# 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 | | |
| Ben Clopper | Florence & Hutchinson | | |
| Scott Davenport | SCDOT | | |
| Wilson Elgin | SCDOT | | |
| Preston Helms | SCDOT | | |
| Ron Hinson | SCDOT | | |
| Alan King | Wilbur Smith Associates | | |
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| Jeff Powers | Florence & Hutchinson | | |
| Greg Rikard | SCDOT | | |
| Jake Sherman | The LPA Group Incorporated | | |
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| Alice Travis | FHWA | | |
| Dawn Watkins | SCDOT | | |
| Chris Wood | The LPA Group Incorporated | | |
| Elham Farzam | The LPA Group Incorporated | | |

**Additional Participants:**

| Name | Company | Telephone | E-Mail |
|---|---|---|---|
| Dennis Townsend | SCDOT | | |
| Mike Thomas | Florence & Hutchinson | | |
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| Rob Dubnicka | The LPA Group Incorporated | | |

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 | |
|---|---|
| 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**

| | |
|---|---|
| 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**

| | |
|---|---|
| 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**

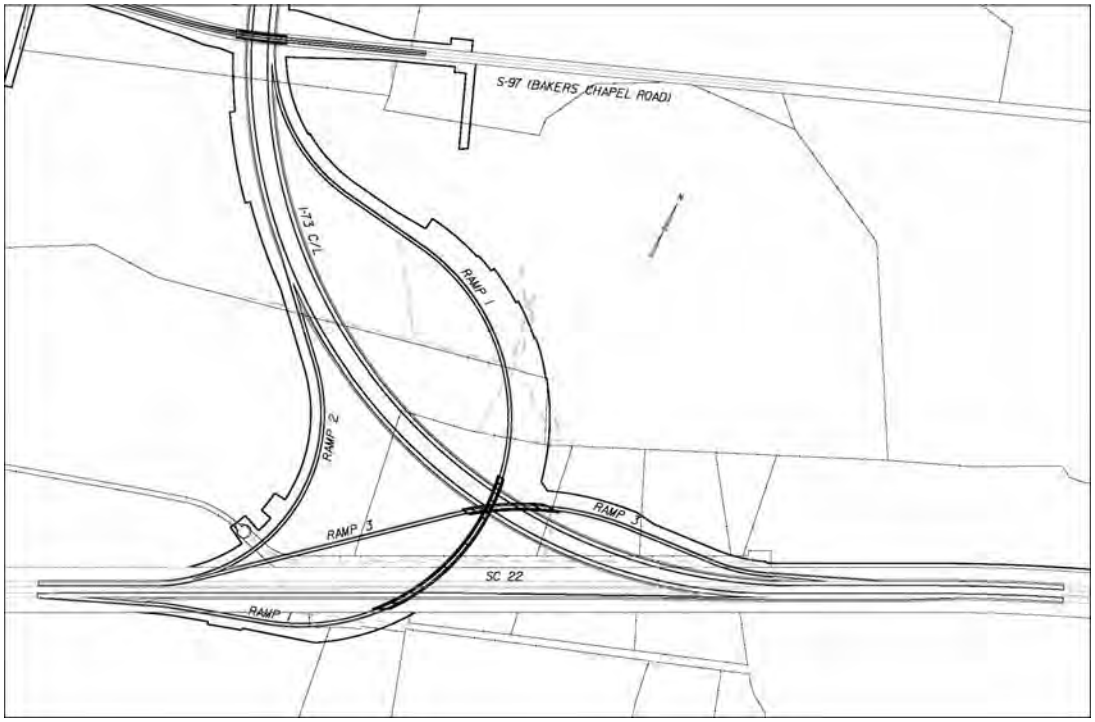
***I-73/SC22 Interchange***
***Revise current three-level, multiple structure interchange to a T-type, trumpet design.***

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.

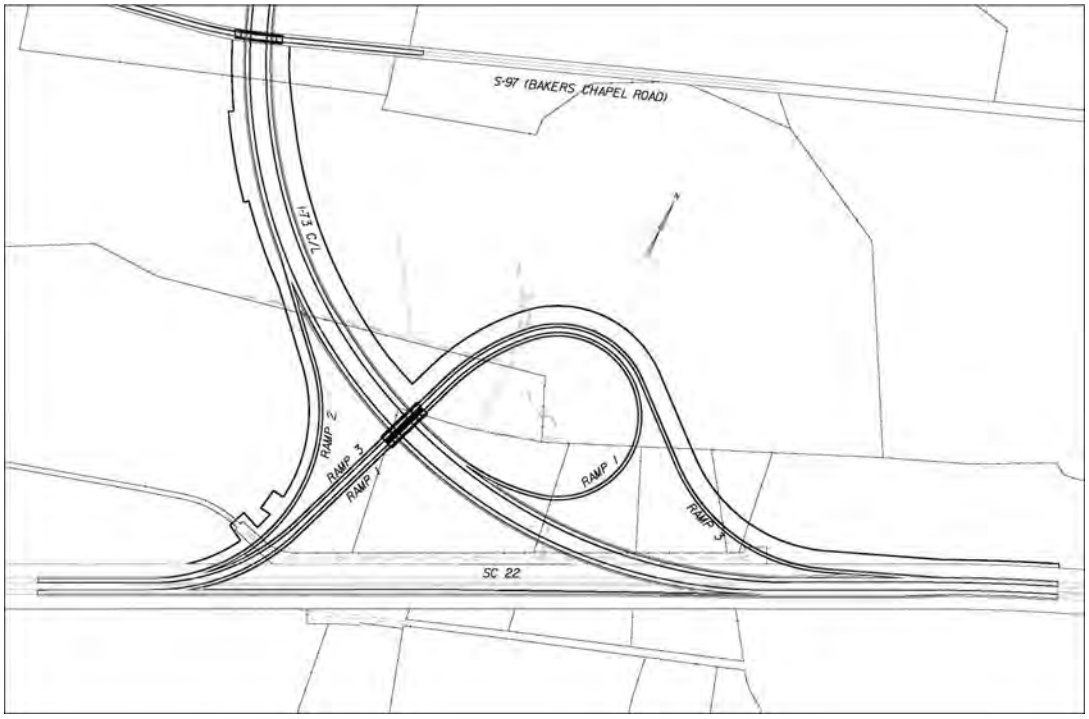
Fred Kicklighter requested a traffic analysis for these options. This analysis is included as Appendix B.

