

VALUE ENGINEERING TRAINING STUDY REPORT

SR 166 / US 27 Interchange Reconstruction

Project No. NH-017-1(22)
Carroll County
PI No. 621990
November 12, 2009

OWNER:



Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308
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VALUE ENGINEERING
INSTRUCTOR:



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Project No. NH-017-1(22)
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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

VALUE ENGINEERING TRAINING STUDY REPORT

SR 166 / US 27 Interchange Reconstruction

Project No. NH-017-1(22)
PI No. 621990

November 12, 2009

Study Background

This report presents the results of a value engineering (VE) study for the interchange improvements at US 27 over SR 166 in Carroll County. The study was conducted as part of a VE training session held for GDOT staff on October 19 to 23, 2009.

This existing section of US 27 has minimal room for left turns. During heavy traffic and peak hours this results in the 4-lane roadway functioning as a 2-lane road due to the left turn traffic utilizing the left lanes on the bridge. This project will widen each of the twin bridges to allow for left turn lanes to accommodate heavy left turn movements. The widening of the bridges will allow for longer storage lengths for the left turn queues. Additionally, the interchange ramps would be reconstructed and widened to match the new left turn lanes.

The estimated construction cost of the project is \$5,132,959, the R/W estimate is \$26,000 yielding a total project cost of \$5,158,959. On Monday, October 19, 2009, the design team gave an overview of the project to the VE team and on Friday, October 23, 2009, the VE Team presented their recommendations.

This report presents the VE 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 information about the project and the team. The **Recommendations** section presents a more detailed description and support information about each recommendation. The **Appendix** includes a complete record of the Team's activities and findings as well as the worksheets developed during the information, creative and evaluation phases of the study. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

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DEVELOPMENT PHASE - EXECUTIVE SUMMARY	
Project: US27/SR166 INTERCHANGE RECONSTRUCTION	Team: 3
Location: CARROLL COUNTY	Date: 10/22/2009

INTRODUCTION

This report presents the results of a value engineering (VE) study conducted for the proposed interchange reconstruction at US27/SR166 in Carroll County in West Georgia. This project is listed in the current Transportation Improvement Program General Work Program. The project will provide for ramp reconstruction and the widening of the US27 parallel bridges over SR166. This existing section of US27 has minimal room for left turns to SR166. During heavy traffic this results in the 4-lane roadway becoming a 2-lane roadway due to the left turn traffic encroaching onto the inside travel lane of each bridge. It is proposed in this project to widen each of the bridges to allow for dual left run lanes to accommodate heavy left turn movements. The widening of the bridges will allow for longer storage lengths for the left turn queue. Additionally, the interchange ramps would be reconstructed to match the additional left turn movements. This project will be reconstructed within the existing limits of the interchange.

This report presents the VE Team's recommendations and all supporting information, for consideration by the decision-makers. This Executive Summary includes a brief description of each recommendation. The Project Identification Section contains information about the project and the team. The Recommendation Section presents a more detailed description and supporting information about each recommendation.

CONSIDERATIONS

The project being evaluated in this study has an estimated construction cost of \$5,132,960 (not including right of way). The proposed right of way cost is \$26,000. The only constraint of the study was to maintain the existing footprint of the interchange. The project concept report has been approved.

RESULTS OBTAINED

Through the use of functional analysis and brainstorming techniques, the team generated 30 ideas with 14 being identified for additional evaluation as possible recommendations. The VE team developed 5 independent recommendations that have the potential to reduce the project by \$507,000. A summary of all recommendations are included in the report.

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DEVELOPMENT PHASE - SUMMARY OF COST SAVINGS						
Project: US27/SR166 INTERCHANGE RECONSTRUCTION					Team No.: 3	
Location: CARROLL COUNTY					Date: 10/22/09	
Idea No.	Creative Idea Description	Original Initial Cost	Proposed Initial Cost	Initial Cost Savings	Future Savings	Total Life Cycle Savings
A-3-1	DECREASE LANE & SHOULDER WIDTH – MAINLINE	\$2,477,000	\$2,047,000	\$430,000		
A-3-2	DECREASE LANE WIDTHS – RAMPS	\$306,000	\$239,000	\$65,000		
D-3	MODIFY TIMING – INTERCONNECT SIGNALS	0	\$98,000	(\$98,000)		
H-2	ELIMINATE FIELD OFFICE	\$74,000	0	\$74,000		
K-1	WIDEN RAMP C TO INSIDE	\$226,000	\$190,000	\$36,000		
			Total Savings	\$507,000		

STUDY IDENTIFICATION

VE-1

STUDY IDENTIFICATION

Project: US27/SR166 INTERCHANGE RECONSTRUCTION	Date: 10/19/09
Location: CARROLL COUNTY	

VE Team Members

Name:	Position:	Organization:	Telephone:
KEITH COLLINS	Urban Design	GDOT	404-631-1727
JONATHAN CRAIG	Urban Design	GDOT	404-631-1722
LATOYA JOHNSON	Transportation Engr	FHWA	404-562-4280
JOE KING	Bridge Design	GDOT	404-631-1913
CINDY POLLARD	Bridge Design	GDOT	404-631-1865
MELVIN WALDROP	District 7 Design	GDOT	770-986-1257
MATT BENNETT	Program Delivery	GDOT	912-271-7404

Project Description:

This project consists of widening of the twin bridge structures at US 27 over SR 166. The proposed construction will add dual left turn lanes to the inside of each of the two twin structures. The existing single left turn lanes start at the bridge ends and have insufficient storage lengths. This causes left turn traffic to extend back into the through lanes. Adding a second left turn lane for each direction and extending their storage length onto the bridge will alleviate this problem. Interchange ramps will be reconstructed to accommodate dual left turn movements.

Project Constraints:

Remain within current ROW footprint.

VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: US27/SR166 INTERCHANGE RECONSTRUCTION			
Idea No.: A-3-1	Sheet No.: 1 of 11	CREATIVE IDEA: DECREASE LANE & SHOULDER WIDTHS – MAINLINE	
Comp By: CP, JK & MW Date: 10/22/09 Checked By: MB & LJ Date: 10/22/09			
<p>Original Concept: The original concept proposes a typical section that includes 12-foot lanes and 12-foot inside and outside shoulders. To achieve this typical section, the existing parallel bridges would be widened and connected. The northbound and southbound lanes would be separated by a 16-foot median.</p> <p>Proposed Change: The proposed design recommends decreasing the lane widths to 11 feet. For the bridge, the inside shoulder width would be decreased to 5’-6” and the outside shoulder would be decreased to 8 feet. In this design the existing parallel bridges would remain and only widened approximately 16 feet to the inside. The new roadway design will include 11 foot lanes, 2 foot inside paved shoulder and 6 foot outside paved shoulder.</p> <p>Justification: By changing the original concept, the cost of widening the bridge would be reduced. Additionally, the quantities of asphalt and graded aggregate base items would be decreased.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$2,477,000		
Proposed	\$2,051,000		
Savings	\$426,000		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$426,000

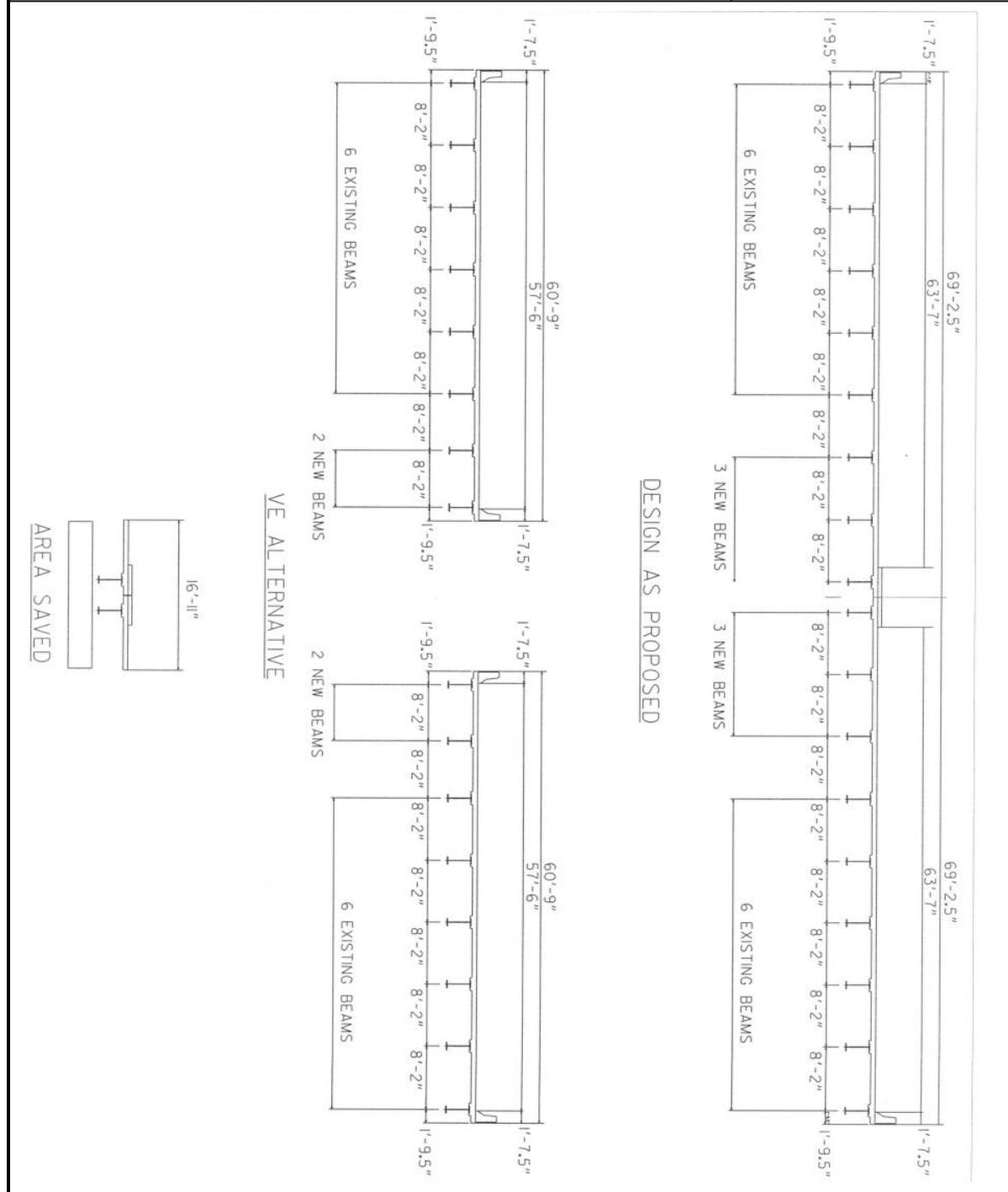
SKETCH

Project: US27/US166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-1

Client:: GDOT

Sheet 2 of 11



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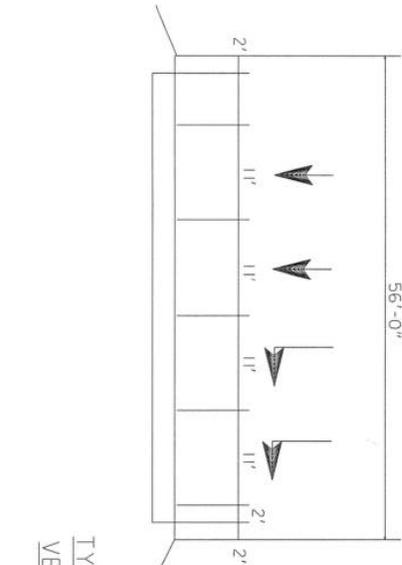
SKETCH

