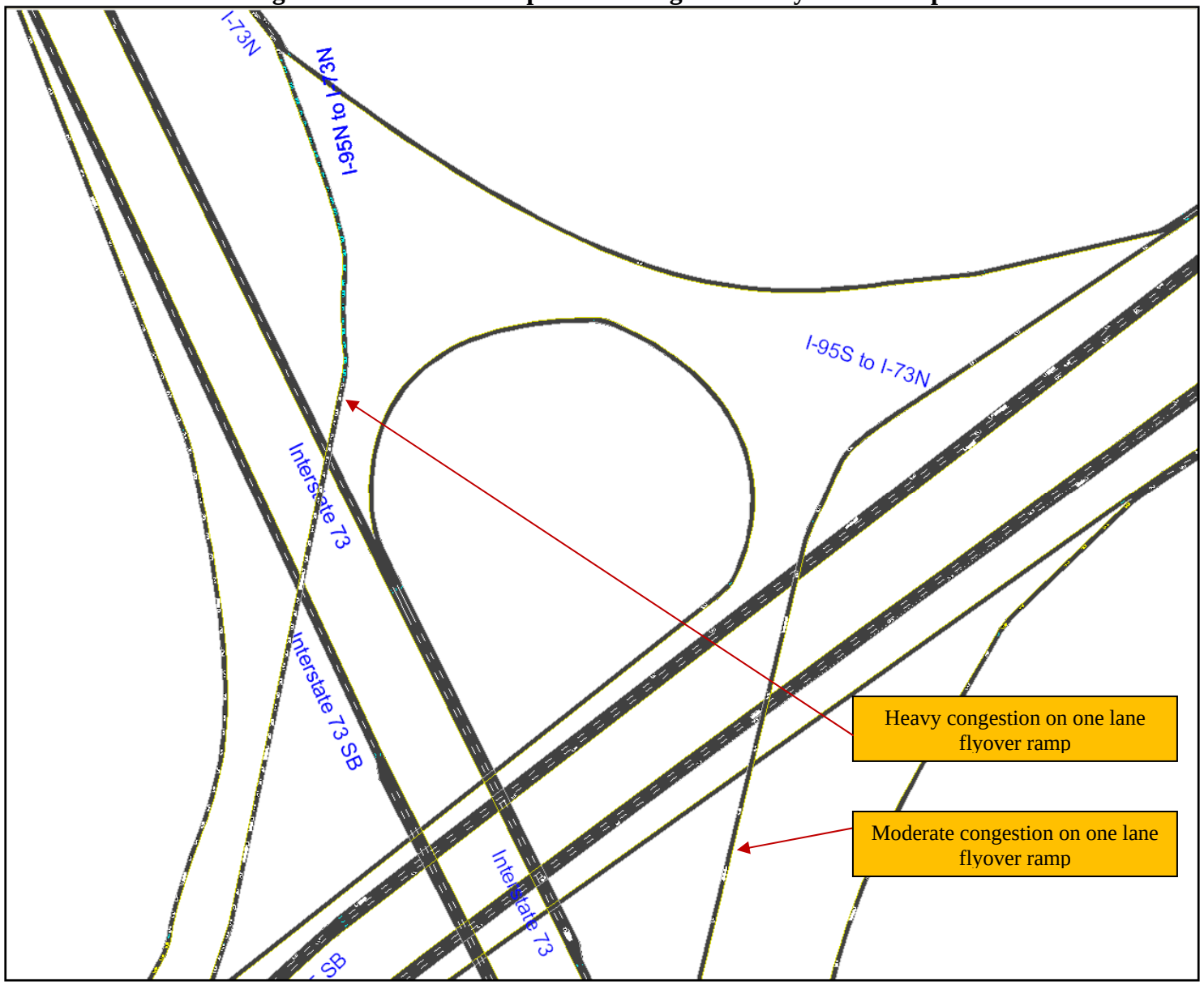


Figure 6a: SimTraffic Snapshot for Single Lane Flyover Ramp

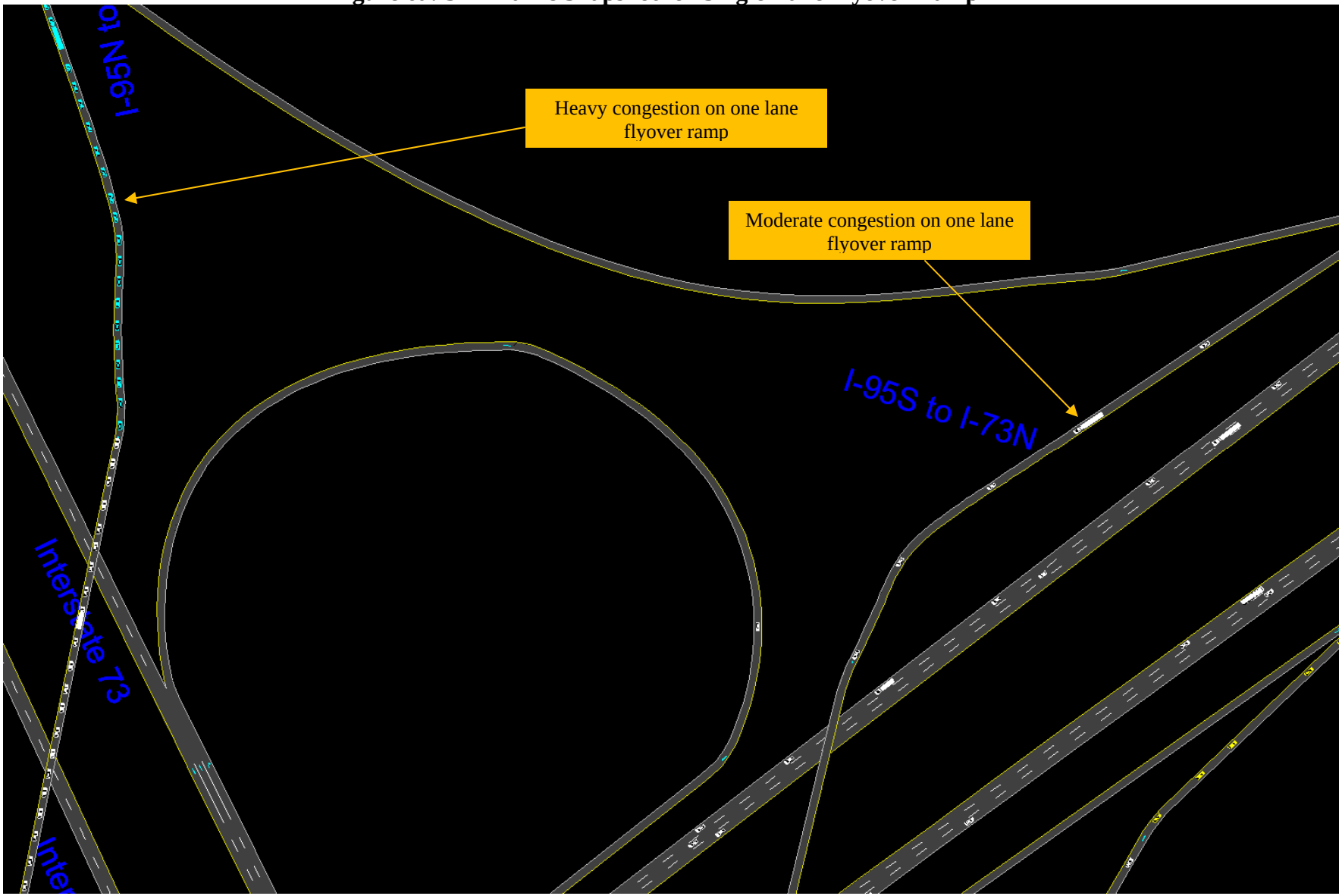
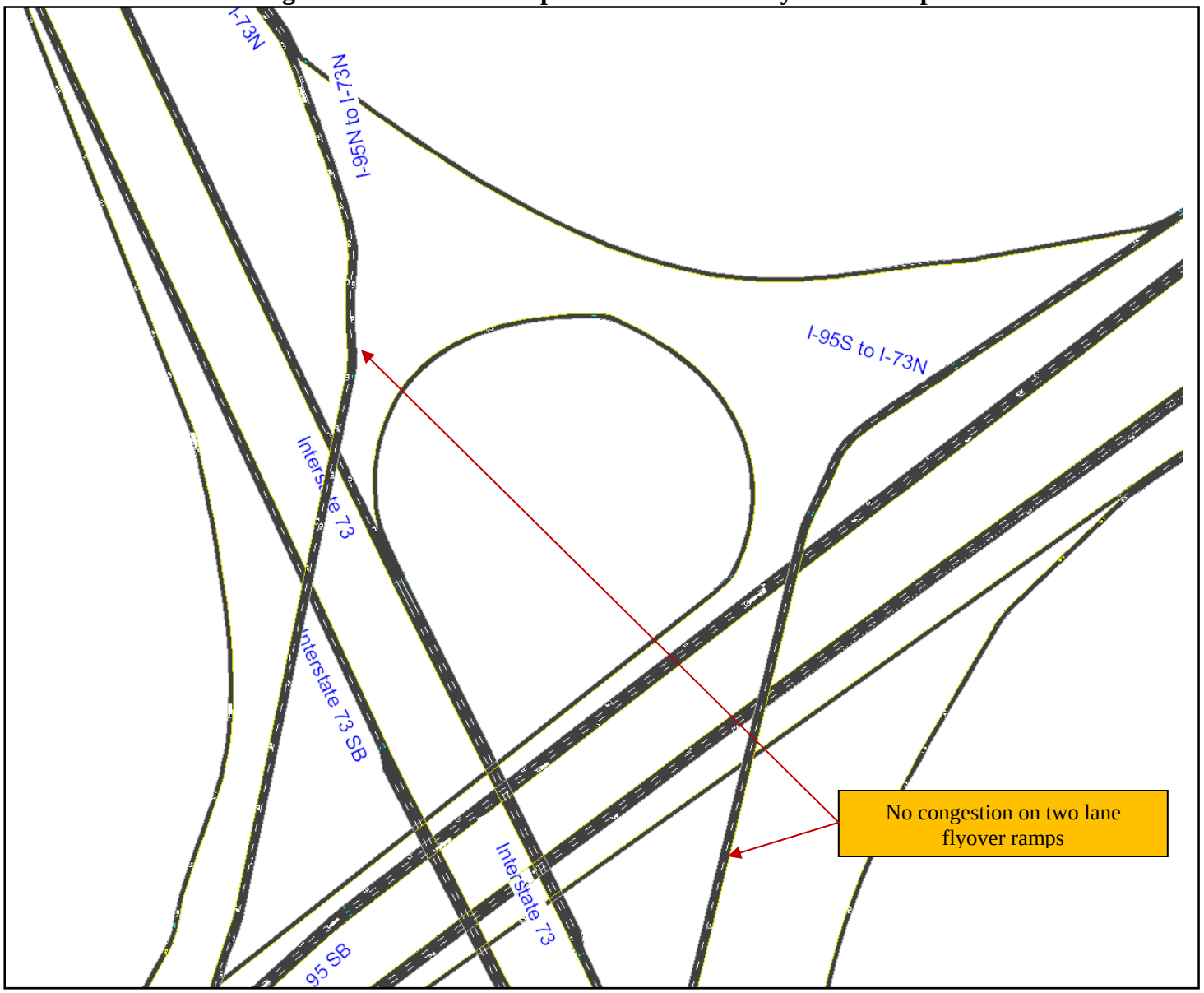


Figure 7: SimTraffic Snapshot of Two Lane Flyover Concept



Highway Capacity Manual (HCM) Guideline

The *Highway Capacity Manual (HCM), 2000* was consulted to determine the capacity of a typical single lane ramp. According to the Exhibit 25-3 of the HCM a single lane ramp with a free flow speed over 50 MPH has a capacity of 2,200 vehicles per hour. **Figure 2** shows the design year traffic volumes on the flyover ramps. They are 1,772 (80% of the capacity) and 1,022 (47% of the capacity) vph for the I-95 northbound to I-73 northbound and I-95 southbound to I-73 southbound flyover ramps respectively.

Conclusion and Findings

Based on the results from the traffic micro-simulation program (Synchro) and the guidance from *HCM 2000* it can be concluded that the design year peak hour traffic can be accommodated in a single lane on both the flyovers (I-95 northbound to I-73 northbound and I-95 southbound to I-73 southbound). However, the I-95 northbound to I-73 northbound flyover ramp would operate at about 80% of the capacity for the single lane concept.

The findings are summarized below:

- Both flyover ramps may be designed as a two-lane facility in order to avoid any lane closure possibilities during any accident or crash occurrence on the ramps;

- I-95 northbound to I-73 northbound will operate at 80% of the capacity in the design year 2035. At an annual average traffic growth rate of 1.24% the projected traffic volume on the ramp will exceed the capacity in the year 2053 (18 years beyond the design year).

- Although I-95 southbound to I-73 southbound flyover ramp operates at an acceptable LOS for both single and dual lane concepts, but it is recommended that the ramp should be designed as a two-lane facility in order to maintain the interchange symmetric.