| | |
|---|---|
| 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.***

| | |
|---|---|
| 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

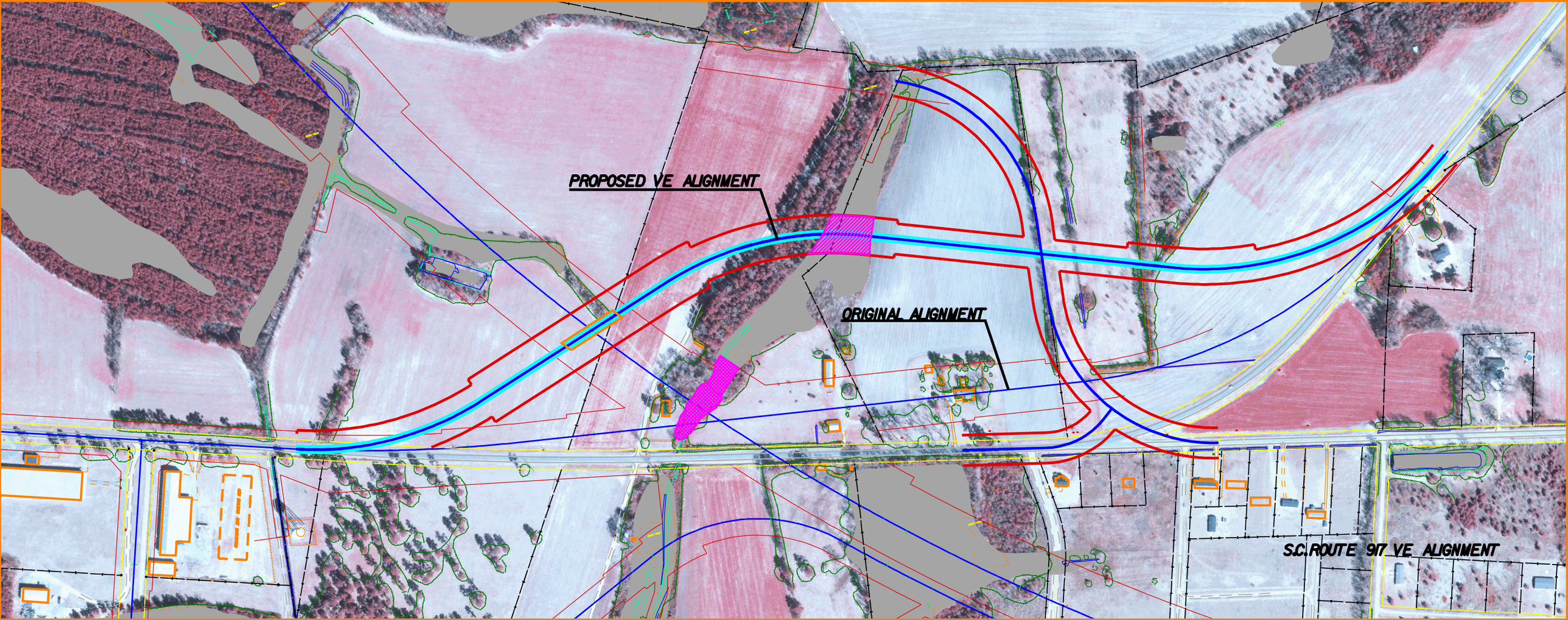
The VE Study Team reviewed bridge crossings at SC917, US301, S198, S27, and S309 and determined that each of these bridges have heavy skews that have resulted in continuous structural steel superstructures. The VE Team requested that the design team review each of these bridges to determine if the skews 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.***

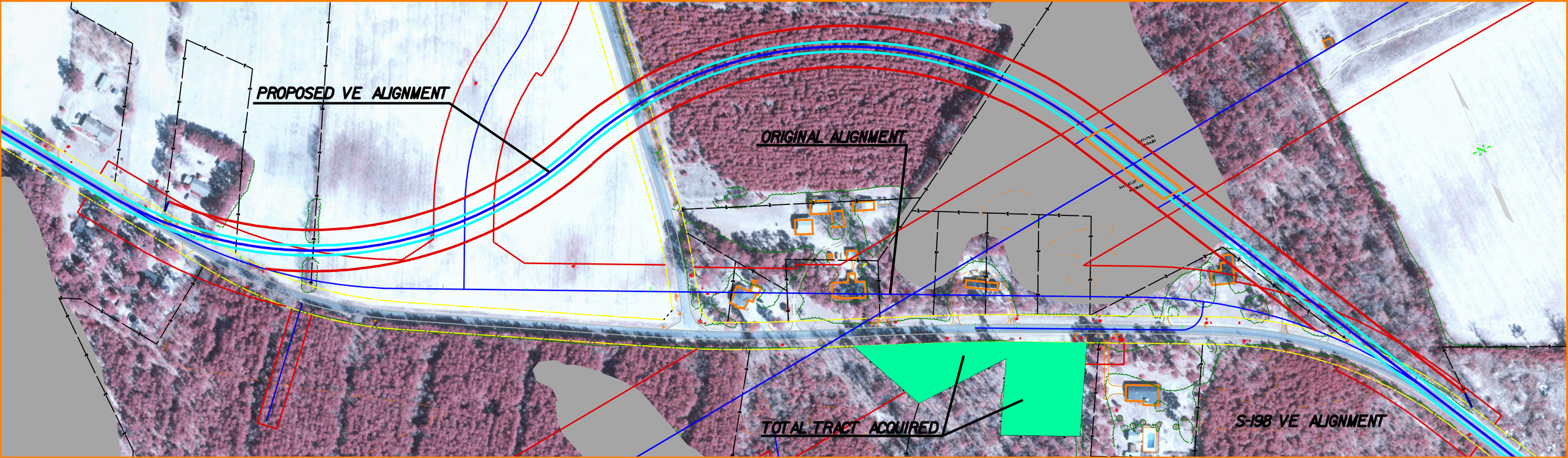
| | |
|---|---|
| Cost savings of $1.6 Million in bridge construction | Would require reopening the EIS document to assess the impacts |
| Avoid displacement | Less desirable roadway alignment |
| Significantly reduce skew | Multiple horizontal curves introduced on SC197 |
| Concrete girders require 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.***