Project: US27/US166 INTERCHANGE RECONSTRUCTION

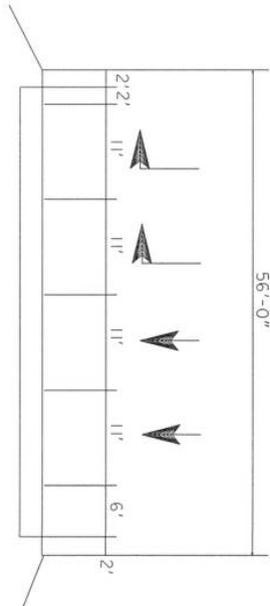
Idea No. : A-3-1

Client:: GDOT

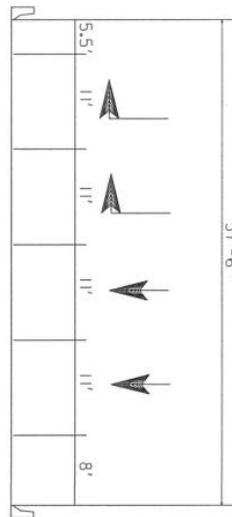
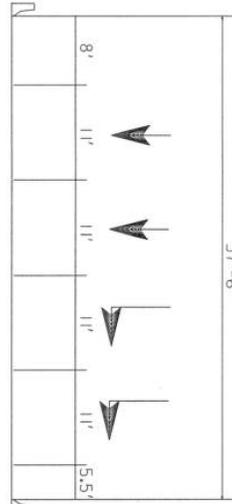
Sheet 3 of 11



TYPICAL SECTION
VE ALTERNATIVE
OFF BRIDGE



TYPICAL SECTION
VE ALTERNATIVE
AT BRIDGE



CALCULATIONS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-1
 Client:: GDOT
 Sheet 5 of 11

GROOVED CONCRETE

ROADWAY WIDTH	112 FT
LENGTH	292 FT
GROOVED WIDTH (RW - 4FT)	108 FT
AREA	31536 SQFT
	3504 SQYD
COST	\$4.19 PER SQYD
COST	\$14,681.76

COST OF ORIGINAL DESIGN \$12,060.00

SAVINGS -\$3,378.24

SUPERSTRUCTURE CONCRETE

DECK SAVED

WIDTH	19' 10"	=	19.83333333 FT
LENGTH	292'	=	292 FT
THICKNESS	7.5"	=	0.625 FT
VOL		=	3619.583333 CUFT
			134.058642 CUYD

MEDIAN SAVED

WIDTH	7' 11"	=	7.91666667 FT
LENGTH	292'	=	292 FT
THICKNESS	6"	=	0.5 FT
VOL		=	1155.833333 CUFT
			42.80864198 CUYD

TOTAL SUPERSTRUCTURE CONCRETE SAVED		COST OF CONCRETE (ITEM MEAN SUMMARY)
=	176.857284 CUYD	= \$665.31 PER CUYD

TOTAL COST AS PROPOSED
 = \$1,210,000.00

TOTAL CONCRETE AS PROPOSED (TOTAL COST AS PROPOSED / COST OF CONCRETE)
 = 1818.701057 CUYD

VE ALTERNATIVE TOTAL CONCRETE (TOTAL CONCRETE AS PROPOSED - TOTAL CONCRETE SAVED)
 = 1641.833773 CUYD

COST SAVED IN SUPERSTRUCTURE CONCRETE
 = \$117,671.57

CALCULATIONS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-1
 Client:: GDOT
 Sheet 6 of 11

BARRIER ADDED

LENGTH	=	584 LF
COST PER LF	=	\$39.86 PER LF
COST	=	\$23,278.24

TOTAL BARRIER FOR VE ALTERNATIVE	=	(LENGTH OF BRIDGE X 4)
	=	1168 LF

STRUCTURAL STEEL

SAVE 2 STEEL ROLLED BEAMS (AS WELL AS DIAPHRAGMS ASSOCIATED WITH)

TOTAL COST SUPERSTRUCTURE STEEL	=	\$268,800.00
TOTAL PROPOSED BEAMS	=	6

COST PER BEAM	=	\$44,800.00
---------------	---	-------------

AMOUNT SAVED	=	\$89,600.00
--------------	---	-------------

TOTAL STEEL USED IN VE ALTERNATIVE	=	(2/3 STEEL AS PROPOSED)
0.66 X 350000 LB	=	231000 lb

SUBSTRUCTURE CONCRETE

INTERMEDIATE BENTS

CAP WIDTH		3 FT
CAP LENGTH	19.5 FT	
CAP DEPTH	3 FT	
# BENTS	3	
VOL	526.5 CUFT	

END BENTS		
CAP WIDTH		3 FT
CAP DEPTH	2 FT	
LENGTH	17.5 FT	
# BENTS	2	
VOL	210 CUFT	

WING WALL		
LENGTH		11 FT
WIDTH	1 FT	
HEIGHT	6 FT	
# OF WINGS	4	
	264 CUFT	

CALCULATIONS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-1
 Client:: GDOT
 Sheet 7 of 11

TOTAL SUBSTRUCTURE CONCRETE SAVED

472.5 CUFT
 17.5 CUYD

TOTAL SUBSTRUCTURE CONCRETE USED IN VE ALTERNATIVE
 SUB CONCRETE USED IN PROPOSED - TOTAL CONCRETE SAVED
 368 CUYD - 17.5 CUYD = 350.5 CUYD

COST PER CUYD \$238 PER CUYD

SAVINGS COST \$4,165

SUPERSTRUCTURE REINFORCING STEEL

WE ARE USING A WIDTH OF 59.25' PER BRIDGE
 FOR A TOTAL OF 118.5' TOTAL

PROPOSED WIDTH IS 138.33' TOTAL

WE ARE USING 118.5'/138.33' OF STEEL
 = 0.856647148
 = 86%

TOTAL SUPER STEEL USED IN VE ALTERNATIVE
 86% OF USED IN PROPOSED
 0.86 x 280,000 lb
 = 240800 LB

TOTAL COST OF SUPERSTRUCTURE STEEL AS PROPOSED
 = \$605,000.00

ALTERNATIVE'S STEEL COST
 = \$520,300.00

SAVINGS = \$84,700.00

SUMMARY OF SAVINGS

-GROOVED CONCRETE	\$3,378.24
-SUPERSTRUCTURE CONCRETE	\$117,671.57
-SUPERSTRUCTURE REBAR	\$84,700.00
-BARRIER	-\$23,278.24
-SUPERSTRUCTURE STEEL	\$150,000.00
-SUBSTRUCTURE STEEL	\$4,165.35
TOTAL SAVINGS	\$352,658.68

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CALCULATIONS

Project: US27/US166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-1
 Client:: GDOT
 Sheet 8 of 11

