VALUE ENGINEERING REPORT

I-95/Horse Stamp Church Road Interchange
Camden County

Project No. NH-95-1(167) P.I. No. 511430

February 25, 2009

OWNER AND DESIGN TEAM:

Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308

VALUE ENGINEERING CONSULTANT:

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EXECUTIVE SUMMARY

Executive Summary

VALUE ENGINEERING STUDY

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Project No. NH-95-1(167) P.I. No. 511430

Introduction

This report summarizes the results of a value engineering (VE) study conducted on the proposed I-95/Horse Stamp Church Road Interchange located in Camden County. The project consists of a new diamond interchange, widening of Horse Stamp Church Road, a new bridge over I-95, and related local road improvements. The estimated construction cost is $17.3M. The design is currently at the Preliminary Plans stage, and the estimated let date will be March, 2010. The project is being designed for GDOT by Moreland Altobelli Associates. The study was conducted February 3-6, 2009, at the GDOT headquarters, by a four-person VE team.

This report presents the Team's recommendations and all back-up information, for consideration by the decision-makers. This **Executive Summary** includes a brief description of each recommendation. The **Study Identification** section contains additional information about the project, the study process, and the team. The **Recommendations** section presents a more detailed description and support information about each recommendation. Lastly, the **Appendix** includes a complete record of the Team's activities and findings. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

Considerations

Two constraints to this value study were identified during the kick-off meeting. Impact on wetlands must be kept to a minimum, and no impact on the nearby cemetery will be permitted. The VE Team concentrated its efforts on three elements of the baseline project, based on the high proportion of project cost associated with these elements. They include alignment/earthwork, typical sections, and the proposed bridge.

Results Obtained

The VE Team developed 10 recommendations, some of which are mutually exclusive, as described below. These recommendations have the potential to reduce the project cost significantly, enhance its constructability, reduce environmental impact and continue to provide the functionality to meet the project purpose and need.

Recommendation Highlights

EA-4 Realign Spring Bluff Road Closer to Existing Alignment

The baseline design provides a 1000' separation between the new SB ramps and the intersection of Spring Bluff Road and Horse Stamp Church Road. The VE Team recommends a realignment of Spring Bluff Road that would result in a 300' separation which would meet standards, reduce construction cost and reduce wetland impact.

The total potential savings if accepted is $445,000.

EA-5 Realign the SB off-ramp to the Existing Spring Bluff Road Alignment

This recommendation would utilize some of the existing road grade and minimize wetland impact, but would increase construction cost. This concept is considered to be mutually exclusive with Recommendation EA-4 above.

The total potential increase if accepted is $255,000.

EA-11 Use a Loop Ramp for the SB Off-Ramp

Eliminating the SB off-ramp in the NW quadrant, and moving it to the SW quadrant, would reduce wetland impact significantly. Aligning the two SB ramps across Horse Stamp Church Road from the existing Spring Bluff Road would eliminate the need to realign Spring Bluff Road. This recommendation would be mutually exclusive with Recommendations EA-4 and EA-5 above.

The total potential savings if accepted is $525,000.

T-1 Use 11' Lanes for Local Roads

11' lanes would provide the required functionality on Horse Stamp Church, Spring Bluff, and Horseshoe Cove Roads, while reducing construction and O&M costs.

The total potential savings if accepted is $250,000.

T-4 Eliminate the Additional Two Lanes on Horse Stamp Church Road

The baseline concept is to provide a five-lane section, including center turn lane, on Horse Stamp Church Road between Horseshoe Cove and relocated Spring Bluff. The VE Team believes that the current and projected traffic volumes do not warrant four through lanes.

The total potential savings if accepted is $1,070,000.

T-5 Grade For Five-Lane Section, but Pave Only Three Lanes

If Recommendation T-4 above cannot be implemented, the VE Team recommends that the footprint for the five-lane concept be constructed under this project, but that only three lanes should be paved at this time. This would make it relatively easy and inexpensive to add the other two lanes when and if the traffic volumes warrant.

The total potential savings if accepted is $970,000.

T-6 Use Asphalt Paving for 10' Ramp Shoulder

The VE Team recommends that the 10' shoulder on all four ramps be paved with AC. Low truck volumes and the 16' concrete ramp main lane would reduce wear on the AC shoulder.

The total potential savings if accepted is $250,000.

T-9 Reduce the Paved Width of the 10' Ramp Shoulder

Given the 16' width of the ramp main lane and the 4' inside shoulder, the VE Team believes that a 6' outside shoulder would provide the needed functionality while reducing construction and O&M cost.

The total potential savings if accepted is $310,000.

B-3 Widen Existing Bridge

The existing steel bridge carrying Horse Stamp Church Road over I-95 has a good sufficiency rating and could be widened to accomplish the project functions.

The total potential savings if accepted is $720,000.

B-4 Type 3 AASHTO Girders in Lieu of Bulb Tees

If Recommendation B-3 above cannot be implemented, the VE Team recommends the use of AASHTO Type 3 girders which would be easier to construct and would allow the profile to be lowered, reducing borrow requirement.

The total potential savings if accepted is $20,000 plus potential reduction in earthwork.

DESIGN SUGGESTION – The baseline design speed for Horse Stamp Church Road is 60 mph. The VE Team suggests that this might be reduced, given that the existing posted speed in the area is 35 mph. This change would permit more flexibility in alignment and potentially reduce earthwork costs.

I-95/Horse Stamp Church Road Interchange SUMMARY OF VALUE ENGINEERING RECOMMENDATIONS							
ITEM No.	**RECOMMENDATION DESCRIPTION**	**BASELINE INITIAL COST**	**PROPOSED INITIAL COST**	**INITIAL COST SAVINGS**	**FUTURE SAVINGS**	**TOTAL LIFE CYCLE SAVINGS**	**COMMENTS**
	ALIGNMENT						
EA-3	Reduce Design Speed on Horse Stamp Church **(Design Suggestion)**						Road is currently signed at 35 mph
EA-4	Realign Spring Bluff Closer to Existing Alignment	445,000	0	445,000	0	445000	Reduces wetlands impact; reduces property impact; 300' separation acceptable
EA-5	Realign SB Off-ramp to the Existing Spring Bluff Alignment **(mutually exclusive with EA 4)**	0	255,000	(255,000)	0	(255,000)	Reduces wetland impact; uses existing roadway grade
EA-11	Use a Loop Ramp for the SB Off-ramp **(mutually exclusive with EA-4 and EA-5)**	635,000	110,000	525,000	0	525,000	Significant reduction in wetland impact; eliminates Spring Bluff realignment

I-95/Horse Stamp Church Road Interchange SUMMARY OF VALUE ENGINEERING RECOMMENDATIONS							
ITEM No.	**RECOMMENDATION DESCRIPTION**	**BASELINE INITIAL COST**	**PROPOSED INITIAL COST**	**INITIAL COST SAVINGS**	**FUTURE SAVINGS**	**TOTAL LIFE CYCLE SAVINGS**	**COMMENTS**
	TYPICAL SECTION						
T-1	Use 11' Lanes for local roads	3,000,000	2,750,000	250,000	Nominal	250,000	Acceptable for low volume roads
T-4	Eliminate the Additional Two Lanes on HSCR	1,070,000	0	1,070,000	High	1,070,000	Design year volumes do not warrant four lanes
T-5	Grade For 5 Lanes; Pave Only Three **(mutually exclusive with T-4)**	970,000	0	970,000	High	970,000	Defers significant cost into future when/if lanes are warranted
T-6	Use AC For Ramp Shoulders	450,000	200,000	250,000	Small increase	250,000	Low truck volumes; wide ramps
T-9	Reduce Paved Width of Shoulders	310,000	0	310,000	Nominal	310,000	Low truck volumes; wide ramps
	BRIDGE						
B-3	Widen Existing Bridge	2,650,000	1,930,000	720,000			Conserve resource; clearances okay
B-4	Use Type 3 Girders in lieu of Bulb Tees **(mutual excl)**	615,000	595,000	20,000			Reduction in borrow – not estimated

STUDY IDENTIFICATION

Study Identification

Project: I-95/Horse Stamp Church Road Interchange – Camden County	**Dates: February 3-6, 2009**
Study Location: Atlanta	

VE Team Members

Name:	Discipline:	Organization:	Contact:
Alex Wiley, PE	Highway Design	MACTEC	awiley@mactec.com
Aruna Sastry, PE	Bridge Design	Sastry and Assoc.	Sast9375@bellsouth.net
Dan Cogan, PE	Constructability	KEA Group	dcogan@keagroup.com
Rod Curtis, PE CVS	VE Team Facilitator	MACTEC	rhcurtis@mactec.com

Project Description

This project proposes to construct a new diamond interchange of I-95 and Horse Stamp Church Road, classified as a Rural Minor Collector, in order to accommodate anticipated high development in the area and also to accommodate FEMA evacuation requirements for coastal areas. The location of the new interchange is between 2 existing interchanges 12 miles apart meaning that this project will not have a negative impact on the operation of the existing I-95.

The interchange ramps will be 16’ wide with 10’ and 4’ paved shoulders, and will be paved with PCCP. Horse Stamp Church Road and adjacent local roads will be paved with AC. The proposed typical section for Horse Stamp Church road includes 4-12’ lanes and a 12’ center turn lane between the two intersecting roads – Spring Bluff and Horseshoe Cove. Horse Stamp Church Road will be two 12’ lanes elsewhere. Spring Bluff Road will be relocated away from the interchange for access control and operations enhancement. The Horseshoe Cove Road intersection angle with Horse Stamp Church Road will be improved to 90 degrees. The total project length along Horse Stamp Church Road will be approximately 5100’.

The estimated AADT on Horse Stamp Church Road is 14,200 in 2010 and 23,800 in 2030. Peak hour volumes on the proposed ramps in 2030 range from 240 to 1210. Trucks are 2% of the volume on Horse Stamp Church.

The existing bridge over I-95 has a high sufficiency rating but is too narrow for the proposed roadway. The new concrete bridge will be 287’’ long, four spans, and 87’ wide. Vertical clearance will increase from 16’11” to 18’7”.

