

VALUE ENGINEERING TRAINING STUDY REPORT

US 441 - Widening and Reconstruction

Project No. EDS-441(47)

Clinch County

PI No. 422420

November 12, 2009

OWNER:



Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308
(404.631.1770)

VALUE ENGINEERING
INSTRUCTOR:



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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

VALUE ENGINEERING TRAINING STUDY REPORT

US 441 - Widening and Reconstruction

Project No. EDS-441(47)

PI No. 422420

November 12, 2009

Study Background

This report presents the results of a value engineering (VE) study for the widening and reconstruction of US 441 from the intersection of SR 94 and SR 177 to a point 2,850 ft north of Williamsburg Road in Clinch County. The study was conducted as part of a VE training session held for GDOT staff on October 19 to 23, 2009.

The existing roadway consists of 2-12 foot lanes with rural shoulders and an urban section consisting of 2-20 foot lanes with curb and gutter and sidewalk within the City of Fargo. The existing major structures are 1) Suwannee River Overflow – 243' x 32' bridge with a sufficiency rating of 40 and 2) Suwannee River – 417' x 30' bridge with a sufficiency rating of 41. US 441 is a primary north-south corridor and is designated part of the Governor's Road Improvement Program (GRIP). As part of this program, the existing 2-lane road will be multi-laned. The proposed construction will provide a four lane roadway with a 32' depressed, grassed median from the beginning of the project to 1,000' south of the at-grade railroad crossing in Fargo. From there to the end of the project, the improvements will provide a 4-lane section with a 20' raised median and 5 foot sidewalks on both sides. New bridges will be constructed over the Suwannee River Overflow and the Suwannee River crossings.

The estimated construction cost of the project is \$17,180,816, the R/W estimate is \$3,612,500, and reimbursable utilities are \$99,450 yielding a total project cost of \$20,892,766. 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.

VE-11

DEVELOPMENT PHASE - EXECUTIVE SUMMARY	
Project: EDS00-0441-00(047)	Team: 1
Location: US 441 Near Fargo GA	Date: 10-22-09

Executive Summary

VALUE ENGINEERING STUDY

US 441/SR 89 WIDENING AND RECONSTRUCTION Clinch County

Introduction

This report presents the results of a value engineering (VE) study conducted on the proposed design for the US 441/SR 89 Widening and Reconstruction project in Clinch County near Fargo, Georgia. The project consists of widening and reconstructing US 441 from the intersection with SR 94 and SR 177 to north of Williamsburg Road for a total of 2.68 miles. US 441 is a primary north-south corridor and is part of the Governor's Road Improvement Program (GRIP) which stipulates that the existing two lane roadway be multilaned. The two existing bridge structures on this project have a low sufficiency rating and will be replaced. The proposed divided highway with depressed grass median on the southern end of the project will require the construction of double bridges across the Suwannee River and the Suwannee River Overflow to accommodate the new lanes. The grass median ends at a point 1000' +/- south of an at-grade railroad crossing in Fargo. Four lanes with a 4' flush median and urban section continue through town with sidewalks to the limits of the state park. From that point, there are four lanes with a 4' flush median to the end of the project.

The additional lanes will result in a 4 lane section which ties into a project at the northern terminus of this project. The additional lanes will improve capacity in this area and bring the highway into compliance with the GRIP requirements. Major contract work items include pavement, bridge replacement, right of way and earthwork. The total estimated cost of the project including right of way is \$20.9 million. The project is currently in final design phase. The study was conducted October 19-23, 2009 at the Georgia DOT General Office in Atlanta, using a 7 person 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 information about the project and the team. The **Recommendations** section presents a more detailed description and support information about each recommendation.

Considerations

The project being evaluated has an estimated construction cost of \$17.3 million. Project funding comes from both federal and state sources. The concept report has been approved. Environmental documents have been obtained.

Results Obtained

The VE team focused their efforts on the high cost items of the project. Using brainstorming techniques and functional analysis, the team generated 42 ideas with 8 being identified for additional investigation and evaluation as possible recommendations. The implementation of individual alternatives has the potential to reduce project costs by approximately \$2,066,000. A detailed write-up of each recommendation is contained in the appropriated section of the report. A summary of the recommendations and design suggestions follows.

Items to investigate:

The following items were noticed by the VE team. Recommend that designers investigate:

- Railroad owner not consistent throughout project documents: Georgia Southern and Florida Railroad, with only 2 trains per day versus Norfolk Southern Railroad with 24 class I trains per day.
- Typical sections do not match approved pavement design
- Quantities and estimate seem to be based on old typical section; need to update for 4-ft flush median
- Recommend revisiting local officials

VE-10

DEVELOPMENT PHASE - SUMMARY OF COST SAVINGS						
Project: EDS00-0441-00(047)					Team No.: 1	
Location: US 441 Near Fargo GA					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-1	Reduce lane widths	6,807,517	6,659,550	148,000		
A-2	Eliminate/reduce median width	336,211	126,346	210,000		
A-3	Reduce paved shoulder width	231,800	152,000	79,000		
A-5	Remove turn/auxiliary lanes	114,700	8,000	107,000		
B-3	Construct 1 wide bridge instead of 2 bridges	5,222,698	4,633,846	590,000		
B-9	Redesign T-beams to Type I (MOD)					
C-1	Reduce ROW/Utilize more easement	787,000	1500	786,000		
C-5	Reduce required ROW beyond const limits	145,824	0	146,000		
DS	Consider Roundabout at intersection of US 441/SR 94 at SR 177					

STUDY IDENTIFICATION

VE-1

STUDY IDENTIFICATION

Project: EDS00-0441-00(047), PI# 422420	Date: October 19, 2009
Location: CLINCH COUNTY (NEAR CITY OF FARGO), GEORGIA	

VE Team Members

Name:	Position:	Organization:	Telephone:
Jennifer Harris-Dunham	Bridge Engineer	GDOT-Bridge	4) 631-1897
Judy Meisner	Bridge Engineer	GDOT-Bridge	4) 631-1899
Vo Nguyen	Bridge Engineer	GDOT-Bridge	4) 631-1891
Charner Rodgers	Project Manager	GDOT-OPD	4) 308-3079
Larry Smith	Highway Engineer	GDOT	4) 631-1424
Ralph Volpe	Quality Specialist	FHWA	4) 562-3637
Sam Woods	Highway Engineer	GDOT-Road	4) 631-1628

Project Description

This project proposed to widen and reconstruct US 441 from the intersection with SR 94 and SR 177 to north of Williamsburg Road for a total of 2.68 miles. Existing typical section is a 2-lane road; outside of the City of Fargo it is a 2-lane rural road with 12-ft lanes, inside the City of Fargo, the typical is a 2-lane road with 20-ft lanes and urban shoulders. The proposed typical section will be a 4-lane roadway with a 32-ft depressed median and rural shoulders outside the city. Inside the city the typical section will change to a 4-lane urban typical with a 4-ft flush median. An existing at-grade rail crossing will remain. The design speed will vary from 45 mph to 65 mph. There are 2 existing bridge structures with sufficiency ratings of 40 and 41 respectively that will be replaced by this project. The design year (2027) traffic is 5,210. The northern terminus ties to a similar project EDS-41(48).