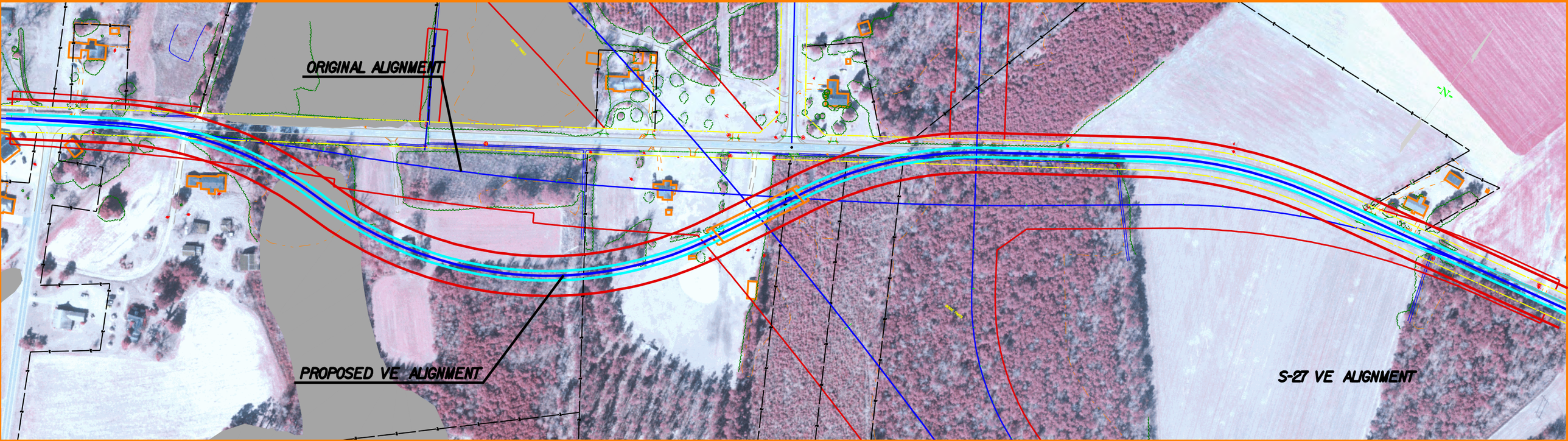
| | |
|---|---|
| Cost savings of $2.3 Million in bridge construction | Would require reopening the EIS document to assess the impacts |
| Eliminate need for run-around | Additional wetlands impact (.8 acres) |
| Skew improved | Some total-take tracts have already been acquired by SCDOT |
| Concrete 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.***

| | |
|---|---|
| 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) |

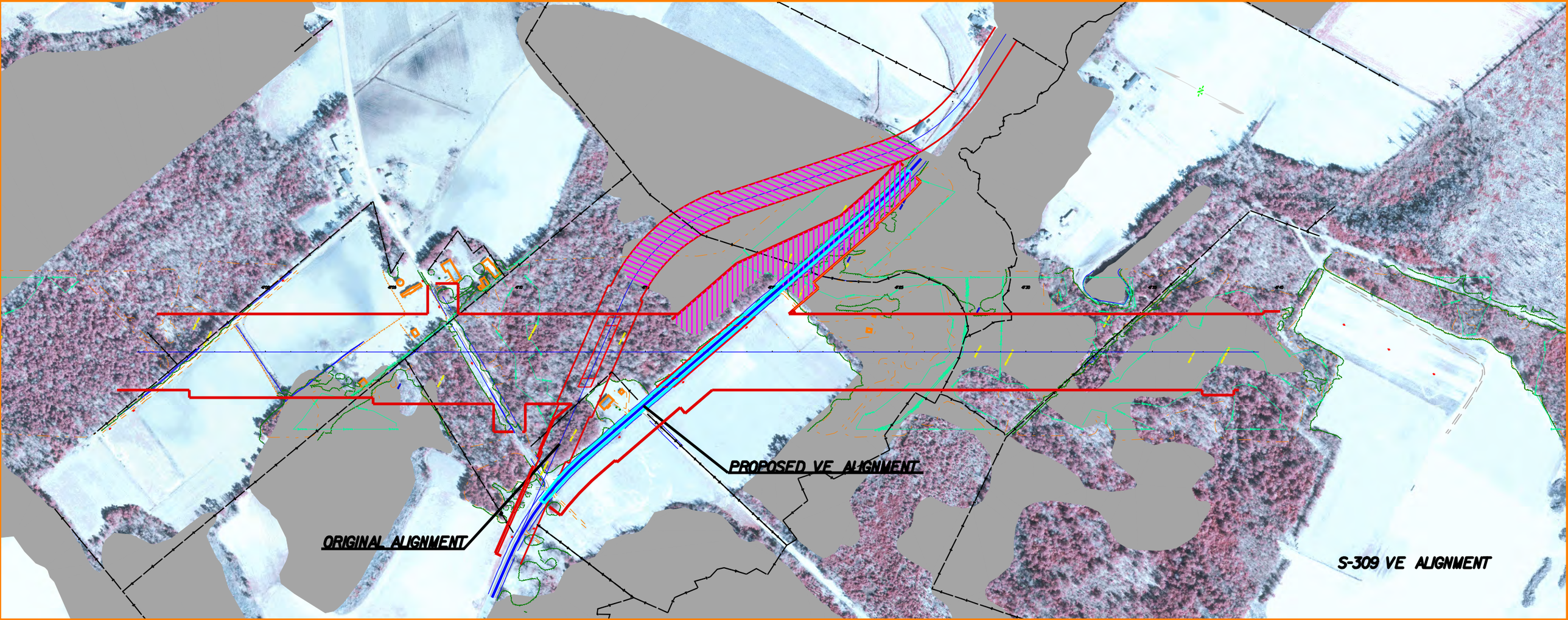

ORIGINAL ALIGNMENT
PROPOSED VE ALIGNMENT
S-27 VE ALIGNMENT

**Recommendation 7**

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

| | |
|---|---|
| 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.

| | |
|---|---|
| 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 | |
|---|---|
| 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 | |
|---|---|
| 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 | |
|---|---|
| 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 |