- The SimTraffic animation shows that the design year traffic on the single lane I-95 northbound to I-73 northbound flyover ramp of gets congested due to the heavy traffic volume. However, the ramp volume does not exceed the capacity and do not back up to the I-95 mainline.

  While for the two lane concept the congestion problem improves significantly at the same flyover ramp.

Cc: Rob Dubnicka, P.E., The LPA Group Inc.

Appendix C
Bridge Crossings at
SC917, S198, S27, S309, and US301
Original and Proposed Design
Cost Estimates

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

SC Rt 917 ORGINAL STUDY DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	0	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	1.06	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.07	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.99	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$1,126,000.00	$1,126,000
2	UNCLASSIFIED EXCAVATON	5,150	CY	$10.50	$54,075
3	BORROW EXCAVATION	252,350	CY	$15.50	$3,911,425
4	FINE GRADING	41,818	SY	$5.00	$209,088
5	MAINLINE & RAMP PAVEMENT	44,141	SY	$49.50	$2,184,970
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$159,000
8	EROSION CONTROL	1	MI	$50,000.00	$53,000
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$20,140
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0	MI	$19,000.00	$0
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	1	MI	$75,000.00	$79,500
12	FENCING	12,313	LF	$12.50	$153,912
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$683,000.00	$683,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	0	SF	$150.00	$0
14.b	STEEL GIRDER BRIDGE	16,561	SF	$250.00	$4,140,250
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$1,277,000.00	$1,277,000
I	**Total Estimated Construction Cost (ECC)**				$14,051,360
II	**Engineering Design Fees (12% of ECC)**				$1,686,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	31	AC	$7,500.00	$231,300
V	**Wetland Mitigation**	0.0	AC	$40,000.00	$0
VI	**Construction Administration & Inspection (12% of ECC))**				$1,686,000
	TOTAL ESTIMATED COST (2009 Dollars)				$17,655,000

