

# Value Engineering Study Report

*Project No. – STPIM-0075-03(210)*

*P.I. No. – 610930*

*Reconstruction of I-75 and SR 136 Interchange*

*Widening of SR 136*

*Gordon County*



**Value Management Team**



**Design Team**



February 2009



February 20, 2009

Ms. Lisa Myers  
Design Review Engineer Manager/VE Coordinator  
Georgia Department of Transportation-Engineering Services  
One Georgia Center  
600 W. Peachtree Street NW  
Atlanta, GA 30308

RE: Submittal of the final Value Engineering Report  
Project No.: STPIM-0075-03(210)  
P.I. No.: 610930  
Reconstruction of I-75 and SR 136 Interchange  
Gordon County

Dear Ms. Myers:

Please find enclosed two (2) hard copies and one (1) CD of our final Value Engineering Report for the reconstruction of the I-75 and SR 136 interchange and the widening of SR 136.

This Value Engineering Study, which was performed during the period February 5 through February 8, 2009, identified **28 Alternative Ideas** of which **12 ideas are recommended for implementation**. We believe that the **Alternative Ideas** recommended may have a significant positive affect on the project.

We trust that you will find this report to be in proper order. It should be noted that the results of this workshop are volatile in that they can be overcome by the events that accompany the expeditious continuance of the design process. Accordingly, we encourage an equally expeditious implementation meeting to design the disposition of the contents of this report.

On behalf of our VE Team, we thank you very much for this opportunity to work with you and the hard working staff of the Georgia Department of Transportation.

Yours truly,

**PBS&J**

A handwritten signature in black ink that reads "Les M. Thomas".

Les M. Thomas, P.E., CVS-Life  
VE Team Leader

A handwritten signature in black ink that reads "Randy S. Thomas".

Randy S. Thomas, CVS  
Assistant Team Leader

# ***Value Engineering Study Report***

***Project No. STPIM-0075-03(210)***

***P.I. No. 610930***

***Reconstruction of I-75 and SR 136 Interchange***

***Widening of one mile of SR 136***

***Gordon County***

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# *Executive Summary*

# ***EXECUTIVE SUMMARY***

## **INTRODUCTION**

This report summarizes the analysis and conclusions by the PBS&J Value Engineering workshop team as they performed a Value Engineering study during the period of February 5 through February 8, 2009 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study was Project STPIM-0075-03(210), P.I. No. 610930, widening and reconstruction of the I-75 and SR 136 interchange and the widening of SR 136 from west of Camp Creek to SR 3/US41 in Gordon County. The design for the project has been prepared by Wilbur Smith Associates. At the time of the workshop the plans had advanced to the final design level.

## **PROJECT DESCRIPTION**

This project is located on S.R. 136 over I-75 in Gordon County. The project as currently designed will widen a mostly rural two lane road with some curb and gutter to a divided four lane road with a 20' raised median. West of the I-75 interchange, beyond the ramps, a rural section is designed while through the interchange east to SR 3/US 41 an urban section is designed.

The project as currently designed begins approximately 500' west of the Camp Creek Bridge on SR 136 which is 900' west of the I-75 interchange and continues easterly along the existing alignment to the intersection of SR 3/US 41 within the city of Resaca. The length of the project is approximately 0.9 mile.

The project consists of the replacement of the bridge over I-75 on SR 136 to accommodate future widening of I-75. Minimum clearance under the bridge will be 17'-2". Construction will be staged to allow continued use of the interchange during construction. The exit ramps from I-75 will be widened to provide left and right turn lanes at SR 136. Turn lanes are proposed on US 41 at SR 136.

At this stage, the design also calls for the replacement of the Camp Creek Bridge. Design speed is 45 mph.

The estimated construction costs as of April 2008 are projected to be \$15,595,264 plus Right-of-Way costs of approximately \$4,300,000. Total costs for this project total to \$19,895,264 . In addition, utility reimbursement costs are estimated at \$104,000, but could increase significantly if the City of Calhoun were to apply for utility assistance for the relocation of their facilities.

This project is more fully described in the documentation that is located in the Tabbed section of this report, entitled ***Project Description***.

## PROJECT CONCERNS AND OBJECTIVES

Some of the information from the concept report and the designer's presentation indicated the following important points about the project:

- Alignment on the western side of the I-75 interstate must accommodate the Resaca Battlefield Historic Site being designed.
- Truck traffic is very heavy at the interchange as the Flying J Truck Stop is the last truck stop before reaching Tennessee. Twenty four hour truck percentage is 37%.
- The project will improve safety by providing adequate intersection sight distances at the ramp. At the present time line of sight is substandard and poses a safety hazard.
- Although the bridge at I-75 has a rating of 84, it will not allow for expansion of I-75 proposed widening.
- Access must be changed into the Flying J Truck Stop to allow trucks easier and safer access. Signalization should be considered.

## VALUE ENGINEERING PROCESS

The Value Engineering team followed the seven step Value Engineering job plan as promulgated by SAVE International. This seven step job plan includes the following:

- Investigative
- Analysis
- Speculation
- Evaluation
- Development
- Recommendation
- Presentation

This report is a component of the Presentation Phase. As part of the VE workshop in Atlanta, the team made an informal presentation of their results on the last morning of the workshop. This report is intended to formalize the workshop results and set the stage for a formal implementation meeting in which alternatives and design suggestions will typically be accepted, accepted with modifications, or rejected for cause. The worksheet that follows, along with the formally developed alternatives and design suggestions can be used as a "score sheet" for the implementation meeting. It is also included in this report to identify, on a summary basis, the results of the workshop. The reader is encouraged to visit the third tabbed section of this report entitled *Study Results* for a review of the details of the developed alternatives. The tabbed section *Project Description* includes information about the project itself and the tabbed section *Value Engineering Process* presents the detailed process of the Value Engineering Study.

## CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified **28 *Alternative Ideas*** that appeared to hold potential for reducing the construction cost, improving the end product, and/or reducing the difficulty and time of project construction.

After the evaluation phase was completed, **12 *Alternative Suggestions*** remained for further consideration. These Alternative Ideas may be found, in their documented form, in the section of this report entitled ***Study Results***.

The following ***Summary of Alternatives and Design Suggestions*** coupled with the documentation of the developed alternatives should provide the reader with the information required to fully evaluate the merits of each of the alternatives.

# Summary of Alternatives & Design Suggestions



PROJECT		
<b>Georgia Department of Transportation</b> <b>STPIM-0075-03(210) – P.I. No. 610930</b> <b>Reconstruction of I-75 and SR 136 Interchange</b> <b>Widening of SR 136</b> <b>Gordon County</b>		SHEET NO.: 1 of 1
ALTERNATIVE NUMBER	DESCRIPTION OF ALTERNATIVE	INITIAL COST SAVINGS
	<b>ROADWAY (RD)</b>	
RD-1	Use PCC instead of flexible pavement	\$ 94,908
RD-3	Reduce paved outside shoulders on ramps from 10' to 8'	\$ 101,586
RD-6	Signalize intersection at SR 136 and access road	<b>-\$ 88,000</b>
RD-11	Modify geometrics in transition section at the western terminus to reduce pavement width and bridge width	\$ 398,379
RD-12	Eliminate sidewalks west of truck stop	\$ 786,269
RD-18	Reduce shoulder width in urban sections	\$ 1,396,579
RD-19	Lower grade between Camp Creek and I-75, taper to existing grade east of Camp Creek.	\$ 2,658,981
	<b>BRIDGES at I-75 (BR)</b>	
BR-2	Replace 6' raised sidewalks with 4' flush shoulders	\$ 287,020
BR-4	Remove end spans and use MSE walled abutments	\$ 171,619
	<b>BRIDGES OVER CAMP CREEK (BR)</b>	
BR-7	Reduce shoulder width on Camp Creek Bridge from 10' to 6' to match roadway cross section	\$ 207,152
BR-8	Replace 10' flush shoulders on Camp Creek Bridge with 4' flush shoulders to comply with minimum AASHTO requirements.	\$ 310,728
BR-9	Provide 2-12' thru lanes , 6' flush shoulders in sidewalks in each direction, and a flush 14' striped median on Camp Creek Bridge	\$ 362,516

## *Study Results*

# ***STUDY RESULTS***

## **INTRODUCTION**

This section includes the study results presented in the form of fully developed value engineering alternatives that include descriptions of the original design, description of the alternative design configurations, comments on the technical justifications, opportunities and risks associated with the alternatives, sketches, calculations and technical justification for these alternatives. For the most part, these fully developed alternatives represent an array of choices that clearly could have an impact on the eventual cost and performance of the finished project.

This introductory sheet is followed by a *Summary of Alternatives and Design Suggestions*. It should be noted that the alternatives that are included, which have cost estimates attached are not necessarily representative of the final cost outcome for each alternative. Some of these alternatives have components that are mutually exclusive so they may not be added together.

The users of this report are asked to consider these alternatives and design suggestions as a smorgasbord of choices for selection and use as the project moves forward. The enclosed *Summary of Alternatives & Design Suggestions* may also be used as a “score sheet” within the bounds of an implementation meeting.

## **COST CALCULATIONS**

The cost calculations are intended only as a guide to the approximate results that might be expected from implementation of the alternatives. They should be helpful in making clear choices as to the pursuit of individual alternatives.

The composite mark-up of 10% for the construction cost comparisons was derived from the cost estimate for the project. This estimate can be found in the section of this report entitled *Project Description*.

# Summary of Alternatives & Design Suggestions



PROJECT		
<b>Georgia Department of Transportation</b> <b>STPIM-0075-03(210) – P.I. No. 610930</b> <b>Reconstruction of I-75 and SR 136 Interchange</b> <b>Widening of SR 136</b> <b>Gordon County</b>		SHEET NO.: 1 of 1
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Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Gordon County



Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Camp Creek Bridge & Widening of SR 136  
Gordon County



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-1**

DESCRIPTION: **Use P.C.C. instead of flexible pavement.**

SHEET NO.: **1 of 5**

## Original Design:

The original design proposes using PCC to construct the entrance and exit ramps to/from I-75, while constructing the mainline of SR 136 with flexible pavement.

## Alternative:

The alternative proposes to construct the entire project with PCC.

## Opportunities:

- More durable pavement to withstand heavy truck traffic concentration
- Lower life cycle costs

## Risks:

- Moderate design impacts
- Higher initial construction costs

## Technical Discussion:

The alternative looks to compare the complete life cycle cost analysis of using concrete pavement as opposed to asphalt pavement. The proposed design constructs the ramps with concrete pavement, while constructing the mainline of SR 136 with asphalt. The majority of the project will be a complete reconstruction effort to correct the sight distance problems on the SR 136 bridge over I-75, such that widening/overlay of the existing facility is restricted to the eastern end of the project. The concrete pavement appears to be an attractive alternative considering the high volume of truck traffic (37%- 24 HR Truck %). An analysis of the life cycle costs show that the initial costs are higher for the concrete pavement construction, but the complete life cycle costs are lower.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS AND SINGLE EXPENDITURES	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,354,745	\$ 536,782	\$ 3,891,527
ALTERNATIVE	\$ 3,518,332	\$ 278,287	\$ 3,796,619
SAVINGS	\$ (163,588)	\$ 258,495	\$ 94,908

# Illustration

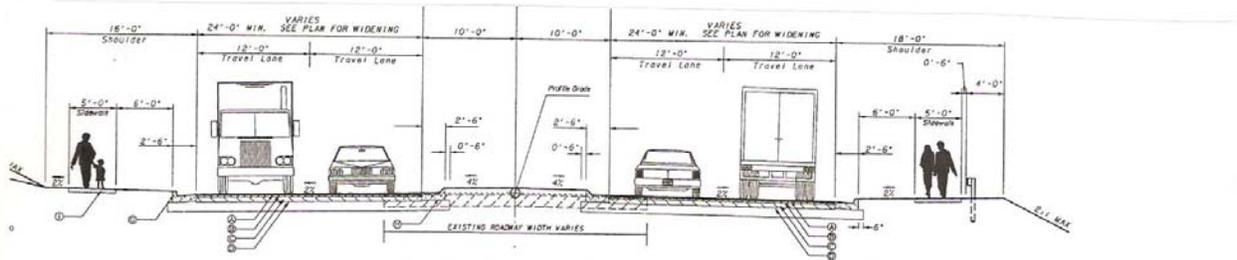


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-1**

DESCRIPTION: **Use P.C.C. instead of flexible pavement.**

SHEET NO.: **2 of 5**



TANGENT SECTION - SR 136  
STATION 114+78 TO 131+59  
STATION 142+90 TO 145+18.99

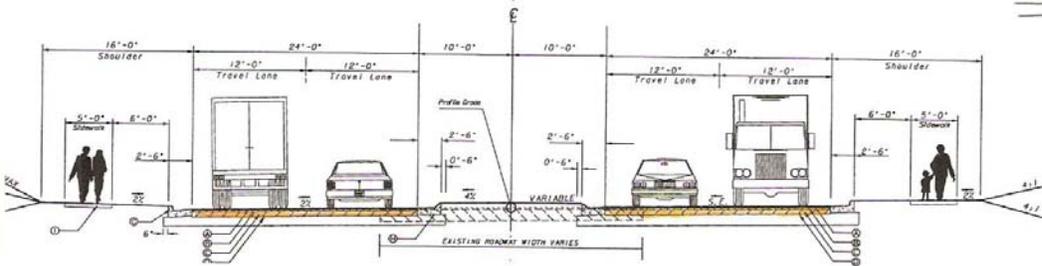
REQUIRED PAVEMENT:

MAINLINE TRAVEL WAY

- ① ASPHALTIC CONCRETE 12.5mm SUPERPAVE POLYMER MODIFIED, 165 1b/sy
- ② ASPHALTIC CONCRETE 19mm SUPERPAVE, 220 1b/sy
- ③ ASPHALTIC CONCRETE BASE 25mm SUPERPAVE, 1320 1b/sy
- ④ 12" GRADED AGGREGATE BASE
- ⑤ 6" GRADED AGGREGATE BASE
- ⑥ CONCRETE CURB AND GUTTER, TYPE 2, 8" X 30"
- ⑦ CONCRETE CURB AND GUTTER, TYPE 7, 8" X 30"
- ⑧ SIDEWALK

ORIGINAL PAVEMENT DESIGN

N.T.S.



ALTERNATIVE PAVEMENT DESIGN

USE: PORTLAND CEMENT CONCRETE - 12"  
ASPHALTIC CONCRETE, 19mm Superpave interlayer (330LB/SY)  
12" GRADED AGGREGATE BASE

# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-1**

DESCRIPTION: **Use P.C.C. instead of flexible pavement.**

SHEET NO.: **3 of 5**

## Assumptions:

STA 100+00-STA 145+19= 4519LF

-Deduct 214' for Camp Creek Bridge.

-Deduct 310' for SR136 Bridge over I-75.

Mainline= approximately 4000LF x 60' average estimated width/9=26,667SY

-Concrete pavement calculated at 26667 SY to replace flexible pavement.

-Separation layer of 19mm Superpave between concrete pavement and GAB @ 330LB/SY=

26667SY x 330LB/SY/2000=4400 Tons added.

-All unit prices derived from GDOT Mean Item Summary dated January 20, 2009.



# LIFE CYCLE COST WORKSHEET

PROJECT: **STIM-0075-03(210) - P.I. No. 610930** ALTERNATIVE **RD-1**  
**Reconstruction of I-75 and SR 136 Interchange**  
**Gordon County**

## Comparison of Concrete vs Asphalt Paving

SHEET NO. **5 of 5**

LIFE CYCLE PERIOD:		20	years				<b>Asphalt</b>	<b>Concrete</b>	
INTEREST RATE:		3.00%	ESCALATION RATE:		0.00%		<b>ORIGINAL</b>	<b>PROPOSED</b>	
<b>A.</b>	<b>INITIAL COST</b>						\$3,354,745	\$3,518,332	
	Useful Life (Years)						40	40	
						<b>INITIAL COST SAVINGS</b>	163,587		
<b>B.</b>	<b>RECURRENT COSTS (Annual Expenditures)</b>								
	1.	Maintenance	% of First Cost during each year	Asphalt	0.50%		16,774		
	2.	Maintenance	% of First Cost during each year	Concrete	0.25%			\$ 8,796	
	3.	Energy							
	4.								
	5.								
	6.								
						<b>Total Annual Costs</b>	16,774	8,796	
						<b>Present Worth Factor</b>	14.8775	14.8775	
						<b>Present Worth of RECURRENT COSTS</b>	249,551	130,860	
<b>C.</b>	<b>SINGLE EXPENDITURES</b>			<b>Year</b>	<b>Amount</b>	<b>PW factor</b>	<b>Present Worth</b>	<b>Present Worth</b>	
	ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)						
		<input checked="" type="checkbox"/>	1.	Concrete Pavement	10	\$0	0.7441	\$ -	\$ -
		<input checked="" type="checkbox"/>	2.	Asphalt Resurfacing	10	\$142,454	0.7441	\$ 105,999	\$ -
		<input checked="" type="checkbox"/>	3.	Asphalt Resurfacing	20	\$142,454	0.5537	\$ 78,873	\$ -
		<input checked="" type="checkbox"/>	4.	Concrete Repairs	20	\$266,270	0.5537	\$ -	\$ 147,427
		<input checked="" type="checkbox"/>	4.	Asphalt Resurfacing	30	\$142,454	0.4120	\$ 58,689	\$ -
		<input checked="" type="checkbox"/>	5.	Asphalt Resurfacing	40	\$142,454	0.3066	\$ 43,670	\$ -
			6.				1.0000	\$ -	\$ -
<b>D.</b>	<b>SALVAGE VALUE</b>			<b>Year</b>	<b>Amount</b>	<b>PW factor</b>	<b>Present Worth</b>	<b>Present Worth</b>	
		<input checked="" type="checkbox"/>	1.				1.0000	-	-
			2.				1.0000	-	-
<b>Present Worth of SINGLE EXPENDITURES</b>							\$287,231	\$147,427	
<b>E.</b>	<b>Total Recurrent Costs &amp; Single Expenditures (B + C + D)</b>						\$536,782	\$278,287	
<b>RECURRENT COSTS &amp; SINGLE EXPENDITURES SAVINGS</b>								\$258,495	
<b>TOTAL PRESENT WORTH COST (A + E)</b>							\$3,891,527	\$3,796,619	
<b>TOTAL LIFE CYCLE SAVINGS</b>								<b>\$94,908</b>	

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-3**

DESCRIPTION: **Reduce paved outside shoulder on ramps from 10' to 8'** SHEET NO.: **1 of 4**

**Original Design:**

The original design provides for a 14' outside shoulder with 10' paved.