SAVED WIDTH

11' LANES	8'	=	-40.34%
REDUCED SHOULDER	11' 10"	=	59.66%
TOTAL	19' 10"	=	100.00%

AS PROPOSED

VE ALTERNATIVE

GROOVED CONCRETE	\$ 18,060.00	\$ 14,680.00
SUPERSTRUCTURE CONCRETE	\$ 1,210,860.00	\$ 1,097,760.00
CONCRETE BARRIER	\$ 23,280.00	\$ 46,560.00
SUB CONCRETE	\$ 87,600.00	\$ 83,310.00
STR STEEL	\$ 756,500.00	\$ 505,890.00
SUPER REIN STEEL	\$ 268,800.00	\$ 231,170.00
	<u>\$ 2,375,100.00</u>	<u>\$ 1,979,370.00</u>

AMOUNT SAVED

JUST LANES

JUST SHOULDERS

GROOVED CONCRETE	\$ 3,380	\$ 1,363.36	\$ 2,016.64
SUPERSTRUCTURE CONCRETE	\$ 113,100	\$ 45,620.17	\$ 67,479.83
CONCRETE BARRIER	\$ (23,280)	\$ (23,280.00)	\$ (23,280.00)
SUB CONCRETE	\$ 4,290	\$ -	\$ -
STR STEEL	\$ 260,510	\$ -	\$ -
SUPER REIN STEEL	\$ 37,630	\$ 15,178.49	\$ 37,630.00
	<u>\$ 395,730</u>	<u>\$ 38,882.02</u>	<u>\$ 83,846.47</u>

TO MAXIMIZE THE VALUE OF THIS PROPOSAL BOTH LANES AND SHOULDERS MUST BE REDUCED.
 THIS ALLOWS THE REMOVAL OF 2 BEAMS PER SPAN.

CALCULATIONS

Project: US27/US166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-1
 Client:: GDOT
 Sheet 10 of 11

A3-1 Reduce Lane width on mainline
 Southside
 Reduction in paving quantities

Assumptions made: Paving on Mainline constitutes 25% of original paving quantities (Asphalt and GAB)

	Original	25% Cost		
Original Quantity =				
12.5mm	1701	425.25	74.31	31600.33
19mm	320	80	67.77	5421.6
25mm	960	240	59.47	14272.8
GAB	218	54.5	17.04	928.68
Original Cost of paving total mainline:				52223.41

Sta. 15+10.00 to 16+70.00 the out 7.5' of proposed full depth pavement

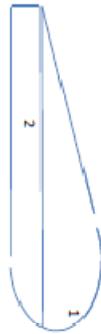
width	length	SY	inches	lb/SY	lb/ton	Cost	Total
2.5	160	9	1.5	110	2000	3.666667	74.31
							272.47
Total SY	44,444.44	12.5mm	3	110	2000	7.333333	67.77
							496.98
							12.27222
							59.47
							726.855556
							306.72
							1808.025556

Eliminate Median (north)

Original Quantity (Class A concrete CV)

83 \$238.02

\$19,755.66 Original Price



Approx (1)	Height	Length	Factor	Depth	Cubic Ft	CV
Approx (1)	24	160	0.5	0.5	960	35.5555556
Approx (2)	16	160	1	0.5	1280	47.40740741
Total Eliminated						82.96296296
Total Saved			@83			\$19,746.84

Total North and South Reductions:	5,186,306 Savings
New/Proposed Cost	47037.102
Total Concrete Savings	155 CV \$37,025.33

Total Eliminations	Price	Total Check
12.5mm	10,541.67	74.31
19mm	21,083.33	67.77
25mm	35,138.89	59.47
GAB	51,903	17.04
	5186,306 Savings Ck	783,3513
		1,428,818
		2,089,71
		884,4271
		5186,306 Savings Ck

CALCULATIONS

Project: US27/US166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-1
 Client:: GDOT
 Sheet 11 of 11

A3-1
 Mainline Proposed-reduce shoulder (Grading Complete)
 Proposed Shoulders
 6' Inside 8' Outside
 2' paved 6' paved
 4' total 8' total

Inside Shoulder Weighted Average
 Width Length Percent
 4 132 0.192701
 8 328 0.478832
 32 225 0.328467
 685

$$[(4(.19)+8(.48)+32(.33))/1.00] = 15' \text{ AVG}$$

Outside Weighted Average
 Width Pavement Depth
 12 21.5' 1.8'

Grading Complete Saved
 W L D Cubic ft. CV
 Inside 4 685 1 2740 101.4815
 Outside 4 685 0.75 2055 76.11111

Total @	177 CV
Cost	\$4,00
Savings**	\$708,00

A3-1
 Mainline Grading Complete-Reduce Lane Width
 Proposed Lanes = 4-12ft lanes 48'
 VE Proposed =4-11ft lanes 44'
 Saved GC 1"=685*2 1370 50,74074

Q	Cost	Total
Savings	50,74074	\$4,00
		\$202,96
		@ \$200**

**Includes tear out (excavation), borrow, dressing, and fine grading

VE-9A

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: US 27/SR166 INTERCHANGE RECONSTRUCTION			
Idea No.: A-3-2	Sheet No.: 1 of 4	CREATIVE IDEA: DECREASE LANE WIDTHS - RAMPS	
Comp By: MW Date: 10/22/09 Checked By: MB & LJ Date: 10/22/09			
<p>Original Concept: The original design used 12 foot lanes on all ramps.</p> <p>Proposed Change: The proposed design decreases the ramp lane widths to 11 foot.</p> <p>Justification: By changing the lane widths, cost savings would be achieved by decreasing the quantities for grading complete, asphalt and grade base aggregate. These changes are in accordance with the guidelines of the AASHTO A Policy on Geometric Design of Highways and Streets (The Greenbook).</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$306,000		
Proposed	\$239,000		
Savings	\$67,000		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$67,000

CALCULATIONS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-2
 Client:: GDOT
 Sheet 3 of 4

A3-2 Reduce Ramp Widths

SY required

	Ramp A	Ramp B	Ramp C	Ramp D	Total	Surfs
12.5mm	1809	920	1420	782	12.5mm	4931
19mm	333	560	217	293	19mm	1403
25mm	333	560	217	293	25mm	1403
GAB	333	560	217	293	GAB	1403

Type	SY	Depth	Spread	Tons
12.5mm	4931	1.5	110	406,807.5
19mm	1403	3	110	231,495
25mm	1403	5	110	385,825
GAB	1403	12	150	1252.7

Quantities Required for Ramps

Type	Unit Cost	Cost
12.5mm	74.31	30229.87
19mm	67.77	15688.42
25mm	59.47	22945.01
GAB	17.04	21516.41
Total		90379.7

Cost for Ramp Paving
 (Majority is Overlay)

Further investigation showed that reducing/proposing a 2' inside shoulder and 8' outside shoulder on the ramps will have additional cost due to increased quantities of asphalt and GAB. It is more beneficial to only reduce the lane widths.