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

SC Rt 917 VE STUDY DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	0	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	1.17	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.05	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	1.12	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$1,112,000.00	$1,112,000
2	UNCLASSIFIED EXCAVATON	4,569	CY	$10.50	$47,975
3	BORROW EXCAVATION	223,875	CY	$15.50	$3,470,063
4	FINE GRADING	47,309	SY	$5.00	$236,544
5	MAINLINE & RAMP PAVEMENT	49,937	SY	$49.50	$2,471,885
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$175,500
8	EROSION CONTROL	1	MI	$50,000.00	$58,500
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$22,230
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0	MI	$19,000.00	$0
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	1	MI	$75,000.00	$87,750
12	FENCING	13,591	LF	$12.50	$169,884
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$674,000.00	$674,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	11,215	SF	$150.00	$1,682,250
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$1,021,000.00	$1,021,000
I	**Total Estimated Construction Cost (ECC)**				$11,229,580
II	**Engineering Design Fees (12% of ECC)**				$1,348,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	23	AC	$7,500.00	$174,500
V	**Wetland Mitigation**	0.7	AC	$40,000.00	$27,200
VI	**Construction Administration & Inspection (12% of ECC))**				$1,348,000
	TOTAL ESTIMATED COST (2009 Dollars)				$14,128,000

Savings **$3,527,000**

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

S-198 ORGINAL STUDY DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	0	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.64	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.08	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.56	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$444,000.00	$444,000
2	UNCLASSIFIED EXCAVATON	7,020	CY	$10.50	$73,710
3	BORROW EXCAVATION	63,180	CY	$15.50	$979,290
4	FINE GRADING	23,654	SY	$5.00	$118,272
5	MAINLINE & RAMP PAVEMENT	24,969	SY	$49.50	$1,235,942
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$96,000
8	EROSION CONTROL	1	MI	$50,000.00	$32,000
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$12,160
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0	MI	$19,000.00	$0
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	1	MI	$75,000.00	$48,000
12	FENCING	7,434	LF	$12.50	$92,928
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$269,000.00	$269,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	0	SF	$150.00	$0
14.b	STEEL GIRDER BRIDGE	20,125	SF	$250.00	$5,031,250
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$843,000.00	$843,000
I	**Total Estimated Construction Cost (ECC)**				$9,275,552
II	**Engineering Design Fees (12% of ECC)**				$1,113,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	6	AC	$7,500.00	$48,500
V	**Wetland Mitigation**	0.1	AC	$40,000.00	$4,800
VI	**Construction Administration & Inspection (12% of ECC))**				$1,113,000
	TOTAL ESTIMATED COST (2009 Dollars)				$11,555,000

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

S-198 VE STUDY DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	0	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.78	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.04	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.74	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$648,000.00	$648,000
2	UNCLASSIFIED EXCAVATON	11,973	CY	$10.50	$125,717
3	BORROW EXCAVATION	107,757	CY	$15.50	$1,670,234
4	FINE GRADING	31,258	SY	$5.00	$156,288
5	MAINLINE & RAMP PAVEMENT	32,994	SY	$49.50	$1,633,210
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$117,000
8	EROSION CONTROL	1	MI	$50,000.00	$39,000
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$14,820
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0	MI	$19,000.00	$0
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	1	MI	$75,000.00	$58,500
12	FENCING	9,060	LF	$12.50	$113,256
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$393,000.00	$393,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	11,244	SF	$150.00	$1,686,600
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$666,000.00	$666,000
I	**Total Estimated Construction Cost (ECC)**				$7,321,624
II	**Engineering Design Fees (12% of ECC)**				$879,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	7	AC	$7,500.00	$49,700
V	**Wetland Mitigation**	0.9	AC	$40,000.00	$34,000
VI	**Construction Administration & Inspection (12% of ECC))**				$879,000
	TOTAL ESTIMATED COST (2009 Dollars)				$9,164,000

Savings **$2,391,000**

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

S-27 ORGINAL STUDY DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	0	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.75	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.06	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.69	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$742,000.00	$742,000
2	UNCLASSIFIED EXCAVATON	3,245	CY	$10.50	$34,073
3	BORROW EXCAVATION	158,995	CY	$15.50	$2,464,423
4	FINE GRADING	29,146	SY	$5.00	$145,728
5	MAINLINE & RAMP PAVEMENT	30,765	SY	$49.50	$1,522,858
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$112,500
8	EROSION CONTROL	1	MI	$50,000.00	$37,500
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$14,250
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0	MI	$19,000.00	$0
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	1	MI	$75,000.00	$56,250
12	FENCING	8,712	LF	$12.50	$108,900
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$450,000.00	$450,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	0	SF	$150.00	$0
14.b	STEEL GIRDER BRIDGE	14,453	SF	$250.00	$3,613,250
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$930,000.00	$930,000
I	**Total Estimated Construction Cost (ECC)**				$10,231,731
II	**Engineering Design Fees (12% of ECC)**				$1,228,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	10	AC	$7,500.00	$74,200
V	**Wetland Mitigation**	0.0	AC	$40,000.00	$1,200
VI	**Construction Administration & Inspection (12% of ECC))**				$1,228,000
	TOTAL ESTIMATED COST (2009 Dollars)				$12,764,000

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

S-27 VE STUDY DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	0	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.80	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.04	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.76	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$1,122,000.00	$1,122,000
2	UNCLASSIFIED EXCAVATON	5,989	CY	$10.50	$62,885
3	BORROW EXCAVATION	293,471	CY	$15.50	$4,548,801
4	FINE GRADING	32,102	SY	$5.00	$160,512
5	MAINLINE & RAMP PAVEMENT	33,886	SY	$49.50	$1,677,350
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$120,000
8	EROSION CONTROL	1	MI	$50,000.00	$40,000
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$15,200
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0	MI	$19,000.00	$0
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	1	MI	$75,000.00	$60,000
12	FENCING	9,293	LF	$12.50	$116,160
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$680,000.00	$680,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	10,788	SF	$150.00	$1,618,200
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$1,022,000.00	$1,022,000
I	**Total Estimated Construction Cost (ECC)**				$11,243,107
II	**Engineering Design Fees (12% of ECC)**				$1,349,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	4	AC	$7,500.00	$30,000
V	**Wetland Mitigation**	0.3	AC	$40,000.00	$12,400
VI	**Construction Administration & Inspection (12% of ECC))**				$1,349,000
	TOTAL ESTIMATED COST (2009 Dollars)				$13,984,000

Savings **-$1,220,000**

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

S-309 ORGINAL STUDY DESIGN

I-73 SEGMENT C-1
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
S-309 Original

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	1	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.00	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.00	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.00	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.29	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.08	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)	0.37	MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$191,000.00	$191,000
2	UNCLASSIFIED EXCAVATON	1,969	CY	$10.50	$20,675
3	BORROW EXCAVATION	53,390	CY	$15.50	$827,545
4	FINE GRADING	5,444.27	SY	$5.00	$27,221
5	MAINLINE & RAMP PAVEMENT	0.00	SY	$49.50	$0
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	4,074	SY	$48.50	$197,589
7	DRAINAGE	0.29	MI	$150,000.00	$43,500
8	EROSION CONTROL	0.29	MI	$50,000.00	$14,500
9	PAVEMENT MARKINGS (MAINLINE)	0.00	MI	$19,000.00	$0
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0.29	MI	$19,000.00	$5,510
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	0.29	MI	$75,000.00	$21,750
12	FENCING	0	LF	$12.50	$0
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$116,000.00	$116,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	0	SF	$150.00	$0
14.b	STEEL GIRDER BRIDGE	14,960	SF	$250.00	$3,740,000
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$521,000.00	$521,000
I	**Total Estimated Construction Cost (ECC)**				$5,726,290
II	**Engineering Design Fees (12% of ECC)**				$687,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	8	AC	$7,500.00	$57,400
V	**Wetland Mitigation**	0.0	AC	$40,000.00	$0
VI	**Construction Administration & Inspection (12% of ECC))**				$687,000
	TOTAL ESTIMATED COST (2009 Dollars)				$7,158,000

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

S-309 VE STUDY DESIGN

I-73 SEGMENT C-1
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
S-309 Original