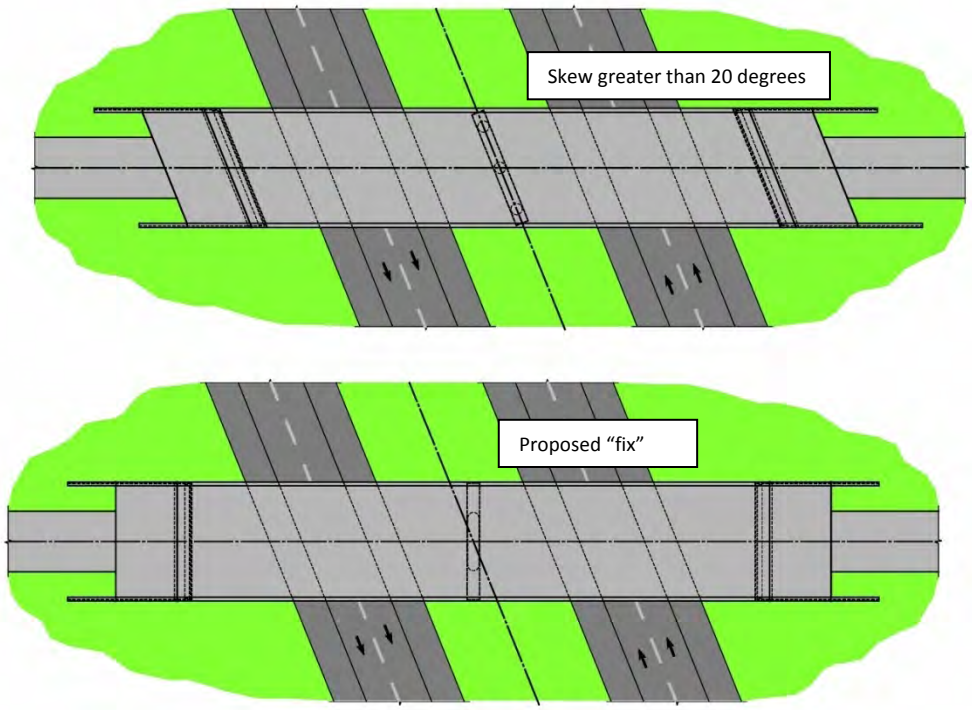
## Justification for the S308 Interchange

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**

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**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

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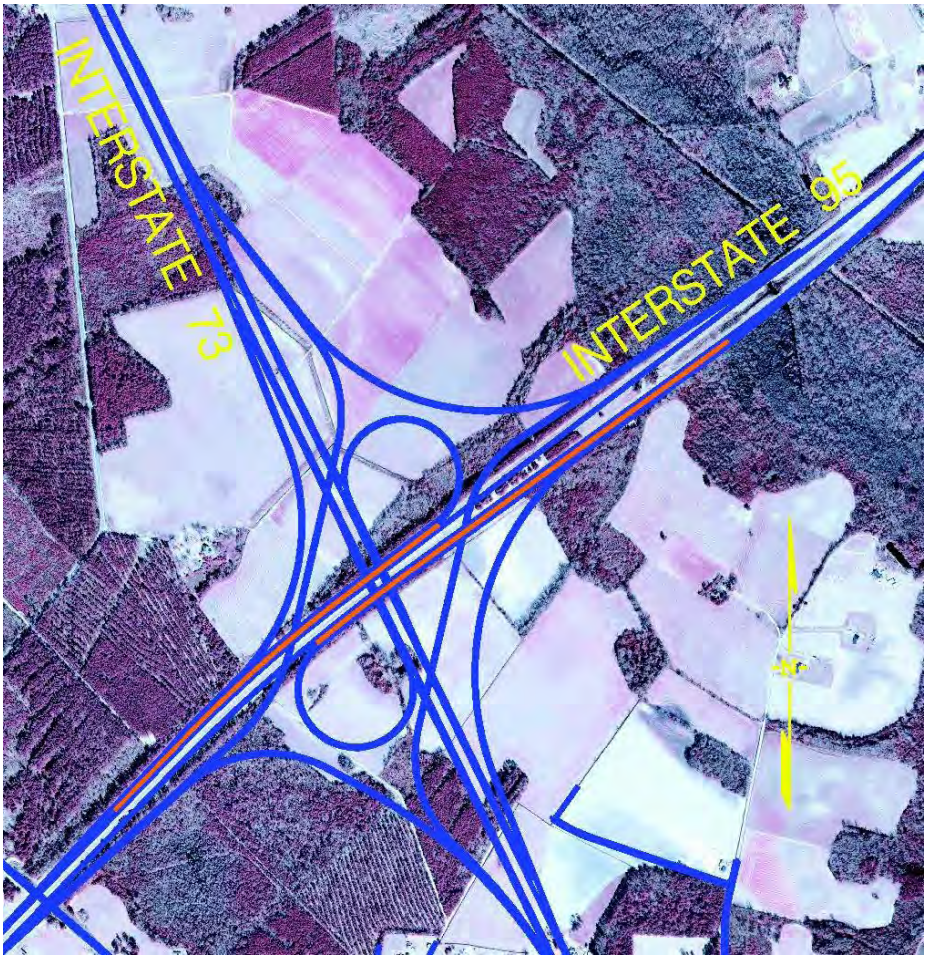
We have completed the design year (year 2035) capacity analysis of the two flyover ramps (I-95 northbound to I-73 northbound and I-95 southbound to I-73 southbound) at the proposed I-73 interchange with I-95. The primary intent of this analysis is to determine whether or not the single lane concept on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