Project Constraints

There is a historic railroad in the City of Fargo in addition to many other historic resources. Project is also located near a National Wildlife Refuge. Northern terminus ties to another proposed project.

VE RECOMMENDATIONS

VE-9

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: EDS00-0441-00(047) CLINCH COUNTY			
Idea No.: A-1	Sheet No.: of	CREATIVE IDEA: Reduce lane width	
Comp By: RV	Date: 10-22-09	Checked By:	Date:
<p>Original Concept: Four (4) – Twelve (12) Foot Lanes</p> <p>Proposed Change: Decrease the inside travel lane in each direction by one (1) foot. The outside travel lane will remain as proposed with a 12' lane in each direction.</p> <p>Justification: This is a G.R.I.P project. The design speed is 45 mph with low traffic volumes and low posted speeds. Existing 2 lanes work fine with current capacity. With additional 2 lanes, capacity will significantly increase. Therefore, by eliminating 1' in each direction will not harm future travel demand nor jeopardize the safety issue.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$6,807,517		
Proposed	\$6,659,550		
Savings	\$148,000		
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			\$148,000

VE-9C

CALCULATIONS

Project: EDS00-0441-00(047) CLINCH COUNTY

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

Length of project to reduce travel lanes by one (1) feet in each direction = 13,858.5 ft.
 (Station 120+00.00 to 258+58.47)

Remove structure length = 726 ft;
 Net length = 13,132.5 ft.

Reduce travel lane width from 24' to 23'. 95.8% of original travel lane width remains.

Since capacity improvement of US-441 widening project represents 94.3% of total project, the following calculations (based on units) were used to justify the new estimate:

<u>Pay Item</u>	<u>Unit</u>	<u>Cost/Unit</u>	<u>Original</u>	<u>US-441</u>	<u>2' Reduction</u>	<u>New Estimate</u>
GAB	Ton	\$17.04	126,210	119,016	109,102	115,697
Rec. Asph Conc. Level	Ton	66.70	11,660	10,995	10,079	10,688
25mm Superpave	Ton	59.47	39,500	37,249	34,146	36,210
12.5mm Superpave	Ton	64.13	9,860	9,298	8,524	9,039
19mm Superpave	Ton	67.77	13,139	12,139	11,128	11,800
Bitum. Tack Coat	GL	2.00	3,680	3,470	3,181	3,373

VE-9

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: EDS00-0441-00(047) CLINCH COUNTY			
Idea No.: A-2	Sheet No.: of	CREATIVE IDEA: Eliminate/Reduce median width	
Comp By: VN		Date: 10-22-09	
Checked By:		Date:	
<p>Original Concept: 32' depressed median</p> <p>Proposed Change: 4' flush median in rural section and no median in urban section</p> <p>Justification: This is the G.R.I.P project. The design speed is 45 mph and really low volume of traffic. Existing 2 lanes work fine with current capacity. With additional 2 lanes, capacity will be significantly reduced. Therefore, eliminate or reduce the median will not jeopardize the safety issue. However, this will be a significant reduction of cost for ROW and Earth Work.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$336,211		
Proposed	\$126,346		
Savings	\$210,000		
FUTURE COST: Savings			0
TOTAL PRESENT WORTH SAVINGS			\$210,000

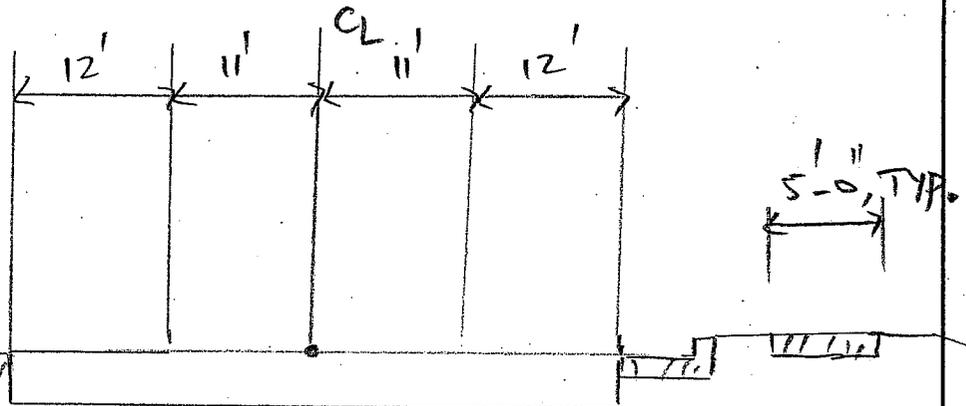
SKETCH

Project: EDS00-0441-00(047)

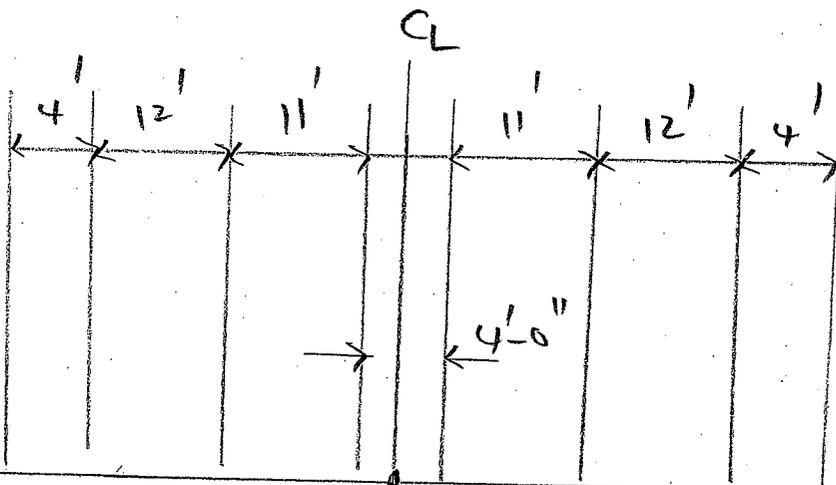
Idea No.:
Client: A-2
GDOT

ORIGINAL - 4-12' LANES WITH 32' MEDIAN.