Assumption: 75% of original asphalt and GAB quantities are dedicated to Ramp paving

CALCULATIONS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : A-3-2
 Client:: GDOT
 Sheet 4 of 4

GRADING COMPLETE - RAMPS / LANES

PROPOSED LANES - 12' - 2 LANES = 24'

VE PROPOSED - 11' - 2 LANES = 22'

SAVED :

$$1' \times 685' \times 2 = 1370 \text{ LF} = 50 \text{ CY}$$



50 CY @ \$4.00/CY = \$200.00

$$\begin{array}{r}
 \text{TOTAL} = \$700 \\
 \quad \quad \quad \$200 \\
 \quad \quad \quad \hline
 \quad \quad \quad \$900
 \end{array}$$

VE-9A

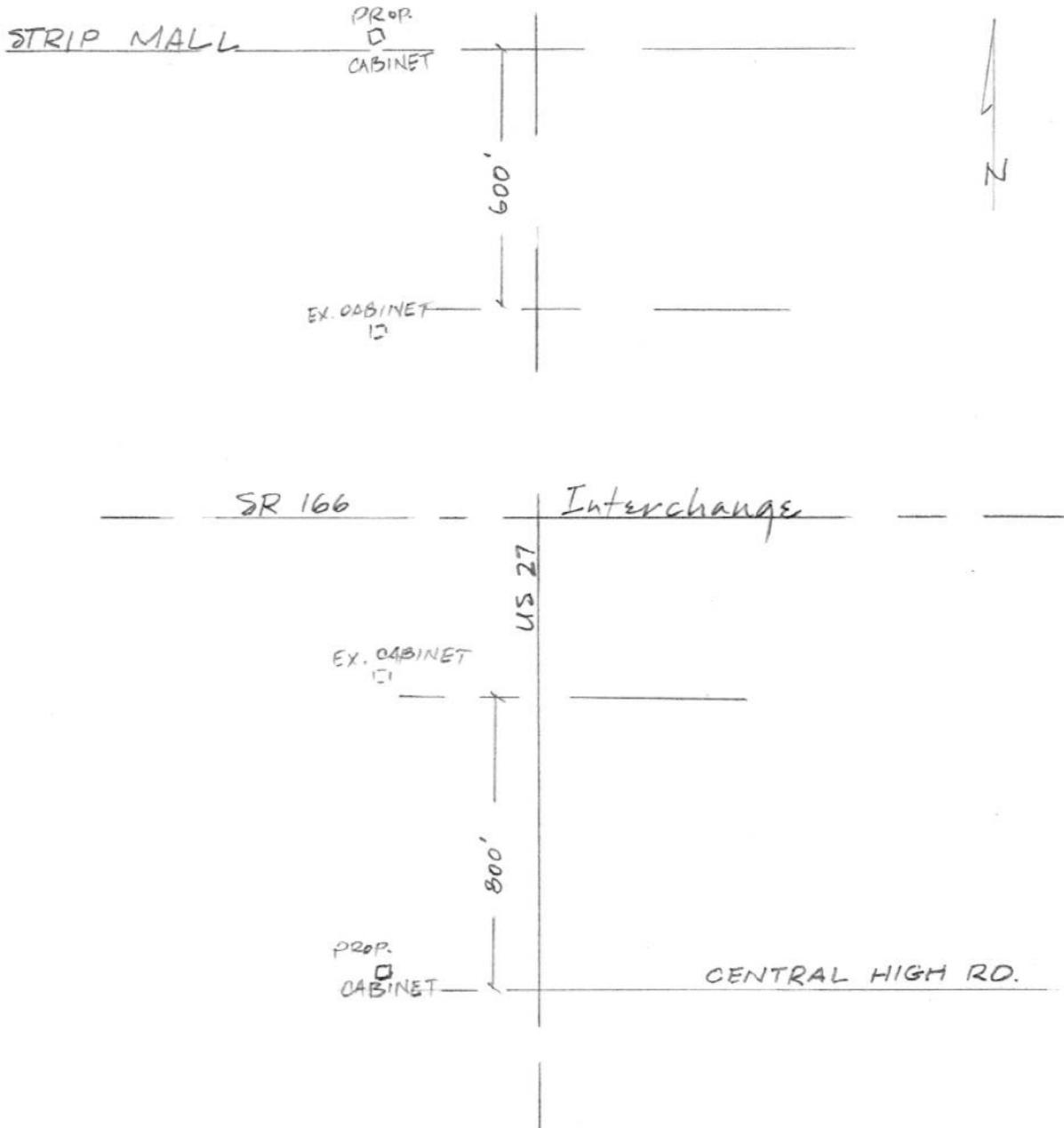
DEVELOPMENT AND RECOMMENDATION PHASE			
Project: US27/SR166 INTERCHANGE RECONSTRUCTION			
Idea No.: D-3	Sheet No.: 1 of 3	CREATIVE IDEA: MODIFY TIMING – INTERCONNECT SIGNALS	
Comp By: LJ	Date: 10/22/09	Checked By: MB & JTC	Date: 10/22/09
<p>Original Concept: The original design only called for interconnecting the signals at the ramps of the US27/SR166 interchange.</p> <p>Proposed Change: It is recommended that the signals at the ramps of the interchange be interconnected to the existing signals along US27 that are directly adjacent to the project. This would include interconnect for the signals at the entrance to the strip mall north of the project and Central High Road which is south of the project.</p> <p>Justification: By interconnecting adjacent signals on US27, traffic operations would be improved at the US27/SR166 interchange, therefore improving LOS, capacity and overall operations. This would better manage traffic demand that is currently concentrated at the interchange. This is a relatively low cost change that would increase capacity and traffic operations, which adds a higher value to the project for minimum cost increase.</p> <p>NOTE: In our analysis of the traffic signal items, we found additional quantities that could be eliminated by reusing existing materials. Upon verification with the project manager, it was determined that actual estimated cost for items related to the traffic signals was approximately \$55,000 instead of \$271,000.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	0		
Proposed	\$98,000		
Savings	(\$98,000)		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			(\$98,000)