The proposed design speeds are 45 mph on the ramps, 60 mph on Horse Stamp Church Road, and 35 mph on Spring Bluff and Horseshoe Cove Roads.

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Utility relocation, right of way acquisition, and project design are being done and financed by the County. Existing utilities may include telephone, cable, power, gas, ATMS, and water.

There are numerous wetlands in the vicinity of the project. A 404 permit may be required. Two historic properties have been identified – the Horse Stamp Cemetery and the Horse Stamp Methodist Church.

Ramp termini will be un-signalized, but the Concept Report presumes that signals will be added prior to the design year of 2030.

The Concept Report was approved in March of 2006. Plans are currently at the Preliminary stage of development. Construction is planned for March of 2010. The preliminary estimate is $17.3M which does not include E&C, mobilization, R/W or utility relocations. The County is financing the design, R/W, and utility portions of the project.

Key items of the proposed work (based on estimate dated 9/2008):

• Earthwork	$ 5.7M (Borrow - $3.5M)	33%
• Pavement/Base	$ 4.8M (Concrete - $1.8M)	28%
• Bridge	$ 2.8M	16%
• Traffic Control	$ 1.6M	9%
• Drainage	$ 1.2M (Box Culverts - $0.8M)	7%
• Erosion Control	$ 0.6M	3%
• Traffic Engineering	$ 0.5M (Rail and Barrier - $0.3M)	3%
• Miscellaneous	$ 0.1M`	1%

Kickoff meeting – February 3, 2009

A brief kickoff meeting was conducted on the first morning of the study, with the following personnel in attendance.

Attendance:

Lisa Myers	GDOT Engineering Services
James Magnus	GDOT Construction
Ken Werho	GDOT Traffic Operations
Doug Fadool	GDOT Engineering Services
Tim Matthews	GDOT Project Manager
Bryan Czech	GDOT District 5 (by video conference)
Stanley Kim	GDOT Bridge
Andy Casey	GDOT Road Design
LaShane Alexander	GDOT Right of Way
Funmi Adesesan	GDOT Environmental
Bobby Dollar	GDOT Environmental
Carlos Figueroa	FHWA
Scott Brazell	Camden County

Hisham Deeb	Moreland Altobelli
Shrujal Amin	Moreland Altobelli

The value engineering team appreciated the participation by these busy professionals, and particularly appreciated the information provided by Project Manager Tim Matthews.

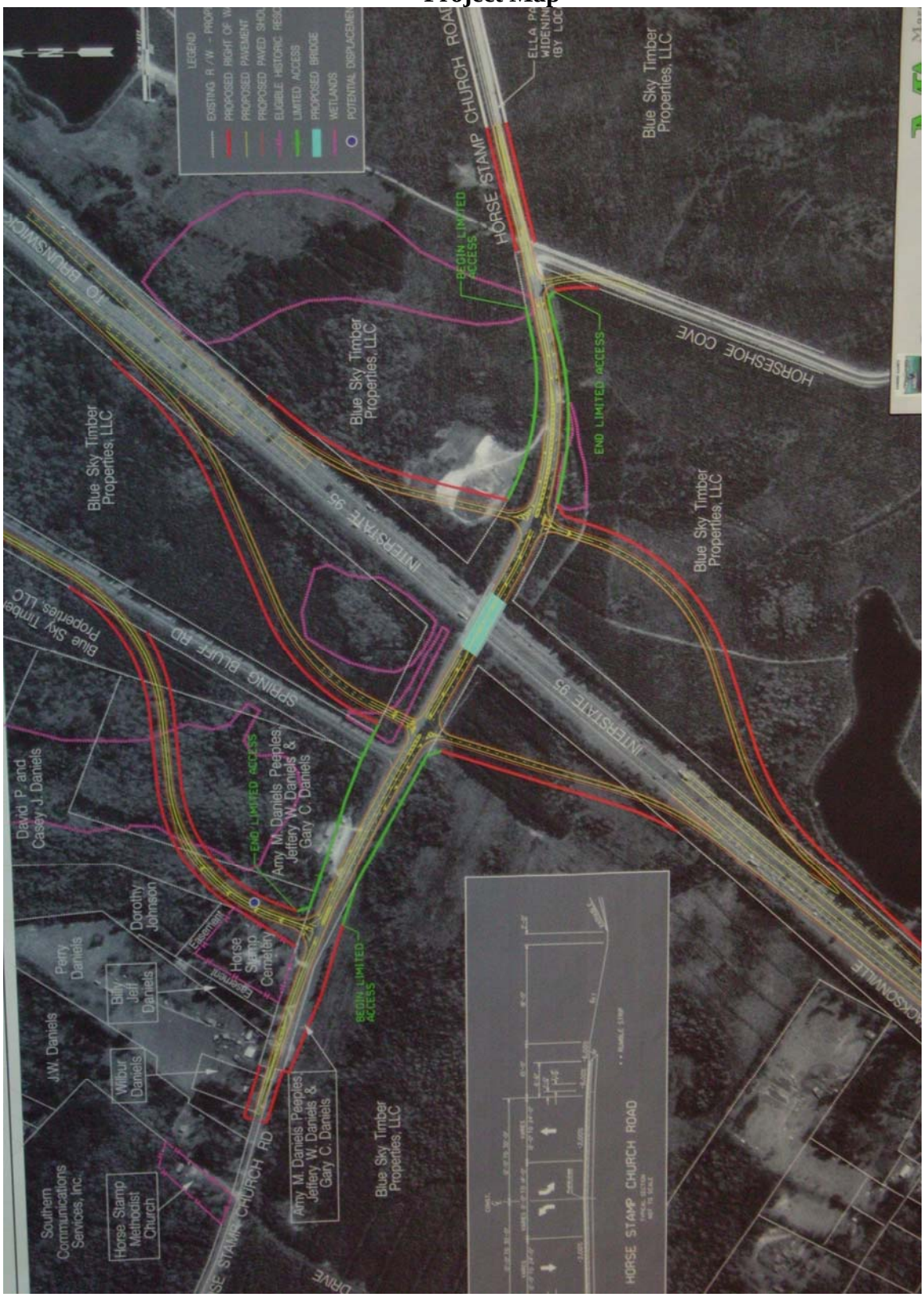
The following items were noted during the meeting:

- Construction duration is planned for 18 months.
- The Design Team is proposing to close Horse Stamp Church Road bridge over I-95 during construction, as opposed to stage construction of the bridge which was originally planned. It appears that there is no local opposition to this concept.
- The Spring Bluff Road alignment shift was influenced by the location of wetlands and the cemetery, as well as by traffic operations. Similarly, the ramp termini were also influenced by the need to avoid wetlands.
- Horse Stamp Church Road is currently an unimproved (dirt) road east of Horseshoe Cove Road, but the County is currently upgrading it.
- Widening the existing bridge was considered too costly in comparison with a new structure.
- R/W cost was budgeted at $500,000 but actual cost will be nominal. The one affected residence mentioned in the concept report – a mobile home- has now been moved.
- A Categorical Exclusion has been approved for this project.
- **Constraints** – Two constraints to the VE study were established. No impact to the nearby cemetery will be permitted. Wetland impact must be kept to a minimum.

V.E. Presentation

The Team gave a brief presentation of their recommendations on February 6, 2009.

Project Map


LEGEND
EXISTING R/W - PROP
PROPOSED RIGHT OF W
PROPOSED PAVEMENT
PROPOSED PAVED SHO
ELIGIBLE HISTORIC RES
LIMITED ACCESS
PROPOSED BRIDGE
WETLANDS
POTENTIAL DISPLACEME
HORSE STAMP CHURCH ROAD
ELLA P
WIDENIN
(BY LOC
BEGIN LIMITED ACCESS
END LIMITED ACCESS
HORSESHOE COVE
Blue Sky Timber Properties, LLC
INTERSTATE 95
SPRING BLUFF RD
David P. and Casey J. Daniels
Amy M. Daniels Peeples Jeffery W. Daniels & Gary C. Daniels
Dorothy Johnson
Perry Daniels
Billy Jeff Daniels
Horse Stamp Cemetery
Easement
J.W. Daniels
Wilbur Daniels
Southern Communications Services, Inc.
Horse Stamp Methodist Church
HORSE STAMP CHURCH ROAD

VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name
I-95/Horse Stamp Church Rd. Interchange

IDEA No.:	**Sheet No.:**	**CREATIVE IDEA:**
EA-4	1 of 4	Realign Spring Bluff Road Relocation Intersection

Prepared By: AW **Date: 02/05/09** **Checked By: RHC** **Date: 02/16/09**

Original Concept:

Realign the Spring Bluff Road intersection with Horse Stamp Church Road approximately 1100' west of the intersection of the southbound ramps with Horse Stamp Church Road. This provides approximately 1000' of limited access from the ramp intersection west.