PROPOSE



STA 163+00 TO STA 213+00
NO 4' FLUSH MEDIAN.



STA. 126+00 TO STA 163+00
STA 213+00 TO STA 258+59.51.
4'-0" FLUSH MEDIAN.

CALCULATIONS

Project: EDS00-0441-00(047)

Idea No.: A-2
Client: GDOTORIGINAL

32'-0" DEPRESSED MEDIAN FROM

STA. 120+00 TO STA 139+50

STA. 142+30 TO STA 150+68

STA. 153+14 TO STA 163+60.00

STA 251+74.4 TO STA 258+59.51

$$\Rightarrow \text{AREA} = 4320 \times 32 = 138240 \text{ FT}^2$$

$$= 15360 \text{ YD}^2$$

4'-0" FLUSH MEDIAN.

STA. 163+60 TO STA. 242+35.00

$$\Rightarrow \text{AREA} = 7875 \times 4 = 31500 \text{ FT}^2 = 3508 \text{ YD}^2$$

PROPOSED

- NO DEPRESSED MEDIAN.

- 4'-0" FLUSH MEDIAN.

$$\text{AREA} = 8259.51 \times 4' = 33038 \text{ FT}^2 = 3670 \text{ YD}^2$$

ASSUME ROW THAT $\frac{1}{3}$ IS COMMERCIAL.AND $\frac{2}{3}$ IS RESIDENTIAL

CALCULATIONS

Project: EDS-0441-00(047)

Idea No.: A-2
Client: GDOT⇒ COST OF ROW PER YD²

$$\left[8,100,000 \times \frac{1}{3} + \frac{2}{3} \times 20,000 \right] / 43,560$$

$$= \$1.07 / \text{FT}^2 = \$9.64 / \text{YD}^2$$

AREA OF EARTH WORK REDUCE

$$15360 + 3500 - 3670 = 15190 \text{ YD}^2$$

* AVERAGE DEPTH OF EARTH WORK THROUGHOUT

PROJECT - ASSUME 5'-0" DEPTH

$$\Rightarrow \text{VOLUME} = 15190 \times \frac{5}{3} = 25316 \text{ YD}^3$$

VE-9

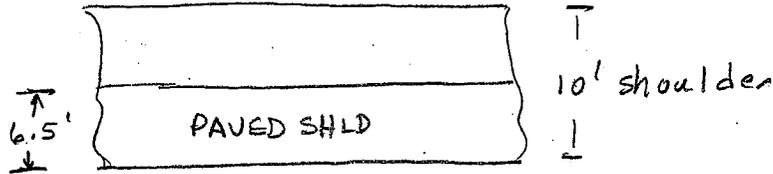
DEVELOPMENT AND RECOMMENDATION PHASE			
Project: EDS00-0441-00(047)			
Idea No.: A-3	Sheet No.: of	CREATIVE IDEA: Reduce Paved Shoulder Width	
Comp By: LS		Date: 10-22-09	
		Checked By: Date:	
<p>Original Concept:</p> <p>Original concept proposed 6.5 ft. paved shoulders.</p> <p>Proposed Change:</p> <p>The proposed change is to reduce the paved shoulder width to 4.0 ft.</p> <p>Justification:</p> <p>This is a GRIP project with low traffic volumes (2007 ADT 3250 and 2027 ADT 5210) and low posted speeds. Reducing the paved shoulder width will reduce the asphalt and GAB quantities while maintaining an adequate paved shoulder. The 10 ft overall shoulder width is not changing.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$230,800		
Proposed	\$152,000		
Savings	\$79,000		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$79,000

SKETCH

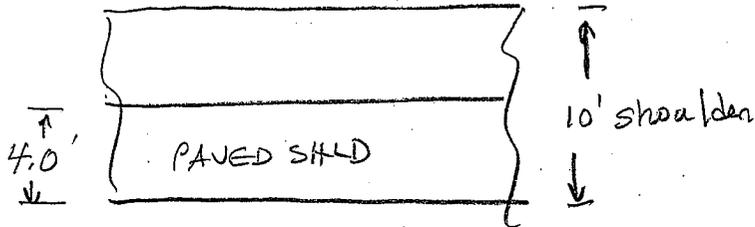
Project: EDS00-0441-00(047)

Idea No.: A-3
Client: GDOT

ORIGINAL



PROPOSED



CALCULATIONS

Project: EDS00-0441-00(047)

Idea No.: A-3
Client: GDOT

CALCULATIONS FOR ASPHALT FOR PAVED SHOULDERS

Determine linear feet of paved shoulder :

STA	LF
39+00 to 50+00	1100
103+50 to 139+50	3600
142+30 to 150+68	838
155+14 to 163+60	846
213+00 to 242+35	2935

TOT 9319 LF ea side

$\times 2$
18638 LF of paved shoulder

For 6.5' Paved Shoulder

$$\begin{array}{r} 18638 \text{ FT} \\ \times 6.5 \text{ FT} \\ \hline 121,147 \text{ SF} \end{array}$$

CONVERT TO SY @ 9SF/SY

$$121,147 / 9 = 13,461 \text{ SY}$$

Per Typical section

Paved shoulder 12.5 mm, 135#/SY Asphalt =
19 mm, 220#/SY Asphalt
6 in. GAB

$$\begin{array}{r} 12.5 \text{ mm} \\ 13,461 \times 135 = 908 \text{ TNS} \\ \hline 2000 \end{array}$$

$$\begin{array}{r} 19 \text{ mm} \\ 13,461 \times 220 = 1480 \text{ TNS} \\ \hline 2000 \end{array}$$

For 4.0' Paved Shoulder

$$\begin{array}{r} 18,638 \text{ FT} \\ \times 4.0 \text{ FT} \\ \hline 74,552 \text{ SF} \end{array}$$

$$74,552 / 9 = 8,284 \text{ SY}$$

$$\begin{array}{r} 12.5 \text{ mm} \\ 8,284 \times 135 = 559 \text{ TNS} \\ \hline 2000 \end{array}$$

$$\begin{array}{r} 19 \text{ mm} \\ 8,284 \times 220 = 911 \text{ TNS} \\ \hline 2000 \end{array}$$

CALCULATIONS

Project: EDS00-0441-00(047)

Idea No.: A-3
Client: GDOT

CALCULATIONS FOR GAB

TYPICAL SECTION \Rightarrow 6" GAB
140#/CF

FOR 6.5' Paved Shoulder

FOR 4.0' Paved Shoulder

$$\begin{array}{r} 121,147 \text{ SF} \\ \times 0.5 \text{ FT (6" Depth)} \\ \hline 60,574 \text{ CF} \end{array}$$

$$\begin{array}{r} 74,552 \text{ SF} \\ \times 0.5 \text{ FT (6" Depth)} \\ \hline 37,276 \text{ CF} \end{array}$$

$$\frac{60,574 \times 140}{2000} = 4240 \text{ TNS}$$

$$\frac{37,276 \times 140}{2000} = 2610 \text{ TNS}$$

NOTE: There is some inconsistency in the Asphalt surface layer - The Typical Sections & Detailed Estimate indicates 9.5 mm - The CONSTRUCTION COST ESTIMATE (DET) and the Pavement Design Recommendations indicates 12.5 mm.