**Alternative:**

The alternative would provide a 12' improved shoulder with 8' paved.

**Opportunities:**

- Reduce required paving
- Conform to AASHTO recommendations
- Reduce earthwork

**Risks:**

- Minimal design effort

**Technical Discussion:**

AASHTO policy makes the recommendation that when providing paved shoulders on ramps, "For one way operation, the sum of the right and left shoulders should not exceed 10' to 12'.(AASHTO A Policy on Geometric Design of Highways and Streets 2004, page 838, bullet #1). By providing excess shoulder width it will encourage parking on the ramps and attempts to use this wider paving as an additional travel lane. If the designer feels that a 10' paved outside shoulder really is necessary due to truck traffic the inside shoulder should be reduced to 2' paved.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 101,586	\$ 0	\$ 101,586
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 101,586	\$ 0	\$ 101,586

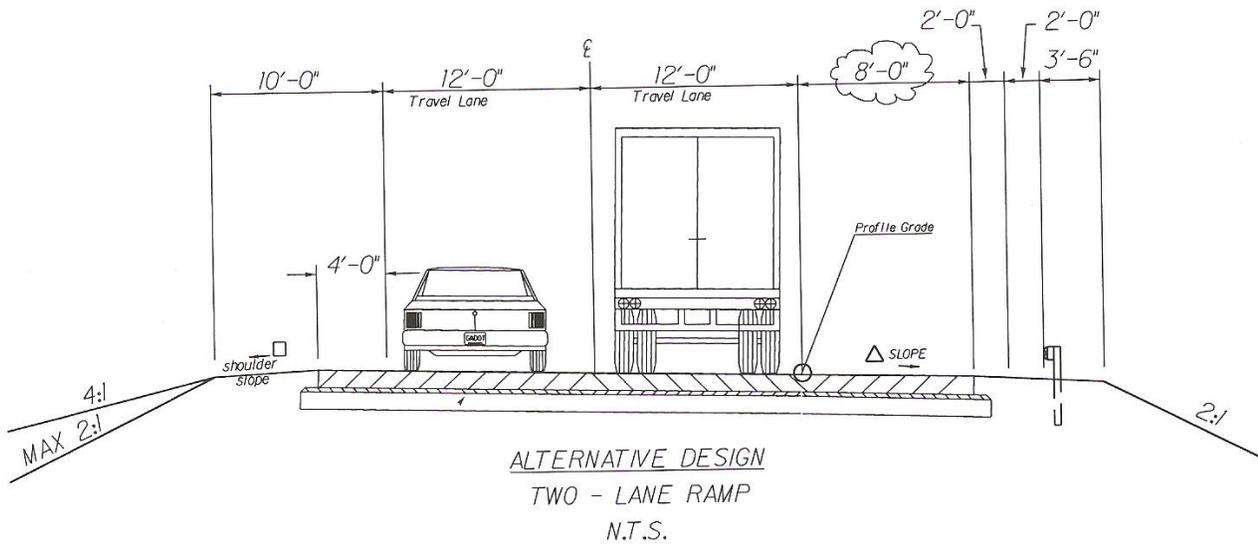
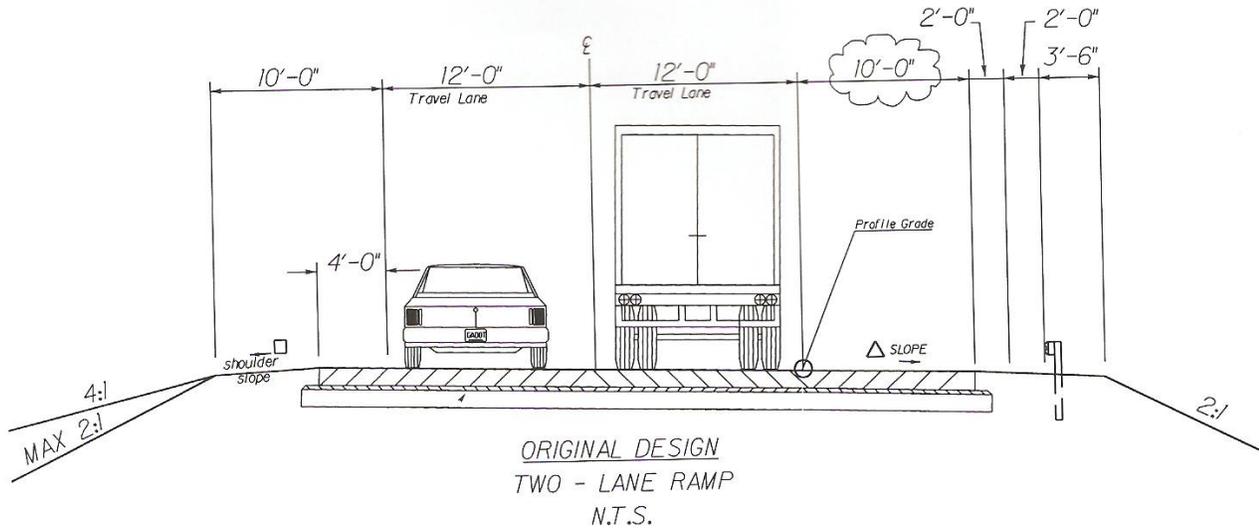
# Illustration

PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-3**

DESCRIPTION **Reduce paved outside shoulder on ramps from 10' to 8'**

SHEET NO.: **2** of **4**



# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-3**

DESCRIPTION: **Reduce paved outside shoulder on ramps from 10' to 8'**

SHEET NO.: **3** of **4**

## REDUCED PAVEMENT AREA:

Ramp A = Station 201+50 to Station 211+30 = 980 lf

Ramp B = Station 300+50 to Station 310+25 = 975 lf

Ramp C = Station 401+50 to Station 409+50 = 800 lf

Ramp D = Station 500+50 to Station 512+00 = 1150 lf

$(980' + 975' + 800' + 1150') \times 2' / (9 \text{sf/sy}) = 868 \text{ sy}$

G.A.B.-  $(3905 \text{ lf}) \times 2' \times (1.0') = 7,810 \text{ cf}$

## AFFECTED PAY ITEMS:

12' PCC- => 868 sy

19.0 mm Superpave-  $(868 \text{ sy} \times 330\#/\text{sy}) / (2000\#/\text{ton}) => 143 \text{ tons}$

12" G.A.B => 868 sy

# Cost Worksheet



PROJECT:	Georgia Department of Transportation STPIM-0075-03210) - P.I. No.: 610930 Reconstruction of I-75 and SR 136 Interchange and Widening of SR 136 Gordon County	ALTERNATIVE NO.:	<b>RD-3</b>
DESCRIPTION:	Reduce paved outside shoulder on ramps from 10' to 8'	SHEET NO.:	4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
12' PCC	sy	868	\$ 72.50	\$ 62,930	0	\$ 72.50	\$ -
19.0 mm Superpave	tons	143	\$ 67.65	\$ 9,674	0	\$ 67.65	\$ -
G.A.B.	sy	868	\$ 22.75	\$ 19,747	0	\$ 22.75	\$ -
<b>Sub-total</b>				\$ 92,351			\$ -
<b>Mark-up at 10.00%</b>				\$ 9,235			\$ -
<b>TOTAL</b>				<b>\$ 101,586</b>			<b>\$ -</b>

Estimated Savings: \$101,586

# Value Analysis Design Alternative



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Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-6**

DESCRIPTION: **Signalize intersection at SR 136 and access road**

SHEET NO.: **1 of 4**

## Original Design:

The original design provides no signalization on the project.

## Alternative:

The alternative is to install signals for the intersection.

## Opportunities:

- Improve operations
- Improve safety

## Risks:

- Additional cost for signalization
- Moderate design effort

## Technical Discussion:

The Designer stated that the proposed intersection did not currently meet traffic signal warrants. However, analysis was based on 2010/2030 projections from 2006. The previous evaluation which included a SYNCRO analysis of the intersection in addition to the warrant analysis indicated the signals would be required sometime around 2015. From observations in the field and evaluation of the previous analysis, it is felt that a re-evaluation of this intersection may be prudent.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	\$ 0	\$ 0
ALTERNATIVE	\$ (88,000)	\$ 0	\$ (88,000)
SAVINGS	\$ (88,000)	\$ 0	\$ (88,000)

# Illustration

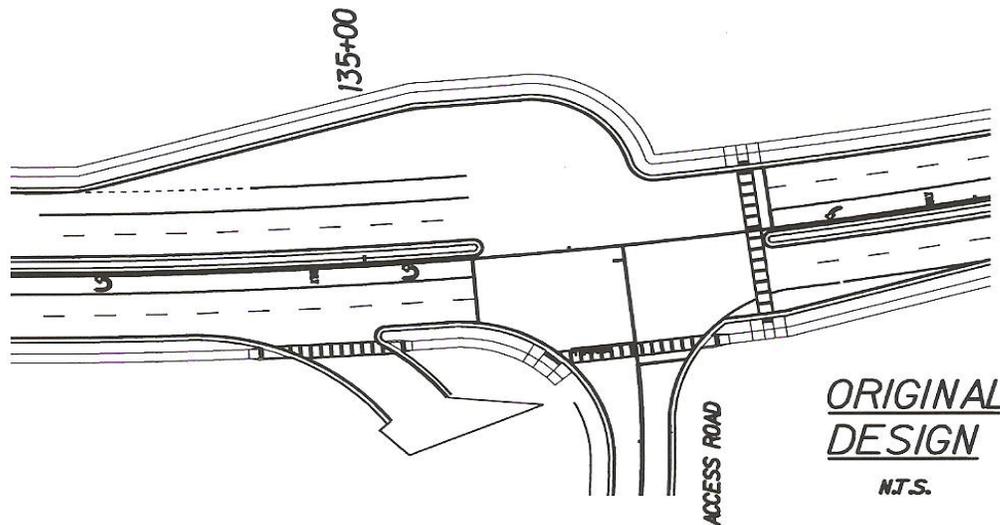
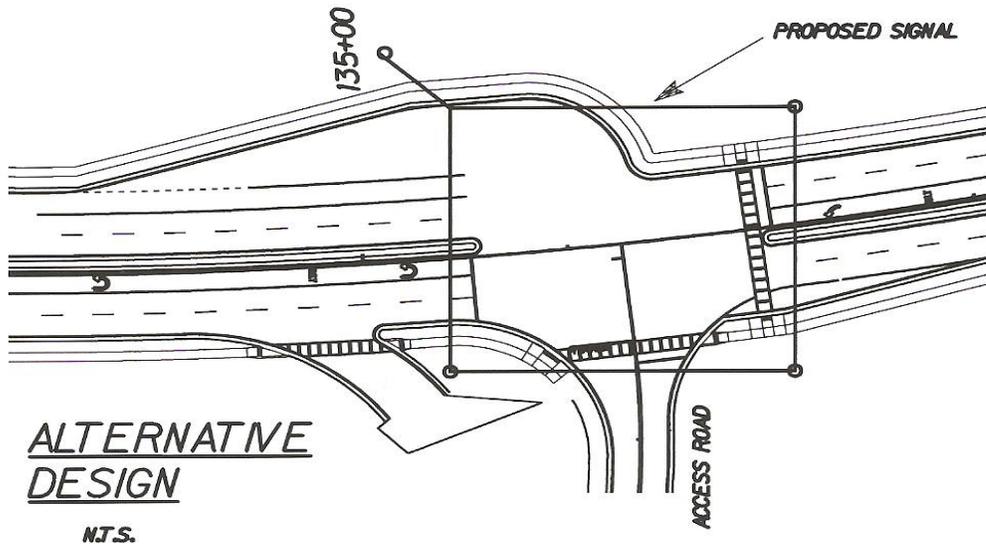


PROJECT: **Georgia Department of Transportation  
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Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-6**

DESCRIPTION: **Signalize intersection at SR 136 and access road**

SHEET NO.: **2 of 4**



# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-6**

DESCRIPTION: **Signalize Intersection at SR 136 and Access Road**

SHEET NO.: **3** of **4**

Assume a three legged intersection will cost 80% of the cost of a 4 legged intersection.

$$0.80 \times \$100,000 = \$80,000$$



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-11**

DESCRIPTION: **Modify geometrics in the transition section at the western terminus to reduce pavement and bridge width**

SHEET NO.: **1** of **4**

### Original Design:

The original design provides for a “full width” typical section all the way across the Camp Creek Bridge to beginning of the project at ~Station 101+75.

### Alternative:

The alternative would reduce the pavement and bridge width by one thru lane in the easterly direction from ~Station 101+75 to ~Station 115+40.

### Opportunities:

- Reduce required paving
- Reduce bridge width
- Reduce earthwork

### Risks:

- Moderate design effort

### Technical Discussion:

Since the “future” project to the west is considered to be long range with an undetermined implementation date it is probable that any additional pavement would not be utilized for a number of years.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 398,379	\$ 0	\$ 398,379
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 398,379	\$ 0	\$ 398,379

# Illustration

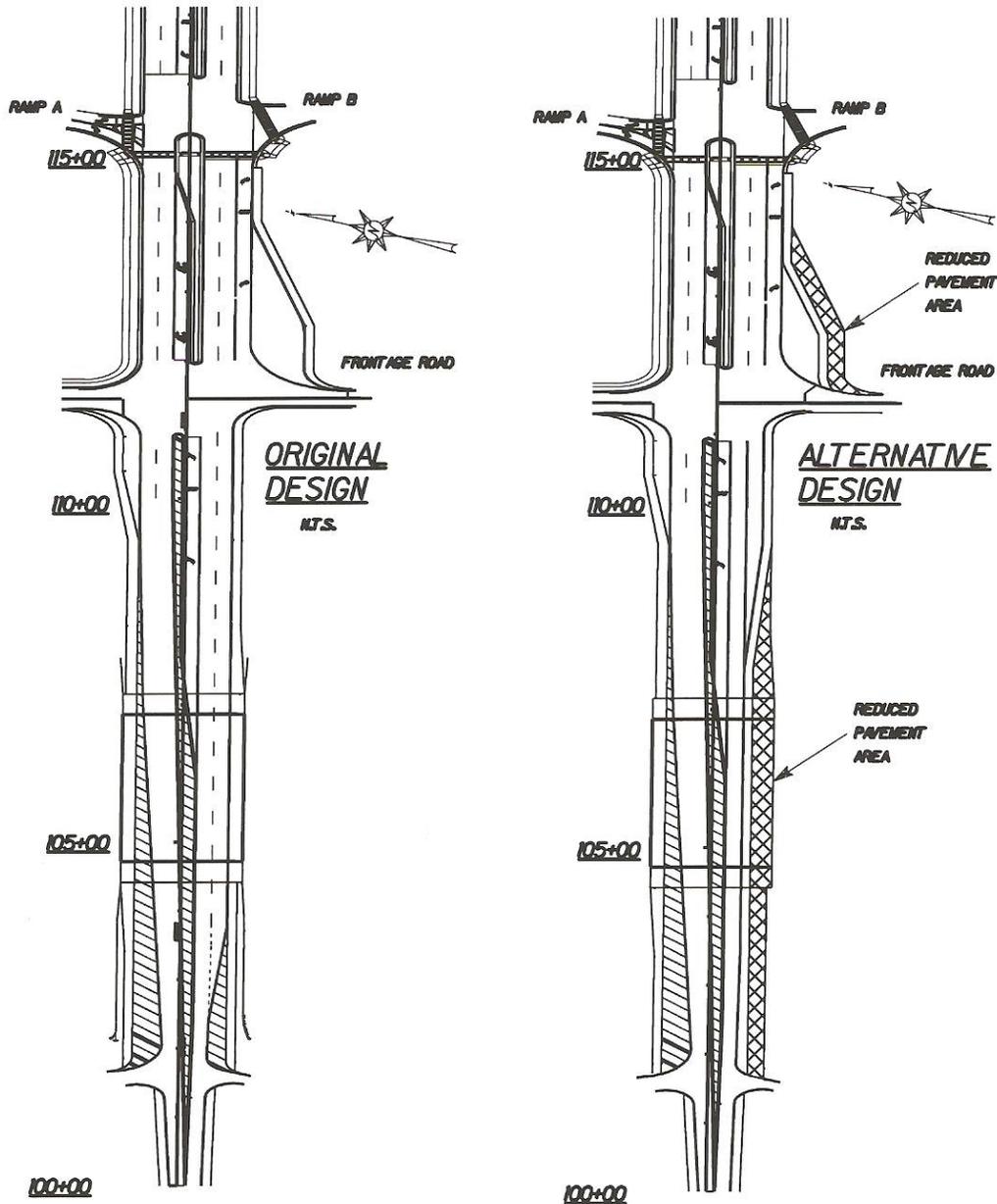


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-11**

DESCRIPTION: **Modify geometrics in the transition section at the western terminus to reduce pavement and bridge width**

SHEET NO.: **2** of **4**



# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-11**

DESCRIPTION: **Modify geometrics in the transition section at the  
western terminus to reduce pavement and bridge width**

SHEET NO.: **3** of **4**

## REDUCED PAVEMENT AREA:

Station 101+75 to Station 108+75-  
[(325' x 12')+(160'/2 x 12')] = 4,860 sf  
4,860 sf / (9sf/sy) = 540 sy

Station 111+60 to Station 115+40-  
[(325' x 12')+(90'/2 x 12')] = 4,440 sf  
4,440 sf / (9sf/sy) = 493 sy

G.A.B.- 9300sf x 1' = 9300 cf

Bridge- 214' x 12' = 2568 sf

Total = 1,033 sy (9300sf)

## AFFECTED PAY ITEMS:

12.5 mm Superpave- (1,033 sy X 165#/sy) / (2000#/ton) => 85 tons

19.0 mm Superpave- (1,033 sy X 220#/sy) / (2000#/ton) => 114 tons

25.0 mm Superpave- (1,033 sy X 1320#/sy) / (2000#/ton) => 682 tons

G.A.B.- (9,300 cf) x (135#/cf) / (2000#/ton) => 627 tons

Bridge- 214' x 12' = 2568 sf

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>STPIM-0075-03210) - P.I. No.: 610930</b> <b>Reconstruction of I-75 and SR 136</b> <b>Interchange and Widening of SR 136</b> <b>Gordon County</b> <b>Modify geometrics in the transition section at</b> <b>the western terminus to reduce pavement and</b> <b>bridge width.</b>	ALTERNATIVE NO.:
		<b>RD-11</b>
DESCRIPTION:		SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
12.5mm Superpave	tons	85	\$ 67.88	\$ 5,770	0	\$ 67.88	\$ -
19.0 mm Superpave	tons	114	\$ 67.65	\$ 7,712	0	\$ 67.65	\$ -
25.0 mm Superpave	tons	682	\$ 62.61	\$ 42,700	0	\$ 62.61	\$ -
G.A.B.	sy	1,033	\$ 22.75	\$ 23,501	0	\$ 22.75	\$ -
Bridge	sf	2,568	\$ 110.00	\$ 282,480	0	\$ 110.00	\$ -
<b>Sub-total</b>				\$ 362,163			\$ -
<b>Mark-up at 10.00%</b>				\$ 36,216			\$ -
<b>TOTAL</b>				\$ 398,379			\$ -

Estimated Savings: \$398,379

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-12**

DESCRIPTION: **Eliminate sidewalks west of truck stop**

SHEET NO.: **1 of 4**

## Original Design:

The original design calls for construction of sidewalks from STA 112+00 to STA 145+19.