Proposed Change:

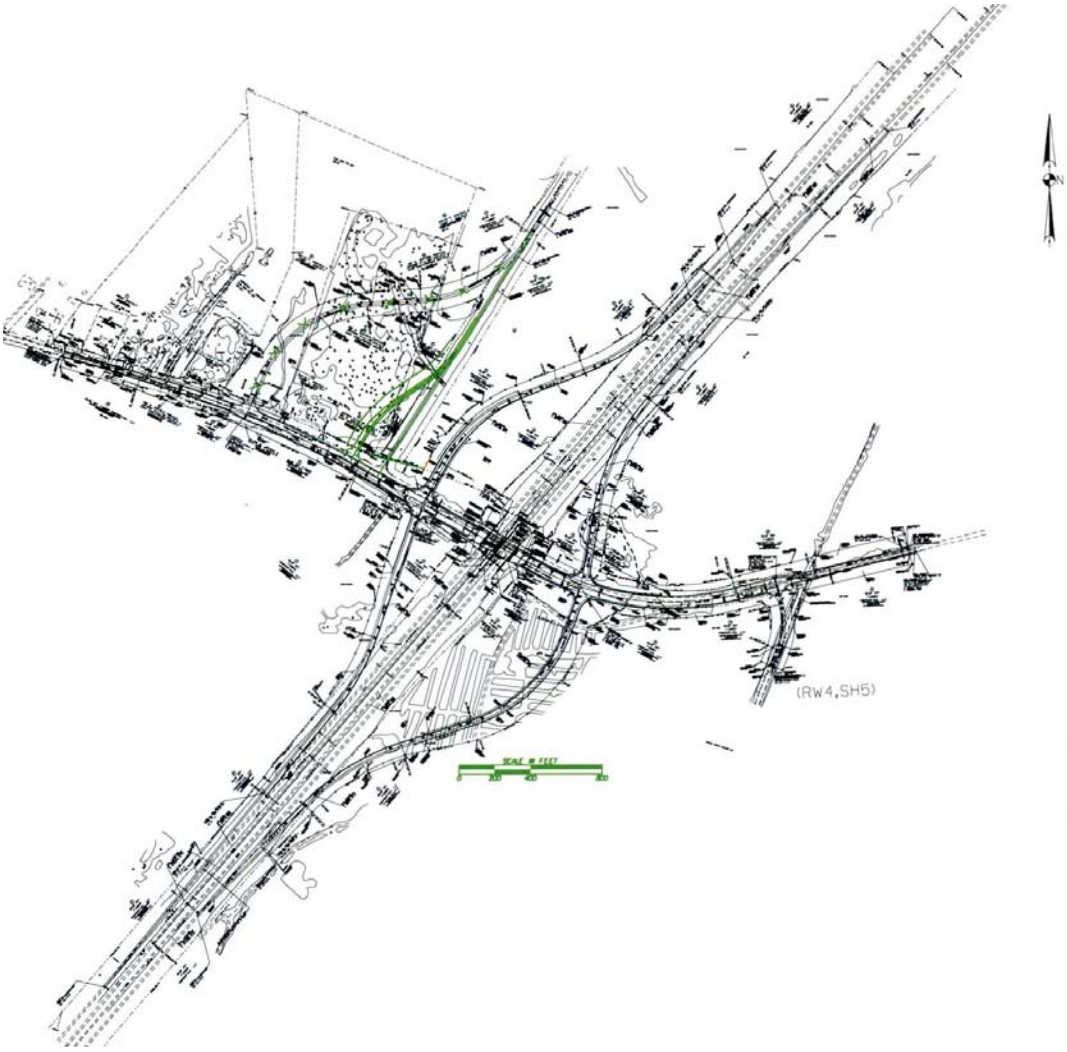
The VE Team recommends that the Design Team move the Spring Bluff Road intersection closer to the ramp intersection and allow a minimum of 300' of limited access in lieu of 1000' **(See Sketch)**

Justification:

-The length of the relocation would be shorter, thus reducing its construction and O&M costs.
-Impact on wetlands and property would be reduced. .
-A box culvert would be eliminated.
-The required length of reconstruction on Horse Stamp Church Road would be reduced
-Separation of ramp termini and local road intersection of 300' meets applicable standard. 1000' separation, although desirable, is not required in this condition.

LIFE CYCLE COST SUMMARY	**CAPITAL COST**	**FUTURE COST**	**TOTAL COST**
INITIAL COST - Original	$445,000		
- Proposed	0		
- Savings	$445,000		$445,000
FUTURE COST – Savings			0
TOTAL PRESENT WORTH SAVINGS			**$445,000**

SKETCH	
Project Name: I-95/Horse Stamp Church Road Interchange	IDEA No: E-4
	Sheet 2 of 4



COST WORKSHEET							
Project Name: I-95/Horse Stamp Church Road Interchange					IDEA No: EA-4		
					Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
Spring Bluff Road							
12.5 mm Superpave	TN	242	72.97	17659			
19 mm Superpave	TN	323	81.96	26473			
25 mm Superpave	TN	484	62.68	30337			
12” GAB	SY	2933	21.73	63734			
DBL. 6x4 Box Culvert							
Concrete	CY	138	376.76	51993			
Reinf. Steel	LB	15348	0.86	13199			
Horse Stamp Church Rd							
12.5 mm Superpave	TN	422	72.97	30793			
19 mm Superpave	TN	562	81.96	46062			
25 mm Superpave	TN	843	62.68	52839			
12” GAB	SY	5110	21.73	111040			
TOTAL				444,129			
TOTAL ROUNDED				445,000			0

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Road Interchange	ITEM No: EA-4
	Sheet 4 of 4

Current Design: 722+00 – 700+00 = 2200 L.F.
Proposed Realignment: 130 + 335 + 160 + 288 + 180 = 1093 L.F.

Area of reduced paving: 2200 – 1093 = 1107 L.F. Use 1100 L.F. x 24 FT. = 26400 S.F.
26400S.F. / 9S.F./S.Y. = 2933 S.Y.

165LB./S.Y. 12.5 mm Superpave: 2933S.Y. x 165Lb./S.Y. / 2000LB./Ton = 242 Tons
220LB./S.Y. 19 mm Superpave: 2933S.Y. x 220LB./S.Y. / 2000LB./Ton = 323 Tons
330LB./S.Y. 25 mm Superpave: 2933S.Y. x 330LB./S.Y. / 2000LB./Ton = 484 Tons
12" GAB: 2933 S.Y

Double 6' x 4'Concrete Box Culvert:
(119L.F. x 1.049C.Y./L.F.) + 13.05 C.Y.(Wngwalls & Parapets) = 138 C.Y. Concrete
(119L.F. x 126.4LB./L.F.) + 306LB. (Wingwalls & Parapets) = 15348 LB.

Paving Area Horse Stamp Church Road = 630 x 60 = 37800 S.F.
Paved Shoulders = [630 x (6.5 x2)] = 8190 S.F.
Total Area = 37800 + 8190 =45990 S.F. / 9 S.F. /S.Y. = 5110 S.Y.

165LB./S.Y. 12.5 mm Superpave: 5110S.Y. x 165Lb./S.Y. / 2000LB./Ton = 422 Tons
220LB./S.Y. 19 mm Superpave: 5110S.Y. x 220LB./S.Y. / 2000LB./Ton = 562 Tons
330LB./S.Y. 25 mm Superpave: 5110S.Y. x 330LB./S.Y. / 2000LB./Ton = 843 Tons
12" GAB: 5110 S.Y

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name
I-95/Horse Stamp Church Rd. Interchange

IDEA No.:	Sheet No.:	CREATIVE IDEA:
EA-5	1 of 4	Realign the Southbound Exit Ramp Onto the Original Spring Bluff Road Alignment

Prepared By: AW Date: 02/05/09 Checked By: RHC Date: 02/16/09

Original Concept:

The current southbound exit ramp intersects Horse Stamp Church Rd. approximately 300' east of the existing intersection of Spring Bluff Rd. The current alignment will impact several wetland areas before intersecting with Horse Stamp Church Road.

Proposed Change:

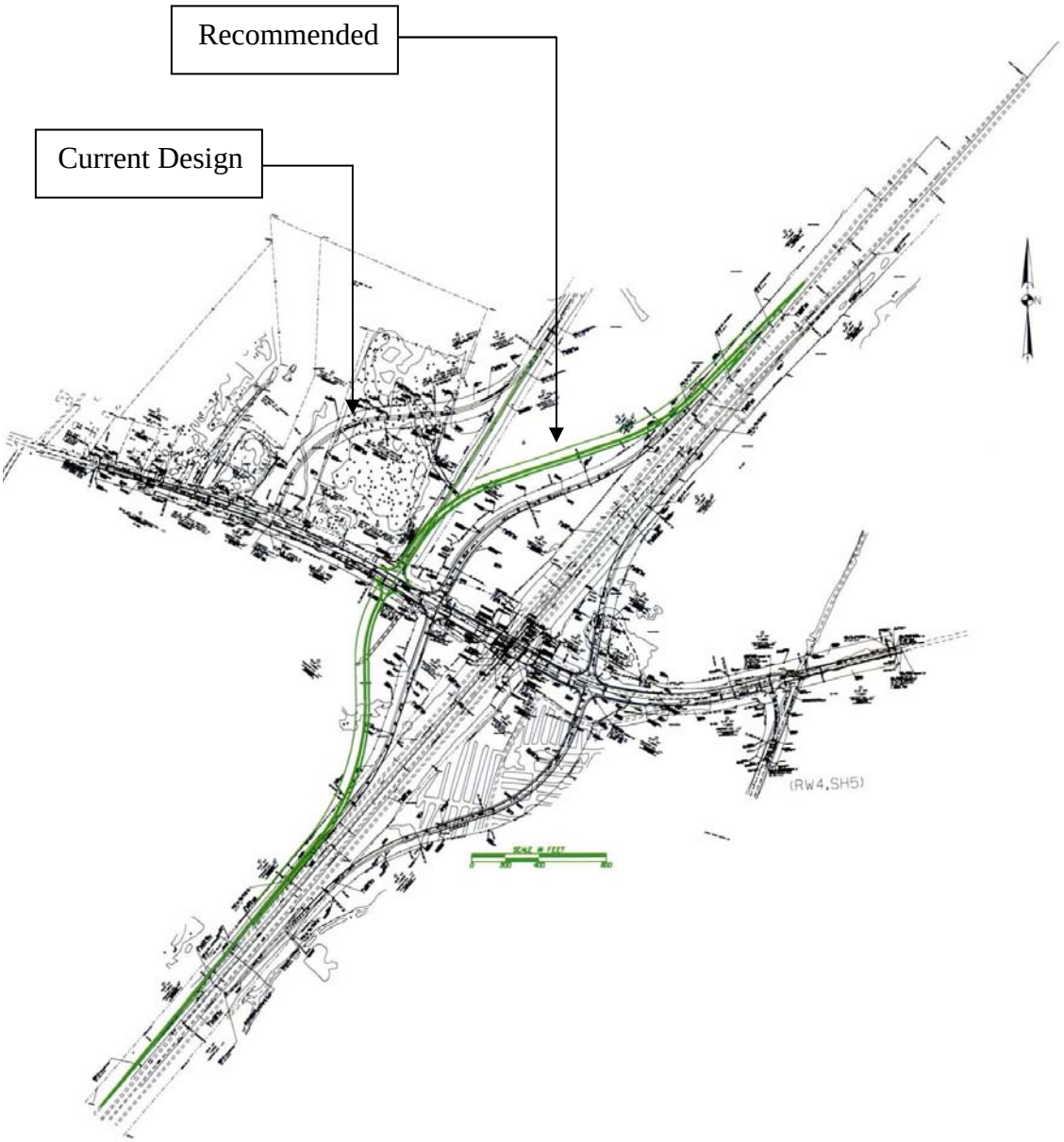
The VE Recommendation is to realign the southbound entrance and exit ramps so that the exit ramps align with the current alignment of Spring Bluff Rd. at Horse Stamp Church Rd. **(See Sketch) Note: This recommendation is mutually exclusive with Recommendation EA-4**