VE-9

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: EDS00-0441-00(047)			
Idea No.: A-5	Sheet No.: of	CREATIVE IDEA: Reduce Turning/Auxiliary Lanes	
Comp By: LS		Date: 10-22-09	
Checked By:		Date:	
<p>Original Concept:</p> <p>Original concept proposes eyebrows and auxiliary lanes.</p> <p>Proposed Change:</p> <p>The proposed change is to eliminate three (3) eyebrows and one (1) continuous right turn lane, and to reduce the length of one (1) right turn lane.</p> <p>The eyebrows being eliminated are at the following locations: two (2) at Riverside Avenue and one (1) at 2nd Avenue.</p> <p>The continuous right turn lane being eliminated is from approximately station 179 + 00 to 186 + 50 (SB lane).</p> <p>The right turn lane being reduced is NB at Williamsburg.</p> <p>Justification:</p> <p>This is a GRIP project with low traffic volumes (2007 ADT 3250 and 2027 ADT 5210) and low posted speeds. Turning volumes are low at most of the sidestreets and u-turns movements are low or not allowed. Reducing the auxiliary lanes will reduce the asphalt and GAB quantities, reduce required Row, and reduce earthwork.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$114,700		
Proposed	\$8,000		
Savings	\$107,000		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$107,000

VE-9B

COST WORKSHEET							
Project: EDS00441-00(047)					Idea No.: A-5 Client:: GDOT Sheet of		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Asphalt							
12.5 mm	TN	135	\$64.13	\$8,658	0		0
19 mm	TN	220	\$67.77	\$14,910	0		0
25 mm	TN	440	\$59.47	\$26,167	0		0
GAB							
	TN	844	\$17.04	\$14,382	0		0
ROW							
Commercial	AC	0.41	\$100,000	\$41,000	0		0
Earthwork							
Borrow Excavation	CY	3200	\$2.98	\$9,536	0		0
Subtotal:				\$114,653	0		0
Mark-up (7 %)							\$8,025
Total							
Total Rounded				\$114,700			\$8,000

CALCULATIONS

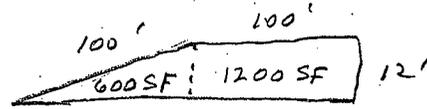
Project: EDS00-0441-00(047)

Idea No.: A-5
Client: GDOT

GAB = 8"

Reduce Auxiliary Lanes

Each Eyebrow = 1800 SF



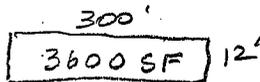
Remove (3) Eyebrows

(2) at Riverside Ave.
(1) at 2nd Ave.

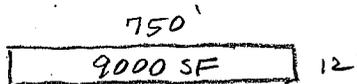
3 eyebrows x 1800 SF/eyebrow
= **5400 SF** Full Depth Asphalt

Reduce RT TURN Lane NB at Williamsburg Rd.

From 500 FT to 200 FT ⇒ Reduce 300 FT



Eliminate continuous RT TURN LN SB from Levinston Ave
to CR 6 ≈ STA 179+00 to 186+50 ⇒ 750'



All the Aux Ln Reduction is in R&R ROW section
Reduce ROW by ≈ 18000 SF

TOTAL SF Reduction = 18000 SF = 2000 CY

$$\frac{2000 \times 135}{2000} = 135 \text{ TN}$$

$$\frac{2000 \times 220}{2000} = 220 \text{ TN}$$

$$\frac{2000 \times 440}{2000} = 440 \text{ TN}$$

$$\text{GAB } 18000 \text{ LF} \times 0.67 \text{ FT} = 12060 \text{ CF}$$

$$12060 \text{ CF} \times 140 \text{ \#/CF} = 168,840 \text{ lbs} = 844 \text{ TN}$$

2' FILL FOR 750' RT TURN 750' x 12' x 2' = 18000 CF = 2000 CY } SAVE
3' FILL FOR 300' RT TURN REDUCTION 300' x 12' x 3' = 10800 CF = 1200 CY } 3200 CY
EARTHWORK

DEVELOPMENT AND RECOMMENDATION PHASE

Project: EDS-441(47) CLINCH COUNTY

Idea No.: B-3	Sheet No.: of	CREATIVE IDEA: To construct two wide single bridges
-------------------------	-------------------------	---------------------------------------------------------------

Comp By: JH-D Date: 10-22-09 Checked By: Date:

Original Concept:

To replace existing bridges 1 and 2 with double bridges. (4 total bridges)

Proposed Change:

To replace existing bridges 1 and 2 with single bridges. (2 total bridges)

Justification:

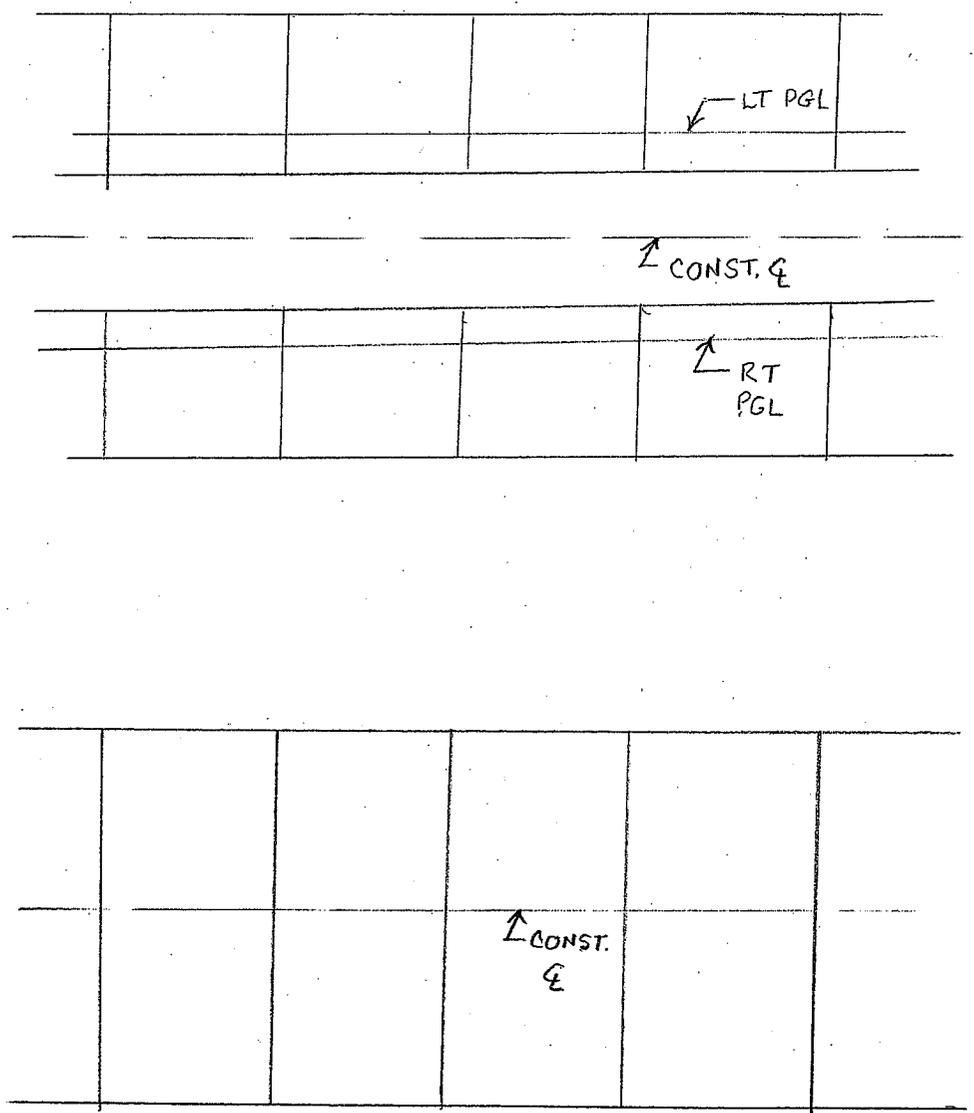
Traffic volume in the GRIP corridor (3250 ADT for 2007 and 5210 ADT for 2027) does not warrant the use of two double bridges nor does the design speed.
The proposed change to single bridges, carrying four lanes of traffic, will generate significant cost savings and match the proposed roadway typical section.

LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	5,222,698		
Proposed	4,633,846		
Savings	590,000		
FUTURE COST: Savings			590,000
TOTAL PRESENT WORTH SAVINGS			\$590,000

SKETCH

Project: EDS 00-0441-00(047)

Idea No.: B-3
Client: GDOT



COST ESTIMATE FROM PLANS = \$82.5/FT² ; SHOULD BE \$95/FT²

EXISTING BRIDGE 1 :

$$\begin{aligned} (280' \times 41.25') \times 2 &= 23,100 \text{ ft}^2 \text{ of bridge @ } 82.5 = \$1,905,750 \\ + (275 \times 2)(2) &= 1100 \text{ LF of barrier @ } \$48.54 && 53,394 \\ + (10.45)(8)/27 &= 3.10 \text{ cy of endpost concrete @ } \$508.72 && 1,577 \\ &&& \$1,960,720 \end{aligned}$$

NEW BRIDGE 1 : (PROPOSED)

$$\begin{aligned} (280 \times 49.25) &= 19390 \text{ ft}^2 \text{ of bridge @ } 82.5 = \$1,599,675 \\ + (275 \times 2) &= 550 \text{ LF of barrier @ } 48.54 && 26,697 \\ + (10.45)(4)/27 &= 1.55 \text{ cy of endpost concrete @ } 508.72 && 700,5 \\ &&& \$1,627,160 \end{aligned}$$

ALT 2 - REDUCED OUTSIDE SHOULDER :

$$\begin{aligned} (280 \times 61.25) &= 17,150 \text{ ft}^2 \text{ of bridge} \\ + 550 \text{ LF OF BARRIER} \\ + 1.55 \text{ CY OF ENDPOST CONCRETE} \end{aligned}$$

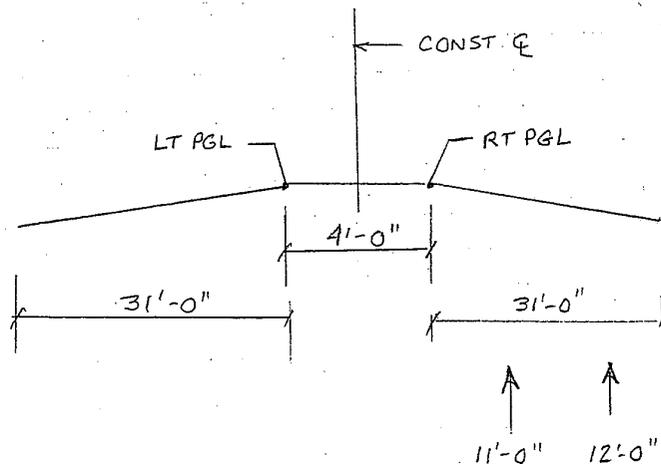
$$\Delta = \$333,560$$

COST COMPARISON W/ \$95/FT²

EXISTING : \$2,249,470

PROPOSED : \$1,869,450

$$\Delta = \$380,024$$



818 ft of guardrail

EXISTING BRIDGE 2 :

$$\begin{aligned}
 (446' \times 41.25') \times 2 &= 36,795 \text{ ft}^2 \text{ of bridge @ } 82.5 = 3,035,588 \\
 + (876.5 \times 2) &= 1753 \text{ LF of barrier @ } 48.54 = 85,091 \\
 + (26.8 \times 4) / 27 &= 4.0 \text{ CY of endpost concrete @ } 509.72 = 2035. \\
 & \qquad \qquad \qquad \$ 3,122,710
 \end{aligned}$$

NEW BRIDGE 2 : (PROPOSED)

$$\begin{aligned}
 (446 \times 69.25) &= 30,885 \text{ ft}^2 \text{ of bridge} && 2,548,054 \\
 + (876.5 \times 1) &= 876.5 \text{ LF of barrier} && 42,545 \\
 + (26.8 \times 2) / 27 &= 2.0 \text{ CY of endpost concrete} && 1,017 \\
 & && \$ 2,591,620
 \end{aligned}$$