NUMBER OF LANES (MAINLINE)	0	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	1	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.00	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.00	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.00	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	0.52	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.06	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)	0.58	MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$267,000.00	$267,000
2	UNCLASSIFIED EXCAVATON	2,162	CY	$10.50	$22,701
3	BORROW EXCAVATION	67,013	CY	$15.50	$1,038,702
4	FINE GRADING	9,762.13	SY	$5.00	$48,811
5	MAINLINE & RAMP PAVEMENT	0.00	SY	$49.50	$0
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	7,322	SY	$48.50	$355,098
7	DRAINAGE	0.52	MI	$150,000.00	$78,000
8	EROSION CONTROL	0.52	MI	$50,000.00	$26,000
9	PAVEMENT MARKINGS (MAINLINE)	0.00	MI	$19,000.00	$0
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	0.52	MI	$19,000.00	$9,880
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	0.52	MI	$75,000.00	$39,000
12	FENCING	0	LF	$12.50	$0
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$162,000.00	$162,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	10,674	SF	$150.00	$1,601,042
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$365,000.00	$365,000
I	**Total Estimated Construction Cost (ECC)**				$4,013,233
II	**Engineering Design Fees (12% of ECC)**				$482,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	20	AC	$7,500.00	$150,000
V	**Wetland Mitigation**	3.2	AC	$40,000.00	$128,000
VI	**Construction Administration & Inspection (12% of ECC))**				$482,000
	TOTAL ESTIMATED COST (2009 Dollars)				$5,256,000
				Savings	**$1,902,000**

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

US 301 ORIGINAL DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	3	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	1	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.93	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.05	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.88	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	1.93	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.00	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$889,000.00	$889,000
2	UNCLASSIFIED EXCAVATON	3,461	CY	$10.50	$36,341
3	BORROW EXCAVATION	170,037	CY	$15.50	$2,635,574
4	FINE GRADING	37,171	SY	$5.00	$185,856
5	MAINLINE & RAMP PAVEMENT	39,236	SY	$49.50	$1,942,195
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$139,500
8	EROSION CONTROL	1	MI	$50,000.00	$46,500
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$17,670
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	2	MI	$19,000.00	$36,670
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	3	MI	$75,000.00	$214,500
12	FENCING	10,803	LF	$12.50	$135,036
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$539,000.00	$539,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	13,500	SF	$150.00	$2,025,000
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$884,000.00	$884,000
I	**Total Estimated Construction Cost (ECC)**				$9,726,841
II	**Engineering Design Fees (12% of ECC)**				$1,167,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	13	AC	$7,500.00	$94,100
V	**Wetland Mitigation**	1.2	AC	$40,000.00	$48,000
VI	**Construction Administration & Inspection (12% of ECC))**				$1,167,000
	TOTAL ESTIMATED COST (2009 Dollars)				$12,203,000

I-73 SOUTHERN SECTION
RIGHT OF WAY PLANS
VALUE ENGINEERING STUDY

US 301 VE STUDY DESIGN

I-73 SEGMENT A-2
ESTIMATED COST OF CONCEPTUAL ROADWAY CONSTRUCTION
RELOCATION OF FRONTAGE ROAD 4, FRONTAGE ROAD 5 AND US 301

NUMBER OF LANES (MAINLINE)	3	LANES
NUMBER OF INTERCHANGES	0	INTERCHANGES
NUMBER OF CROSSOVER ROADS	1	CROSSOVER ROADS
TOTAL LENGTH (MAINLINE)	0.93	MILES
TOTAL LENGTH OF BRIDGES (MAINLINE)	0.00	MILES
TOTAL LENGTH OF ROADBED (MAINLINE)	0.93	MILES
TOTAL LENGTH (RAMPS)	0.00	MILES
TOTAL LENGTH OF BRIDGES (RAMPS)	0.00	MILES
TOTAL LENGTH OF ROADBED (RAMPS)	0.00	MILES
TOTAL LENGTH (FRONTAGE AND CROSSOVER ROADS)	1.92	MILES
TOTAL LENGTH OF BRIDGES (FRONTAGE AND CROSSOVER ROADS)	0.04	MILES
TOTAL LENGTH OF ROADBED (FRONTAGE AND CROSSOVER ROADS)		MILES

ITEM NO.	DESCRIPTION	QUANTS.	UNIT	UNIT PRICE	ITEM PRICE
1	MOBILIZATION, CLEARING & GRUBBING, & TRAFFIC CONTROL (15%)	1	LS	$694,000.00	$694,000
2	UNCLASSIFIED EXCAVATON	1,774	CY	$10.50	$18,627
3	BORROW EXCAVATION	86,974	CY	$15.50	$1,348,097
4	FINE GRADING	39,283	SY	$5.00	$196,416
5	MAINLINE & RAMP PAVEMENT	41,466	SY	$49.50	$2,052,547
6	FRONTAGE AND CROSSOVER ROADS PAVEMENT	0	SY	$48.50	$0
7	DRAINAGE	1	MI	$150,000.00	$139,500
8	EROSION CONTROL	1	MI	$50,000.00	$46,500
9	PAVEMENT MARKINGS (MAINLINE)	1	MI	$19,000.00	$17,670
10	PAVEMENT MARKINGS (RAMPS, FRONTAGE AND CROSSOVER ROADS)	2	MI	$19,000.00	$36,480
11	MISC. SIGNAGE (MAINLINE, FRONTAGE AND CROSSOVER ROADS)	3	MI	$75,000.00	$213,750
12	FENCING	10,803	LF	$12.50	$135,036
13	MISC.& INCIDENTAL ROADWAY ITEMS (10%)			$420,000.00	$420,000
14	BRIDGE CONSTRUCTION COSTS				
14.a	CONCRETE GIRDER BRIDGE	12,880	SF	$150.00	$1,932,000
14.b	STEEL GIRDER BRIDGE	0	SF	$250.00	$0
14.c	FLAT SLAB BRIDGE	0	SF	$115.00	$0
15	OVERALL CONTINGENCY 10%			$725,000.00	$725,000
I	**Total Estimated Construction Cost (ECC)**				$7,975,623
II	**Engineering Design Fees (12% of ECC)**				$957,000
III	**Utility Relocation Cost**				$0
IV	**Right-of-Way/Relocation Cost**	19	AC	$7,500.00	$144,200
V	**Wetland Mitigation**	5.6	AC	$40,000.00	$224,000
VI	**Construction Administration & Inspection (12% of ECC))**				$957,000
	TOTAL ESTIMATED COST (2009 Dollars)				$10,258,000

Savings **$1,945,000**

Meeting Minutes
I73 – VE Presentation
June 4, 2009 1:00 P.M.
SCDOT 5th Floor Auditorium

Voting Attendees:

Danny Shealy – SCDOT	Ed Eargle - SCDOT
Don Turner– SCDOT	Jim Feda - SCDOT
Dennis Townsend – SCDOT	Milton Fletcher - SCDOT
Mitchell Metts – SCDOT	

Other Attendees:

Elham Farzam – LPA	Barry Bowers - SCDOT
Freddy Kicklighter – LPA	Rogers Ideozu - SCDOT
Cameron Nations – LPA	Wilson Elgin - SCDOT
Quazi Masood – LPA	Michael Humphries - SCDOT
Charlie Stearns –WSA	Scott Davenport - SCDOT
Eric Burk – WSA	Charlie Smoak - SCDOT
Steve Ikerd – FHWA	Rob Bedenbaugh - SCDOT
Alice Travis – FHWA	Jeremy Goodwin – SCDOT
Stuart Timmons – SCDOT	Michael McKenzie – SCDOT
Brent Dillon – SCDOT	Ron Hinson – SCDOT

The following is a summarization of the decisions made at the VE Presentation meeting for the purpose of accepting, rejecting or other of the recommendations of the VE Study.