## Alternative:

The alternative proposes limiting the construction of sidewalks from STA 129+00 to STA 145+19, deleting the proposed sidewalk west of the Flying J truck stop from approximate STA 129+00 to STA 112+00.

## Opportunities:

- Reduction in concrete sidewalk costs
- Reduction in construction costs

## Risks:

- Restricts pedestrian traffic
- Moderate design impacts

## Technical Discussion:

The alternative proposes limiting the construction of sidewalks from the west end of the Flying J truck stop to the eastern terminus of the project at US 41. It appears from the site visit that the pedestrian traffic on the project seems to be concentrated from the Flying J truck stop, east to the project limits in the town of Resaca. The proposed sidewalk west of the Flying J is proposed to be deleted in the scope of this project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,082,083	\$ 0	\$ 8,082,083
ALTERNATIVE	\$ 7,295,814	\$ 0	\$ 7,295,814
SAVINGS	\$ 786,269	\$ 0	\$ 786,269

# Illustration

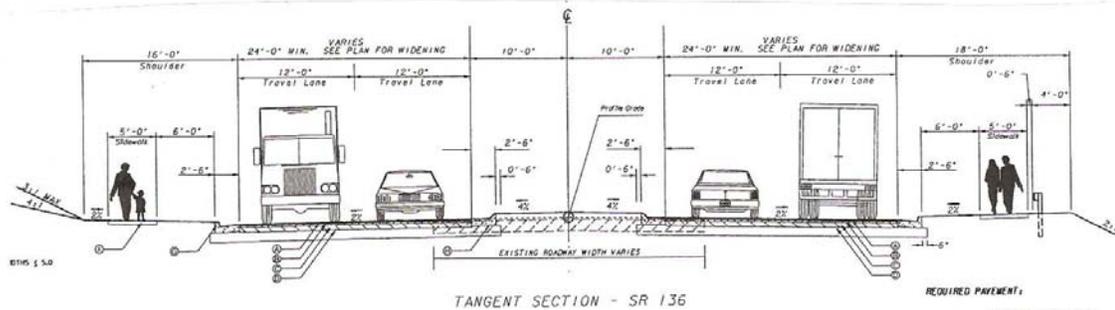


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-12**

DESCRIPTION: **Eliminate sidewalks west of truck stop**

SHEET NO.: **2** of **4**



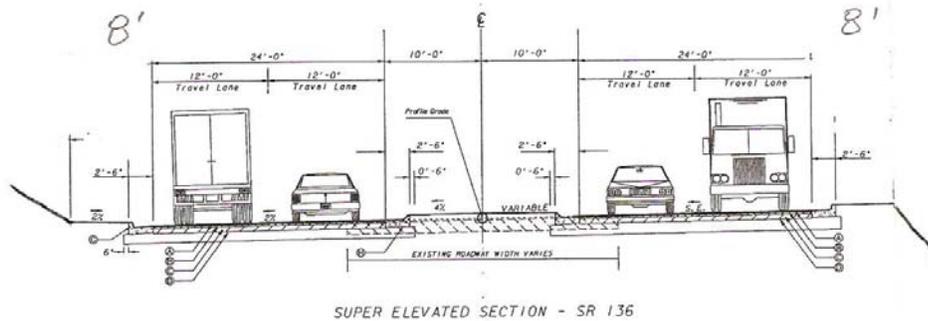
REQUIRED PAVEMENT:

**MAINLINE TRAVEL WAY**

- ① ASPHALTIC CONCRETE 12.5mm SU
- ② ASPHALTIC CONCRETE 19mm SUPE
- ③ ASPHALTIC CONCRETE BASE 25mm
- ④ 12" GRADED AGGREGATE BASE
- ⑤ 6" GRADED AGGREGATE BASE
- ⑥ CONCRETE CURB AND GUTTER, TY.
- ⑦ CONCRETE CURB AND GUTTER, TY.
- ⑧ SIDEWALK

ORIGINAL  
STA 129+00 - STA 145+19

N.T.S.



ALTERNATIVE  
STA 129+00 - STA 112+00

# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-12**

DESCRIPTION: **Eliminate sidewalks west of truck stop**

SHEET NO.: **3** of **4**

## Assumptions:

-Eliminate sidewalk west of truck stop from approximate STA 129+00 to approximate STA 111+45.

-Roadway reduction #1- STA 129+00-STA122+50= 650LF x 5'w x 2 sides/9=722 SY reduction.

-Bridge reduction- See alternative BR-2 for calculations.

-Roadway reduction #2- STA 118+70-STA 111+45=725LF x 5'w x 2 sides/9=806 SY reduction.

**ROW reduction from narrowing shoulders from 16' proposed to 8' alternative=**

**#1-650LF x 2 sides= 1,300LF x 8' reduction=10,400SF**

**#2-725LF x 2 sides= 1,450LF x 8' reduction= 11,600SF**

**Total SF ROW reduction- 22,000SF/43,560SF/AC=0.51 AC reduction**

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>STPIM-0075-03210) - P.I. No.: 610930</b> <b>Reconstruction of I-75 and SR 136 Interchange</b> <b>and Widening of SR 136</b> <b>Gordon County</b>	ALTERNATIVE NO.:	<b>RD-12</b>
DESCRIPTION:	<b>Eliminate sidewalks west of truck stop</b>	SHEET NO.:	<b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE				
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL		
441-0104 Concrete sidewalk-4"	SY	2,974	\$ 32.29	\$ 96,030	1,446	\$ 32.29	\$ 46,691		
ROW acquisition	AC	5.591	\$ 769,903	\$ 4,304,528	5.081	\$ 769,903	\$ 3,911,877		
Bridge reduction	SF	26,789	\$110.00	\$ 2,946,790	24,309.00	\$110.00	\$ 2,673,990		
<b>Sub-total</b>				<b>\$ 7,347,348</b>				<b>\$ 6,632,558</b>	
<b>Mark-up at</b>	<b>10.00%</b>				<b>\$ 734,735</b>				<b>\$ 663,256</b>
<b>TOTAL</b>				<b>\$ 8,082,083</b>				<b>\$ 7,295,814</b>	
Estimated Savings:							<b>\$786,269</b>		

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-18**

DESCRIPTION: **Reduce shoulder width in urban section**

SHEET NO.: **1 of 4**

## Original Design:

The original design calls for 16' shoulders and sidewalks in urban sections from STA 112+00 to STA 145+19.

## Alternative:

The alternative would delete the sidewalks in the above section, and reduce the shoulder width from 16' to 8'.

## Opportunities:

- Reduction in ROW costs
- Reduction in concrete sidewalk costs
- May have the effect of reducing construction time

## Risks:

- Moderate design impacts
- Deviation from typical section
- Restricts pedestrian traffic

## Technical Discussion:

The alternative seeks to reduce the footprint of the widening by reducing the shoulder width in urban sections from 16' to 8', and eliminating the proposed sidewalk on the project. The savings calculated were based on a burdened average cost per acre on ROW acquisition as provided in the concept report. The reduction of the shoulder in the alternative is from 16' to 8', and would allow for a utility strip, and a traversable shoulder for sporadic pedestrian traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,082,083	\$ 0	\$ 8,082,083
ALTERNATIVE	\$ 6,685,504	\$ 0	\$ 6,685,504
SAVINGS	\$ 1,396,579	\$ 0	\$ 1,396,579

# Illustration

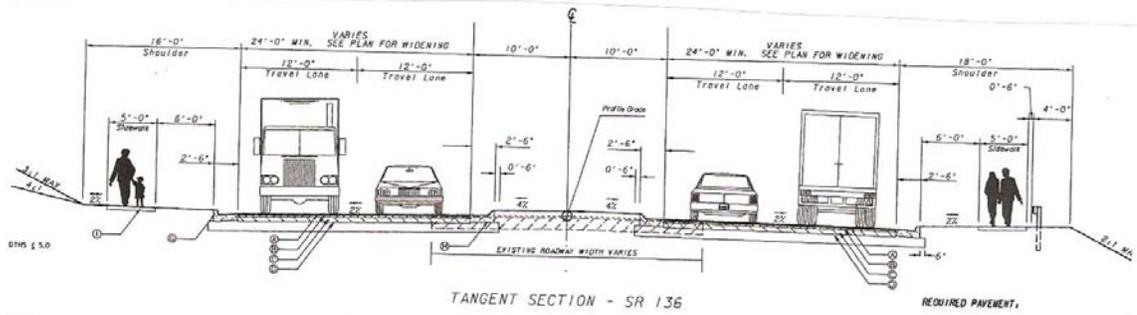


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-18**

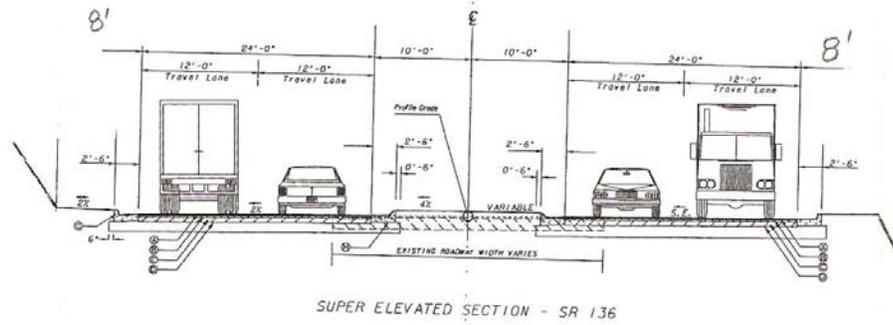
DESCRIPTION: **Reduce shoulder width in urban section**

SHEET NO.: **2** of **4**



ORIGINAL

N.T.S.



ALTERNATIVE

# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**RD-18**

DESCRIPTION: **Reduce shoulder width in urban section**

SHEET NO.: **3 of 4**

## Assumptions:

-Reduce shoulder width in urban sections from 16' to 8'.

-Eliminate sidewalk throughout project.

Urban section per typical =

-STA 114+78-STA 112+00 (single side only)=278LF x 8' reduction=2224 SF

-STA 114+78-STA 145+19(both sides)=3041LF x 8'w=24328 SF x 2=48656 SF

48656 SF + 2224 SF=50880 SF/43560 SF/AC=**1.17 AC**

**Figures used in ROW calculations were gathered from Preliminary ROW Cost Estimate dated 2/4/2008, and provided in the concept report.**

Commercial ROW-1.313 AC + 4.278 AC=5.591 AC

Burdened cost=\$4,300,000

Burdened cost per acre=\$769,093

5.591 AC – 1.170 AC= 4.421 AC

## **Bridge Reduction:**

See BR-2 for bridge calculations.

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>STPIM-0075-03210) - P.I. No.: 610930</b> <b>Reconstruction of I-75 and SR 136</b> <b>Interchange and Widening of SR 136 Gordon</b> <b>Gordon County</b>	ALTERNATIVE NO.:  <b>RD-18</b>
DESCRIPTION:	<b>Reduce shoulder width in urban sections</b>	SHEET NO.: <b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
441-0104 Concrete Sidewalk-4	SY	2,974	\$ 32.29	\$ 96,030	0	\$ 32.29	-
ROW Acquisition	AC	5.591	\$ 769,903	\$ 4,304,528	4.421	\$ 769,903	\$ 3,403,741
Bridge Reduction	SF	26,789	\$110.00	\$ 2,946,790	24,309	\$110.00	\$ 2,673,990
<b>Sub-total</b>				\$ 7,347,348			\$ 6,077,731
<b>Mark-up at 10.00%</b>				\$ 734,735			\$ 607,773
<b>TOTAL</b>				<b>\$ 8,082,083</b>			<b>\$ 6,685,504</b>
Estimated Savings:							\$1,396,579

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-2**

DESCRIPTION **Replace 6' raised sidewalks with 4' flush shoulders**

SHEET NO.: **1** of **4**

## Original Design:

The original design calls for the replacement of a 34.25' X 267' bridge carrying two lanes of SR 136 across I-75 with a 86'-5" X 310' bridge carrying four travel lanes, turn lanes and sidewalks. The four span bridge is designed to span across the proposed future typical cross section of I-75.

## Alternative:

The alternative proposes replacing the 6' sidewalks with 4' flush shoulders.

## Opportunities:

- Potential savings in construction costs due to reduced bridge width (deck concrete, elimination of a girder, reduced bent width, elimination of pedestrian safety fence)
- Reduced dead loads on the exterior bridge girders
- Reduced exposure of pedestrians to accident risk as there is no provision for crosswalks at intersections in current design for their safety

## Risks:

- Minimal redesign effort

## Technical Discussion:

A 4' outside shoulder between the inside travel lanes and the bridge rail will be adequate for bridge lengths greater than 200', per AASHTO Geometric Design of Highways and Streets (pgs. 224, 315, 412, 455 & etc.).

Replacing the 6' raised sidewalks with 4' flush shoulders could potentially reduce the width by 8' resulting in an out-to-out bridge width of 78'-5".

The calculations of quantities and savings are provided in the following pages.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 323,950	\$ 0	\$ 323,950
ALTERNATIVE	\$ 36,930	\$ 0	\$ 36,930
SAVINGS	\$ 287,020	\$ 0	\$ 287,020



# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-2**

DESCRIPTION: **Replace 6' raised sidewalks with 4' flush shoulders**

SHEET NO.: **3** of **4**

**Note:**

- 1) Reduction from current design = savings for alternative
- 2) The Bridge Plans made available to the VE Team at the time of the study were in the preliminary phase of development

**Current Design (4 Span – 310' Long – 45' + 110.0' + 110.00' + 45', 86-5" Out-to-Out Bridge) WITH 6' Raised Sidewalks on Both Sides of Bridge.**

**Alternative Design (4 Span – 310' Long – 45' + 110.0' + 110.00' + 45', 86-5" Out-to-Out Bridge) Replacing 6' Raised Sidewalks with 4' Flush Shoulders on both sides of Bridge.**

**Reduction in Bridge Width = (2 \* 6' Sidewalk) + (2 \* 2' Buffer) - (2 \* 4' Shoulder) = 8'**

**Reduction in deck area due replacement of 6' Sidewalk (and 2' buffer to travel lane) with 4' flush shoulder along both sides of Bridge = [310' \* (8')] = 2480 SF**

**Reduction in pedestrian safety fence = 2 \* 310' = 620 LF**

**Addition of Aluminum Railing = 2 \* 310' = 620 LF**

Other treatments (assumed same for current design & alternative, therefore, not considered).

**NOTE:**

**A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study. Example: One Girder line can be eliminated, concrete grooving reduced, etc.**

# Cost Worksheet



<b>PROJECT:</b>	<b>Georgia Department of Transportation                  STPIM-0075-03210) - P.I. No.: 610930                  Reconstruction of I-75 and SR 136                  Interchange and Widening of SR 136                  Gordon County</b>	<b>ALTERNATIVE NO.:</b>
		<b>BR-2</b>
<b>DESCRIPTION:</b>	<b>Replace 6' raised sidewalks with 4' flush shoulders</b>	<b>SHEET NO.: 4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
8' Reduction of Bridge Width	SF	2,480	\$ 110.00	\$ 272,800	0	\$ 110.00	\$ -
Reduction in Safety Fence	LF	620	\$ 35.00	\$ 21,700	0	\$ 50.00	\$ -
Addition of Aluminum Railing	LF	0	\$ 54.15	\$ -	620	\$ 54.15	\$ 33,573
<b>Note: Savings from Alternative Design = Cost for Current Design</b>							
<b>Sub-total</b>				\$ 294,500			\$ 33,573
<b>Mark-up at 10.00%</b>				\$ 29,450			\$ 3,357
<b>TOTAL</b>				<b>\$ 323,950</b>			<b>\$ 36,930</b>
<b>Estimated Savings:</b>							<b>\$287,020</b>

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-4**

DESCRIPTION **Remove end spans and use MSE-walled abutments**

SHEET NO.: **1 of 4**

## Original Design:

The original design calls for the replacement of a 34.25' X 267' bridge carrying two lanes of SR 136 across I-75 with a 86'-5" X 310' bridge carrying four travel lanes, turn lanes and sidewalks. The four span bridge is designed to span across the proposed future typical cross section of I-75.