~~ALT 2 - REDUCED OUTSIDE SHOULDER~~

$$\begin{aligned}
 (446 \times 61.25) &= 27,318 \text{ ft}^2 \text{ of bridge} && \Delta = 531,090 \\
 + 876.5 \text{ LF OF BARRIER} &&& \\
 + 2.0 \text{ CY OF ENDPOST CONCRETE} &&&
 \end{aligned}$$

COST COMPARISON W/ \$95/FT²

$$\begin{aligned}
 \text{EXISTING : } & \$ 3,582,650 && \text{PROPOSED : } & \$ 2,977,640 \\
 & && \Delta = & \$ 605,014
 \end{aligned}$$

710 ft of guardrail

$$\text{TOTAL GUARDRAIL FOR BR : } 1528 @ 17.89 \text{ LF} = 27,335$$

$$\text{TOTAL : } 531,090 + 333,560$$

VE-9

DEVELOPMENT AND RECOMMENDATION PHASE		
Project: EDS-441(47) CLINCH COUNTY		
Idea No.: B-9	Sheet No.: of	CREATIVE IDEA: Redesign Bridge No. 1 using Typ I(MOD) Beams
Comp By: JH-D	Date: 10-22-09	Checked By: Date:
Original Concept: Bridge one utilizes 7 spans of T-beams for the superstructure on the left and right bridges.		
Proposed Change: Designer should modify design to utilize Typ I(MOD) PSC beams for each of the two bridges in lieu of the T-beams.		
Justification: While the costs are close, safety of the workers is of paramount concern. With precast members, the crew spends sufficiently less time over waterways which are closely monitored by EOL . In place T-beam construction requires the use of false piles and formwork which must later be removed without adversely impacting the waterway below. Because the Typ I(MOD) construction can be performed safer and quicker, it is advisable.		

DEVELOPMENT AND RECOMMENDATION PHASE

Project: EDS-441(47) CLINCH COUNTY

Idea No.: C-1	Sheet No.: of	CREATIVE IDEA: Reduce ROW / Utilize more easement from Riverside Ave. to CR 7 / 3 rd Avenue
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Comp By: SW Date: 10-22-09 Checked By: Date:

Original Concept:

Required ROW offset some distance from construction limits

Proposed Change:

Set required ROW at shoulder break point or set distance beyond. Purchase easement to construct side slopes.

Justification:

Saves required ROW, reduces cost, eliminates 5 displacements, reduces ROW acquisition time

LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$787,000		
Proposed	\$1,500		
Savings	\$785,500		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$786,000

COST WORKSHEET

Project: EDS-441(47) CLINCH COUNTY

Idea No.: C-1
Client: GDOT
Sheet of

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Residential Land	AC	.30	\$20,000	\$5800	0		0
Commercial Land	AC	.63	\$100,000	\$63,000	0		0
Permanent Easement	AC	0		0	.06	\$10,000	\$600
Relocation (Residential)	Ea	4	\$40,000	\$160,000	0		0
Relocation (Commercial)	Ea	1	\$25,000	\$25,000	0		0
Subtotal:				\$253,800			\$600
Scheduling Cont.	55%			\$139,590			\$330
Administration/court costs	60%			\$393,390			\$558
Total:				\$786,780			\$1488
Total Rounded				\$787,000			\$1500

CALCULATIONS

Project: EDS00-0441-00(047) CLINCH CO.

Idea No. : C-1
 Client:: GDOT
 Sheet of

Areas are taken from ROW plan tables

Parcel #	Reqd. ROW Reduction (AC)	Easement Addition (AC)
13	.13	-
14	.08	-
15	.08	-
17	.05	-
20	.03	-
21	.09	-
22	.02	-
23	.03	-
24	.02	-
26	.06	-
28	.33	.06
TOTAL:	.66 *	.06

*.3 AC residential and .63 AC commercial

DEVELOPMENT AND RECOMMENDATION PHASE

Project: EDS-441(47) CLINCH COUNTY

Idea No.: C-5	Sheet No.: of	CREATIVE IDEA: Reduce required ROW beyond construction limits
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Comp By: SW Date: 10-22-09 Checked By: Date:

Original Concept:

Required ROW placed 20' to 30' beyond construction limits in some locations

Proposed Change:

Pull in required ROW to be 10' to 20' beyond construction limits

Justification:

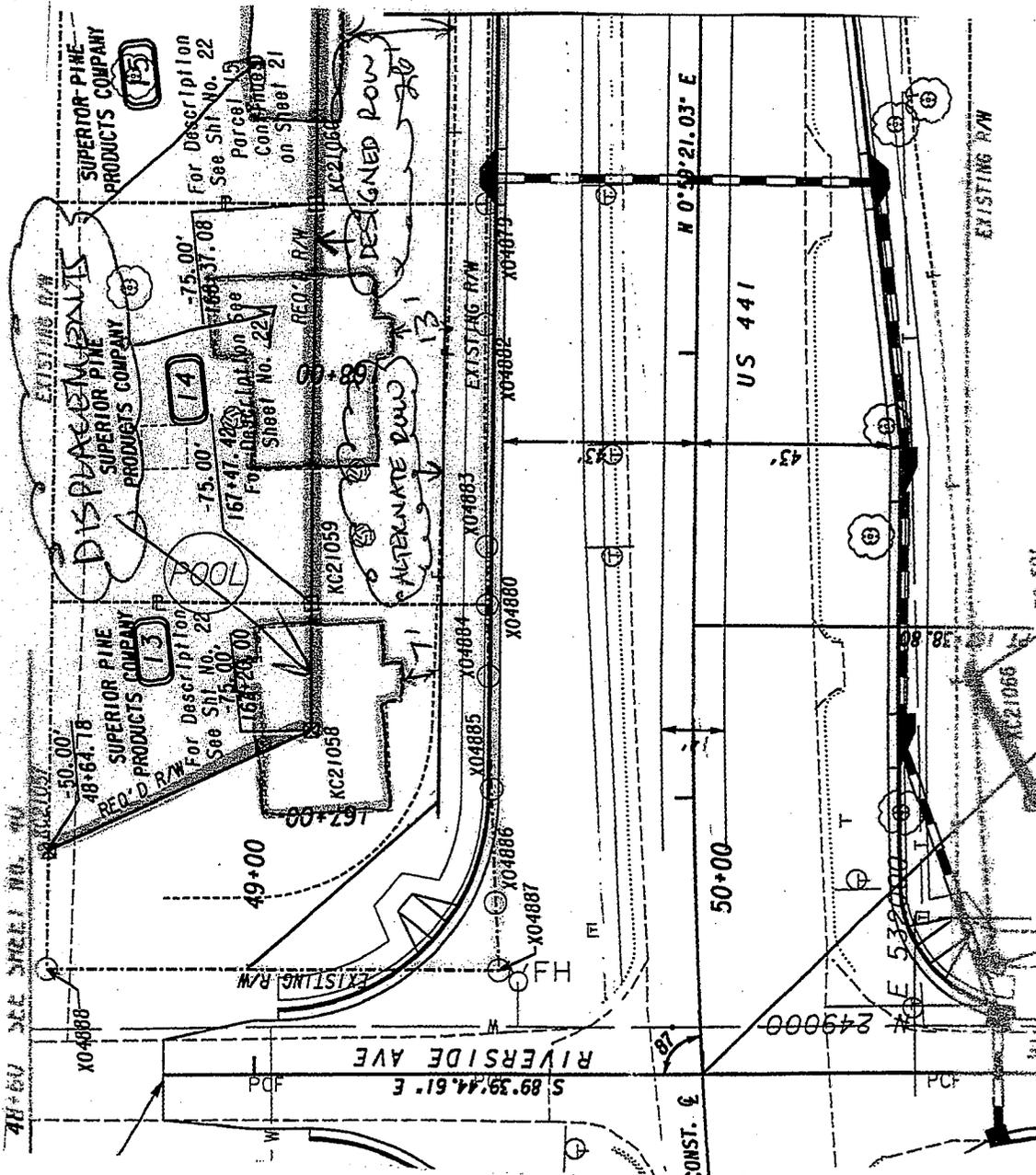
Saves ROW costs

LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original	\$145,824		
Proposed	\$0		
Savings	\$145,824		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$146,000

SKETCH

Project: E0500-0441-00(047)

Idea No.: C-5
Client: GDOT



COST WORKSHEET

Project: EDS-441(47) CLINCH COUNTY					Idea No.: C-5 Client.: GDOT Sheet of		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Excess required ROW – residential	AC	.14	\$20,000	\$2,800	0		0
Excess required ROW – commercial	AC	.56	\$100,000	\$56,000	0		0
Subtotal:				\$58,800			0
Scheduling Cont.	55%			\$32,340			
Administration/court costs	60%			\$54,684			
Total:				\$145,824			
Total Rounded				\$146,000			

CALCULATIONS

Project: EDS00-0441-00(047) CLINCH CO.

Idea No. : C-5
 Client:: GDOT
 Sheet of

Parcel #	Length along ROW (ft)	ROW reduction in width (ft)	ROW reduction in area (SF)
28	260	10	2600
30	340	7	2380
32	110	10	1100
33	170	5	850
36	1340	10	13400
38	220	10	2200
39	120	7	840
40	180	7	1260
41	180	10	1800
42	180	7	1260
43	180	7	1260
44	150	10	1500
		TOTAL:	30,450 square ft (.7 acres)

Reduction includes .56 AC commercial and .14 AC residential

*Cost worksheet shows reduction in required ROW only. Not enough time to look up total ROW and subtract reduction

APPENDIX

VE-2

INFORMATION PHASE - SOURCES
Approving/Authorizing Persons

Name:	Position:	Telephone:
Gerald Ross	Chief Engineer, GDOT	4) 631-1004
Karyn Matthews	Project Manager	4) 276-2777

Personal Contacts

Name:	Telephone:	Notes:
Karyn Matthews	404-276-2777	Presented project to VE team
Matthew Bennett	912-427-5737	Clarified recent project status
Paul Liles	404-631-1985	Discussed Bridge shoulder standards
Hugh Breeden	229-435-4755	Discussed T- Beam v. Type I Mod) costs and application

Documents/Abstracts

Reference:	Notes:
Project Concept Report & Draft Revision	
Project Layout	
Construction & ROW Plans	
Cost Estimate dated 9-23-09	
Bridge Layouts and Maintenance Reports	
Pavement Evaluations and Designs	
Local Correspondence	

VE-3

INFORMATION PHASE - COST MODEL
Project Name

Item	Description	\$ Amount	% of Total Project
A	Pavement	\$6,808,097	33%
B	Bridge	\$4,941,338	24%
C	Right of Way	\$3,612,500	17%
D	Earthwork	\$2,001,041	10%
80% Cost Line			
E	Erosion Control	\$872,458	4%
F	Misc Roadway	\$756,712	4%
G	S&PM	\$654,859	3%
H	Drainage	\$555,735	3%
I	Curb & Gutter	\$375,536	2%
J	Sidewalk	\$215,040	1%
K	Utilities	\$99,450	0%
	TOTAL	\$20,892,766	