VE-9B

SKETCH

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : D-3
Client:: GDOT
Sheet 2 of 3



VE-9A

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: US27/SR166 INTERCHANGE RECONSTRUCTION			
Idea No.: H-2	Sheet No.: 1 of 2	CREATIVE IDEA: ELIMINATE FIELD OFFICE	
Comp By: LJ Date: 10/22/09		Checked By: MB Date: 10/22/09	
<p>Original Concept: The roadway estimate includes an item for a Field Engineer’s Office. (See item no. 153-1300: Field Engineers Office TP3 - \$73,914.48)</p> <p>Proposed Change: Delete the Field Engineer’s Office. GDOT and contractor personnel will use local GDOT Maintenance office for all administrative and construction management activities.</p> <p>Justification: The change would reduce the project cost by approximately \$74,000. Additionally, it has been verified with the local GDOT area office that there is a maintenance facility located very close to the project limits. A field office will require 60-120 days to obtain clearances and permits and set-up temporary utilities. Because of the density of development near the site, suitable land area for the offices and vehicle parking may be difficult to locate in the vicinity of the project.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$74,000		
Proposed	0		
Savings	\$74,000		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$74,000

VE-19A

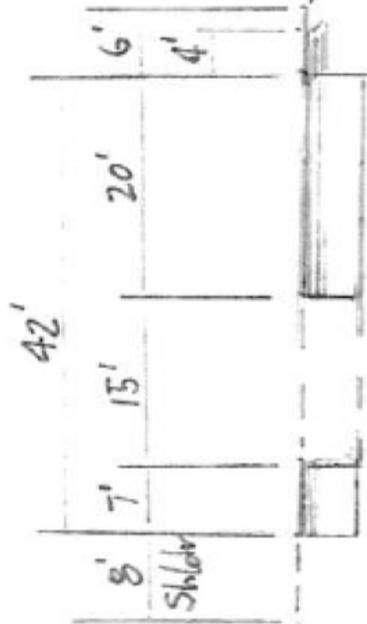
DEVELOPMENT AND RECOMMENDATION PHASE			
Project: US27/SR166 INTERCHANGE RECONSTRUCTION			
Idea No.: K-1	Sheet No.: 1 of 4	CREATIVE IDEA: WIDEN RAMP C TO INSIDE	
Comp By: JTC & KC Date: 10/22/09 Checked By: MB & LJ Date: 10/22/09			
<p>Original Concept: The current design of the westbound SR166 Off Ramp (Ramp C) proposes to widen the ramp to the outside of the interchange. This facilitates the need to acquire right of way.</p> <p>Proposed Change: The proposed change is to widen the westbound SR166 Off Ramp (Ramp C) to the inside of the interchange.</p> <p>Justification: By widening the ramp to the inside of the interchange, the need to acquire right of way is eliminated. Additionally, the quantities for grading complete (Item 210-0100) will be reduced because less grading will be required than in the original concept.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$226,000		
Proposed	\$190,000		
Savings	\$36,000		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$36,000

VE-9B

SKETCH

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : K-1
Client:: GDOT
Sheet 2 of 4



TYPICAL SECTION No. 16

RAMP C

STA 60+65.00 To STA 63+14.00

CALCULATIONS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Idea No. : K-1
 Client:: GDOT
 Sheet 4 of 4



392 S.F.

64 S.F.

STA. 62+50 WAS USED TO FIGURE
 AN AVERAGE FOR EARTHWORK
 392 S.F. SAVINGS.

- 64

328 S.F.

FOR EARTHWORK:
 USE AN AVERAGE OF 300 S.F. ROUNDED DOWN
 FROM STA. 61+50 TO STA. 64+00
 RAMP C @ WESTBOUND EXIT
 RAMP SR 166. TOTAL 250 LIN. FT.

$$300 \text{ S.F.} \times 250 \text{ LIN. FT.} = 75,000 \text{ S.F.}$$

$$= 2778 \text{ CU. YD.}$$

USE AN AVERAGE ROUNDED DOWN
 TOTAL = 2500 CU. YD.

APPENDIX

VE-2

INFORMATION PHASE - SOURCES
Approving/Authorizing Persons

Name:	Position:	Telephone:
Chandria Brown	Project Manager – GDOT	
Genetha Rice-Singleton	Director of Program Control	
Gerald Ross	Chief Engineer	

Personal Contacts

Name:	Telephone:	Notes:
Dan Bodycomb	770-980-6350	Cell # - 404-473-9879
Chandria Brown	404-631-1580	

Documents/Abstracts

Reference:	Notes:
Project Cost Estimate	
Project Concept Report	
R/W Cost Estimate	
Utility Cost Estimate	
Traffic Diagrams for Interchange	
100 Scale Layout	
200 Scale Layout	
Project Plan set	
GDOT Item Means Summary (6/09)	
AASHTO A Policy on Geometric Design for Highways and Streets (2004)	

VE-3

INFORMATION PHASE - COST MODEL
Project Name - US27/SR166 INTERCHANGE RECONSTRUCTION

Item	Description	\$ Amount	% of Total Project
A	WIDEN BRIDGE	\$2,596,507.56	50.33
B	REM OF PARTS OF EXIST BRIDGE	\$650,000.00	12.60
C	PAINT EXIST STEEL	\$620,000.00	12.02
D	TRAFFIC SIGNALS	\$271,807.12	5.27
80% LINE			80.22
E	PAVEMENT	\$232,758.79	4.51
F	TRAFFIC CONTROL	\$202,920.00	3.93
G	GRADING COMPLETE	\$200,000.00	3.88
H	MISC ROADWAY ITEMS	\$177,072.52	3.43
I	REINFORCED CONC APPR SLABS	\$121,640.10	2.36
J	TEMP. EROSOIN CONTROL	\$34,071.97	0.66
K	ROW	\$26,000.00	0.50
M	SIGNING & MARKING	\$22,703.23	0.44
L	PERM. EROSION CONTROL	\$3,478.17	0.07
\$5,158,959.46			