## Alternative:

The alternative proposes constructing a two span 232' long bridge, thus shortening the bridge length and eliminating the 45' end (approach) spans from the original design.

Other bridge geometry remains the same as in the original design.

## Opportunities:

- Potential savings in construction costs and construction time due to reduced bridge length
- Reduction in two intermediate bents
- Lesser maintenance requirements
- Benefit to construction of west ramp terminals and construction staging

## Risks:

- Minimal redesign effort
- Additional MSE Wall and fill requirements (the latter balanced by soil removal requirements in original design)

## Technical Discussion:

A 232' long bridge with two spans, 116' long each, would span the future typical section of I-75. A shorter (relative to the original design) two span bridge can be constructed by providing MSE Walled abutments.

BT – 54 girders made of 8 ksi concrete can be used to span 116', therefore, there is no effect on the PGL and vertical clearance to I-75 from the original design.

The calculations of quantities and savings are provided in the following pages.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 542,322	\$ 0	\$ 542,322
ALTERNATIVE	\$ 370,703	\$ 0	\$ 370,703
SAVINGS	\$ 171,619	\$ 0	\$ 171,619

# Illustration

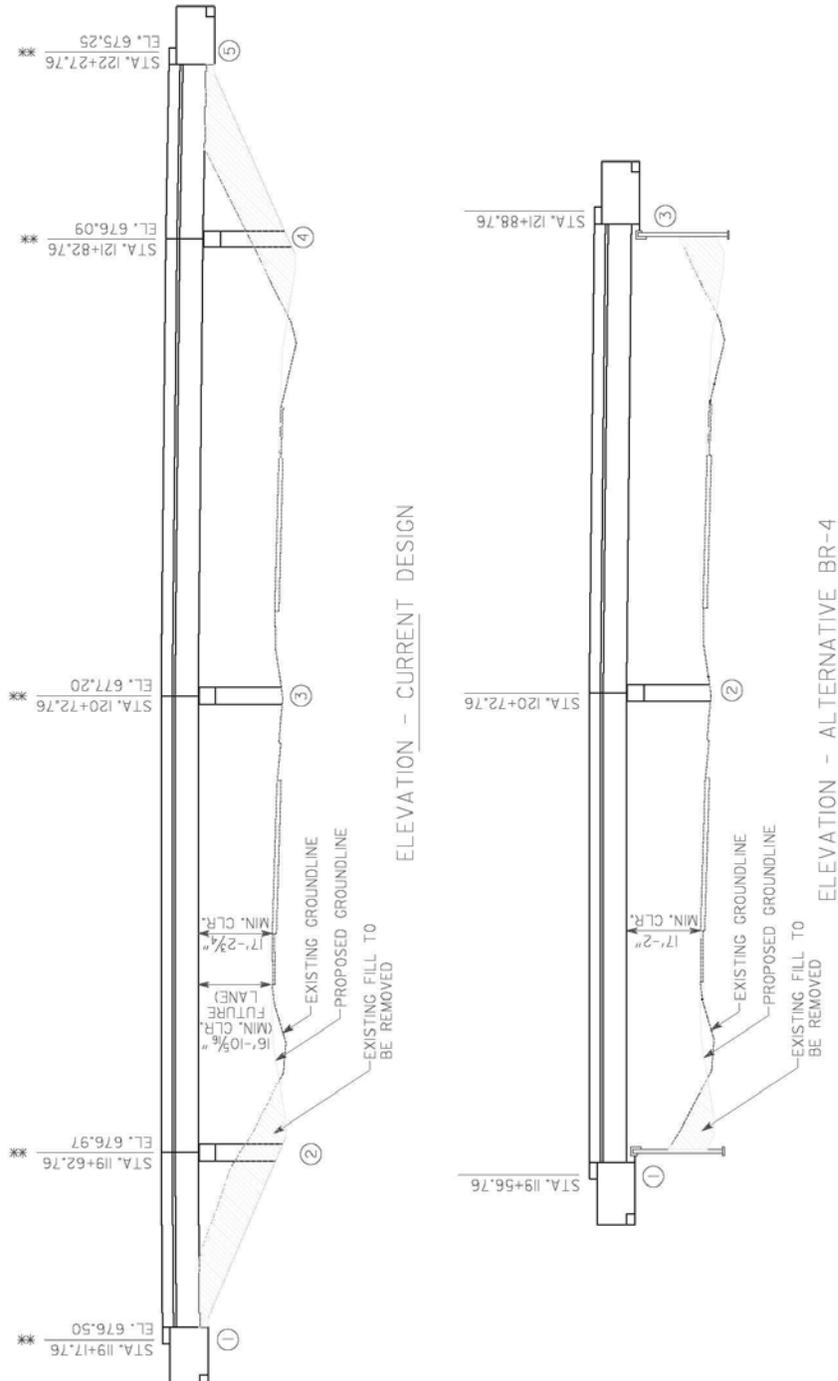


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-4**

DESCRIPTION: **Remove end spans and use MSE-walled abutments**

SHEET NO.: **2** of **4**



# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-4**

DESCRIPTION: **Remove end spans and use MSE-walled abutments**

SHEET NO.: **3** of **4**

**Note:**

- 1) Reduction from current design = savings for alternative**
- 2) The Bridge Plans made available to the VE Team at the time of the study were in the preliminary phase of development**

**Current Design (4 Span – 310' Long – 45' + 110.0' + 110.00' + 45', 86-5" Out-to-Out Bridge).**

**Alternative Design (2 Span – 232' Long – 116.0' + 116.00', 86-5" Out-to-Out Bridge) And MSE WALLED ABUTMENTS.**

**Reduction in Bridge Length =  $(310' - 232') = 78'$**

**Reduction in deck area of Bridge =  $[78' * (86.42')] = 6740.5$  SF**

**Assume MSE Wall Height of 18' over a length of 88.5'**

**Assume MSE Wall Tapers 2:1 over a length of 36'**

**Total area of MSE Walls added =  $2 * [(88.5' * 18') + (2 * 0.5 * 36' * 18')] = 4482$  SF**

**Other treatments (assumed same for current design & alternative, therefore, not considered).**

**NOTE:**

**A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study. Examples: Reduction in safety fence, grooved concrete, substructure concrete, diaphragm concrete, etc.)**



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-7**

DESCRIPTION **Reduce shoulder width on Camp Creek Bridge from  
10' To 6' to match roadway cross section**

SHEET NO.: **1** of **4**

## Original Design:

The original design calls for the replacement of a 32.25' X 141' bridge carrying two lanes of SR 136 over Camp Creek with a 91'-3" X 310' bridge carrying four travel lanes, 20' median and 10' shoulders. The bridge profile is higher than the existing bridge profile probably for hydraulic clearance purposes.

## Alternative:

The alternative proposes reducing the 10' sidewalks to 6' sidewalks to match the roadway section.

## Opportunities:

- Potential savings in construction costs due to reduced bridge width (deck concrete, elimination of a girder, reduced bent width, elimination of pedestrian safety fence)
- Reduced dead loads on the exterior bridge girders

## Risks:

- Minimal redesign effort

## Technical Discussion:

6' shoulders will provide continuity with the roadway section.

A potential reduction in the width of the bridge by 8' will result in an out-to-out bridge width of 83'-3".

The calculations of quantities and savings are provided in the following pages.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 207,152	\$ 0	\$ 207,152
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 207,152	\$ 0	\$ 207,152

# Illustration

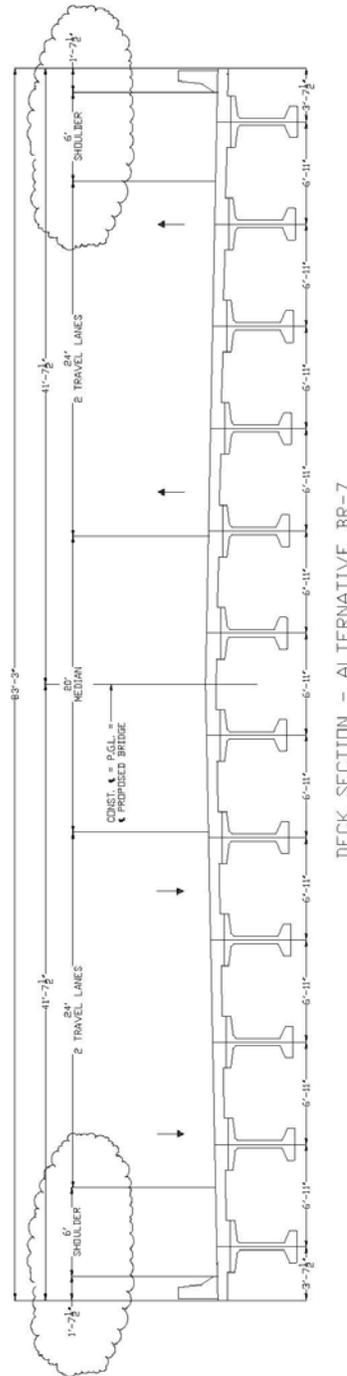
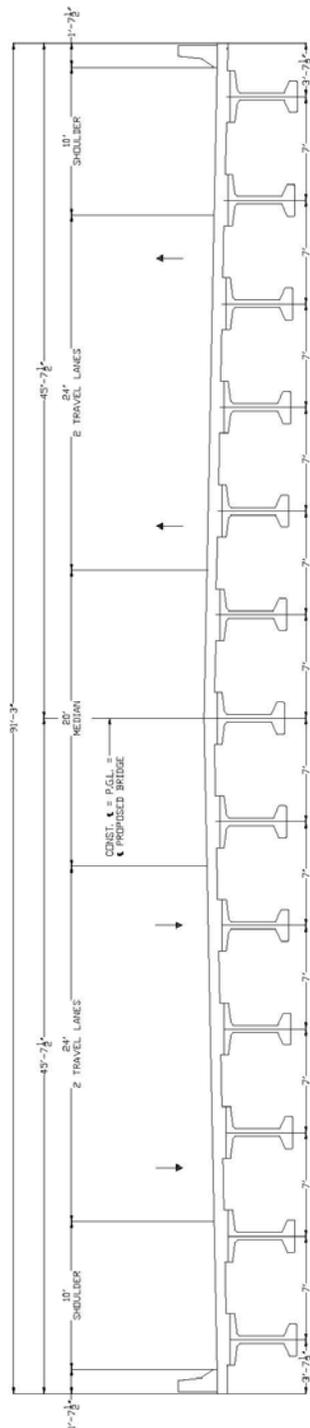


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-7**

DESCRIPTION: **Reduce shoulder width on Camp Creek Bridge from 10'  
To 6' to match roadway cross section**

SHEET NO.: **2** of **4**



# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-7**

DESCRIPTION: **Reduce shoulder width on Camp Creek Bridge from 10'  
To 6' to match roadway cross section**

SHEET NO.: **3** of **4**

**Note:**

- 1) Reduction from current design = savings for alternative
- 2) The Bridge Plans made available to the VE Team at the time of the study were in the preliminary phase of development

**Current Design (3 Span – 214' Long – 60' + 94.0' + 60', 91-3" Out-to-Out Bridge) WITH 10' Flush Shoulder on Both Sides of Bridge.**

**Alternative Design (3 Span – 214' Long – 60' + 94.0' + 60', 81-3" Out-to-Out Bridge) WITH 6' Flush Shoulder on Both Sides of Bridge.**

**Reduction in Bridge Width = (2 \* 10' Shoulder) - (2 \* 6' Shoulder) = 8'**

**Reduction in deck area due to replacement of 10' Flush Shoulder with 6' Flush Shoulder along both sides of Bridge = [214' \* (8')] = 1712 SF**

Other treatments (assumed same for current design & alternative, therefore, not considered).

**NOTE:**

**A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study. Example: One Girder line can be eliminated, concrete grooving reduced, etc.**



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STPIM-0075-03(210) – P.I. No. 610930 Reconstruction of I-75 and SR 136 Interchange Widening of SR 136 Gordon County</b>	ALTERNATIVE NO.:	<b>BR-8</b>
DESCRIPTION	<b>Replace 10' flush shoulders on Camp Creek Bridge with 4' flush shoulders to comply with minimum AASHTO requirements</b>	SHEET NO.:	<b>1 of 4</b>

## Original Design:

The original design calls for the replacement of a 32.25' X 141' bridge carrying two lanes of SR 136 over Camp Creek with a 91'-3" X 310' bridge carrying four travel lanes, 20' median and 10' shoulders. The bridge profile is higher than the existing bridge profile probably for hydraulic clearance purposes.

## Alternative:

The alternative proposes replacing the 6' sidewalks with 4' flush shoulders.

## Opportunities:

- Potential savings in construction costs due to reduced bridge width (deck concrete, elimination of a girder, reduced bent width, etc)
- Reduced dead loads on the exterior bridge girders
- Reduced exposure of pedestrians to accident risk as there is no provision for crosswalks at intersections in current design for their safety

## Risks:

- Minimal redesign effort

## Technical Discussion:

A 4' outside shoulder between the inside travel lanes and the bridge rail will be adequate for bridge lengths greater than 200', per AASHTO Geometric Design of Highways and Streets (pgs. 224, 315, 412, 455 & etc.).

Replacing the 10' flush shoulders with 4' flush shoulders could potentially reduce the width by 12' resulting in an out-to-out bridge width of 79'-3".

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 310,728	\$ 0	\$ 310,728
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 310,728	\$ 0	\$ 310,728

# Illustration

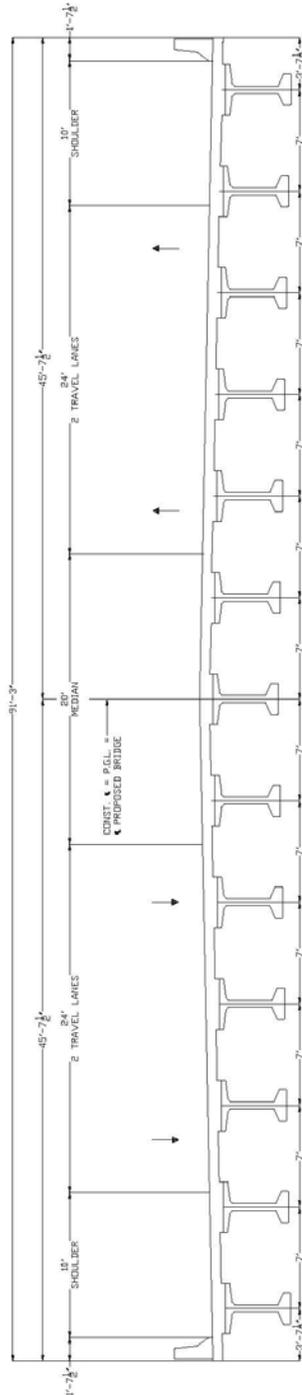


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

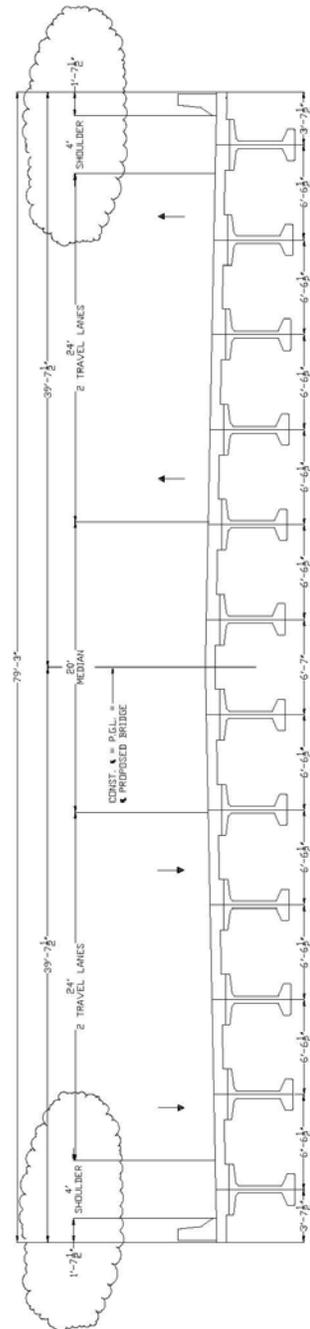
ALTERNATIVE NO.:  
**BR-8**

DESCRIPTION: **Replace 10' flush shoulders on Camp Creek Bridge with  
4' flush shoulders to comply with minimum AASHTO  
requirements**

SHEET NO.: **2** of **4**



DECK SECTION - CURRENT DESIGN



DECK SECTION - ALTERNATIVE BR-8

# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-8**

DESCRIPTION: **Replace 10' flush shoulders on Camp Creek Bridge with  
4' flush shoulders to comply with minimum AASHTO  
requirements**

SHEET NO.: **3** of **4**

## Note:

- 1) Reduction from current design = savings for alternative
- 2) The Bridge Plans made available to the VE Team at the time of the study were in the preliminary phase of development

Current Design (3 Span – 214' Long – 60' + 94.0' + 60', 91-3" Out-to-Out Bridge) WITH 10' Shoulders on Both Sides of Bridge.

Alternative Design (3 Span – 214' Long – 60' + 94.0' + 60', 75-3" Out-to-Out Bridge) WITH 4' Flush Shoulders on Both Sides of Bridge.