Justification:

Although the proposed alignment would increase the project construction cost, it would avoid wetland areas between Spring Bluff Rd. and I-95. The additional cost may be acceptable to the design team in order to gain this advantage. This recommendation would reuse some of the existing Spring Bluff roadbed.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$0		
- Proposed	$255,000		
- Savings	($255,000)		($255,000)
FUTURE COST – Savings			$0
TOTAL PRESENT WORTH SAVINGS			**($255,000)**

SKETCH	
Project Name: I-95/Horse Stamp Church Rd. Interchange	IDEA No: EA-5
	Sheet 2 of 4



COST WORKSHEET							
Project Name: I-95/Horse Stamp Church Rd. Interchange					IDEA No: EA-5		
					Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
PCC Pavement	SY				2860	57.00	163020
25 mm Superpave	TN				472	62.68	29585
12 " GAB	SY				2860	21.73	62148
TOTAL							254,753
TOTAL ROUNDED							255,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Rd. Interchange	ITEM No: EA-5
	Sheet 4 of 4

Areas of ramps from the taper to the gore are similar. Difference is in the length.
Exist: Length of Ramp "A" to Gore 118+00.00 – 99+23.92 = 1876.08 L.F.
Realignment of Ramp "A" to Gore 601+947+227+367+130 = 2272 L.F.
Ramp "A" difference in ramp length = 2272 – 1876 = 396 L.F.
Exist: Length of Ramp "D" to gore 420+99.02 – 400+00.00 = 2099 L.F.
Realignment of Ramp "D" to Gore 265+576+747+648+325 =2561 L.F.
Ramp "D" difference in ramp length = 2561 – 2099 = 462 L.F.
Total length 396 + 462 = 858 L.F.
Area of paving 858 x 30 = 25740 S.F. / 9 S.F./S.Y. = 2860 S.Y.

330LB/SY 25 mm Superpave: 2860 S.Y. x 330LB./S.Y. / 2000LB./Ton = 472 Tons

12" GAB: 2860 S.Y.

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name
I-95/Horse Stamp Church Rd. Interchange

IDEA No.:	Sheet No.:	CREATIVE IDEA:
EA-11	1 of 5	Provide loop ramp for southbound exit ramp

Prepared By: AW **Date: 02/04/09** **Checked By: RHC** **Date: 02/16/09**

Original Concept:

The baseline concept calls for providing a full diamond interchange and relocating Spring Bluff Road away from the new SB ramps.

Proposed Change:

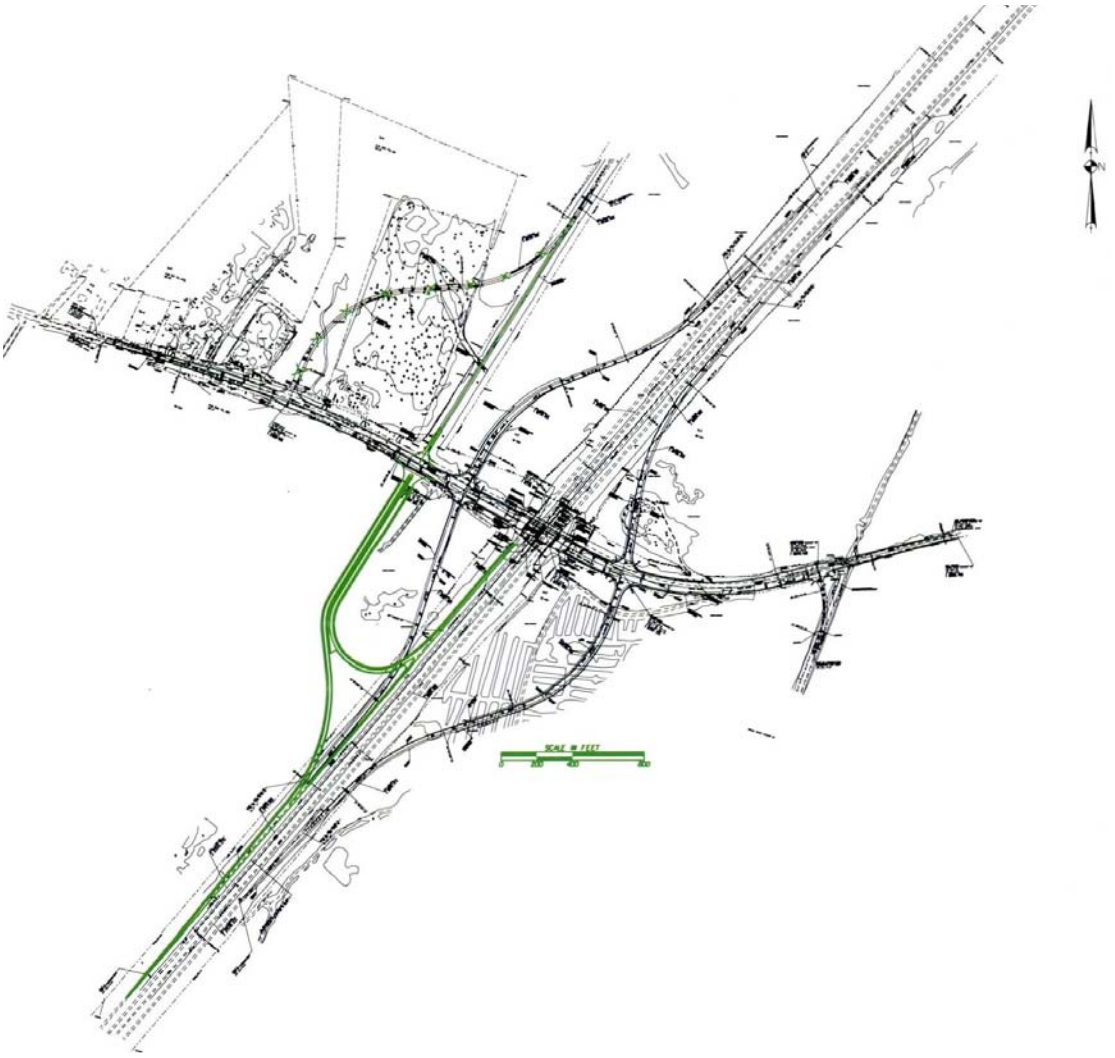
The VE Team recommends a loop ramp for the southbound I-95 traffic to Horse Stamp Church Rd. The proposed southbound entrance would be moved over to accommodate the loop ramp. The new onramp and offramp would align with the existing Spring Bluff Road, creating a two-way intersection. **(See Sketch) Note: This recommendation is mutually exclusive with Recommendations EA-4 and EA-5 above.**

Justification:

The loop ramp would eliminate the current southbound exit ramp which impacts a wetland and causes the 2200' relocation of Spring Bluff Road. By eliminating the Spring Bluff Road relocation, a fairly large wetland encroachment would be eliminated as well as any possible impacts to the cemetery. This change would also avoid splitting the Daniels property with the proposed relocation. Additionally, this recommendation would avoid another wetland where the currently proposed exit ramp will traverse. The loop ramp would likely have a lower design speed but would be acceptable for this location and traffic volume. This change would reduce construction cost significantly. It would also eliminate a future signal.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$635,000		
- Proposed	$110,000		
- Savings	$525,000		$525,000
FUTURE COST – Savings			$0
TOTAL PRESENT WORTH SAVINGS			**$525,000**

SKETCH	
Project Name: I-95/Horse Stamp Church Rd. Interchange	IDEA No: EA-11
	Sheet 2 of 5



COST WORKSHEET							
Project Name: I-95/Horse Stamp Church Rd. Interchange					IDEA No: EA-11		
					Sheet 3 of 5		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
Ramps							
PCC Pavement	SY	578	57.00	32946			
25 mm Superpave	TN	95	62.68	5955			
12 " GAB	SY	578	21.73	12560			
Conc. Median Barrier	LF				1120	100	112000
Spring Bluff Rd. Rel.							
12.5 mm Superpave	TN	396	72.97	28896			
19 mm Superpave	TN	528	81.96	43275			
25 mm Superpave	TN	792	62.68	49643			
12" GAB	SY	4800	21.73	104304			
DBL. 6x4 Box Culvert							
Concrete	CY	138	376.76	51993			
Reinf. Steel	LB	15348	0.86	13199			
Borrow	CY	3467	10.00	34670			
Horse Stamp Church Rd							
12.5 mm Superpave	TN	476	72.97	34734			
19 mm Superpave	TN	635	81.96	52045			
25 mm Superpave	TN	760	62.68	47637			
12" GAB	SY	5773	21.73	125447			
TOTAL				637304			112000
TOTAL ROUNDED				635,000			110,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Rd. Interchange	ITEM No: EA-11
	Sheet 4 of 5

Concrete Paving:
Ramp "A" :
Areas of ramps from the taper to the gore are similar. Difference is in the length.
Exist: Length of Ramp "A" to Gore 118+00.00 – 99+23.92 = 1876.08 L.F.
Proposed: Length of Ramp "A" to Gore 885+190+222+658+150 = 2105 L.F.
Difference is 2105 – 1876 = 229 L.F.
Area of additional paving is 229' x 30' = 6870 S.F.