*	UTILITIES	\$842,482.00	
*	CST CONTINGENCY	\$257,000	
*	ENG & INSPECTION	\$257,000.00	
*	FUEL ADJUSTMENTS	\$100,000.00	
*	A/C ADJUSTMENTS	\$65,000.00	

VE-4

INFORMATION PHASE – FUNCTION ANALYSIS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Project Function: Increase Capacity

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	Worth	Comments
A	WIDEN BRIDGE	INCREASE	CAPACITY			
		WIDE	ROADWAY			
		INCREASE	SAFETY			
		REMOVING	CONFLICT	\$2,596,507	\$1,500,000	REDUCE WIDENING
B	REM PARTS OF EXIST BR	MAINTAIN	SAFETY			
		WIDEN	BRIDGE			
		IMPROVE	RIDE	\$650,000	\$650,000	
C	PAINT EXIST STEEL	PREVENT	CORROSION			
		IMPROVE	ASTHETICS	\$620,000	\$620,000	
D	TRAFFIC SIGNALS	FACILITATES	MOVEMENTS			SIGNALS ALREADY
		IMPROVES	SAFETY			CHANGED TO USE
		INFORMS	MOTORISTS	\$271,807 / \$55,457.00	\$204,000 / \$55,457.00	EXISTING EQUIP
E	PAVEMENT	ENHANCES	RIDE			INCL'S BASE
		WIDEN	ROADWAY	\$232,758	\$198,000	

INFORMATION PHASE – FUNCTION ANALYSIS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Project Function: Increase Capacity

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	Worth	Comments
F	TRAFFIC CONTROL	PROVIDES	SAFETY			FOR MOTORIST
		ALLOWS	CONSTR.	\$202,920	\$202,920	& WORKERS
G	GRADING COMPLETE	ACHIEVE	GRADE			WIDEN ROADWAY
		WIDEN	ROADWAY	\$200,000.00	\$170,000	
H	MISC ROADWAY ITEMS	CONSTRUCT	PROJECT			INCL'S DRAINAGE ITEMS, SAFETY
		DRAIN	PROJECT			FEATURES &
		PROVIDE	SAFETY	\$177,072.52		INCEDENTA L ITEMS.
I	REINF CONC APPR SLABS	WIDEN	ROADWAY			
		IMPROVE	RIDE			
		PROTECTS	BRIDGE	\$121,640.10	\$97,445	REDUCE WIDENING
J	TEMP. EROSOIN CONTROL	CONTROL	EROSION			
		PROTECT	ENVIRON	\$34,071.97	\$34,071.97	
K	ROW	PROVIDE	DRAINAGE			
		WIDEN	ROADWAY	\$26,000	\$26,000	