Recommendation # 1 - I-73/I-95 Interchange

Widen the two flyover ramps from one (1) 16’ lane to two (2) 12’ lanes.

Accepted Unanimously (7 for, 0 against)

Recommendation # 2 - I-73/SC Rt 22 Interchange

Revise current the 3 level full directional interchange to a T-Type (Trumpet) interchange with the loop having a design speed of 60-40-60 MPH.

Accepted (4 for, 3 against)

Recommendation # 3 – Rest Areas

Eliminate all Rest Areas from the project.

Accepted Unanimously (7 for, 0 against)

Recommendation # 4 – SC Rt 917

Re-align the proposed roadway alignment to cross over I-73 at an angle close to 90.

Rejected Unanimously (7 for, 0 against)

Recommendation # 5 – S-198 (Carroll Road)

Re-align the proposed roadway alignment to cross over I-73 at an angle close to 90.

Rejected Unanimously (7 for, 0 against)

Recommendation # 6 – S-27 (Dudley Road)

Re-align the proposed roadway alignment to cross over I-73 at an angle close to 90.

Rejected Unanimously (7 for, 0 against)

Recommendation # 7 – S-309 (Barnhill Road)

Re-align the proposed roadway alignment to cross over I-73 at an angle close to 90.

Accepted Unanimously (7 for, 0 against)

Recommendation # 8 –Secondary Road's Lane & Shoulder Widths

Revise the lane and shoulder widths on secondary road over passes from 12' lanes & 10' shoulders (2' paved, 8' earth) to 11' lanes and 6' shoulders (2' paved, 4' earth).

Rejected Unanimously (7 for, 0 against)

Recommendation # 9 – MOT on Secondary Roads

Evaluate the closing of existing roads during construction by raising the allowable detour distance from 5 miles used by the design.

Other Unanimously (7 for, 0 against)
Each route will be analyzed individually and a final recommendation will be made concurrently by the SCDOT District and Project Management team. The Design team will provide the SCDOT with feasible detour routes for each crossover road.

Cc: File CR048248.1e
Eric Burk – WSA
David Montgomery – F&H
Wilson Elgin – SCDOT
Mitchell Metts – SCDOT
Scott Davenport - SCDOT


SOUTH CAROLINA
73
PATHWAY TO PROGRESS
SCDOT
Value Engineering Study
I-73 Southern Section
Right-of-Way Plans

VE Recommendation 1

I-95/I-73 Interchange

Widen the two main interchange ramps from one, 16’ lane to two, 12’ lanes.

Discussion:

Traffic projections show that the two main interchange fly-over's may fail in 25 to 30 years according to the high DHV’s (based on a non-tolled facility). The next pages show the results of the traffic operational analysis, followed by the pros and cons of widening the northbound and southbound ramps.

Design Year (2035) Peak Hour Traffic Operational Analysis

(non-tolled facility)

Location	Scenario 1: Single Lane Concept		Scenario 2: Two-Lane Concept	
	Density (pc/mi/lane)	LOS	Density (pc/mi/lane)	LOS
I-95 northbound to I-73 northbound	28.19	D	14.09	B
I-95 southbound to I-73 southbound	16.25	B	8.13	A

LOS is defined as a quality measure describing the operational conditions within a traffic stream. Six LOS Letter Grades (A through F) are designated to evaluate the condition of the facility, where 'LOS A' representing the best operating condition and 'LOS F' the worst.

Maximum density for LOS D is 34 pc/mi/lane (ref: Exhibit 25-4, HCM)

VE Recommendation 1

I-95/I-73 Interchange: Widen the two main interchange ramps from one, 16’ lane to two, 12’ lanes.

PROS	CONS
Two lanes will better accommodate truck traffic	Additional, initial cost of $3.2 million
Ease of maintenance (will allow lane closures)	Over-design for toll road scenario (60% reduction in traffic with tolls)
Achieve **LOS B** for design year 2035	Increased right-of-way costs (estimated at $10,000)
Longer service life.	
Eliminate future widening	
Accommodate emergency services	
Improve hurricane evacuation	

Northbound Ramp

VE Recommendation 1

I-95/I-73 Interchange: Widen the two main interchange ramps from one, 16’ lane to two, 12’ lanes.

PROS	CONS
Two lanes will better accommodate truck traffic	Additional, initial cost of $3.2 million
Ease of maintenance (will allow lane closures)	Over-design for toll road scenario (60% reduction in traffic with tolls)
Achieve **LOS A** for design year 2035 (**LOS B** for single lane)	Increased right-of-way costs (estimated at $10,000)
Longer service life	
Eliminate future widening	
Accommodate emergency services	
Improve hurricane evacuation	

Southbound Ramp

VE Recommendation 1

I-95/I-73 Interchange

Widen the two main interchange ramps from one, 16’ lane to two, 12’ lanes.

Action

- Accept
- Reject
- Other

VE Recommendation 2

I-73/SC 22 Interchange

Revise current three-level, multiple structure interchange to a T-type, trumpet design.

Discussion:

I-73 adjoins SC 22 just east of the SC 22/SC319 interchange and will continue eastward towards Conway. The VE Study Team discussed the possibility of revising the I-73/SC 22 Interchange to a one-lane or two-lane trumpet design instead of a system-to-system directional interchange. The VE Study Team requested that the Design Team evaluate the possibility of using a compound curvature for the loop ramp.