Ramp "D" :
Areas of ramps from the taper to the gore are similar. Difference is in the length and from gore
to end of taper are different.
Exist: Length of Ramp "D" to gore 420+99.02 – 400+00.00 = 2099 L.F.
Approx. area of paving from the gore to end of taper = 550' x (40+0/2) = 11000 S.F.
Area of paving (2099 x 30) + 11000 = 73970 S.F.
Proposed: Length of proposed loop 885+678+55 = 1618 L.F.
Approx. area of paving from the gore to the end of the deceleration taper =
[260 x (40+12/2)]+[500 x 12]+[100 x (12+0/2)] = 13360 S.F.
Area of paving (1618 x 30) + 13360 = 61900 S.F.
Reduced area of paving: 73970- 61900 = 12070 S.F.
Total difference in area of concrete paving: 12070 – 6870 = 5200 S.F./ 9 S.F./S.Y. = 578 S.Y.

330LB/SY 25 mm Superpave: 578 S.Y. x 330LB./S.Y. / 2000LB./Ton = 95 Tons

12" GAB: 578 S.Y.

Spring Bluff Rd. Relocation:
Current length of relocation from lane widening at the intersection to the tie in to the existing road: 722+00 – 704+00 = 1800L.F.
Area = 1800 x 24 = 43200S.F. / 9 S.F./S.Y. = 4800 S.Y.

165LB./S.Y. 12.5 mm Superpave: 4800S.Y. x 165Lb./S.Y. / 2000LB./Ton = 396 Tons
220LB./S.Y. 19 mm Superpave: 4800S.Y. x 220LB./S.Y. / 2000LB./Ton = 528 Tons
330LB./S.Y. 25 mm Superpave: 4800S.Y. x 330LB./S.Y. / 2000LB./Ton = 792 Tons
12" GAB: 4800 S.Y.
Reduce Earthwork: Assume 1' high [1 x (44 + 60 / 2)] / 27 C.F. / C.Y. = 3467 C.Y.
Concrete Median Barrier: 1120 L.F.

Double 6' x 4'Concrete Box Culvert:
(119L.F. x 1.049C.Y./L.F.) + 13.05 C.Y.(Wngwalls & Parapets) = 138 C.Y. Concrete
(119L.F. x 126.4LB./L.F.) + 306LB. (Wingwalls & Parapets) = 15348 LB.

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Rd. Interchange	ITEM No: EA-11
	Sheet 5 of 5

Horse Stamp Church Road:

Area = [260 x 24]+[420 x (24+36/2)]+[130 x 36]+[260 x 12]+[425 x (18+12/2)]+[300 x12]+ [4815 S.F.] = 41430 S.F. / 9 S.F./S.Y. = 4603 S.Y.

Area of shoulder paving = 810 x (6.5 x 2) = 10530 S.F. / 9 S.F./S.Y. = 1170 S.Y.

Total Paved Area = 4603 + 1170 = 5773 S.Y.

165LB./S.Y. 12.5 mm Superpave: 5773S.Y. x 165Lb./S.Y. / 2000LB./Ton = 476 Tons
220LB./S.Y. 19 mm Superpave: 5773S.Y. x 220LB./S.Y. / 2000LB./Ton = 635 Tons
330LB./S.Y. 25 mm Superpave: 4603S.Y. x 330LB./S.Y. / 2000LB./Ton = 760 Tons
12" GAB: 5773 S.Y.

DEVELOPMENT AND RECOMMENDATION PHASE

I-95/HORSE STAMP CHURCH ROAD INTERCHANGE

IDEA No.:	Sheet No.:	CREATIVE IDEA: 11 Ft. Lanes on Local Roads
T-1	1 of 3	

Prepared By: AS **Date: 2/5/09** **Checked By: RHC** **Date: 02/16/09**

Original Concept:

The baseline proposes to construct 12 ft. lanes on Horse Stamp Church Road, Spring Bluff Road and Horseshoe Cove Road.

Proposed Change:

The VE Team recommends the use of 11' lanes on these local roads. The center turn lane on Horse Stamp Church Road would remain 12' in width.

Justification:

This allows reducing the roadway section by 4 ft. on Horse Stamp Church Road and 2 ft. on Spring Bluff Road and Horseshoe Cove, resulting in a significant construction cost reduction. The VE Team believes that 11' lanes would be acceptable in this condition, particularly because opposing traffic on Horse Stamp Church Road would be separated.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$3,000,000		
- Proposed	$2,750,000		
- Savings	$250,000		$250,000
FUTURE COST – Savings			$0
TOTAL PRESENT WORTH SAVINGS			**$250,000**

COST WORKSHEET							
Project Name: **USE OF 11 FT. LANES INSTEAD OF 12 FT. LANES**					IDEA No: T-1		
					Sheet 2 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
COST OF 12 FT. LANE SECTION	LS			3,000,000			
COST OF 11 FT. LANE SECTION	LS						2,750,000
TOTAL				3,000,000			2,750,000
TOTAL ROUNDED				3,000.000			2,750,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Road Interchange	ITEM No: T-1
	Sheet 3 of 3

Cost of Paving 12 ft. lanes for HSCR (Excluding bridge) + Cost of Paving Spring Bluff Road and Horseshoe Cove

Asphalt Paving: $ 3,038,354.00 from estimate SAY $3,000,000

This is for 5 lanes of HSCR @ 12 ft. + 2 lanes of Spring Bluff Road and Horseshoe.

Total length of HSCR = 3220 lft. (5 lanes) + (1128+768) 3 lanes = 5116 lf

Spring Bluff Road = 2200 ft. (1100 ft 3lanes+ 1100 ft. 2 lanes)

Reduction in area . = 3220 ft X 4ft + 1896ft X 2 ft + 2200 ft X 2 ft = 21,072 sf

Total area of pavement:

= 3220 ft X12X 5 + 1896ft X12X 3 + 1100 ft X12X 3 + 1100 ft. X12X 2.
= 327,456 sq. ft.

% reduction : 21,072 / 327,456 = 0.083 X 100 % = 6.4%

COST SAVINGS = 6.4/100 x $ 3,000,000 = $ 192,000

SAY $250,000 to include Horseshoe, earthwork reduction, striping, etc.

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name: I-95 at Horse Stamp Church Rd. Interchange

IDEA No.:	Sheet No.:	CREATIVE IDEA: Eliminate The Two Additional Through Lanes on Horse Stamp Church Road.
T-4	1 of 3	

Prepared By: dpc Date: 02/04/09 Checked By: RHC Date: 02/16/09

Original Concept:

The proposed typical section of Horse Stamp Church Road between Horseshoe Cove and the realigned Spring Bluff Road calls for five lanes, two through lanes in each direction and a center turn lane or back-to-back left turn lanes.

Proposed Change:

The VE Recommendation would reduce the proposed typical section of Horse Stamp Church Road between Horseshoe Cove (STA 1042+98+/-) and the realigned Spring Bluff Road (STA 1010+78+/-) from five lanes to three lanes. Construct one lane in each direction and one center turn lane or back-to-back left turn lanes between the intersections, allowing the corridor to function within acceptable levels of service.

Justification:

2010 AADT for this section of the corridor is projected at 14,220 and 2030 AADT is projected at 23,800. These volumes do not justify the increase from two to four lanes of through traffic flow. This change would continue to provide the required functionality of the new interchange – access to I-95 - while significantly reducing construction and O&M costs.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$1,070,000		
- Proposed	$0		
- Savings	$1,070,000		$1,070,000
FUTURE COST – Savings		Significant	
TOTAL PRESENT WORTH SAVINGS			**1,070,000**

COST WORKSHEET							
Project Name: I-95 at Horse Stamp Church Road					IDEA No: T-4		
					Sheet 2 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST / UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
GAB, 12 inch, incl. mat.	SY	5,413	21.73	117,624			
Recyl Asph Conc 25 mm	TN	900	62.68	56,412			
Recyl Asph Conc 19 mm	TN	600	81.96	49,176			
Recyl Asph Conc 12.5 mm	TN	450	72.97	32,837			
Borrow Excavation	CY	10,220	10.00	102,200			
Thermoplastic Skip Traffic Stripe 5” white	GLF	574	.48	276			
Thermoplastic Solid Traffic Stripe 5” white	LF				574	.42	241.08
Conc. Approach Slab	SY	160	151.82	24,291			
Bridge SF Reduction	SF	6,888	100	688,800			
TOTAL				1,071,630			241.00
TOTAL ROUNDED				1,070,000			0

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Road Interchange	ITEM No: T-4
	Sheet 3 of 3

12 LF Wide Bridge width reduction calculation:

a. Bridge begins STA 1025+25 and runs to STA 1028+12 for a total length of 287 LF.
b. Roadway lane width = 12 LF.
c. 287 LF x 12 LF x 2 (EB & WB Lanes) = 6,888 SF

12 LF Wide Approach Slab length reduction calculation:

a. 30 LF plan approach slab x 12LF lane reduction width / 9 SY = 40 SY x 4 areas = 160 SY

12 LF Wide Roadway reduction calculation:

a. Eastbound additional lane reduction zones –
   STA 1011+00 to 1018+00 = 700 LF x 12 LF = 8,400 SF
   STA 1022+00 to 1024+95 = 295 LF x 12 LF = 3,540 SF
   STA 1028+42 to 1039+12 = 1,070 LF x 12 LF = 12,840 SF
b. Westbound additional lane reduction zones –
   STA 1015+00 to 1024+95 = 995 LF x 12 LF = 11,940 SF
   STA 1028+42 to 1031+ 42 = 300 LF x 12 SF = 3,600 SF
   STA 1036+00 to 1043+00 = 700 LF x 12 LF = 8,400 SF
c. Total lane length reduction = 4,060 LF x 12 LF = 48,720 SF
d. Total lane reduction = 5,413 SY

Asphalt SY to TON calculation:

a. 12.5 mm mix at 165 #/SY x 5,413 SY / 2,000 TN = 450 TN
b. 19 mm mix at 220 #/SY x 5,413 SY / 2,000 TN = 600 TN
c. 25 mm mix at 330 #/SY x 5,413 SY / 2,000 TN = 900 TN