Reduction in Bridge Width =  $(2 * 10' \text{ Shoulders}) - (2 * 4' \text{ Shoulders}) = 12'$

Reduction in deck area due to replacement of 10' Flush Shoulders with 4' Flush Shoulders along both sides of Bridge =  $[214' * (12')] = 2568 \text{ SF}$

Other treatments (assumed same for current design & alternative, therefore, not considered).

## NOTE:

A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study. Example: Two Girder lines can be eliminated, concrete grooving reduced, etc.



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STPIM-0075-03(210) – P.I. No. 610930 Reconstruction of I-75 and SR 136 Interchange Widening of SR 136 Gordon County</b>	ALTERNATIVE NO.:	<b>BR-9</b>
DESCRIPTION	<b>Provide 2-12' through lanes, 6' flush shoulders in each direction, and a flush 14' striped median on Camp Creek Bridge</b>	SHEET NO.:	<b>1 of 4</b>

## Original Design:

The original design calls for the replacement of a 32.25' X 141' bridge carrying two lanes of SR 136 over Camp Creek with a 91'-3" X 310' bridge carrying four travel lanes, 20' median and 10' shoulders. The bridge profile is higher than the existing bridge profile probably for hydraulic clearance purposes.

## Alternative:

The alternative proposes reducing the 10' sidewalks to 6' sidewalks to match the roadway section and a 14' flush striped median.

## Opportunities:

- Potential savings in construction costs due to reduced bridge width (deck concrete, elimination of a girder, reduced bent width, etc)
- Reduced dead loads on the exterior bridge girders

## Risks:

- Minimal redesign effort

## Technical Discussion:

6' sidewalks will provide continuity with the roadway section.

A potential reduction in the width of the bridge by 10' will result in an out-to-out bridge width of 77'-3".

The calculations of quantities and savings are provided in the following pages.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 362,516	\$ 0	\$ 362,516
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 362,516	\$ 0	\$ 362,516

# Illustration

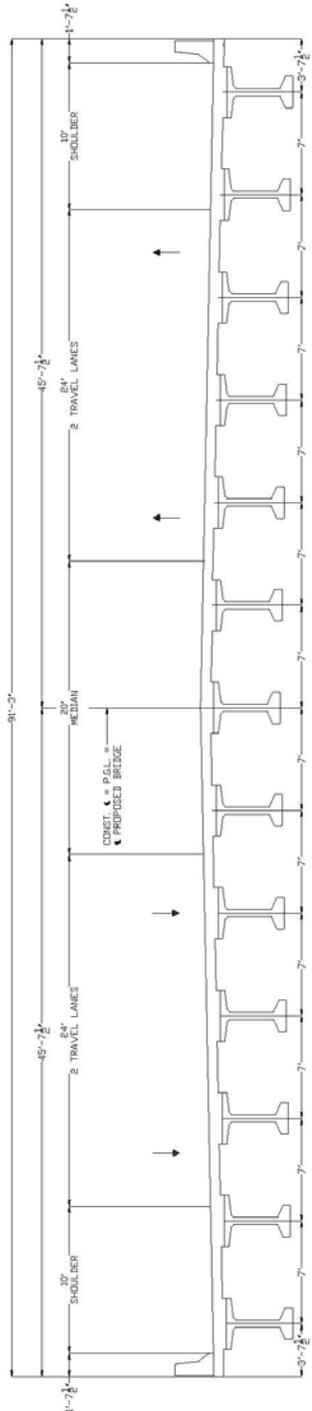


PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

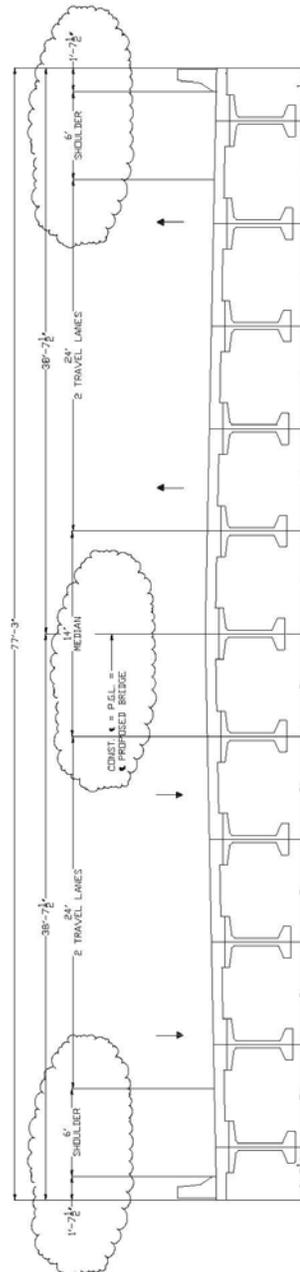
ALTERNATIVE NO.:  
**BR-9**

DESCRIPTION: **Provide 2-12' through lanes, 6' sidewalks in each direction and a flush 14' striped median on Camp Creek Bridge**

SHEET NO.: **2** of **4**



DECK SECTION - CURRENT DESIGN



DECK SECTION - ALTERNATIVE BR-9

# Calculations



PROJECT: **Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

ALTERNATIVE NO.:  
**BR-9**

DESCRIPTION: **Provide 2-12' through lanes, 6' flush shoulders in each direction and a flush 14' striped median on Camp Creek Bridge**

SHEET NO.: **3** of **4**

**Note:**

- 1) Reduction from current design = savings for alternative
- 2) The Bridge Plans made available to the VE Team at the time of the study were in the preliminary phase of development

**Current Design (3 Span – 214' Long – 60' + 94.0' + 60', 91-3" Out-to-Out Bridge) WITH 10' Shoulders on Both Sides of Bridge.**

**Alternative Design (3 Span – 214' Long – 60' + 94.0' + 60', 81-3" Out-to-Out Bridge) WITH 6' Shoulders on Both Sides of Bridge And 14' Flush Median.**

**Reduction in Bridge Width =**

$$(2 * 10' \text{ Shoulders}) + (20' \text{ Median}) - (2 * 6' \text{ Shoulders}) - (14' \text{ Shoulder}) = 14'$$

**Reduction in deck area =  $[214' * (14')] = 2996 \text{ SF}$**

Other treatments (assumed same for current design & alternative, therefore, not considered).

**NOTE:**

**A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study. Example: One Girder line can be eliminated, concrete grooving reduced, etc.**



## *Project Description*

# ***PROJECT DESCRIPTION***

## **PROJECT INTRODUCTION**

This project is located on S.R. 136 over I-75 in Gordon County. The project as currently designed will widen a mostly rural two lane road with some curb and gutter to a divided four lane road with a 20' raised median. West of the I-75 interchange, beyond the ramps, a rural section is designed while through the interchange east to SR 3/US 41 an urban section is designed.

The project as currently designed begins approximately 500' west of the Camp Creek Bridge on SR 136 which is 900' west of the I-75 interchange and continues easterly along the existing alignment to the intersection of SR 3/US 41 within the city of Resaca. The length of the project is approximately 0.9 mile.

The project consists of the replacement of the bridge over I-75 on SR 136 to accommodate future widening of I-75. Minimum clearance under the bridge will be 17'-2". Construction will be staged to allow continued use of the interchange during construction. The exit ramps from I-75 will be widened to provide left and right turn lanes at SR 136. Turn lanes are proposed on US 41 at SR 136.

At this stage, the design also calls for the replacement of the Camp Creek Bridge. Design speed is 45 mph.

The estimated construction costs as of April 2008 are projected to be \$15,595,264 plus Right-of-Way costs of approximately \$4,300,000. Total costs for this project total to \$19,895,264. In addition, utility reimbursement costs are estimated at \$104,000, but could increase significantly if the City of Calhoun were to apply for utility assistance for the relocation of their facilities

## **REPRESENTATIVE DOCUMENTS**

- Georgia Department of Transportation
  - Construction Cost Estimates
  - Preliminary Right-of-Way Cost Estimate
  - Utility Cost Estimate
  - Project location map
  - Concept Report/Revised Concept Report
  - Traffic Analysis
- Wilbur Smith Associates

The VE Team utilized the supplied project materials noted above and the current standard drawings, details and specifications provided by Wilbur Smith Associates.

## Estimate Report for file "SR136"

Section Roadway					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	1	LS	227115.63	TRAFFIC CONTROL -	227115.63
150-5010	3	EA	12082.07	TRAFFIC CONTROL, PORTABLE IMPACT ATTENUATOR	36246.21
153-1300	1	EA	71117.80	FIELD ENGINEERS OFFICE TP 3	71117.80
201-1500	1	LS	300000.00	CLEARING & GRUBBING -	300000.00
205-0001	19131	CY	4.00	UNCLASS EXCAV	76524.00
206-0002	243502	CY	6.15	BORROW EXCAV, INCL MATL	1497537.30
310-1101	35096	TN	21.67	GR AGGR BASE CRS, INCL MATL	760530.32
318-3000	190	TN	23.24	AGGR SURF CRS	4415.60
402-1812	119	TN	68.58	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME	8161.02
402-3121	20109	TN	63.07	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	1268274.63
402-3130	1378	TN	64.86	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME	89377.08
402-3190	6656	TN	63.41	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	422056.96
402-4510	2219	TN	62.90	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL POLYMER-MODIFIED BITUM MATL & H LIME	139575.10
413-1000	2025	GL	1.87	BITUM TACK COAT	3786.75
432-5010	2348	SY	1.68	MILL ASPH CONC PVMT, VARIABLE DEPTH	3944.64
433-1100	560	SY	80.16	REINF CONC APPROACH SLAB, INCL CURB	44889.60
433-1200	587	SY	203.22	REINF CONC APPROACH SLAB, INCL SLOPED EDGE	119290.14
439-0026	13759	SY	77.50	PLAIN PC CONC PVMT, CL 3 CONC, 12 INCH THK	1066322.50
439-0056	796	SY	82.45	PLAIN PC CONC PVMT, CL HES CONC, 12 INCH THK	65630.20
441-0004	195	SY	44.20	CONC SLOPE PAV, 4 IN	8619.00
441-0006	789	SY	61.72	CONC SLOPE PAV, 6 IN	48697.08
441-0018	364	SY	48.01	DRIVEWAY CONCRETE, 8 IN TK	17475.64
441-0104	2974	SY	32.29	CONC SIDEWALK, 4 IN	96030.46
441-0204	339	SY	35.46	PLAIN CONC DITCH PAVING, 4 IN	12020.94
441-0740	2189	SY	37.09	CONCRETE MEDIAN, 4 IN	81190.01
441-0748	639	SY	60.91	CONCRETE MEDIAN, 6 IN	38921.49
441-4020	145	SY	41.84	CONC VALLEY GUTTER, 6 IN	6066.80
441-6222	8090	LF	17.30	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	139957.00
441-6720	5559	LF	16.22	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	90166.98
446-1100	2582	LF	2.90	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	7487.80
456-2015	0	GLM	903.30	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (SKIP)	388.42
500-3800	10	CY	766.27	CLASS A CONCRETE, INCL REINF STEEL	7662.70
500-9999	70	CY	217.25	CLASS B CONC, BASE OR PVMT WIDENING	15207.50
550-1180	3800	LF	43.75	STORM DRAIN PIPE, 18 IN, H 1-10	166250.00
550-1181	700	LF	59.14	STORM DRAIN PIPE, 18 IN, H 10-15	41398.00
550-1182	480	LF	78.00	STORM DRAIN PIPE, 18 IN, H 15-20	37440.00
550-1183	59	LF	54.71	STORM DRAIN PIPE, 18 IN, H 20-25	3227.89
550-1240	390	LF	48.98	STORM DRAIN PIPE, 24 IN, H 1-10	19102.20
550-1242	180	LF	67.26	STORM DRAIN PIPE, 24 IN, H 15-20	12106.80
550-1420	17	LF	109.10	STORM DRAIN PIPE, 42 IN, H 1-10	1854.70
550-1423	150	LF	161.00	STORM DRAIN PIPE, 42 IN, H 20-25	24150.00
550-1480	16	LF	125.99	STORM DRAIN PIPE, 48 IN, H 1-10	2015.84
550-4218	5	EA	656.40	FLARED END SECTION 18 IN, STORM DRAIN	3282.00
550-4224	8	EA	786.39	FLARED END SECTION 24 IN, STORM DRAIN	6291.12
550-4242	4	EA	1516.22	FLARED END SECTION 42 IN, STORM DRAIN	6064.88
550-4418	4	EA	568.58	FLARED END SECTION, 18 IN, SLOPE DRAIN	2274.32
576-1018	450	LF	35.65	SLOPE DRAIN PIPE, 18 IN	16042.50
610-1055	4486	LF	2.71	REM GUARDRAIL	12157.06
610-1075	24	EA	139.01	REM GUARDRAIL ANCH, ALL TYPES	3336.24
615-1000	136	LF	329.84	JACK OR BORE PIPE -	44858.24
620-0100	8700	LF	28.30	TEMPORARY BARRIER, METHOD NO. 1	246210.00
627-1000	2133	SF	52.63	MSE WALL FACE, 0 - 10 FT HT, WALL NO -	112259.79
627-1010	6395	SF	53.76	MSE WALL FACE, 10 - 20 FT HT, WALL NO -	343795.20

627-1020	8511	SF	55.44	MSE WALL FACE, 20 - 30 FT HT, WALL NO -	471849.84
627-1030	1725	SF	62.35	MSE WALL FACE, GTR THAN 30 FT HT, WALL NO -	107553.75
627-1100	127	LF	65.42	COPING A, WALL NO - 1 & 2	8308.34
627-1140	640	LF	250.00	TRAFFIC BARRIER V, WALL NO - 3 & 4	160000.00
632-0003	4	EA	14317.47	CHANGEABLE MESSAGE SIGN, PORTABLE, TYPE 3	57269.88
634-1200	42	EA	102.91	RIGHT OF WAY MARKERS	4322.22
635-1000	80	LF	100.24	BARRICADES	8019.20
641-1100	441	LF	44.07	GUARDRAIL, TP T	19434.87
641-1200	8449	LF	15.72	GUARDRAIL, TP W	132818.28
641-5001	20	EA	627.58	GUARDRAIL ANCHORAGE, TP 1	12551.60
641-5012	9	EA	1813.66	GUARDRAIL ANCHORAGE, TP 12	16322.94
643-0010	555	LF	5.05	FIELD FENCE WOVEN WIRE	2802.75
643-8200	900	LF	2.95	BARRIER FENCE (ORANGE), 4 FT	2655.00
668-1100	53	EA	2766.90	CATCH BASIN, GP 1	146645.70
668-1110	47	LF	297.28	CATCH BASIN, GP 1, ADDL DEPTH	13972.16
668-2100	8	EA	3069.63	DROP INLET, GP 1	24557.04
668-2110	26	LF	366.53	DROP INLET, GP 1, ADDL DEPTH	9529.78
668-4300	2	EA	2514.23	STORM SEWER MANHOLE, TP 1	5028.46
668-4311	5	LF	323.98	STORM SEWER MANHOLE, TP 1, ADDL DEPTH, CL 1	1619.90
<b>Section Sub Total:</b>					<b>\$9,084,065.79</b>

**Section Erosion Control - Permanent**

Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0240	232	TN	182.09	MULCH	42244.88
207-0203	10	CY	51.26	FOUND BKFFILL MATL, TP II	512.60
603-2018	270	SY	57.06	STN DUMPED RIP RAP, TP 1, 18 IN	15406.20
603-7000	270	SY	5.06	PLASTIC FILTER FABRIC	1366.20
700-6910	16	AC	1071.92	PERMANENT GRASSING	17150.72
700-7000	16	TN	60.17	AGRICULTURAL LIME	962.72
700-7010	40	GL	21.73	LIQUID LIME	869.20
700-8000	16	TN	295.96	FERTILIZER MIXED GRADE	4735.36
700-8100	800	LB	2.47	FERTILIZER NITROGEN CONTENT	1976.00
716-1000	74000	SY	2.18	EROSION CONTROL MATS, WATERWAYS	161320.00
<b>Section Sub Total:</b>					<b>\$246,543.88</b>

**Section Erosion Control - Temporary**

Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0232	8	AC	730.32	TEMPORARY GRASSING	5842.56
163-0300	23	EA	1731.88	CONSTRUCTION EXIT	39833.24
163-0503	12	EA	534.99	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 3	6419.88
163-0520	3400	LF	16.89	CONSTRUCT AND REMOVE TEMPORARY PIPE SLOPE DRAIN	57426.00
163-0523	340	EA	144.62	CONSTRUCT AND REMOVE TEMPORARY DITCH CHECKS - TYPE C SILT FENCE	49170.80
163-0530	2700	LF	4.19	CONSTRUCT AND REMOVE BALED STRAW EROSION CHECK	11313.00
163-0550	102	EA	277.45	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	28299.90
165-0010	6000	LF	0.81	MAINTENANCE OF TEMPORARY SILT FENCE, TP A	4860.00
165-0030	13500	LF	1.46	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	19710.00
165-0040	170	EA	100.99	MAINTENANCE OF EROSION CONTROL CHECKDAMS/DITCH CHECKS	17168.30
165-0070	1400	LF	1.72	MAINTENANCE OF BALED STRAW EROSION CHECK	2408.00
165-0087	6	EA	143.94	MAINTENANCE OF SILT CONTROL GATE, TP 3	863.64
165-0101	12	EA	566.34	MAINTENANCE OF CONSTRUCTION EXIT	6796.08
165-0105	51	EA	95.23	MAINTENANCE OF INLET SEDIMENT TRAP	4856.73
167-1000	2	EA	1111.79	WATER QUALITY MONITORING AND SAMPLING	2223.58
167-1500	18	MO	938.90	WATER QUALITY INSPECTIONS	16900.20
171-0010	12000	LF	1.68	TEMPORARY SILT FENCE, TYPE A	20160.00
171-0030	27000	LF	3.91	TEMPORARY SILT FENCE, TYPE C	105570.00