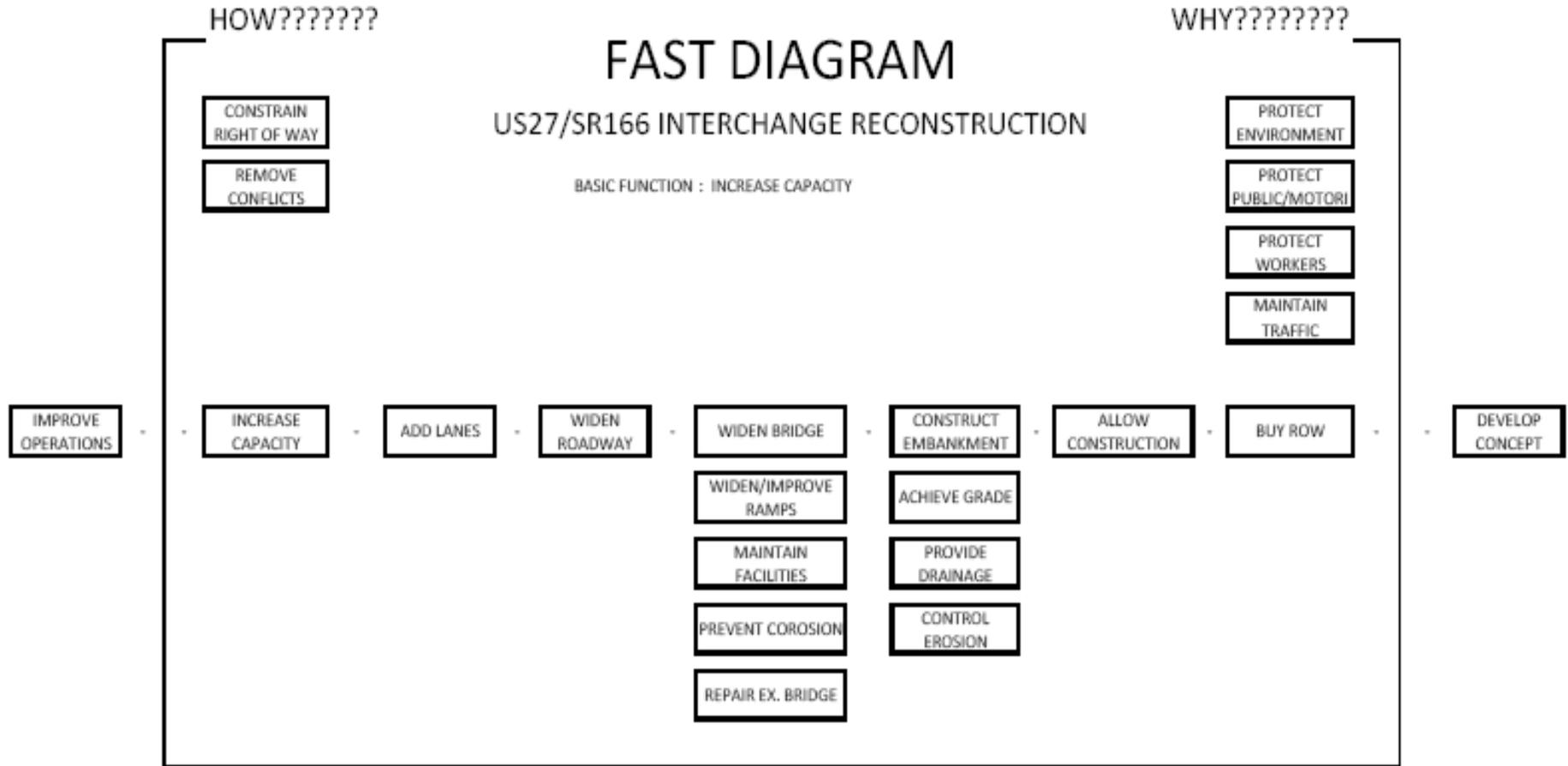
INFORMATION PHASE – FUNCTION ANALYSIS

Project: US27/SR166 INTERCHANGE RECONSTRUCTION

Project Function: Increase Capacity

ITEM	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
No.		Verb	Noun	Cost	Worth	Comments
L	SIGNING & MARKING	INFORM	MOTORISTS			
		IMPROVE	SAFETY	\$22,703.23	\$22,703.23	
M	PERM. EROSION CONTROL	CONTROL	EROSION			
		PROTECT	ENVIRON	\$3,478.17	\$3,478.17	

INVESTIGATION PHASE - FAST DIAGRAM



VE-6

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
A	BRIDGE WIDENING		
A-1	NEW SUPERSTRUCTURE	LOWER UNIT COST, MORE QUANTITY, LOW MAINTENANCE, ALLOWS FOR REMOVAL OF EXISTING BEAMS, REQU'S RAISING GRADE	5
A-2	SINGLE BRIDGE	ELIMINATE MEDIAN, FUTURE EXPANSION, NO PHYSICAL BARRIER, LOW COST SAVINGS, DECREASE LANE WIDTH	5
A-3	DECREASE LANE & SHOULDER WIDTH	LESS WIDENING, SAVE COSTS	9
A-4	USE EXISTING CONFIG & MAKE 2 LEFT TURNS W/ 1 THRU LANE	HIGH SAVINGS, SOLVES CURRENT PROBLEMS, POTENTIAL FOR OTHER PROBLEMS	5
B	BRIDGE REMOVAL		
B-1	PARTIAL FULL DEPTH SLAB REPL	SAVES COST, INVESTIGATION REQ'D	3
B-2	HYDRO-BLAST	SAVES COST, DOES NOT SOLVE COMPLETE PROBLEM	2
C	PAINT EXISTING STEEL		
C-1	ALT PAINT TYPE	SAVES INITIAL COST, RAISES LONGEVITY COSTS, INCREASE MAINTANCE COSTS	2

VE-6

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
D	TRAFFIC SIGNALS		
D-1	ROUND ABOUT	HIGH ROW COSTS, INCREASES SAFETY & OPERATIONS	2
D-2	LOOP RAMP	HIGH ROW COSTS, INCREASES SAFETY & OPERATIONS	2
D-3	REDO TIMING – INTERCONNECT	IMPROVES OPERATIONS, INCREASES CAPACITY, LOW COST	9
E	PAVEMENT		
E-1	MODIFY PAVEMENT STRUCTURE	SAVES INITIAL COSTS, ALLOW LOCAL AVAILABLE MAT'L, DECREASE LONGEVITY, INCREASE MAINTENANCE	2
E-2	DECREASE LANE WIDTHS	SAVES INITIAL COSTS, DECREASES DRIVER COMFORT	9
E-3	DECREASE SHLDR WIDTHS	SAVES INITIAL COSTS, DECREASES DRIVER COMFORT & ACCESS	6
F	TRAFFIC CONTROL		
F-1	ROAD CLOSURE / DETOUR	HIGH COMPLAINTS, HIGH BUSINESS IMPLACTS, SAFER, FASTER CONSTRUCTION,	2
F-2	ALTER STAGING / TEMP BARRIER	DECREASES QUANTITY, POTENTIAL TO SAVE COST BUT DECREASE SAFETY	5

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
G	GRADING COMPLETE		
G-1	RETAINING WALL	SAVES COSTS FOR ROW, GRADING COMPLETE, SAVES ACQUISITION TIME, BUT INCREASES CST COSTS SIGNIFICANTLY	5
G-2	SOIL STABLIZATION	ALLOWS FOR STEEPER SLOPES, LOW COST SAVINGS	3
H	MISC ROADWAY ITEMS	INCL'S DRAINAGE, GR & FIELD OFFICE	
H-1	REPLACE DITCHES W/ PIPE	REDUCES ROW & GRADING COMPLETE & INCREASES PIPE COST	6
H-2	ELIMINATE FIELD OFFICE	DECREASE COST, VERIFIED ALTERNATIVE LOCATION, INCREASES CEI INCONVENIENCES	9
I	APPROACH SLABS		
I-1	REDUCE THICKNESS	MINIMAL COST SAVINGS	3
I-2	USE ALTERNATIVE MAT'LS	MINIMAL COST SAVINGS	2
J	EROSION CONTROL	PERM & TEMP	
J-1	GRASS	LOW COST, HIGH MAINTENANCE	0
J-2	RECYCLE TOP SOIL	NONE – CURRENT SCT PRACTICE	0
J-3	TEXTILE	HIGHER COST, LESS MAINTENANCE	3
J-4	MATS	HIGHER COST, LESS MAINTENANCE	0

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
J-5	RIP RAP	NONE – NO APPLICATION	0
K	ROW		
K-1	WIDEN RAMPS TO INSIDE	ELIMINATES ROW COST, POSSIBLY INCREASES GRADING	7
K-2	PIPE ROW DITCH @ RAMP C	DECREASE ROW, GRADING COMPLETE, INCREASES CST COST	6
L	SIGNING & MARKING		
L-1	USE PAINT RATHER THAN THERMO/CONTRAST	LOWERS INITIAL COSTS, INCREASES MAINTENANCE COSTS	3
L-2	MAINTAIN & USE EXIST SIGNS	LOWERS INITIAL COSTS, MINIMAL COSTS	5