Borrow Excavation calculation:

a. Roadway length is 4,090 LF
b. Embankment required -
   STA 1017+00 to 1019+00 = 200 LF x 24 LF wide x 2.5 LF avg. depth/27 = 444 CY
   STA 1019+00 to 1021+00 = 200 LF x 24 LF wide x 9 LF avg. depth/27 = 1,600 CY
   STA 1021+00 to 1025+00 = 400 LF x 24 LF wide x 10 FL avg. depth/27 = 3,555 CY
   STA 1028+42 to 1031+42 = 300 LF x 24 LF wide x 8 FL avg. depth/27 = 2,133 CY
   STA 1031+42 to 1035+42 = 400 LF x 24 LF wide x 6 FL avg. depth/27 = 2,133 CY
   STA 1035+42 to 1037+42 = 200 LF x 24 LF wide x 2.0 LF avg. depth/27 = 355 CY
c. Total CY = 10,220

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name: I-95 at Horse Stamp Church Rd. Interchange

IDEA No.:	Sheet No.:	CREATIVE IDEA: Grade for Five-Lane Section for Future Expansion- Pave Only Three Lanes
T-5	1 of 3	

Prepared By: dpc Date: 02/04/09 Checked By: RHC Date: 02/16/09

Original Concept:

The proposed typical section of Horse Stamp Church Road between Horseshoe Cove and the realigned Spring Bluff Road calls for five lanes, two through lanes in each direction and a center turn lane or back-to-back left turn lanes.

Proposed Change:

If the previous recommendation, T-4, cannot be implemented, The VE Team recommends that the Design Team reduce the proposed paved typical section of Horse Stamp Church Road between Horseshoe Cove (STA 1042+98+/-) and the realigned Spring Bluff Road (STA 1010+78+/-) from five lanes to three lanes. In this case, the Contractor would build the footprint to handle a future five-lane paved roadway if the traffic flow increases to a level to support a five lane section.

Justification:

2010 AADT for this section of corridor is projected at 14,220 and 2030 AADT is projected at 23,800. These AADT projections do not warrant an increase in capacity from two to four lanes of through traffic. However, if AADT does increase to a justifiable number, all that would have to be built is the pavement section. This recommendation would significantly reduce the construction and O&M costs of the project.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$970,000		
- Proposed	$0		
- Savings	$970,000		$970,000
FUTURE COST – Savings		Significant	
TOTAL PRESENT WORTH SAVINGS			**$970,000**

COST WORKSHEET							
Project Name: I-95 at Horse Stamp Church Road					IDEA No: T-5		
					Sheet 2 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
GAB, 12 inch, incl. mat.	SY	5,453	21.73	118,493			
Recyl Asph Conc 25 mm	TN	900	62.68	56,412			
Recyl Asph Conc 19 mm	TN	600	81.96	49,176			
Recyl Asph Conc 12.5 mm	TN	450	72.97	32,837			
Borrow Excavation	CY	0	10.00	0			
Thermoplastic Skip Traffic Stripe 5” white	GLF	574	.48	276			
Thermoplastic Solid Traffic Stripe 5” white	LF				574	.42	241.08
Conc. Approach Slab	SY	160	151.82	24,291			
Bridge SF Reduction	SF	6,888	100	688,800			
TOTAL				970,285			241.08
TOTAL ROUNDED				970,000			0

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95 at Horse Stamp Church Road	ITEM No: T-5
	Sheet 3 of 3

12 LF Wide Bridge width reduction calculation:

d. Bridge begins STA 1025+25 and runs to STA 1028+12 for a total length of 287 LF.
e. Roadway width if 12 LF.
f. 287 LF x 12 LF x 2 (EB & WB Lanes) = 6,888 SF

12 LF Wide Approach Slab length reduction calculation:

b. 30 LF plan approach slab x 12LF lane reduction width / 9 SY = 40 SY x 4 areas = 160 SY

12 LF Wide Roadway reduction calculation:

e. Eastbound additional lane reduction zones –
   STA 1011+00 to 1018+00 = 700 LF x 12 LF = 8,400 SF
   STA 1022+00 to 1024+95 = 295 LF x 12 LF = 3,540 SF
   STA 1028+42 to 1039+12 = 1,070 LF x 12 LF= 12,840 SF
f. Westbound additional lane reduction zones –
   STA 1015+00 to 1024+95 = 1,025 LF x 12 LF= 12,300 SF
   STA 1028+42 to 1031+ 42 = 300 LF x 12 LF = 3,600 SF
   STA 1036+00 to 1043+00 = 700 LF x 12 LF = 8,400 SF
g. Total lane length reduction = 4,090 LF
h. Total lane reduction = 5,453 SY

Asphalt SY to TON calculation:

d. 12.5 mm mix at 165 #/SY x 5,453 SY / 2,000 TN= 450 TN
e. 19 mm mix at 220 #/SY x 5,453 SY / 2,000 TN = 600 TN
f. 25 mm mix at 330 #/SY x 5,453 SY / 2,000 TN = 900 TN

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name: I-95 at Horse Stamp Church Rd. Interchange

IDEA No.:	Sheet No.:	CREATIVE IDEA: Construct Ramp Shoulders With Asphalt Instead of Concrete
T-6	1 of 3	

Prepared By: dpc Date: 02/04/09 Checked By: RHC Date: 02/16/09

Original Concept:

The proposed typical section of all exit / entrance ramps onto I-95 consists of a 16 LF wide single traffic lane flanked by a 4 LF full-depth inside shoulder and a 10 LF full-depth outside shoulder designed with a 12 inch GAB base + 330 # asphalt base + 12 inch plain class 3 concrete.

Proposed Change:

The VE Recommendation is to retain the full depth section across entire ramp width including both shoulders, but replace the top 12" of plain class 3 concrete with two layers of asphalt on the 10 LF outside shoulder. Leave the 16 LF wide ramp lane and inside shoulder as concrete.

Justification:

Anticipated truck use has been reported at 2%. The proposed full-depth 10 LF wide outside shoulder would stay unchanged with regard to functional width, but we can save cost without losing value with a material change from concrete to asphalt.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$450,000		
- Proposed	$200,000		
- Savings	$250,000		$250,000
FUTURE COST – Savings			$0
TOTAL PRESENT WORTH SAVINGS			**$250,000**

COST WORKSHEET							
Project Name: I-95 at Horse Stamp Church Road					IDEA No: T-6		
					Sheet 2 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
Recyl Asph Con. 12.5 mm	TN				651	72.97	47,503
Recyl Asph Conc 25 mm	TN				1,302	62.68	81,610
Recyl Asph Conc 19 mm	TN				869	81.96	71,223
Plain PC Conc Pavement, Class 3 - 12” thick	SY	7,889	57.00	449,673			
TOTAL				449,673			200,336
TOTAL ROUNDED				450,000			200,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Road Intersection	ITEM No: T – 6
	Sheet 3 of 3

RAMP A Calculation:

a. Remove 10 LF wide existing concrete shoulder from:
   STA 117+23 to 99+23 = 1,800 LF x 10 LF / 9 = 2,000 SY
b. Replace with layer of 25 mm asphalt – SY to TON calculation:
   25 mm mix at 330 #/SY x 2,000 SY / 2,000 TN = 330 TN
c. Replace with layer of 19 mm asphalt – SY to TON calculation:
   19 m mix at 220 #/SY x 2,000 SY / 2,000 TN = 220 TN
d. Replace with layer of 12.5 mm asphalt – SY to TON calculation:
   12.5 mm mix at 165 #/SY x 2,000 SY / 2,000 TN = 165 TN

RAMP B Calculation:

a. Remove 10 LF wide existing concrete shoulder from:
   STA 196+10 to 219+10 = 2,300 LF x 10 LF / 9 = 2555 SY
b. Replace with layer of 25 mm asphalt - SY to TON calculation:
   25 m mix at 330 #/SY x 2555 SY / 2,000 TN = 422 TN
c. Replace with layer of 19 mm asphalt – SY to TON calculation:
   20 m mix at 220 #/SY x 2555 SY / 2,000 TN = 281 TN
d. Replace with layer of 12.5 mm asphalt – SY to TON calculation:
   12.5 mm mix at 165 #/SY x 2555 SY / 2,000 TN = 211 TN

RAMP C Calculation:

a. Remove 10 LF wide existing concrete shoulder from:
   STA 317+50 to 305+50 = 1,200 LF x 10 LF / 9 = 1,333 SY
b. Replace with layer of 25 mm asphalt - SY to TON calculation:
   25 m mix at 330 #/SY x 1,333 SY / 2,000 TN = 220 TN
c. Replace with layer of 19 mm asphalt – SY to TON calculation:
   21 m mix at 220 #/SY x 1,333 SY / 2,000 TN = 147 TN
d. Replace with layer of 12.5 mm asphalt – SY to TON calculation:
   12.5 mm mix at 165 #/SY x 1,333 SY / 2,000 TN = 110 TN

RAMP D Calculation:

a. 10 LF wide reduction calculation:
   STA 421+00 to 403+00 = 1,800 LF x 10 LF / 9 = 2,000 SY
b. Replace with layer of 25 mm asphalt - SY to TON calculation:
   25 mm mix at 330 #/SY x 2,000 SY / 2,000 TN = 330 TN
c. Replace with layer of 19 mm asphalt – SY to TON calculation:
   22 m mix at 220 #/SY x 2,000 SY / 2,000 TN = 220 TN
d. Replace with layer of 12.5 mm asphalt – SY to TON calculation:
   12.5 mm mix at 165 #/SY x 2,000 SY / 2,000 TN = 165TN

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name: I-95 at Horse Stamp Church Rd. Interchange

IDEA No.:	Sheet No.:	CREATIVE IDEA: Reduce Paved Width of Shoulders on all Four Ramps.
T-9	1 of 3	

Prepared By: dpc Date: 02/04/09 Checked By: RHC Date: 02/16/09

Original Concept:

The proposed typical sections of all exit / entrance ramps onto I-95 consist of a 16 LF wide single traffic lane flanked by a 4 LF full-depth inside shoulder and a 10 LF full-depth outside shoulder. Full depth interpreted as 12" GAB + 330 # asphalt base + 12" plain class 3 concrete.