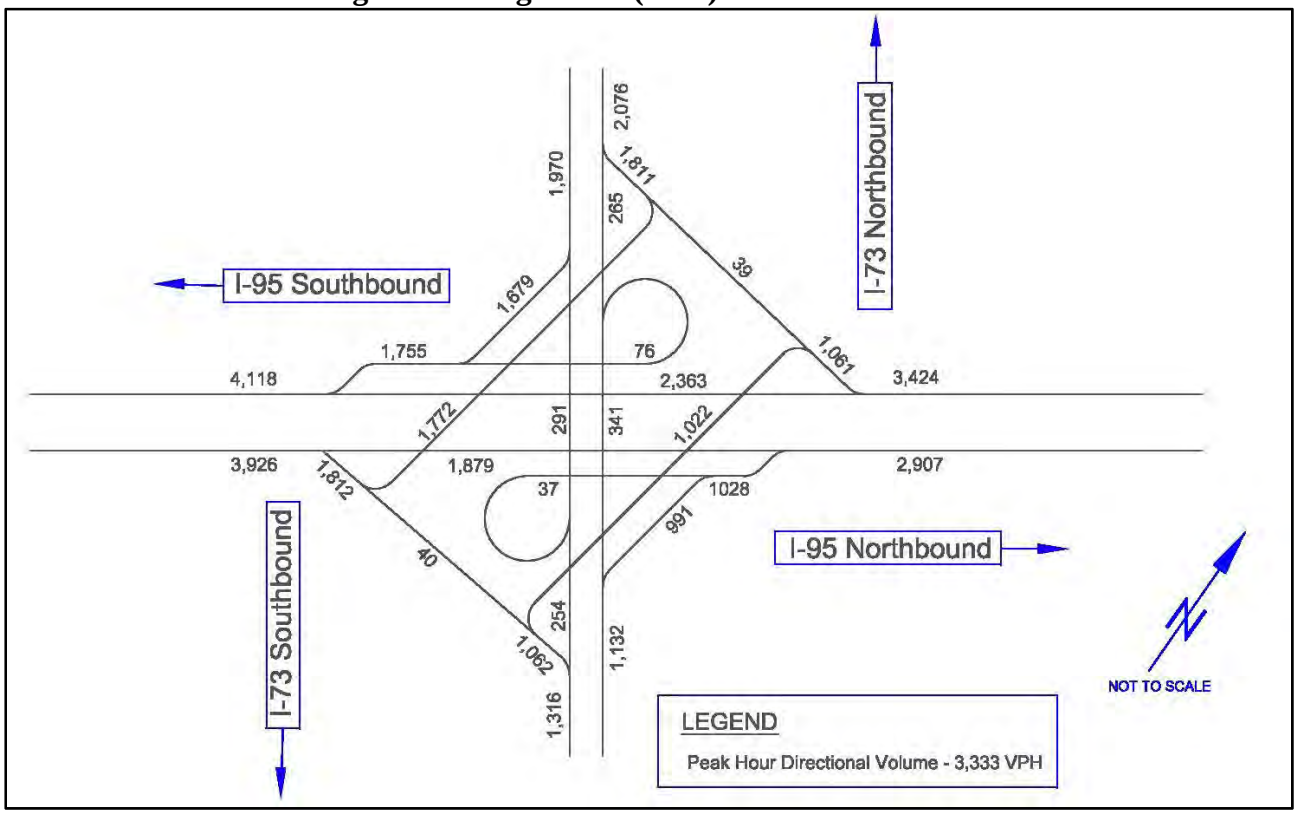
**Figure 1: Proposed I-95/I-73 Interchange Layout**



**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)**

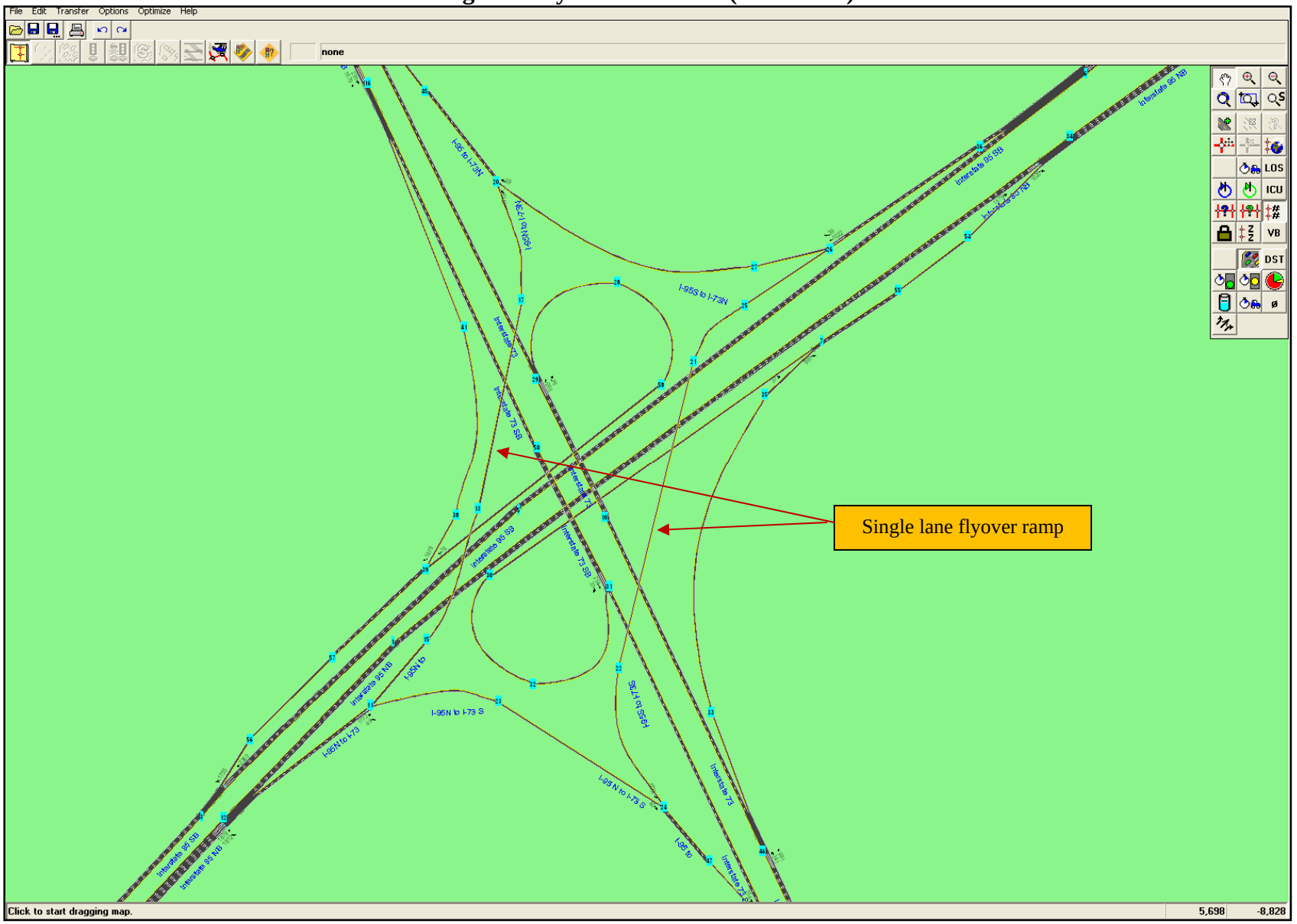
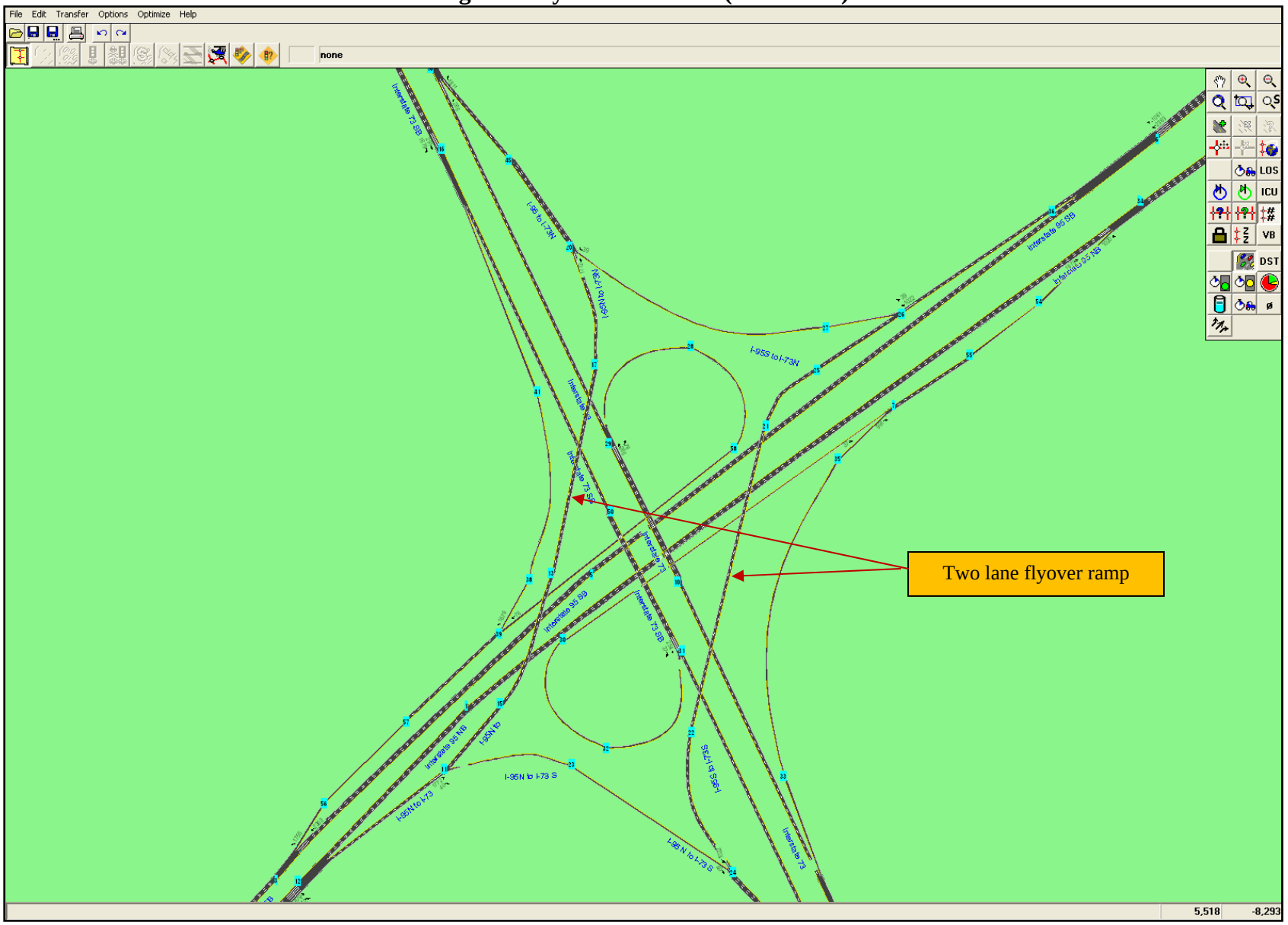