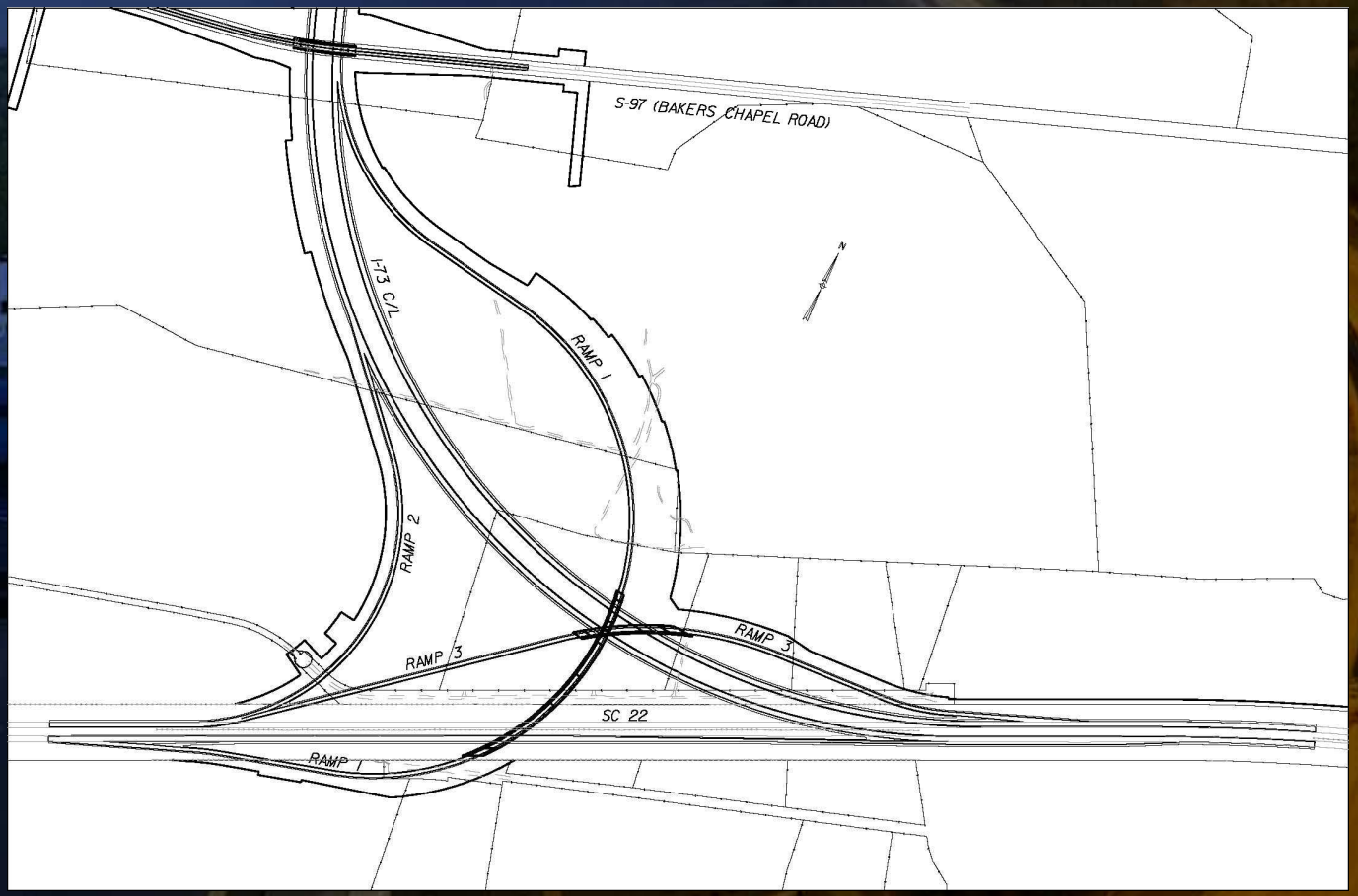
VE Recommendation 2

PROS	CONS
Reduce ramp fill heights and bridge requirements for a cost savings estimated at $31.1 million	Safety issues with loop design
Lessen length of Bakers Chapel Road crossing bridge (end acceleration lane prior to crossing under the Bakers Chapel Road bridge)	Two of the four ramps will have reduced (60-40-60 mph) design speeds – directional ramps are all 55 mph
No conflict with hurricane evacuation	May require reopening the EIS to assess impacts
Handle estimated volumes at design year (with projected SELL project volumes)	

I-73/SC 22 Interchange: Revise current three-level, multiple structure interchange to a T-type, trumpet design.

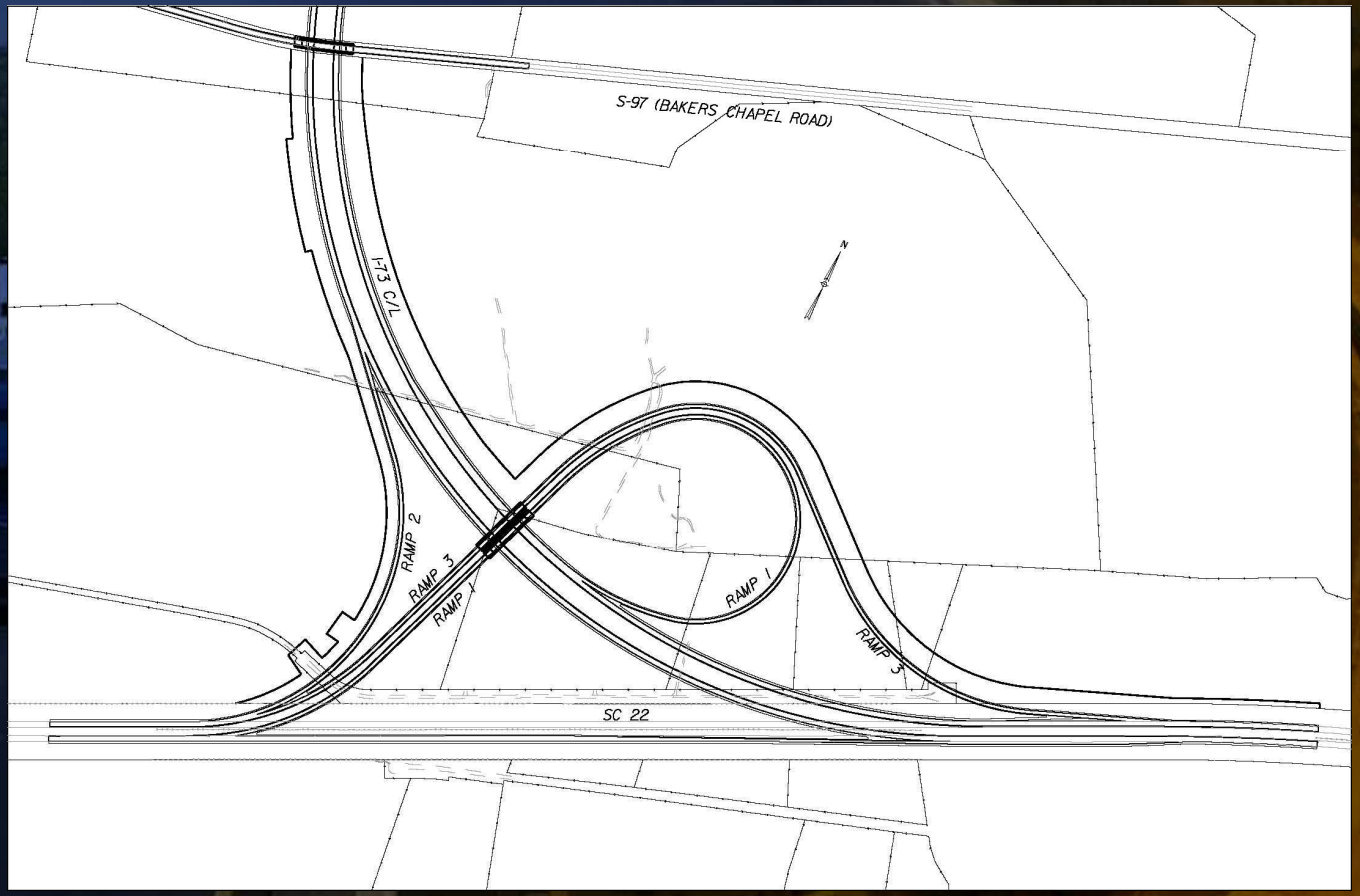
VE Recommendation 2

I-73/SC 22 Interchange: Original Directional Interchange



VE Recommendation 2

I-73/SC 22 Interchange: Proposed option, one-lane trumpet interchange.



VE Recommendation 3

Rest Area: Eliminate Rest Area on I-73 currently proposed to be located near Harry Martin Road.

PROS	CONS
Save initial cost of approximately $20 Million	No Rest Area on I-73
Eliminate maintenance costs	Will need to find alternative location for ITS Sub Station and SHEP Maintenance Shed along I-73
Eliminate potential wetlands impacts	
Eliminate a potential utility conflict	
Allow potential for private development truck stop	
Decrease SCDOT liability	
Shorten bridge crossing length at Harry Martin Road	

VE Recommendation 3

Rest Area

Eliminate Rest Area on I-73 currently proposed to be located near Harry Martin Road.

Action

- Accept
- Reject
- Other

VE Recommendations for Reducing Skew of Crossing Bridges

Discussion:

The VE Study Team reviewed bridge crossings at SC 917, US501, S198, S27, and S309 and determined that each of these bridges have heavy skews that have resulted in continuous structural steel superstructures. The VE Team requested that the design team review each of these bridges to determine if the skews could be reduced such that the span length is 140’ or less. The reduction in length would allow the bridges to be constructed with the more cost effective Prestressed Concrete Girders rather than Structural Steel Girders. Additionally, reduction of skew would enhance the performance of the structure during a seismic event.

The bridge crossings recommended for evaluation are discussed on the following pages.

VE Recommendation 4

Bridge 7D Crossing at SC917: Reconfigure the bridge to reduce the heavy skew.