Proposed Change:

The VE Team recommends that the Design Team retain the full depth section across entire ramp width including both shoulder, but reduce the outside shoulder width from 10 LF to 6 LF.

Justification:

Anticipated truck use has been reported at 2%, and thus parking by trucks should not be a significant concern. It was noted that there are truck stops in the vicinity. The proposed 6 LF wide outside shoulder in conjunction with the 16 LF wide ramp lane would provide ample room for any mechanically challenged automobiles that may need temporary refuge, and for bypassing as necessary, and not alter the intended ramp function. A significant construction cost savings could be realized.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$310,000		
- Proposed	0		
- Savings	$310,000		$310,000
FUTURE COST – Savings			$0
TOTAL PRESENT WORTH SAVINGS			**$310,000**

COST WORKSHEET							
Project Name: I-95 at Horse Stamp Church Road					IDEA No: T-9		
					Sheet 2 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
GAB, 12 inch, incl. mat.	SY	1,270	21.73	27,598			
Recyl Asph Conc 25 mm	TN	528	62.68	33,095			
Borrow Excavation	CY	6,667	10.00	66,670			
Plain PC Conc Pavement, Class 3 - 12" thick	SY	3198	57.00	182,286			
TOTAL				309,649			
TOTAL ROUNDED				310,000			$0

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Road Interchange	ITEM No: T – 9
	Sheet 3 of 3

RAMP A:

d. 4 LF wide reduction calculation:
STA 99+23 to 113+23 = 1,400 LF = 622 SY

e. Asphalt SY to TON calculation:
25 mm mix at 330 #/SY x 622 SY / 2,000 TN = 103 TN

f. Borrow Excavation calculation:
STA 101+50 to 113+50 = 1,200 LF x 4 LF wide x 4 LF avg. depth = 711 CY

RAMP B:

d. 4 LF wide reduction calculation:
STA 196+00 to 219+00 = 2,300 LF = 1022 SY

e. Asphalt SY to TON calculation:
25 mm mix at 330 #/SY x 1022 SY / 2,000 TN = 168 TN

f. Borrow Excavation calculation:
STA 198+00 to 219+00 = 2,100 LF x 4 LF wide x 12 LF avg. depth = 3,733 CY

RAMP C:

a. 4 LF wide reduction calculation:
STA 316+50 to 301+50 = 1,500 LF = 666 SY

b. Asphalt SY to TON calculation:
25 mm mix at 330 #/SY x 666 SY / 2,000 TN = 110 TN

c. Borrow Excavation calculation:
STA 307+50 to 301+50 = 600 LF x 4 LF wide x 9 LF avg. depth = 800 CY

RAMP D:

d. 4 LF wide reduction calculation:
STA 421+00 to 401+00 = 2,000 LF = 888 SY

e. Asphalt SY to TON calculation:
25 mm mix at 330 #/SY x 888 SY / 2,000 TN = 147 TN

f. Borrow Excavation calculation:
STA 418+00 to 406+00 = 1,200 LF x 4 LF wide x 8 LF avg. depth = 1,423 CY

DEVELOPMENT AND RECOMMENDATION PHASE

I-95/HORSE STAMP CHURCH ROAD INTERCHANNNGE

IDEA No.:	Sheet No.:	CREATIVE IDEA: Widen Existing Bridge
B-3	1 of 4	

Prepared By: AS Date: 2/5/09 Checked By: RHC Date: 02/16/09

Original Concept:

The baseline concept is to replace the existing two lane structural steel bridge with a new 5-lane pre-stressed concrete beam bridge.

Proposed Change:

The VE Recommendation is to widen the two-lane existing structural steel bridge to a five lane section.

Justification:

The existing bridge has a sufficiency rating of 78, indicating a significant useful life remaining. This recommendation would retain this resource.

Widening the existing bridge would be feasible, particularly given the fact that the Horse Stamp Church Road will be closed during construction.

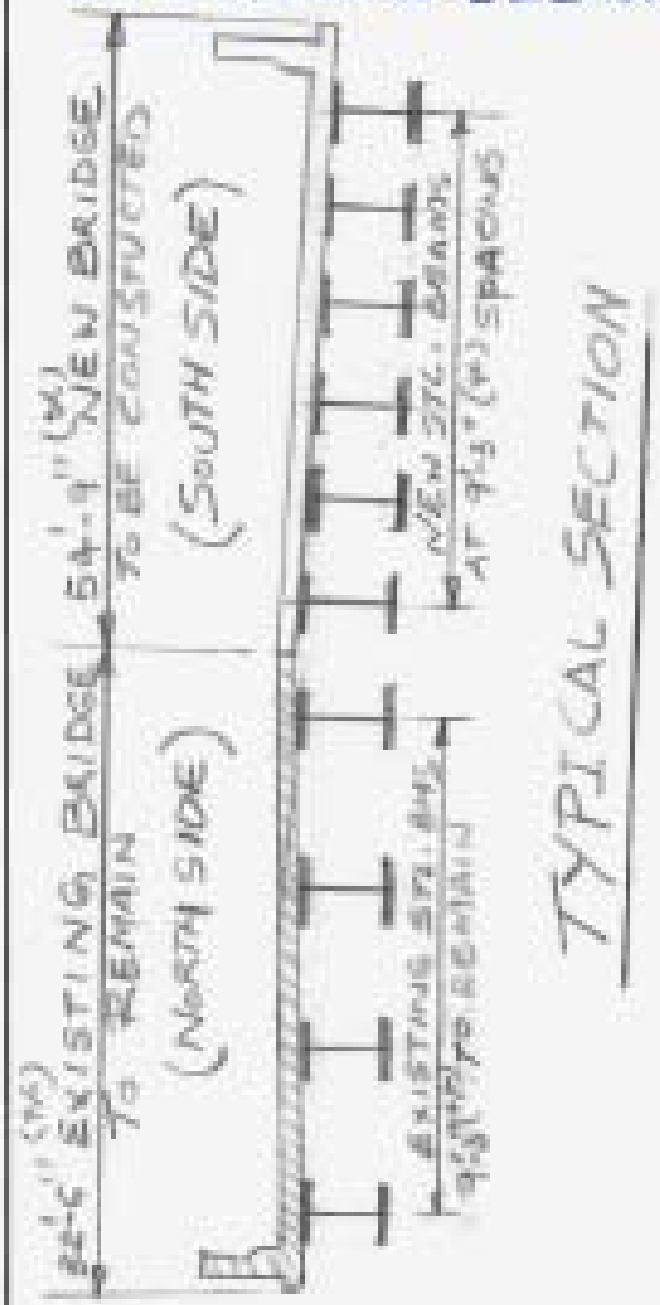
This change would yield a significant construction cost savings, including a reduction of required bridge length of 28'.

The cost of removing the existing bridge (not included in estimate or this recommendation) would be avoided..

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$2,650,000		
- Proposed	$1,930,000		
- Savings	$720,000		$720,000
FUTURE COST – Savings			$0
TOTAL PRESENT WORTH SAVINGS			**$720,000**

SKETCH

Project Name: I-95/ HORSE STAMP CHURCH ROAD INTERCHANGE	IDEA No: B-3
B-3 - WIDEN EXISTING BRIDGE WITH TEMP LANE (5-LANE SECTION)	Sheet 2 of 4



COST WORKSHEET							
Project Name: I-95/Horse Stamp Church Road Interchange					IDEA No: B-3		
					Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
NEW PSC BEAM BRIDGE	LS			2,650,000			
STEEL BRIDGE WIDENING	SF				14828	130	1,927,640
TOTAL				2,650,000			1,927,640
TOTAL ROUNDED				2,650.000			1,930,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Road Interchange	ITEM No: B-3
	Sheet 4 of 4

PSC Beam bridge = $ 2,650,000 Area = 287’ X 83’ = 23,893 sf = $111/sf

Structural steel bridge widening:
259 lf long X 57.25 ft wide = 14,828 sf X $ 130/SF (per Bridge Group) = $ 1,927,640

DEVELOPMENT AND RECOMMENDATION PHASE

I-95/HORSE STAMP CHURCH ROAD INTERCHANGE

IDEA No.:	Sheet No.:	CREATIVE IDEA: Use of TYPE III PSC BEAMS Instead of BT-54 BEAMS
B-4	1 of 3	

Prepared By: AS Date: 2/5/09 Checked By: RHC Date: 02/16/09

Original Concept:

The baseline concept is to use BT-54 bulb-Tee PSC beams for the proposed Pre-stressed Concrete Beam Bridge.

Proposed Change:

If the previous recommendation, B-3, cannot be implemented, the VE Team recommends the use of Type III AASHTO beams for the super structure of the new bridge.