**Section Sub Total: \$399,821.91**

<b>Section Signing and Marking</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
636-1020	504	SF	15.06	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	7590.24
636-1033	436	SF	19.14	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 9	8345.04
636-2080	1408	LF	9.40	GALV STEEL POSTS, TP 8	13235.20
636-3010	114	EA	485.37	GROUND-MOUNTED BREAKAWAY SIGN SUPPORT	55332.18
639-2002	200	LF	3.58	STEEL WIRE STRAND CABLE, 3/8 IN	716.00
639-3003	4	EA	8730.53	STEEL STRAIN POLE, TP III	34922.12
653-0110	3	EA	59.14	THERMOPLASTIC PVMT MARKING, ARROW, TP 1	177.42
653-0120	33	EA	73.00	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	2409.00
653-0170	3	EA	92.22	THERMOPLASTIC PVMT MARKING, ARROW, TP 7	276.66
653-0210	16	EA	112.18	THERMOPLASTIC PVMT MARKING, WORD, TP 1	1794.88
653-1501	14331	LF	0.45	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	6448.95
653-1502	13435	LF	0.46	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	6180.10
653-1704	456	LF	4.04	THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	1842.24
653-1804	4033	LF	2.09	THERMOPLASTIC SOLID TRAF STRIPE, 8 IN, WHITE	8428.97
653-3501	8596	GLF	0.45	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	3868.20
653-6004	1023	SY	3.00	THERMOPLASTIC TRAF STRIPING, WHITE	3069.00
653-6006	747	SY	2.94	THERMOPLASTIC TRAF STRIPING, YELLOW	2196.18
654-1001	90	EA	3.10	RAISED PVMT MARKERS TP 1	279.00
654-1003	267	EA	3.81	RAISED PVMT MARKERS TP 3	1017.27
657-1054	5117	LF	4.84	PREFORMED PLASTIC SOLID PVMT MKG, 5 IN, WHITE, TP PB	24766.28
657-3054	2030	GLF	2.57	PREFORMED PLASTIC SKIP PVMT MKG, 5 IN, WHITE, TP PB	5217.10
657-5001	270	SY	20.55	PREFORMED PLASTIC PAVEMENT MARKING, WHITE, TP PB	5548.50
657-5002	295	SY	18.36	PREFORMED PLASTIC PAVEMENT MARKING, YELLOW, TP PB	5416.20
657-5016	2	EA	529.72	PREFORMED PLASTIC PVMT MKG, WORDS AND/OR SYM, ARROW TP 1, WHITE, TP PB	1059.44
657-5017	5	EA	522.74	PREFORMED PLASTIC PVMT MKG, WORDS AND/OR SYM, ARROW TP 2, WHITE, TP PB	2613.70
657-5019	4	EA	537.06	PREFORMED PLASTIC PVMT MKG, WORDS AND/OR SYM, ARROW TP 4, WHITE, TP PB	2148.24
657-6054	5417	LF	4.90	PREFORMED PLASTIC SOLID PVMT MKG, 5 IN, YELLOW, TP PB	26543.30
<b>Section Sub Total:</b>					<b>\$231,441.41</b>

<b>Section Bridge 1 - SR136/Camp Creek</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
000-0000	18832	SF	110.00	BRIDGE 1	2071520.00
<b>Section Sub Total:</b>					<b>\$2,071,520.00</b>

<b>Section Bridge 2 - SR136/I-75</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
000-0000	19492	SF	110.00	BRIDGE 2	2144120.00
<b>Section Sub Total:</b>					<b>\$2,144,120.00</b>

**Total Estimated Cost: \$14,177,512.99**

# Preliminary Right of Way Cost Estimate

Date: February 4, 2008  
 Project: STP-IM-75-3 (210), Gordon County  
 P.I. Number:  
 Existing/Required R/W:  
 Project Termini: I-75 & S.R. 136 Interchange  
 Project Description: Interchange Improvements

No. Parcels: 11

**Land:**

Gordon County  
Commercial 1.313 Acres @ \$500,000.00 = \$656,500.00  
Commercial 4.278 Acres @ \$200,000.00 = \$855,600.00

Improvements: Signs, Landscaping \$100,000.00

Relocation: None anticipated

Damages:  
 Cost to Cure - 1 Parcels \$50,000.00

TOTAL

SUB-TOTAL: \$ 1,662,100.00

Net Cost		\$1,662,100.00
Scheduling Contingency	55 %	\$ 914,155.00
Adm/Court Cost	60 %	\$ 997,260.00
Market Appreciation	40 %	\$ 664,840.00

TOTAL \$4,238,355.00

**Total Cost (Rounded) \$4,300,000.00**

Prepared By: Freddie C. Law Approved: [Signature] Reviewed  
 Wilbur Smith Associates  
 Freddie Law: Assisted By: Julie Thompson  
 General Certified Appraiser - 3539  
 GDOT R/W

Note: Accuracy of estimate is sole responsibility of Preparer. REVISED: 12-8-06

**DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA**

**INTERDEPARTMENT CORRESPONDENCE**

FILE STPIM-0075-03 (210) Gordon OFFICE Cartersville  
Interchange Reconstruction of DATE January 27, 2009  
I-75 and SR 136  
P.I. No. 610930-

FROM Kerry D. Bonner  
District Utilities Engineer

TO Michael Haithcock  
Assistant Program Delivery Administrator

ATTN Kimberly Nesbitt

SUBJECT PRELIMINARY UTILITY COST ESTIMATE

As requested by your office, we are furnishing you with a Preliminary Utility Cost estimates for each utility with facilities potentially located within the project limits.

FACILITY OWNER	NON- REIMBURSABLE	REIMBURSABLE
Atlanta Gas Light Co.	\$671,380.00	
AT&T-Georgia (BellSouth)	\$150,000.00	
*City of Calhoun W & S)	\$1,560,000.00	
Comcast	\$41,834.00	
North Georgia EMC	\$8,800.00	\$80,000.00
Totals	\$2,432,014.00	\$80,000.00
30% Utility Contingency		\$24,000.00
Total Reimbursement Cost		\$104,000.00

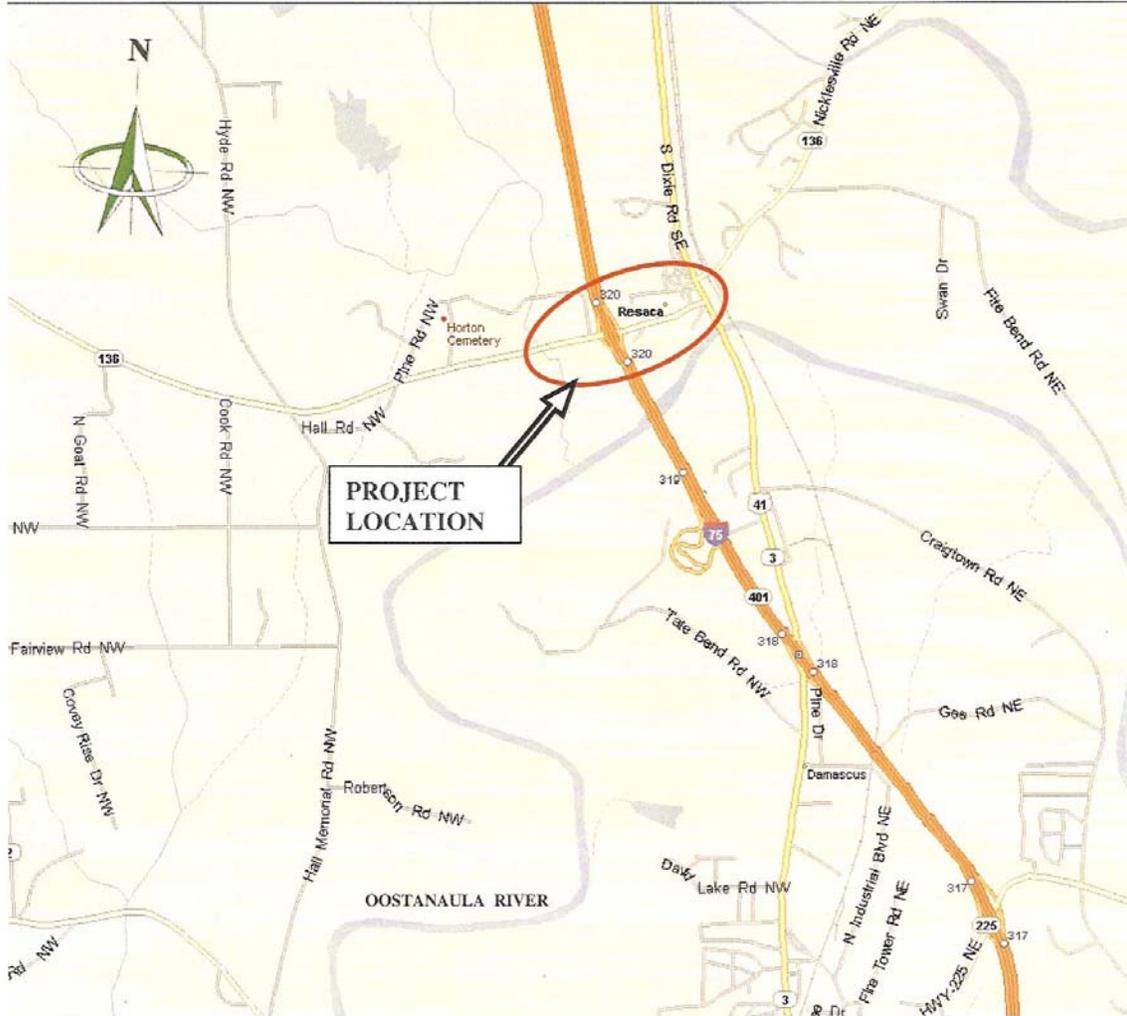
Total cost for the above project is \$2,604,009.00

\*The reimbursement amount could increase to \$2,132,000.00 if the City of Calhoun were to apply for utility assistance for the relocation of their facilities.

If you have any questions, please contact Royce Turner at 770-387-3615.

KDB/RET/rt

C: Jeff Baker, P. E., State Utilities Engineer;  
Angela Whitworth, State Financial Management Administrator  
Mike Thomason, Area Engineer  
File/Estimating Book



## Location Map

Project No.: STP- IM-75-3(210)

**Description:** Reconstruction of I-75 Interchange at SR 136 and Widening of SR 136 from west of Camp Creek to SR 3 US 41

**DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA  
OFFICE OF CONSULTANT DESIGN  
AND PROGRAM DELIVERY  
PROJECT CONCEPT REPORT**

Project Number: STP- IM-75-3(210)  
Gordon County  
P.I. Number: 610930-

Federal Route Number: I-75  
State Route Number: 401

**I-75 Interchange Reconstruction and Widening of SR 136,  
From west of Camp Creek to SR 3 US 41**

Recommendation for approval:

DATE \_\_\_\_\_

\_\_\_\_\_  
Omar U. Zaman, P.E.  
Project Manager Wilbur Smith Associates



DATE \_\_\_\_\_

\_\_\_\_\_  
State Consultant Design and Program Delivery Engineer

The concept as presented herein and submitted for approval is consistent with that which is included in the Regional Transportation Program (RTP) and/or the State Transportation Improvement Program (STP).

DATE \_\_\_\_\_

\_\_\_\_\_  
State Transportation Planning Administrator

DATE \_\_\_\_\_

\_\_\_\_\_  
State Transportation Financial Management Administrator

DATE \_\_\_\_\_

\_\_\_\_\_  
State Environmental / Location Administrator

DATE \_\_\_\_\_

\_\_\_\_\_  
State Traffic Safety and Design Engineer

DATE \_\_\_\_\_

\_\_\_\_\_  
District Engineer

DATE \_\_\_\_\_

\_\_\_\_\_  
Project Review Engineer

DATE \_\_\_\_\_

\_\_\_\_\_  
State Bridge and Structural Design Engineer

**NEED AND PURPOSE:**

**Purpose**

In order to improve the operational capacity of SR 136, the roadway is proposed to be widened under Project 610930 from a point west of the I-75 interchange easterly along existing location to the intersection of SR 136 with US41/SR 3. Although the bridge on SR 136 over I-75 has a sufficiency rating of 83, it is proposed to be replaced due to substandard sight distance and insufficient lateral clearance to allow for future widening of the interstate.

**Traffic Information**

The current (2005) Annual Average Daily Traffic (AADT) volume along SR 136 ranges from 4,250 to 5,160 and it is expected to range from 8,050 to 9,770 by 2030. The current Level of Service (LOS) is C and it is expected to be D by 2030. Acceptable LOS is C for this project. Widening the roadway to four lanes will improve the roadway to LOS A in 2030.

There were a total of 44 crashes reported in project area between 2003 and 2006. The crash and injury rates in the project area between these years were higher in 2003 and these rates in other years were lower than the Georgia statewide rates for an urban minor arterial route (see table below). There was one fatality crash in 2006. Most of the crashes were rear end (17), angle (11), and non-vehicular (8) type crashes. Of the 44 crashes, 2 occurred at the bridge on SR 136 over I-75. These crashes at the bridge were rear end (1), and head-on (1) type crashes.

<b>Crash Analysis: SR 136 from MP 7.3 to 7.8</b>				
<b>Year</b>	<b>Roadway</b>	<b>No. Crash</b>	<b>No. Injuries</b>	<b>No. Fatalities</b>
2004	I-75	6	2	-
	Ramps	3	3	-
	SR 136	5	-	-
	SR 3 / US 41	4	2	-
	<b>TOTAL</b>	<b>18</b>	<b>7</b>	<b>-</b>
2005	I-75	14	5	1
	Ramps	3	1	-
	SR 136	4	1	-
	SR 3 / US 41	1	-	-
	<b>TOTAL</b>	<b>22</b>	<b>7</b>	<b>1</b>
2006	I-75	7	7	-
	Ramps	6	3	-
	SR 136	2	-	-
	SR 3 / US 41	1	-	1
	<b>TOTAL</b>	<b>16</b>	<b>10</b>	<b>1</b>
<b>All Year(s)Total</b>		<b>56</b>	<b>24</b>	<b>2</b>

Rates	2003 SR 136 Urban Minor Arterial	2003 Statewide	2004 SR 136 Urban Minor Arterial	2004 Statewide	2005 SR 136 Urban Minor Arterial	2005 Statewide	2006 SR 136 Urban Minor Arterial	2006 Statewide
Crash Rate	629	585	338	509	214	554	511	531
Injury Rate	252	223	0.00	194	0.00	213	153	132
Fatality Rate	0.00	1.51	0.00	1.44	0.00	1.63	51.06	1.51

(Note: Rates are per 100 Million Vehicle Miles of Travel.)

2003- 2006 Crashes Along SR 136 (MP 7.3 to 8.11)				
Rear Ends	Angle	Non- Vehicle Collision	Sideswipe	Head-on
11	17	8	5	3

2003- 2006 Crashes Along SR 136 @ I-75 /SR 136 (MP 7.55 to 8.11)				
Rear Ends	Angle	Non-Vehicle Collision	Sideswipe	Head-on
10	17	8	5	2

**Logical Termini**

Projects are identified and planned at the western and eastern termini of the project. At the western terminus, Project 632810 is programmed to widen SR 136 from SR 1 in Walker County to a point near I-75 in Gordon County. At the eastern terminus, Project 0006667 is programmed to realign SR 136 at its intersection with SR 3/US 41. Project 0006667 can be constructed independently of Project 610930.

Project Concept Report page 5.  
 Project Number: STP- IM-75-3(210)  
 County: Gordon

<b>Project ID</b>	632810-
<b>STIP Code</b>	No
<b>Construction Status Code</b>	Long Range Program
<b>Project Accounting Number</b>	STP-184-1(8)
<b>Primary Work Type</b>	Widening
<b>Description</b>	SR 136 FM SR 1/LAFAYETTE TO I-75 NEAR RESACA/GORDON & RELOC

<b>Project ID</b>	0006667
<b>STIP Code</b>	No
<b>Construction Status Code</b>	Long Range Program
<b>Project Accounting Number</b>	CSSTP-0006-00(667)
<b>Primary Work Type</b>	Realignment
<b>Description</b>	SR 3/US 41 @ SR 136 IN RESACA

**Environmental Justice**

The project lies within the boundaries of Census Tract 9702. Based on 2000 Census information, about 2.1% of the 6,613 people that lived in this census tract were Black and 4 % of the people were Hispanic. About 9.3% of the 1,893 families in this census tract lived below the poverty level.

**Other Transportation Systems**

Local and State bike plans were reviewed to determine their involvement with SR 136. The route is not a part of these plans.

**Description of the proposed project:**

Project IM-75-3(210) is the proposed reconstruction of the I-75 and SR 136 interchange and the bridge reconstruction over Camp Creek. The project widens an existing two lane mostly rural section with some curb and gutter to a divided four lane facility with a 20 foot raised median. West of the interchange, beyond the ramps, a rural section is proposed, while through the interchange east to SR 3/ US 41 an urban section is proposed. The rural section will provide bikeable shoulders while the urban shoulders will contain sidewalks.

The project along SR 136 begins approximately 500 feet west of the bridge over Camp Creek, approximately 900 feet west of the I-75 interchange, proceeding easterly along the existing alignment, to the intersection with SR 3 / US 41, within the City of Resaca, for a total length of approximately 0.9 mile. The existing bridge over Camp Creek will be replaced to accommodate the four lane section with a 20 foot raised median and rural shoulders. The existing SR 136 bridge over I-75 will be replaced to accommodate the eventual fourth travel lane in each direction on I-75 and correct substandard sight distance for the exit ramps. The existing SR 136 bridge over I-75 will be replaced to accommodate the eventual fourth travel lane in each direction on I-75 and correct substandard sight distance for the exit ramps. Minimum clearance under the proposed bridge will be 17'-2" at the edge of existing travel lane of I-75 and this clearance will be enough to accommodate the future I-75 widening. The bridge replacements and roadway improvements will be staged to allow continued use of the interchange during construction. The exit ramps from I-75 will be widened to provide left and right turn lanes at SR 136. Turn lanes are proposed to be added to US 41 at SR 136. Although the project will be stage constructed,

the interchange will need to be closed for one weekend to construct the grade tie-ins due to the change in vertical alignments.