**Figure 4: Synchro network (Scenario 2)**



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.*

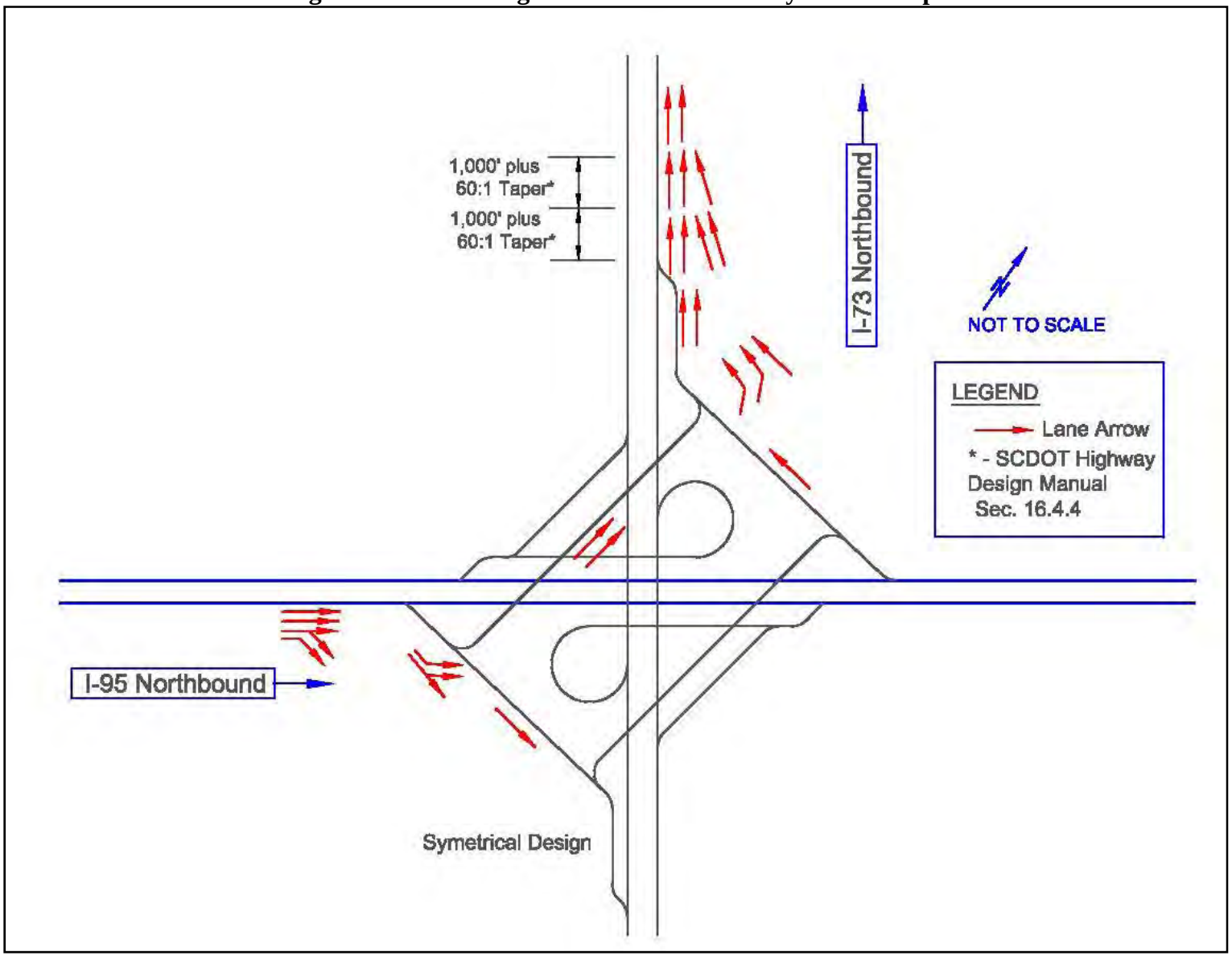
*Maximum density for LOS D is 34 pc/mi/lane (ref: Exhibit 25-4, HCM)*