VE-4

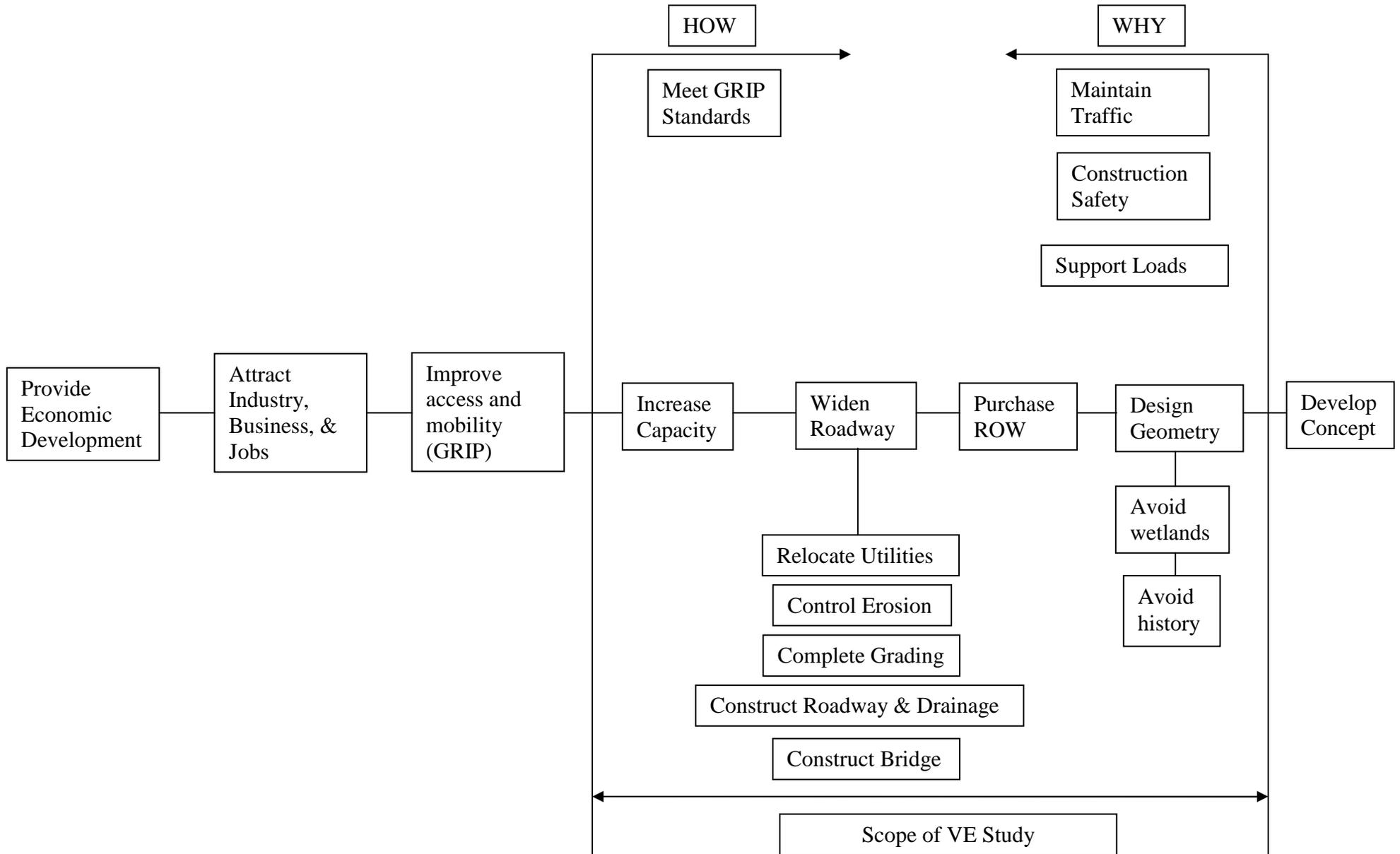
INFORMATION PHASE – FUNCTION ANALYSIS

Project: EDS00-0441-00(047), PI# 422420

Project Function: Economic Development (GRIP corridor)

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	Worth	Comments
A	Pavement	Improves	Ride	\$6,808,097	\$5,941,612	11' lanes, no urban median, reduce rural paved shoulder to 4'
		Supports	Loads			
		Increases	Capacity			
B	Bridge	Supports	Load	\$4,941,338	\$4,421,197	11' lanes on bridge reduces bridge width
		Spans	Obstacle			
		Improves	Hydraulics			
C	Right-of-Way	Allows	Construction	\$3,612,500	\$3,251,250	Typical section reduction, potential profile adjustment
		Improves	Safety			
D	Earthwork	Achieves	Grade	\$2,001,041	\$1,800,937	Typical section reduction, potential profile adjustment
		Promotes	Safety			

INVESTIGATION PHASE - FAST DIAGRAM



VE-6 & 7

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
A	PAVEMENT		
A-1	Reduce lane widths	Either (1) all 11' lanes or (2) 11' inside lanes	9
A-2	Eliminate/Reduce flush median width	Currently 4' flush; go to 0' or 2' flush median	9
A-3	Reduce paved shoulder width	Currently 6.5' paved; go to 4' paved	9
A-4	Reduce pavement thickness/design	Section seems minimal, might reduce	5
A-5	Remove turning/auxiliary lanes	Riverside, CR 6, ST 210+00 lane to nowhere	7
A-6	Evaluate staging pavement and concept	Staging should not be complex	3
A-7	Eliminate/Reduce depressed median	Options: 20' raised, 14' TWLTL, 4' flush, 0'	9
A-8	Adjust project limits	Affects logical termini, ties to project	2
A-9	Modify Layout/Design speed	Use 45 mph design speed throughout?	7
DS	Consider roundabout	US 441 @ SR 94 and SR 177?	5
B	BRIDGE		
B-1	Culvert instead of bridge #1	Hydraulics will not work	1
B-2	Adjust length of bridge	Shortening bridge will affect hydraulics	4
B-3	Construct 1 wide bridge instead of 2 bridges	Make sure bridges match roadway typical	9
B-4	Rehab existing bridge instead of replacing	Low sufficiency rating and grade change	4
B-5	Lower profile	Will negatively affect hydraulics	4

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
B-6	Reduce bridge width	36' minimum (GDOT/AAHSTO policy)	5
B-7	Alternate substructure	BFI recommendation is controlling	2
B-8	Abutment wall in lieu of endroll	Cost of wall and earthwork will offset savings	3
B-9	Replace T-beams with Type 1 (MOD) PSC Beams	More safe and economical construction	9
C	RIGHT OF WAY		
C-1	Reduce ROW/increase easement if constructible	Investigate ROW plans	9
C-2	Adjust alignment to reduce ROW	If alignment change is feasible	5
C-3	Typical section reduction to reduce ROW	Goes with pavement recommendations	9
C-4	Use walls in lieu of side slopes to limit ROW	Possible is it avoids impacts to a structure	5
C-5	Reduce required ROW beyond construction limits	Investigate limits	9
D	EARTHWORK		
D-1	Adjust profile to reduce earthwork	Likely too constrained by bridges and RR	5
D-2	Adjust typical section to reduce earthwork	Similar to pavement recommendation	9
D-3	Use abutment walls in lieu of endrolls	Cost of wall and earthwork will offset savings	3
D-4	Adjust side slopes to reduce earthwork	Side slopes do not have much room to adjust	4

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
E	EROSION CONTROL		
E-1	Consider gabions instead of spread rip-rap	Rip rap more appropriate on end rolls	3
E-2	Reduce rip rap quantity	Not likely with endrolls	3
E-3	Reduce flow across project	Small cost savings	3
F	MISCELLANEOUS ROADWAY		
F-1	Eliminate guardrail quantity	1 bridge would save guardrail length	7
F-2	Use rods in lieu of concrete makers for ROW	Difficult to find, not much cost savings	2
F-3	Simplify traffic control	Staging / traffic control should not be complex	4
F-4	Use cable barrier in lieu of guardrail	Guardrail mainly on bridge approaches	4
DS	Consider centerline rumble strips in urban section	Added safety if no median is present	5
H	DRAINAGE		
H-1	Alternate pipe materials	Governed by allowable pipe materials	1
H-2	Reduce pipe lengths	This will be done by typical section reductions	5
H-3	Reduce inlets and catch basins	If road is narrowed this may be possible	5

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
I	CURB & GUTTER		
I-1	Reduce/eliminate curb & gutter	May eliminate if not needed past park	4
J	SIDEWALK		
J-1	Eliminate/reduce sidewalk locations	May eliminate if not needed past park	4
K	UTILITIES		
K-1	Avoid/minimize utility conflicts	Low cost, may not be able to avoid	2