Capacity (Synchro) analyses showed that the intersections will operate at a LOS "B" or better, with the individual movements at a LOS "D" or better for both peak hours, as unsignalized intersections to accommodate the projected 2010 traffic. The capacity analyses for the 2030 conditions determined that some movements at the I-75 ramps and the US 41 intersection will operate at LOS "F" as unsignalized intersections and should therefore be signalized, resulting in LOS of "B" and "C"; these movements are summarized and included in the attached Traffic Analysis.

The project will improve safety by providing adequate intersection sight distance at the ramps; provide a median to separate opposing traffic, provide adequate lane tapers to transition from a divided four lane highway to the existing two lane highway west of I-75 and provide turn lanes on SR 3 at SR 136 to improve capacity and safety. This is particularly important due to the large number of trucks using the interchange due to the presence of the Flying "J" Truck stop located in the southeast quadrant of the interchange next to the northbound exit ramp. The 24 hour truck percent in front of the Flying "J" Truck Stop is 37%, while the peak hour trucks are at 18%.

Is the project located in a Non-attainment area?      Yes       No

PDP Classification: Major  Minor \_\_\_\_\_

PDP Designation: Full Oversight (  ),      Exempt( ),      State Funded( ),      or Other ( )

Functional Classification: Urban Minor Arterial on SR 136

U.S. Route Number(s): I-75 & US 41      State Route Number(s): 401, 136, 3

Traffic on SR 136 (AADT):

Current Year: (2010) 10,180      Design Year: (2030) 15,590

**Existing design features:**

- Typical Section: Two lane rural section consisting of two travel lanes and shoulders with deceleration lanes at various locations
- Posted speed: 45 mph east of Camp Creek to US 41
- Maximum degree of curvature: 3° 00'
- Maximum grade: 4.75 %
- Width of right of way: 100 to 200 ft
- Major structures: SR 136 over Camp Creek 32.26' x 141', sufficiency rating of 58.3%; SR 136 over I-75, 34.25' x 267', sufficiency rating of 83.0 with 16'-7" existing vertical clearance and approximately 12-14' lateral clearance from existing EOP of I-75 to the bridge column.
- Major interchanges or intersections along the project: I-75 / SR 136 and SR 136 / US 41
- Existing length of roadway segment: 0.9 mi.

**Proposed Design Features:**

- Proposed typical section(s): Four 12' travel lanes, 20' raised median, rural 10' shoulder with bike lanes, west of the I-75 interchange and four 12' travel lanes, 20' raised median, 30" curb & gutter with 5' sidewalks, on 12' shoulders between I-75 and US 41.
- Proposed Design Speed Mainline: 45 mph
- Proposed Maximum grade Mainline: 3.5% Maximum grade allowable 7.0 %.
- Proposed Maximum grade Side Street 6.0% Maximum grade allowable 8.0%.
- Proposed Maximum Ramp degree of curvature: 10° 30' South Bound Ramp E.
- Proposed Maximum Ramp grade: 5.0%.
- Proposed Maximum grade driveway 11% commercial
- Proposed Maximum degree of curve 2° 20'. Maximum degree allowable 8° 11'.
- Right of way
  - Width 140' and variable.
  - Easements: Temporary ( ), Permanent (X), Utility ( ), Other ( ).
  - Type of access control: Full ( X ), Partial ( ), By Permit ( X ), Other ( ).
  - Number of parcels: 9
  - Number of displacements:
    - Business: 0.
    - Residences: 0.
    - Mobile homes: NA.
    - Other: Detached garage/storage building.
- Structures:
  - Bridges:
    - Camp Creek - New bridge on SR 136 over Camp Creek, 91.25 feet wide and 214.0 feet long.
    - I-75 Interchange - New bridge on SR 136 over I-75
      - 86.42 feet wide and 232 feet long
      - proposed 17'-2" vertical clearance at existing EOP of I-75
      - minimum of 51'-0" lateral clearance from existing EOP of I-75 to the retaining walls of bridge abutments
  - Retaining walls: Small gravity wall west of I-75, SR136 West of Camp Creek at Bald Hill. Possible tie back or soil nail walls to minimize impacts to resource.
- Major intersections and interchanges: I-75/SR 136 Interchange and SR 136/US 41 intersection
- Traffic control during construction: Stage construction, to facilitate Bridge construction roadway widening Widen the ramps to the left to facilitate stage construction and. minimize R/W impacts.
- Design Exceptions to controlling criteria anticipated:

	UNDETERMINED	YES	NO
HORIZONTAL ALIGNMENT:	( )	( )	(X)
ROADWAY WIDTH:	( )	( )	(X)
SHOULDER WIDTH:	( )	( )	(X)
VERTICAL GRADES:	( )	( )	(X)
CROSS SLOPES:	( )	( )	(X)
STOPPING SIGHT DISTANCE:	( )	( )	(X)
SUPERELEVATION RATES:	( )	( )	(X)
HORIZONTAL CLEARANCE:	( )	( )	(X)
SPEED DESIGN:	( )	( )	(X)



Project Concept Report page 9.  
Project Number: STP- IM-75-3(210)  
County: Gordon

- o Providing material pits, Contractor
- o Providing detours, Contractor

**Coordination**

- Concept meeting date and brief summary. Attach minutes.
- P. A. R. meetings, dates and results: (None anticipated).
- FEMA: FEMA involvement anticipated.
- Public involvement: PIOH.
- Local government comments: None.
- Other projects in the area: STP-184-1(8) Walker and Gordon Counties, PI 632810- SR 136 widening from SR 1 in Lafayette to I-75 in Long Range and CSSTP-0006-00(667) Gordon Co, PI 0006667 SR 3/US4 Realignment in Resaca, in Long Range
- Other coordination to date: The Georgia Department of Natural Resources (GDNR) for Resaca Battlefield.

**Scheduling – Responsible Parties’ Estimate**

- Time to complete the environmental process: CE currently being drafted based on December 07 PIOH, expected late summer or early fall 08
- Time to complete preliminary construction plans: 6 Months.
- Time to complete right of way plans: 1 Months.
- Time to complete the Section 404 Permit: N/A Months
- Time to complete final construction plans: 6 Months.
- Time to complete to purchase right of way: 6 Months.
- List other major items that will affect the project schedule: None Known - 0 Months.

**Alternates considered:** No Build

**Recommendations:** NA

**Attachments:**

1. Cost Estimates:
  - a. Construction including E&C,
  - b. Right of Way,
  - c. Utilities.
2. Typical Sections,
3. Capacity Analysis,
4. Minutes of Initial Concept and Concept Meetings,
5. Resaca Battlefield State Historic Site Map

# **GORDON COUNTY SR 136 TRAFFIC ANALYSIS**

August 4, 2008

A traffic analysis was conducted using the latest version of the Synchro/SimTraffic software to evaluate existing traffic conditions on SR 136 from I-75 east to US 41.

Five unsignalized intersections with SR 136 were evaluated for both AM and PM peak hours:

- I-75 SB On/Off Ramps
- I-75 NB On/Off Ramps
- Flying J Car Entrance
- Flying J Truck Entrance
- US 41

## **EXISTING 2005 PEAK HOUR TRAFFIC**

Based on the existing volumes and lane configurations, it was determined that under existing conditions, all intersections are operating at overall Level of Service (LOS) “B” or better with all individual movements operating at LOS “C” or better for both peak hours.

## **PROJECTED 2010 PEAK HOUR TRAFFIC**

For the 2010 peak hour analysis, the following assumptions were made:

- SR 136 would be a four-lane divided roadway between the I-75 southbound on/off ramps and US 41;
- Eastbound and westbound left turn lanes would be provided on SR 136 at the new “jug handle” intersection east of the Flying J truck entrance;
- The merging of the jug handle roadway onto SR 136 would be controlled by a yield sign;
- The northbound and southbound I-75 off-ramps would be widened to two lanes at SR 136;

Since SR 136 will be divided, the Flying J car entrance will operate as right-in/right-out only and Flying J truck entrance will operate as right-in only. The Flying J driveway left turning traffic was reassigned to the jug handle intersection. It was assumed that all of the existing outbound left turns from Flying J truck stop section would use a proposed Access Road south of SR 136 to access the jug handle, while the outbound left turns from the passenger vehicle side would turn right onto SR 136 to access it.

Based on these assumptions, it was determined that under 2010 conditions, all intersections will operate at overall Level of Service (LOS) “A” with all individual movements operating at LOS “D” or better for both peak hours. No traffic signals will be needed at any intersection to accommodate the projected 2010 traffic.

## PROJECTED 2030 PEAK HOUR TRAFFIC

The capacity analyses for the 2030 conditions determined that some movements at the I-75 ramps and the US 41 intersection will operate at LOS "F"; these movements are discussed below and summarized in Table 1:

### *I-75 Southbound Ramps*

All movements operate acceptably except for the southbound off-ramp left turn movement which operates at LOS "F" during both the A.M. and P.M. peak hours. No widening of SR 136 will mitigate this failing level of service, therefore, a traffic signal was assumed. With a two-phase traffic signal, the intersection will operate at acceptable levels of service for both peak hours in 2030. To provide adequate storage for vehicles on the ramp, the left turn lane should be about 170 feet in length.

### *I-75 Northbound Ramps*

All movements operate acceptably except for the northbound off-ramp left turn movement which operates at LOS "F" during both A.M. and P.M. peak hours. No widening of SR 136 will mitigate this failing level of service, therefore, a traffic signal was assumed. With a two-phase traffic signal, the intersection will operate at acceptable levels of service for both peak hours in 2030. To provide adequate storage for vehicles on the ramp, the left turn lane should be about 170 feet in length.

### *Flying J Driveways*

With the median on SR 136, these driveways will remain unsignalized and operate as right-in-right-out only; the driveways were determined to operate at acceptable levels of service in 2030. These driveways are not shown in Table 1.

### *New Jug Handle Intersection*

The intersection will operate at Level of Service (LOS) "A" during both A.M. and P.M. peak hours. The northbound through movement from the service drive to the jug handle will operate at LOS "D" during the AM peak and at LOS "C" during the PM peak hour. All other movements at the intersection operate at acceptable levels of service.

Based on the above analysis, this intersection will still operate at acceptable levels of service in 2030 and this intersection should be monitored for the need of a traffic signal since it is not definitively warranted.

### *US 41*

All movements operate acceptable at this intersection during both peak hours except for the eastbound left turn movement which will operate at LOS "F" during both peak hours. If a two-

phase traffic signal were installed at the intersection, all movements would operate at acceptable levels of service.

**TABLE 1  
SUMMARY OF 2010 AND 2030 PROJECTED TRAFFIC CONDITIONS**

APPROACH	2010 TRAFFIC CONDITIONS - UNSIGNALIZED		2030 TRAFFIC CONDITIONS - UNSIGNALIZED		2030 TRAFFIC CONDITIONS - MITIGATED WITH SIGNALS	
	A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour	A.M. Peak Hour	P.M. Peak Hour
	DELAY/LOS	DELAY/LOS	DELAY/LOS	DELAY/LOS	DELAY/LOS	DELAY/LOS
<b>SB I-75 On/Off Ramps</b>						
Overall	4.0/A	5.6/A	47.0/E	64.9/F	9.5/A	11.6/B
West	0.0/A	0.0/A	0.0/A	0.0/A	8.0/A	8.7/A
East	1.9/A	2.9/A	2.0/A	3.1/A	6.7/A	8.6/A
North	25.2/D	21.4/C	>200.0/F	>200.0/F	23.2/C	21.0/C
<b>NB I-75 On/Off Ramps</b>						
Overall	5.0/A	3.9/A	53.6/F	17.4/C	11.6/B	13.5/B
West	2.1/A	0.6/A	2.1/A	0.8/A	8.9/A	12.1/B
East	0.0/A	0.0/A	0.0/A	0.0/A	9.8/A	12.8/B
South	20.7/C	12.9/B	>200.0/F	58.3/F	19.9/B	16.0/B
<b>Jug Handle Intersection</b>						
Overall	3.2/A	5.5/A	4.0/A	6.3/A		
West	1.7/A	2.2/A	1.1/A	2.0/A		
East	0.7/A	1.1/A	0.6/A	0.9/A		
South	16.0/C	16.0/C	30.9/D	23.9/C		
<b>US 41 Intersection</b>						
Overall	4.3/A	6.1/A	34.8/C	51.7/F	11.7/B	12.2/B
West	17.1/C	27.3/D	157.0/F	>200.0/F	23.4/C	26.8/C
South	2.3/A	2.3/A	3.4/A	3.6/A	8.6/A	10.9/B
North	0.0/A	0.0/A	0.0/A	0.0/A	8.5/A	7.9/A

# *Value Engineering Process*

## ***VALUE ENGINEERING PROCESS***

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE Study during the period of February 5 through February 8, 2009 in Atlanta, Georgia, for the Georgia Department of Transportation.

### **INTRODUCTION**

The Value Engineering Study team and its leadership were provided by PBS&J. This VE Team consisted of the following:

Les M. Thomas, P.E., CVS-Life	Certified Value Specialist
Luke Clarke, PE, AVS	Highway and Transportation PE
Kevin Martin, Esq. AVS	Highway Construction Specialist
Ramesh Kalvakaalva, PE, AVS	Senior Bridge Structural Engineer
Randy S. Thomas, CVS	Assistant Team Leader

A Site visit was performed on February 5, 2009 (see pictures included).

The Value Engineering Team followed the Seven Step Value Engineering job plan as promulgated by SAVE International. This Seven Step job plan includes the following:

- **Investigation/Information Phase** – during this phase of the VE Team’s work, the team received a briefing from the Wilbur Smith Associates design team and the Georgia Department of Transportation (GDOT) staff. This briefing included discussions of the design intent behind the project, the cost concerns, and the physical project limitations. In the working session that followed, the VE Team developed cost models from the cost data provided by the designers and familiarized themselves with the construction drawings and other data that was available to the team. Some of the representative project information (concept report, cost estimate, and special provisions) may be found in the tabbed section of this report entitled ***Project Description***. Following this current narrative the reader will also find a cost model done in the Pareto fashion, i.e., identifying the highest costs down to the lowest costs for the larger construction cost elements. This cost model, developed by the VE Team, was used by the VE Team to help

focus their week of work. The headings on the Pareto Chart also were used as headings for creative phase activities.

- **Analysis Phase** – during this phase the VE Team determined the “**Functions**” of the project. This was accomplished by reviewing the project from the simplest format in asking the questions of “What is the project supposed to do?”, and “How is it supposed to accomplish this purpose? In the Value Engineering vernacular, the answers to these questions are cast in the form of active verbs and measurable nouns. These verb/noun pairs form the basis of the function analysis which distinguishes a Value Engineering effort from a potentially damaging cost cutting exercise.
  
- The important functions of the project were identified as follows:
  - **Project Objective/Goals**
    - **Improve pavement conditions on SR 136**
    - **Construct new bridge over I-75 to accommodate I-75 growth**
    - **Retain Historic site**
    - **Correct sight distance for exit ramps**
    - **Accommodate large number of trucks at Flying J Truck Stop**
  
  - **Project Basic Functions**
    - **Increase capacity**
    - **Improve safety**
    - **Enhance traffic operations**
    - **Improve Level of Service**
    - **Separate traffic**
  
- **Speculation Phase** - The VE team performed a brainstorming session to identify ideas that might help meet the project objectives as stated above.

This brainstorming session initially identified numerous ideas that were then evaluated in the Judgment phase. The reader will find the creative worksheets enclosed. These same work sheets were also used to record the results of the Judgment/Evaluation Phase.

- **Evaluation Phase** – Once the VE Team identified the creative ideas, it was necessary to decide which alternatives should be carried forward. This is the work of the Evaluation or Judgment Phase. The VE Team reflected back on the project constraints and objectives shared with the team by the owner’s representatives, in the kick-off meeting on the first day of the workshop. From that guidance, the team selected ideas that they believed would improve the project by a vote process.

Following that selection process, the VE Team used the following values as measures of whether or not an alternative had enough merit to be carried forward in the VE process:

- Construction Cost Savings
- Maintainability
- Ability to Implement the Idea
- General Acceptability of the Alternatives
- Constructability
- Scheduling Delays

Based on these criteria, the VE Team evaluated the alternatives and graded them from 5 (Excellent) down to 1 (Poor). Other notes about the alternatives are annotated at the bottom of the enclosed creative and evaluation sheets.

- **Development Phase** – During this phase, the VE Team developed each of the selected design alternatives whose rating was “4” or “5” because of time constraints. If time permitted, the team will develop additional recommendations. This effort included a detailed explanation of the idea with sketches as appropriate to clarify the idea from the original concept, advantages and disadvantages, a technical explanation and an estimation of the cost and resultant savings if implemented. (see the tabbed section – Study Results)
- **Recommendation Phase** – During this phase the VE Team reviews the alternative ideas to confirm which ones are appropriate for the project, have an opportunity for success and which will improve the value of the project if implemented.
- **Presentation Phase** – As noted earlier, the team made an informal “out-briefing” on the last day of the workshop, designed to inform the Owners and the Designers of the initial findings of the VE Study. This written report is intended to formalize those findings.

The following **Function Analysis - Cost Worth and Pareto Chart** was utilized to focus the team and stimulate brainstorming; a copy of the **Attendance Sheets** is also attached so that the reader can be informed about who participated in the Study proceedings.