PROS	CONS
Cost savings of $1.6 million in bridge construction	Would require reopening the EIS document to assess the impacts
Avoid displacement	Less desirable roadway alignment
Significantly reduce skew	Multiple horizontal curves introduced on SC 197
Concrete girders require less maintenance than steel girders	Anything changed at this point will be controversial with the community
More predictable seismic behavior	Increased wetland impact of 0.7 acres.

VE Recommendation 4

Bridge 7D Crossing at SC917

Reconfigure the bridge to reduce the heavy skew.

Action

- Accept
- Reject
- Other

VE Recommendation 5

Bridge 14D Crossing at S198: Reconfigure the bridge to reduce the heavy skew.

PROS	CONS
Cost savings of $2.3 million in bridge construction	Would require reopening the EIS document to assess the impacts
Eliminate need for run-around	Additional wetlands impact (.8 acres)
Skew improved	Some total-take tracts have already been acquired by SCDOT
Concrete girders require less maintenance than steel girders	
More predictable seismic behavior	

VE Recommendation 5

Bridge 14D Crossing at S198

Reconfigure the bridge to reduce the heavy skew.

Action

- Accept
- Reject
- Other

VE Recommendation 6

Bridge 15D Crossing at S27: Reconfigure the bridge to reduce the heavy skew.

PROS	CONS
Cost savings of $1.3 million in bridge construction	Would require reopening the EIS document to assess the impacts
Skew improved	Additional wetlands impact (.3 acres)
Concrete girders require less maintenance than steel girders	Less desirable horizontal alignment for S27
More predictable seismic behavior	May cause additional displacement (Structures on Tract 150)

VE Recommendation 6

Bridge 15D Crossing at S27

Reconfigure the bridge to reduce the heavy skew.

Action

- Accept
- Reject
- Other

VE Recommendation 7

Bridge 56D Crossing at S309: Reconfigure the bridge to reduce the heavy skew.

PROS	CONS
Cost savings of $1.1 million in bridge construction	Would require reopening the EIS document to assess the impacts
Skew improved	Additional wetlands impact of 3.2 acres
Concrete girders require less maintenance than steel girders	
More predictable seismic behavior	

VE Recommendation 7

Bridge 56D Crossing at S309

Reconfigure the bridge to reduce the heavy skew.

Action

- Accept
- Reject
- Other

VE Recommendation 8

Secondary Road Footprints

Revise secondary road footprints from 12’ lanes and 10’ shoulders to 11’ lanes and 6’ shoulders.

Discussion:

The VE Study Team was informed that the EIS committed to 10’ shoulders over the interstate. It was agreed that if the EIS is reopened, then consideration should be given to redesign for functional classifications. It is recognized that some locations may require widths greater than the functional classification in order to accommodate specialized farm equipment.

VE Recommendation 8

Secondary Road Footprints: Revise secondary road footprints from 12’ lanes and 10’ shoulders to 11’ lanes and 6’ shoulders.

PROS	CONS
Cost savings of $791,000 per mile	Would require reopening the EIS document to assess the impacts
	Bridge crossings would need to be evaluated individually to determine the need to accommodate specialized farm equipment

VE Recommendation 8

Secondary Road Footprints

Revise secondary road footprints from 12’ lanes and 10’ shoulders to 11’ lanes and 6’ shoulders.

Action

- Accept
- Reject
- Other

VE Recommendation 9

MOT on Secondary Roads

Evaluate the staging of adjacent closures and increasing the detour limit of five miles to six or seven miles, thus reducing the number of temporary run-arounds required during construction.

VE Recommendation 9

Discussion:

The VE Study Team questioned the use of temporary run-arounds in various locations. It was thought that some of these run-arounds could be eliminated by closing the road and showing a detour.

The Team was informed that the District Engineers were evaluating the feasibility of detours and would recommend eliminating the temporary run-arounds when geometrics and length were conducive to detours. The following locations are recommended for this review:

Segment	Secondary Road
A1	SC917
A2	US 301, US 501
A3	S197, S198, S27
A4	41A
B1	S84
B2	SC41, SC31

VE Recommendation 9

MOT on Secondary Roads

Evaluate the staging of adjacent closures and increasing the detour limit of five miles to six or seven miles, thus reducing the number of temporary run-arounds required during construction.

Action

- Accept
- Reject
- Other

VALUE ENGINEERING STUDY

OTHER DISCUSSION ISSUES

Reviewed, but Rejected by VE Study Team

Bridge 12D Crossing at US501: Reconfigure the bridge to reduce the heavy skew. This option was rejected based on the resulting geometry.

PROS	CONS
Cost savings of $1.9 million in bridge construction	Would require reopening the EIS document to assess the impacts
Skew improved	Increased impacts to wetlands of 0.5 acres
Concrete girders require less maintenance than steel girders	Greater impact on residences
More predictable seismic behavior	Less desirable geometry to mainline and US501

Reviewed, but Rejected by VE Study Team

US 301

Shift the alignment of US 301 to the east in order to eliminate a structure.

PROS	CONS
Cost savings of $3.97 million in bridge construction	Would require reopening the EIS document to assess the impacts
Only one bridge to maintain	Additional wetlands impact (4.4 acres)
	Additional 6 acres of ROW impacts.
	Possible impacts for truck access to Signode and Smurfit Container.
	Possible impacts to apartment complex
	Maintenance of frontage road and US 301

Reviewed by the VE Study Team

Interchange at S308:

The VE Study Team asked the Design Team to provide justification for the S308 interchange and for the location chosen for that interchange.

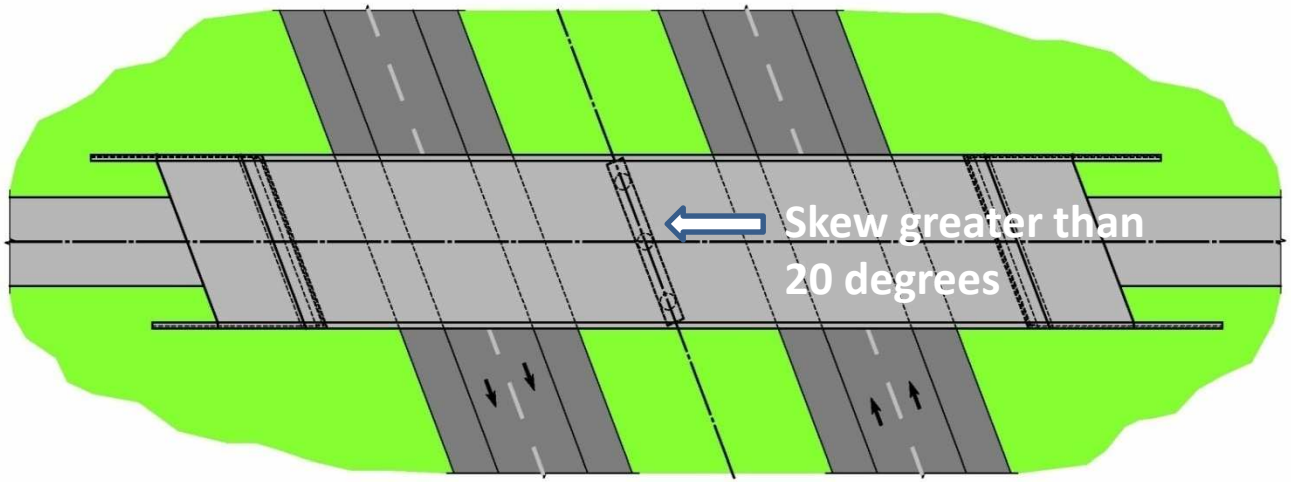
- Without the S308 interchange, there was no access between US 701 and US 76 interchange, a distance of over 25 miles.
- Other potential locations are at S23 (South Nichols Highway) or S99 (Lake Swamp Road). The communities at S23 and S99 did not want the interchange at those locations, fearing an interchange would alter the character of the community.
- There would be additional relocation impacts at either S23 or S99.
- Ketchup Town, located on S99, is considered to be a local landmark and would be impacted significantly by the interchange.
- Horry County requested the S308 location for the interchange to provide more direct access to the Cool Springs Industrial Park.