Justification:

This change would allow a reduction of the profile by at least 9" which would reduce the fill required. Also, smaller girders would be easier to handle during the construction. This recommendation would result in a small cost saving for the beams and deck, not including potential savings from lowering the profile.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	$615,000		
- Proposed	$595,000		
- Savings	$20,000		$20,000
FUTURE COST – Savings			$0
TOTAL PRESENT WORTH SAVINGS			**$20,000**

COST WORKSHEET							
Project Name: **USE OF TYPE III PSC BEAMS INSTEAD OF BT-54 BEAMS FOR PROPOSED BRIDGE**					IDEA No: B-4		
					Sheet 2 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
NEW PSC BEAM BRIDGE BT-54	LF	2057	162.3	333,851			
NEW PSC BEAM BRIDGE TYPE III AASHTO	LF				2244	142.77	320,376
Bridge deck BT-54	CY	371.385	762	282,995			
Bridge deck PSC TP III	CY				358.795	762	273,402
TOTAL				616,846			593,778
TOTAL ROUNDED				615,000			595,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE	
Project Name: I-95/Horse Stamp Church Road Interchange	ITEM No: B-4
	Sheet 3 of 3

NEW PSC BEAM BRIDGE BT-54:

2057 LF X $ 162.3 = $ 333,851

NEW PSC BEAM BRIDGE TYPE III AASHTO

2244 LF X $ 142.77 = $ 320,376 (one additional girder line on center span only)

Bridge deck BT-54 - Use 7 3/8” thick slab

371.385 CY X $ 762.00 = $ 282,995

Bridge deck PSC TP III - Use 7 1/8” thick slab

358.795 CY X $ 762.00 = $ 273,402

APPENDIX

Sources

Approving/Authorizing Persons

Name:	Position:	Telephone:
Gerald Ross	Chief Engineer	
Ron Wishon	Manager, Engineering Services	

Personal Contacts

Name:	Telephone:	Notes:
Peng Zhang -MACTEC Traffic Engineer	770-421-3400	Review of traffic information
Stanley Kim - GDOT Bridge Group	404-631-1895	Steel bridge unit cost

Documents Used During Study

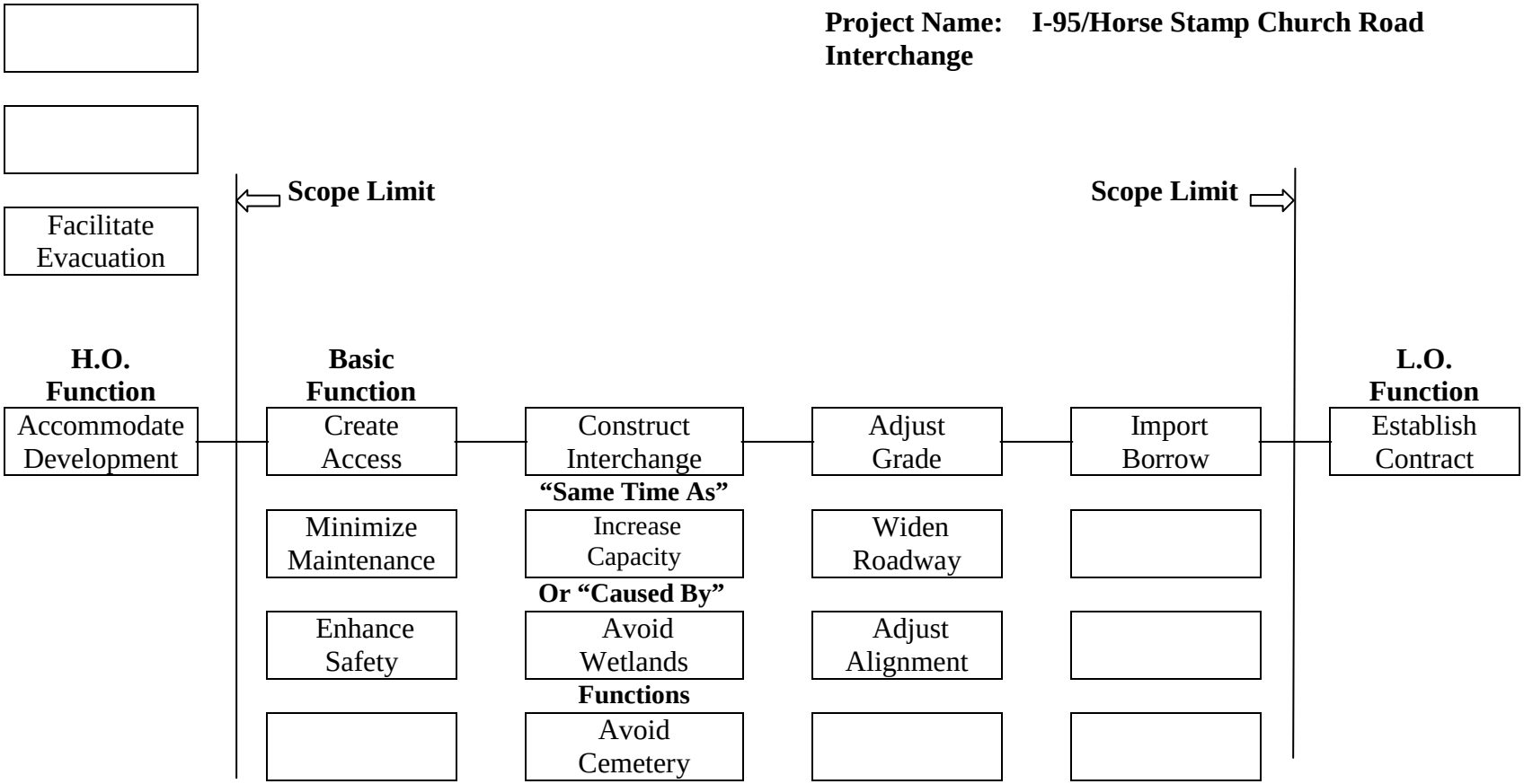
Document:	Source:
Preliminary Plans	Moreland Altobelli Associates – undated
Concept Report	GDOT March 2006
Cost Estimate	Moreland Altobelli Associates Sept, 2008
Aerial map and large scale plan	Moreland Altobelli Associates Feb, 2009

Cost Model / Distribution

Item	Description	$ Amount	% of Total Project
E	Earthwork	5,733,834	33
P	Pavement and Base	4,849,899	28
B	Bridge	2,773,530	16
TC	Traffic Control	1,618,837	9
D	Drainage	1,171,504	7
ER	Erosion Control	573,672	3
TR	Traffic Engineering Items	507,711	3
M	Miscellaneous	73,612	1
	TOTAL	**$17,302,599**	**100**
	Does not include Mobilization, E&C, R/W, Utilities		

F.A.S.T. DIAGRAM

Project Name: I-95/Horse Stamp Church Road Interchange



CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**ADVANTAGES/DISADVANTAGES**	**IDEA RATING**
	Earthwork/Alignment		
EA 1	Upgrade local roads in lieu of interchange`	Dropped in first cut	X
EA 2	Obtain developer financing	Dropped in first cut	X
EA 3	Reduce Design Speed on Horse Stamp Church	A– More flexibility in alignment design	DS
		A – Potential reduction in earthwork	
		D – Requires re-design effort	
EA 4	Realign Spring Bluff closer to existing alignment	A – Cost reduction	✓
		A – Less impact on wetlands	
		D – Moves intersection closer to ramp	
EA 5	Realign SB off ramp to existing Spring Bluff	A – Uses existing roadbed	✓
		A – Reduced impact on wetlands	
		D – Reduces distance between ramp and road	
		D – Would increase construction cost	
EA 6	Connect SB off ramp to new Spring Bluff Road	Dropped in first cut	X
EA 7	Use a loop for the NB off ramp	Dropped in first cut	X
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**ADVANTAGES/DISADVANTAGES**	**IDEA RATING**
EA 8	Move NB off ramp to the west to avoid wetland	A – Possibility of less impact on wetlands	X
		D – Shift would increase wetland impact in NW quadrant	
EA 9	Realign Horse Stamp Church Road to avoid wetland	Dropped in first cut	X
EA 10	Tighten up NB ramps	Dropped in first cut	X
EA 11	Change SB off ramp to a loop	A – Reduces impact to wetlands	✓
		A – Eliminates need to realign Spring Bluff	
		D – Requires re-design	
		D – Lower ramp design speed	
	Typical Section		
T 1	Use 11’ lanes on Horse Stamp Church Road	A – Reduces construction cost	✓
		A – 11’ lanes acceptable for local, low speed road	
		A – Opposing traffic will be separated	
T 2	Use a 12’ median	Dropped in first cut	X
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**ADVANTAGES/DISADVANTAGES**	**IDEA RATING**
T 3	Eliminate continuous turn lane	A – Construction cost reduction	X
		D – Refuge needed for ramp movements	
		D – Opposing traffic not separated – safety issue	
T 4	Eliminate additional two lanes	A – Significant construction and O&M reduction	✓
		A – Volumes in design year do not warrant	
		A – Center turn lane provides for ramp moves	
T 5	Grade for 5-lane; pave for three	A – Reduces construction and O&M cost	✓
		A – Plans for future need if it occurs	
		D – Unused footprint must be erosion protected	
T 6	Pave ramp shoulders with AC	A – Cost reduction; retain function	✓
		A – Ramp main lane is wide, truck volume low	
		D – May violate GDOT policy	
T 7	Change 3” base to 2”	Dropped in first cut	X
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**ADVANTAGES/DISADVANTAGES**	**IDEA RATING**
T 8	Reduce the width of the ramp through lanes	Dropped in first cut	X
T 9	Reduce the paved width of ramp shoulders	A – Reduces construction and O&M costs	✓
		A – Trucks parking not expected in this location	
		A – Ramp mainline is 16’ wide – room for	
		bypassing when needed.	
T 10	AC pavement on ramps	A – Significant reduction in construction cost	X
		D – Increase in O&M cost and effort	
		D – Violates department policy	
T 11	11’ lanes on Spring Bluff and Horseshoe	Combine with T 1	X
T 12	`Use an alternate base material	Dropped in first cut	X
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	**CREATIVE IDEA**	**ADVANTAGES/DISADVANTAGES**	**IDEA RATING**
	Bridge		
B 1	Widen bridge to four lanes, no turn lane	Dropped in first cut	X
B 2	Retain existing bridge and build a parallel bridge	Dropped in first cut	X
B 3	Widen existing bridge to the baseline typical section	A – Conserves resources; bridge is in good condition; vertical clearance is acceptable;	✓
		A – Significant construction cost reduction; avoid cost and impact of removing bridge	
		D – Bridge design cost would be lost; additional design cost required.	
B-4	Baseline bridge but use Type 3 AASHTO girders	A – Savings in bridge and roadway cost	✓
		A – Reduced borrow requirement	
		A – Facilitates constructability	
		D – Additional design cost required	
B 5	Widen existing bridge one lane for turn lane plus shoulders	A – same as B 3 plus additional construction savings	Add to T-4
		D – less capacity on roadway and bridge	
		D – only feasible with 3-lane roadway	
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			