# VALUE ENGINEERING STUDY AGENDA

for

Georgia Department of Transportation

Project No. STPIM-0075-03(210)

P.I. No. 610930

*Reconstruction of I-75 and SR 136 Interchange*

*Widening One Mile of SR 136SR*

Gordon County

February 2-5, 2009

## Pre-Workshop Activities

VE Team Leader organizes study, coordinates with the Owner and Designer the project objectives and materials necessary. The VE Team receives and reviews all project documents. The team develops a Pareto Chart and/or Cost Model for the project.

## Day One

### 9:00-10:30 Design Team Presentation (Information Phase)

- Introduction of participants, owner, designer, and VE team members
- Presentation of the project by the design engineer including:
  - History and background
  - Design Criteria and Constraints
  - Special “U” turn requirements
  - Special needs (schools, businesses, etc.)
  - Sidewalks, bicycle lanes, and or multi-use trails
  - Historical Property protection
  - Current Construction Completion Schedule
  - Project Cost Estimate and Budget Constraints
- Owner Presentation – special requirements, definition of life cycle period and interest rate for life cycle costs
- Review VE Pareto Chart/Cost Model
- Discussion, questions and answers
- Overview of the VE Process and Agenda – Workshop goals & project goals

### 10:30-12:00 VE Team reviews project (Information Phase)

- Review design team’s presentation
- Review agenda and goals of the study
- VE Team Site Visit if time allows

### **1:00-2:30 Function Analysis Phase**

- Analyze Cost Model – Pareto
- Identify basic and secondary functions
- Complete Function Matrix/FAST Diagram

### **2:30-5:00 Creative Phase**

- Brainstorming of alternative ideas

## **Day Two**

### **8:00-10:00 Evaluation Phase**

- Establish criteria for evaluation
- Rank ideas
- Identify “best” ideas for development
- Identify those ideas that will become Design Suggestions
- Develop a cost/worth analysis
- Identify a “champion” for each idea to be developed

### **10:00-5:00 Development Phase**

- Develop alternative ideas design suggestions with assessment of original design and write up new alternatives including:
  - Opportunities & risks
  - Illustrations
  - Calculations
  - Cost worksheets
  - Life cycle cost analysis

## **Day Three**

### **8:00-5:00 Development Phase**

- Continue developing Alternative Ideas
- Continue developing Design Suggestions
- Prepare for presentation to Owners and Designers

## **Day Four**

**8:00-9:00 Prepare Presentation**

**9:00-10:00 VE Team Presentation**

# FUNCTION ANALYSIS AND COST-WORTH



**Georgia Department of Transportation**  
**STPIM-0075-03(210) – P.I. No. 610930**  
**Gordon County**

SHEET NO.: **1 of 3**

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	<b>OVERALL PROJECT</b>	Increase	Traffic Capacity	B	19,895	15,895	CW=1.25
		Reduce	Congestion	B			
		Enhance	Safety	S			
2	<b>RIGHT-OF-WAY</b>	Accommodate	Widening	B	4,300	3500	C/W= 1.22
		Facilitate	Utilities	RS			
3	<b>BRIDGE 2 – SR 136 and I-75</b>	Cross	Interstate	B	2,144	1,686	CW=1.27
		Separate	Traffic	B			
4	<b>BRIDGE 1 – CROSS CREEK BRIDGE</b>	Cross	Creek	B	2,072	1,200	CW=1.72
		Improve	Safety Rating	S			
5	<b>ASPHALT PAVING</b>	Create	Lanes	B	1,936	1,050	C/W = 1.8
		Increase	Capacity	B			
		Enhance	Safety	RS			
6	<b>CLEARING &amp; GRUBBING</b>	Remove	Vegetation	S	1,874	1,874	CW=1.0

Function defined as: Action Verb  
 Measurable Noun

Kind: B = Basic                      HO = Higher Order  
 S = Secondary                      LO = Lower Order  
 RS = Required Secondary

Cost/Worth Ratio =  
 (Total Cost ÷ Basic Worth)

# FUNCTION ANALYSIS AND COST-WORTH



**Georgia Department of Transportation**  
**STPIM-0075-03(210) – P.I. No. 610930**  
**Gordon County**

SHEET NO.: 2 of 3

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
7	<b>CONCRETE</b>	Create	Lanes	S	1,357	1,000	CW=1.35
		Increase	Capacity	S			
8	<b>MSE WALLS</b>	Support	Load	S	934	900	CW=1.03
9	<b>BASE</b>	Support	Road	S	760	675	CW=1.2
10	<b>DRAINAGE (DR)</b>	Convey	Storm Water	B	543	543	CW=1.0
		Facilitate	Utilities	S			
11	<b>BARRIERS</b>	Enhance	Safety	S	420	420	CW=1.0
12	<b>EROSION CONTROL- TEMPORARY</b>	Stabilize	Earthwork	S	400	400	CW=1.0
13	<b>MISCELLANEOUS ROADWAY ITEMS</b>	Enhance	Traffic Operations	S	275	275	CW=1.0
14	<b>TRAFFIC CONTROL</b>	Facilitate	Safe Construction	S	264	264	CW=1.0
15	<b>EROSION CONTROL- PERMANENT</b>	Stabilize	Earthwork	S	247	247	CW=1.0

Function defined as: Action Verb  
 Measurable Noun

Kind: B = Basic  
 S = Secondary  
 RS = Required Secondary  
 HO = Higher Order  
 LO = Lower Order

Cost/Worth Ratio =  
 (Total Cost ÷ Basic Worth)

# FUNCTION ANALYSIS AND COST-WORTH



**Georgia Department of Transportation**  
**STPIM-0075-03(210) – P.I. No. 610930**  
**Gordon County**

SHEET NO.: **3 of 3**

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
16	<b>GUARDRAILS</b>	Enhance	Safety	S	241	241	CW=1.0
17	<b>CURB &amp; GUTTER</b>	Route	Stormwater	S	236	236	CW=1.0
18	<b>SIGNING &amp; MARKING</b>	Enhance	Safety	S	231	231	CW=1.0
19	<b>CONCRETE MEDIANS</b>	Separate	Traffic	S	130	130	CW=1.0
		Enhance	Safety	S			
20	<b>DRIVEWAYS &amp; SIDEWALKS</b>	Allow	Access	S	114	114	CW=1.0

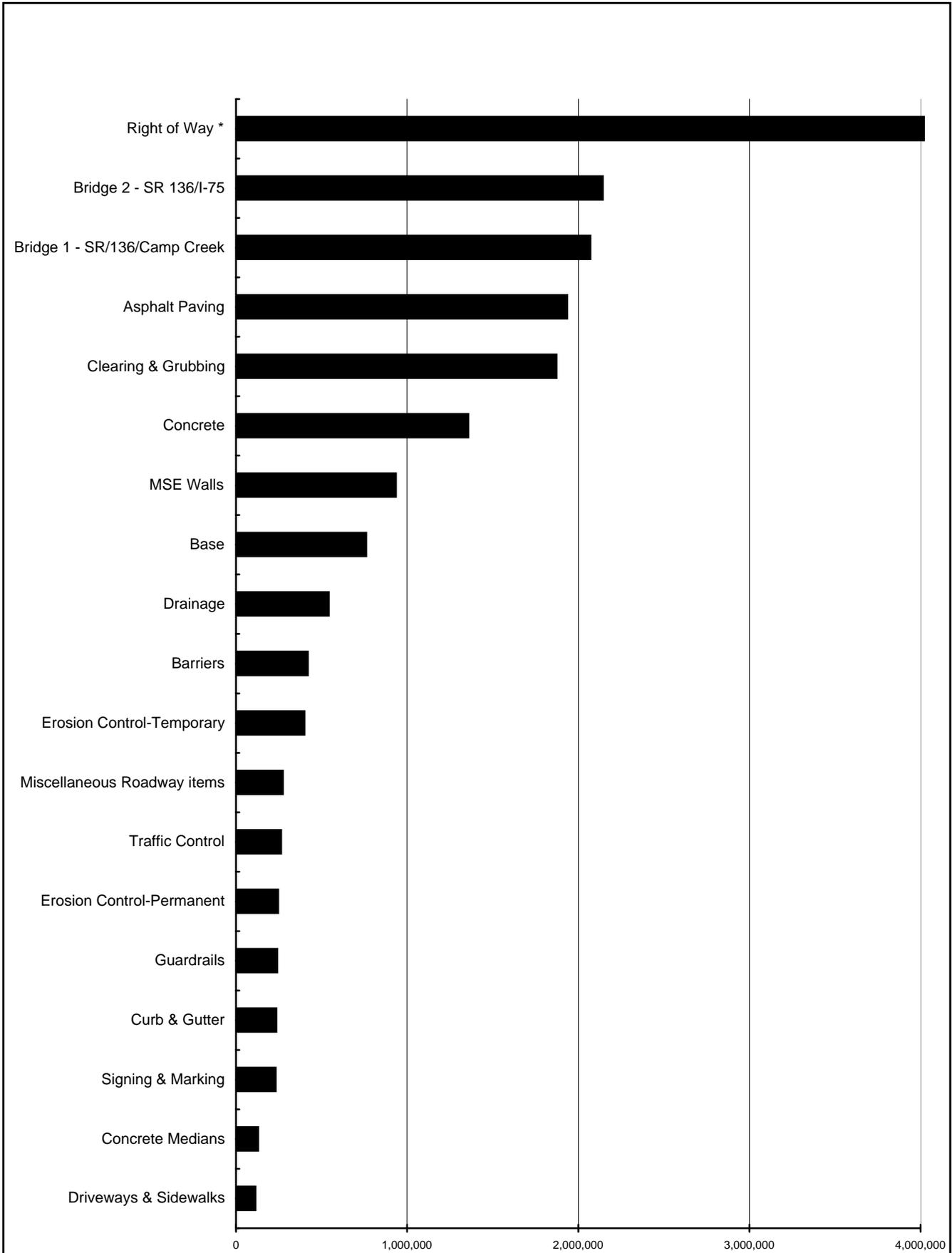
Function defined as: Action Verb  
 Measurable Noun

Kind: B = Basic                      HO = Higher Order  
 S = Secondary                      LO = Lower Order  
 RS = Required Secondary

Cost/Worth Ratio =  
 (Total Cost ÷ Basic Worth)



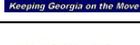
Project: STPIM-0075-03(210)  
P.I. No.61930  
Gordon County



# DESIGNER PRESENTATION



## MEETING PARTICIPANTS

Geogia Department of Transportation		February 5, 2009		
STPIM-0075-03(210) - P.I. No. 610930- Gordon County				
NAME	ORGANIZATION & TITLE	E-MAIL	PHONE	
Lisa Myers	 GDOT - Engineering Services	<a href="mailto:lm Myers@dot.ga.gov">lm Myers@dot.ga.gov</a>	404-631-1770	
James K. Magnus	 GDOT-Construction	<a href="mailto:jmagnus@dot.ga.gov">jmagnus@dot.ga.gov</a>	404-631-1971	
Ken Werho	 GDOT-Traffic Operations	<a href="mailto:kwerho@dot.ga.gov">kwerho@dot.ga.gov</a>	404-635-8144	
Douglas Fudool	 GDOT-Engineering Services	<a href="mailto:dfudool@dot.ga.gov">dfudool@dot.ga.gov</a>	404-631-1764	
Wesley Brock	 GDOT-Right-of-Way	<a href="mailto:wbrock@dot.ga.gov">wbrock@dot.ga.gov</a>	404-347-0177	
Ron Wishon	 GDOT-Engineering Services	<a href="mailto:rwishon@dot.ga.gov">rwishon@dot.ga.gov</a>	404-631-1753	
Kimberly Nesbitt	 GDOT-Program Development	<a href="mailto:kneswbitt@dot.ga.gov">kneswbitt@dot.ga.gov</a>	770-631-1575	
Kenny Beckworth	 GDOT	<a href="mailto:kbeckworth@dot.ga.gov">kbeckworth@dot.ga.gov</a>	770-332-3609	
Manuel Madera	 GDOT-Construction	<a href="mailto:mmadera@ga.dot.us">mmadera@ga.dot.us</a>		
Joe King	 GDOT-Bridge Design	<a href="mailto:joking@dot.ga.gov">joking@dot.ga.gov</a>	404-631-1913	
Michael Hester	 GDOT	<a href="mailto:mhester@dot.ta.us">mhester@dot.ta.us</a>	404-699-4435	
Aric Mance	 FHWA	<a href="mailto:Aric.Mance@fhwa.dot.gov">Aric.Mance@fhwa.dot.gov</a>	404-562-3654	
Christy Poon-Atkins	 FHWA	<a href="mailto:Christy.Poon-Atkins@FHWA.dot.gov">Christy.Poon-Atkins@FHWA.dot.gov</a>	404-562-3638	
William Moskal	 Wilbur Smith Assoc.	<a href="mailto:wmoskal@wilbursmith.com">wmoskal@wilbursmith.com</a>	770-936-8650	
Umit Seyhan	 Wilbur Smith Assoc.	<a href="mailto:useyhan@wilbursmith.com">useyhan@wilbursmith.com</a>	770-936-8650	
Dean Miller	 Wilbur Smith Assoc.	<a href="mailto:dmiller@wilbursmith.com">dmiller@wilbursmith.com</a>	770-936-9534	
Les Thomas, PE, CVS	 PBSJ	<a href="mailto:lmthomas@pbsj.com">lmthomas@pbsj.com</a>	678-677-6420	
Luke Clarke, PE, AVS	 PBS&J	<a href="mailto:lwclarke@pbsj.com">lwclarke@pbsj.com</a>	205-969-3776	
Randy Thomas, CVS	 PBSJ	<a href="mailto:rsthomas@pbsj.com">rsthomas@pbsj.com</a>	770-883-1545	
Kevin Martin, Esq., AVS	 PBSJ	<a href="mailto:klmartin@pbsj.com">klmartin@pbsj.com</a>	205-969-3776	
Ramesh Kalvakaalva, PE, AVS	 Civil Services, Inc.	<a href="mailto:rameshk@civilservicesinc.com">rameshk@civilservicesinc.com</a>	770-312-2014	

# VE TEAM PRESENTATION



## MEETING PARTICIPANTS

Georgia Department of Transportation		February 8, 2009		
STPIM-0075-03(210) - P.I. No. 610930 - Gordon County				
NAME	ORGANIZATION & TITLE		E-MAIL	PHONE
Lisa Myers		GDOT - Engineering Services	<a href="mailto:lmyers@dot.ga.gov">lmyers@dot.ga.gov</a>	404-631-1770
Ron Wishon		GDOT - Engineering Services	<a href="mailto:rwishon@dot.ga.gov">rwishon@dot.ga.gov</a>	404-631-1575
Douglas Fudool		GDOT-Engineering Services	<a href="mailto:dfudool@dot.ga.gov">dfudool@dot.ga.gov</a>	404-631-1764
Kimberly Nesbitt		GDOT-Program Development	<a href="mailto:kneswbitt@dot.ga.gov">kneswbitt@dot.ga.gov</a>	770-631-1575
Aric Mance		FHWA	<a href="mailto:Aric.Mance@fhwa.dot.gov">Aric.Mance@fhwa.dot.gov</a>	404-562-3654
Umit Seyhan		Wilbur Smith	<a href="mailto:useyhan@wilbursmith.com">useyhan@wilbursmith.com</a>	770-936-8650
Les Thomas, PE, CVS		PBS&J	<a href="mailto:lmthomas@pbsj.com">lmthomas@pbsj.com</a>	678-677-6420
Luke Clarke, PE, AVS		PBS&J	<a href="mailto:lwclarke@pbsj.com">lwclarke@pbsj.com</a>	205-969-3776
Randy Thomas, CVS		PBS&J	<a href="mailto:rsthomas@pbsj.com">rsthomas@pbsj.com</a>	770-883-1545
Kevin Martin, Esq., AVS		PBSJ	<a href="mailto:klmartin@pbsj.com">klmartin@pbsj.com</a>	205-969-3776
Ramesh Kalvakaalva, PE, AVS		Civil Services, Inc.	<a href="mailto:rameshk@civilservicesinc.com">rameshk@civilservicesinc.com</a>	770-312-2014

# CREATIVE IDEA LISTING



**PROJECT: Georgia Department of Transportation  
STPIM-0075-03(210) – P.I. No. 610930  
Reconstruction of I-75 and SR 136 Interchange  
Widening of SR 136  
Gordon County**

SHEET NO.: 1 of 2

NO.	IDEA DESCRIPTION	RATING
	<b>ROADWAY (RD)</b>	
RD-1	Use PCC instead of flexible pavement	4
RD-2	Eliminate Type-B left turn at US 41	ABD
RD-3	Reduce paved outside shoulder on ramp from 10' to 8'	5
RD-4	Reduce median width	2
RD-5	Use striping in-lieu of raised medians	3
RD-6	Signalize intersection at SR 136 and access road	5
RD-7	Relocate Westside ramp terminals to the east	3
RD-8	Reduce number of through lanes	2
RD-9	Reduce number of lanes on bridge and provide a traffic signal at west side ramp intersection and move west side logic termini east of bridge over Camp Creek	2
RD-10	Use rural shoulders throughout project	1
RD-11	Modify geometrics in the transition section at the western terminus to reduce pavement width and bridge width	5
RD-12	Eliminate sidewalks west of truck stop	5
RD-13	Move the PVC east to increase the line of sight on west side	3
RD-14	Reduce PGL on ramps	2
RD-15	Move westerly on/off ramps to increase line of sight	2
RD-16	Use a modular wall on the non-roadway bearing retaining wall	3
RD-17	Move truck stop access westerly to existing location	2
RD-18	Reduce shoulder width in urban section	4
RD-19	Lower grade between Camp Creek and I-75, taper to existing grade east of Camp Creek.	3

**Rating:** 1→2 = Not to be Developed; 3 = Varying Degrees of Development Potential;  
4→5 = Most likely to be Developed; DS = Design Suggestion; ABD = Already Being Done