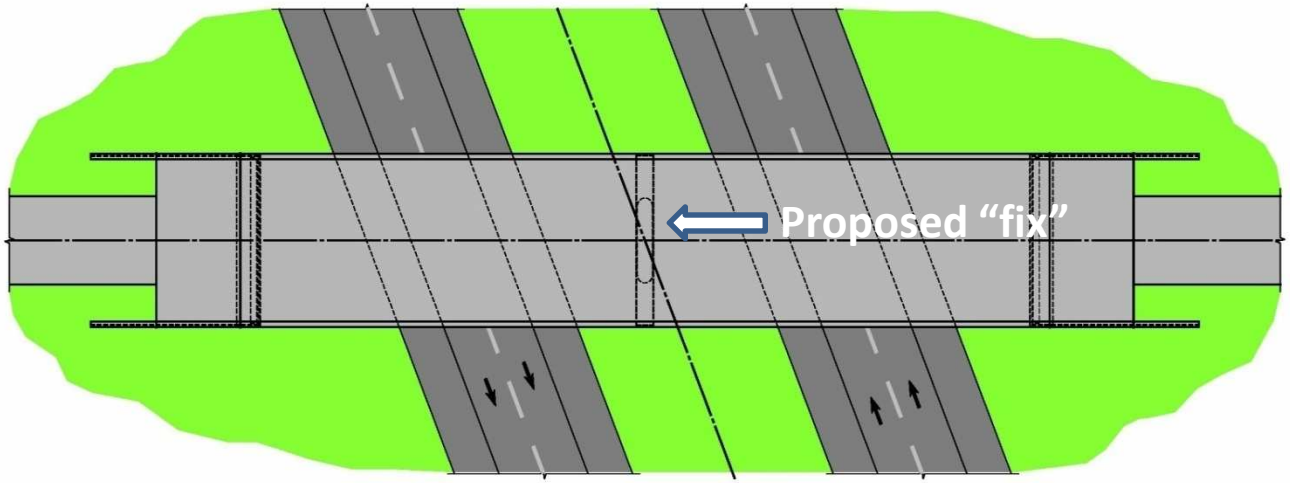
Reviewed by the VE Study Team

Bridge Skew:

The VE Study Team discussed instances of bridge locations with skew greater than 20 degrees, but less than the skew considered in Recommendations 4 through 7.

- It was suggested that the designers “square up” the ends of the bridges to increase performance in case of a seismic event. (See figures, next page)
- After evaluating the economics of reducing the skew, it appears that the costs outweigh the benefits.


Skew greater than
20 degrees


Proposed “fix”

Rest Area Options Reviewed by the VE Study Team

The VE Study Team considered the following options for a Rest Area on I-73:

1. One suggestion was to combine the two rest areas into one that would service both northbound and southbound traffic.
   a) A costly interchange would be required
   b) Cost savings on building size would be minimal
   c) The savings on maintenance costs would not be sufficient to justify the cost of the interchange
   d) Wetlands impacts would be increased by approximately 10 acres.
   e) **The VE Study Team does <u>not</u> recommend this option.**

Rest Area Options Reviewed by the VE Study Team

2. Another suggestion was to move the Rest Area closer to Floydale, approximately three miles down the highway.

a) Initially, it was thought that this location might have sewer capacity available to service the Rest Area. However, there is no sewer line available at this location.

b) It appears that this location will allow for the ramp to be constructed of Prestressed Concrete Girders in lieu of Structural Steel.

c) One of the drawbacks to the current location is its close proximity to an interchange. This location would place it farther away.


SOUTH CAROLINA
73
PATHWAY TO PROGRESS
SCDOT
Value Engineering Study
I-73 Southern Section
Right-of-Way Plans

Appendix B
SHPO Correspondence

South Carolina
Department of Transportation

MULT
13612
10-DK0037
NHPA

March 10, 2009

Ms. Elizabeth Johnson
Deputy State Historic Preservation Officer
South Carolina Department of Archives & History
8301 Parklane Road
Columbia, South Carolina 29223-4905

Re: Brockington and Associates' Draft Report ***Cultural Resources Survey of the Proposed I-73 Southern Corridor, Dillon, Marion and Horry Counties, South Carolina, Volume III; Draft Addendum Report III,*** PIN 36358_RD01.

Dear Ms. Johnson:

The Department's sub-consultant, Brockington and Associates, Inc., has completed three volumes of cultural resources reports of the selected alternate corridor for the above referenced project. Since the submission of Volume III, there have been two subsequent addendum reports for design changes and omissions. This third addendum report addresses additional recent design changes. There are six (6) new design shifts including Catfish Church Road in Dillon County; S-309, J H Martin Road, Good Luck Road and SC 22 in Horry County; and Watermill Road in Marion County. These six design shifts brought portions of the I-73 Southern Corridor outside of the previously surveyed survey universe prompting additional cultural resources investigations.

Additional cultural resources investigations were conducted July 20-28, 2009 and September 3-4, 2009 to determine whether any known historic properties, listed in or eligible for the National Register of Historic Places (NRHP), exist within or near the new design shifts. One NRHP listed property, the Catfish Creek Baptist Church (Site 0002.00, NRIS Number 75001697) and two NRHP eligible properties, the Catfish Creek Baptist Church Cemetery (Site 0002.01) and the Dalcho School and Lodge (Site 71), are located in the area of the design shifts. The rural setting of the church, cemetery and school were previously disturbed by the construction of existing I-95, located 350 to 1,000 feet to the north of these resources. The alignment shifts will not result in any takings from these properties. There are no new effects to the viewshed. Therefore, it is recommended that the project will have no effect on these three properties. No newly identified architectural sites were discovered. No additional investigations are recommended.

Two newly identified archaeological sites were discovered. One newly identified archaeological site, 38DN167, is located at the Catfish Church Road alignment shift. Site 38DN167 consists of a late nineteenth/early twentieth occupation represented by a scatter of artifacts and architectural debris. This site is recommended not eligible for the NRHP. No previously identified archaeological sites are affected. No additional investigations are recommended. A second newly identified archaeological site, 38MA218, is located on the Watermill Road shift. This late nineteenth/early twentieth century site is not eligible for the NRHP. No additional investigations are recommended. There are no historic properties affected by any of these design shifts and no additional investigations are recommended for these sites.

In accordance with the memorandum of agreement approved by the Federal Highway Administration, March 16, 1993, the Department is providing this information as agency official designee, as defined under 36 CFR 800.2, to ensure compliance with Section 106 of the National Historic Preservation Act.

Post Office Box 191
Columbia, South Carolina 29202-0191

Phone: (803) 737-2314
TTY: (803) 737-3870

It is requested that you review the enclosed material and, if appropriate, indicate your concurrence in the Department's findings, thus initiating the formal Section 106 consultation process. Please respond within 30 days if you have any objections or if you have need of additional information.

Sincerely,

Wayne D. Roberts

Wayne D. Roberts
Chief Archaeologist

WDR:edb

Enclosure

I (do not) concur in the above determination.

Signed: [signature] SCDAH for Project Coordinator Date: 3/31/10

cc: Patrick Tyndall, FHWA
Wenonah Haire, Catawba THPO
Environmental Management (Phillips)
Mitchell Metts, Director of Pre-Construction
Mike Barbee, Regional Production Engineer
Keith Derting, SCIAA
Joshua Fletcher, Brockington & Associates, Inc.
Skip Johnson, LPA Group, Inc.

File: Env/WDR