***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**

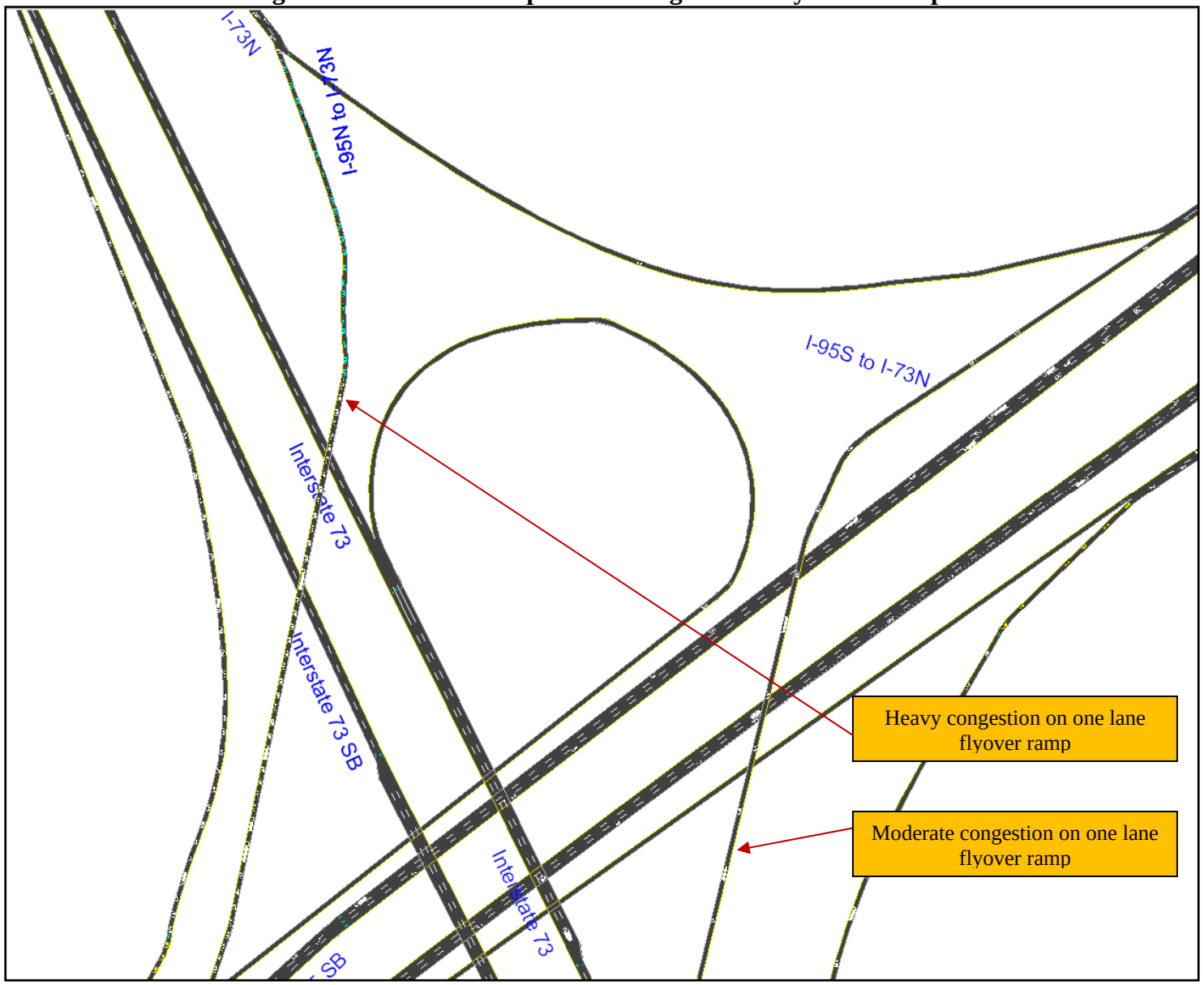


**Figure 6a: SimTraffic Snapshot for Single Lane Flyover Ramp**

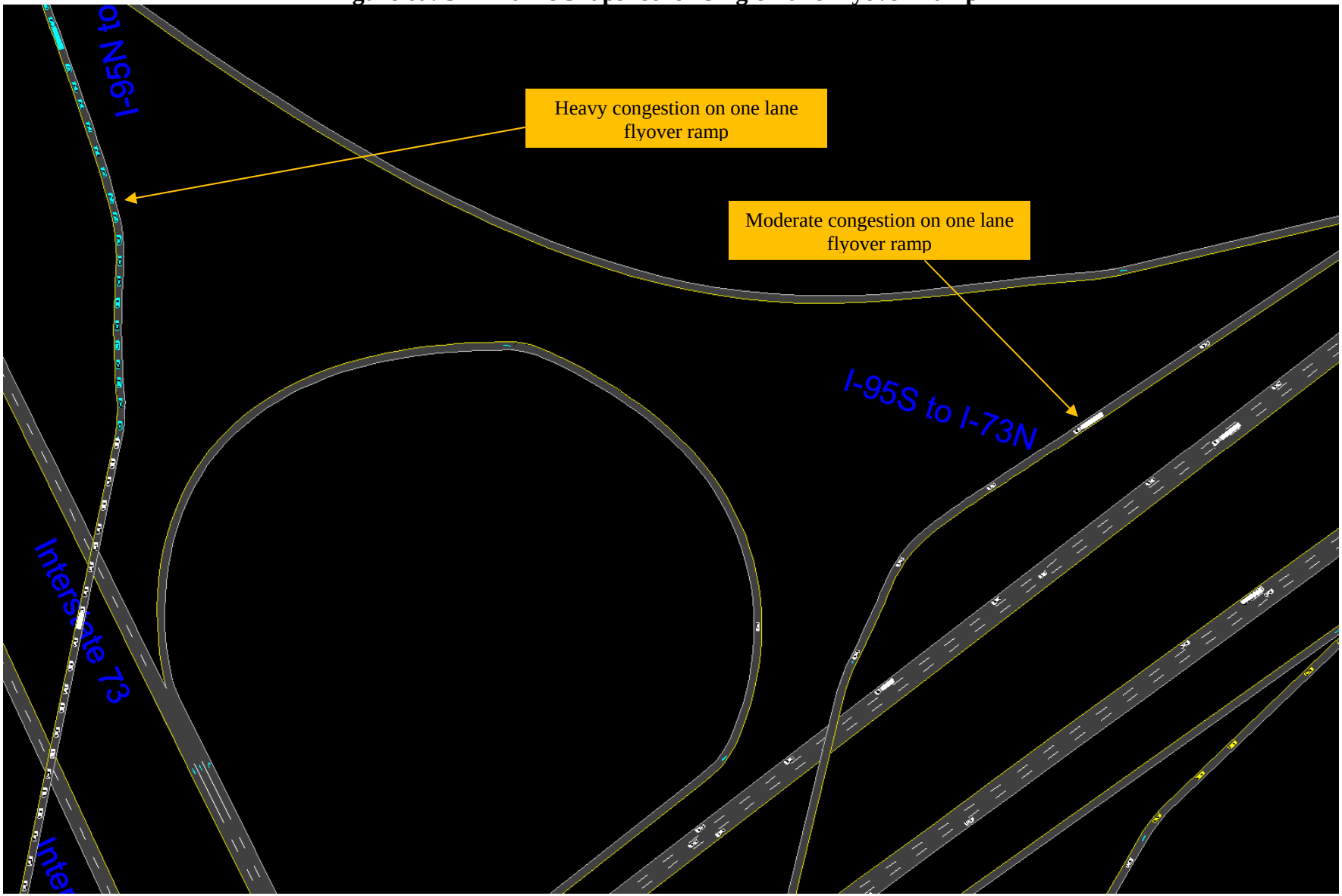
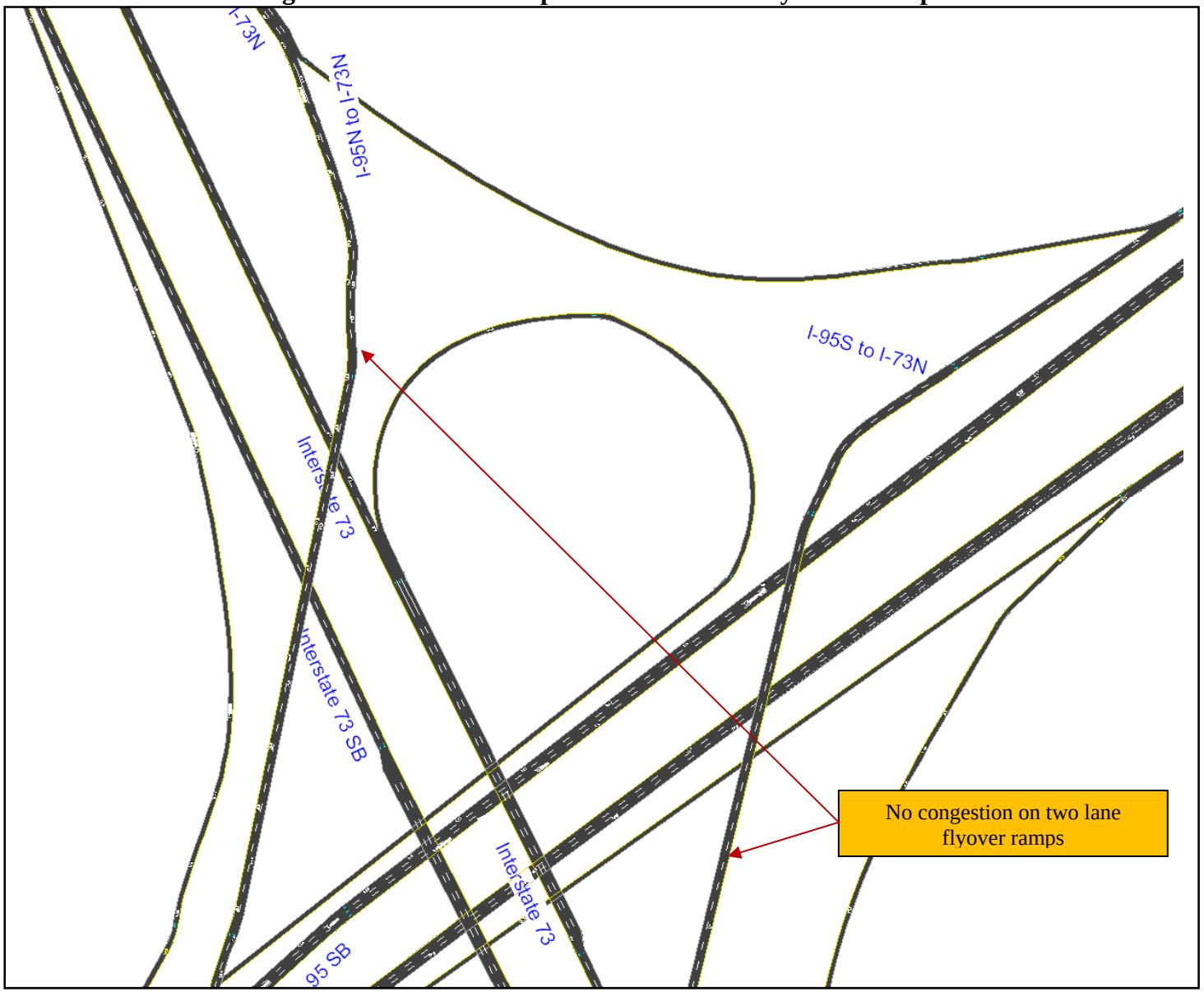


**Figure 7: SimTraffic Snapshot of Two Lane Flyover Concept**



**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