

# Value Engineering Study Report

*Project – STP-012-1(71)), P.I. No. – 621350  
Widening and Relocation of SR 20  
And  
Project – STP-0002-00(626), P.I. No. –0002626  
Interchange Improvements on US 41  
Bartow County*



**Value Management Team**



**Design Team**



October 2007



October 31, 2007

Ms. Lisa Myers  
Design Review Engineer Manager  
Georgia Department of Transportation  
#2 Capitol Square, Room 266  
Atlanta, GA 30334

RE: Submittal of the final Value Engineering Report  
STP-012-1(71) – P.I. No. 621350, SR 20 Widening and Relocation  
STP-0002-00(626) - P.I. No. 0002626, US 41 Interchange Improvements;  
Bartow County  
PBS&J Project Task Order No. 20

Dear Ms. Myers:

Please find enclosed four (4) hard copies and a CD of our final Value Engineering Report for the US 41 and SR 20 Improvements – Bartow County, as referenced above.

This Value Engineering Study, which was performed during the period October 16 through October 19, 2007, identified **35 Alternative Ideas**, of which **19 are recommended for implementation**. The VE Team also identified **1 Design Suggestion Idea** which is recommended for the Engineer to consider in his final design. We believe that the **19 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

# ***Value Engineering Study Report***

***Project – 012-1(71), P.I. No. –621350***

***Widening and Relocation of SR 20***

***And***

***Project – STP-0002-00(626), P.I. No. – 0002626***

***Interchange Improvements and Three Replacement Bridges on US 41***

***Bartow County***

## ***Table of Contents***

### **Executive Summary**

Introduction  
Project Description  
Value Engineering Process  
The Study Results  
Summary of Alternative and Design Suggestions

### **Study Results**

Introduction  
Summary of Alternatives & Design Suggestions  
Documentation of Alternative & Design Suggestions

### **Project Description**

Introduction  
Representative Documents

### **Value Engineering Process**

Introduction  
Function Analysis and Cost–Worth Worksheets  
Pareto Cost Model and Graph  
Attendance Sheet for Designers and VE Team Presentations  
Creative Idea Listing and Evaluation Worksheet

## ***EXECUTIVE SUMMARY***

## ***EXECUTIVE SUMMARY***

### **INTRODUCTION**

This report summarizes the analysis and conclusions by the PBS&J Value Engineering workshop team as they performed a VE study during the period of October 16 – October 19, 2007 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study was Project STP-012-1(71) – P.I. No. 621350, SR 20 Widening and Relocation and Project STP-0002-00(626) - P.I. No. 0002626, US 41 Interchange Improvements, Bartow County. The concept designs for the projects have been prepared by JIG, Inc. At the time of the workshop the plans had advanced to the concept design level.

### **PROJECT DESCRIPTION**

Project STP-012-1(71) – P.I. No. 621350, SR 20 Widening and Relocation, Bartow County. This project consists of the widening and relocation of SR 20 from US 411/SR 61 to Market Place to I-75. The improvements from US 411/SR 61 to Market Place consists of a new alignment constructing a rural section 44' depressed median with curb and gutters and sidewalks; and from Market Place to I-75 by constructing along the same alignment a 4/6 lane section with a 44' depressed median and urban type curb and gutters with sidewalks. The estimated construction cost is \$27,653,826.

Project STP-0002-00(626) - P.I. No. 0002626, US 41 Interchange Improvements, Bartow County. This project consists of the reconstruction of the existing US 41/ US 411/ SR 20 interchange and portions of US 41 and US 411 to increase the capacity of the interchange. The modifications include the replacement and enlargement of six (6) Bridges. The estimated construction cost is \$32,673,102.

These projects are rather fully described in the documentation that is located in Tab 4 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 projects:

- The poor level of service of the existing US 411 and US 41 interchange is a major opportunity.
- Growth in the area is above expectations.

- There are new major schools being constructed.
- The existing terrain presents significant obstacles to construction.

## VALUE ENGINEERING PROCESS

The Value Engineering team followed the seven step Value Engineering job plan as promulgated by the Georgia Department of Transportation. 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 detail process of the Value Engineering Study.

## CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified *35 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, *19 Alternative Ideas* and *1 Design Suggestion* remained for further consideration. These Alternative Ideas and Design Suggestion 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**



**Georgia Department of Transportation**

**US 41 Interchange Improvements - Bartow County STP-0002-00(626) - P.I. No. 0002626**

Alternative Number	Description of Alternative	Initial Cost Savings
	<b>US 41/ 411 Interchange Bridge (BR ITX)</b>	
BR-ITX-1	Build one new 33' structure in between the two existing bridges; route traffic onto new bridge; construct new bridges north and south	\$22,328
BR-ITX-3	Use 8' and 2' shoulders	\$206,712
BR-ITX-4	Use 6'-6" and 2' shoulders	\$284,229
	<b>US 41 Railroad Bridge (BRRR)</b>	
BRRR-1	Use an 8' and a 2' shoulder	\$178,200
BRRR-2	Reduce length by eliminating end spans	\$2,581,734
BRRR-3	Use 6'-6" and 2' shoulders	\$245,025
BRRR-4	Build one new 21' structure in between the two existing bridges; route traffic onto new bridge; construct new bridges north and south	\$112,303
	<b>US 41 Creek Bridge (BRCR)</b>	
BRCR-1	Use an 8' and a 2' shoulder	\$122,760
BRCR-2	Build one new 33' structure in between the two existing bridges; route traffic onto new bridge; construct new bridges north and south	\$63,246
BRCR-3	Use 6'-6" and 2' shoulders	\$168,795
	<b>US 41 Roadway (RD)</b>	
RD-2	Recycle existing pavement on US 41/SR 3	\$906,007

## ***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.

The documented alternatives also include Design Suggestions (DS). As their name implies, these are short write-ups making note of VE perspectives on technical issues and sharing some thoughts for consideration as the design moves forward.

This introductory sheet is followed by a *Summary of Alternatives & Design Suggestions* table. 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 following *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.

A 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*.



# Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening & Relocation – Bartow County	ALTERNATIVE NO.:	<b>RD-1</b>
DESCRIPTION:	<b>REDUCE MEDIAN WIDTHS TO 24' IN RURAL SECTIONS</b>	SHEET NO.:	1 of 4

**Original Design:**

The original design calls for a 44' grassed depressed median for rural sections of this project.

**Alternative:**

The alternative calls for reducing the median width to 24' raised median throughout rural sections of this project to include the portion of SR 20 from Sta 20+00 to Sta 133+83.

**Opportunities:**

- Right-of-Way cost savings
- Earthwork cost savings

**Risks:**

- Moderate design impacts
- Requires design exception
- Potentially requires curb and gutter

**Technical Discussion:**

Reducing median sections from 44' grassed depressed median to 24' raised median would result in approximately 3.44 acres that would not be required for Right-of-Way. Additional savings would be realized by reducing the amount of earthwork to complete the proposed narrower ditch sections.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,272,681	\$	\$ 8,272,681
ALTERNATIVE	\$ 6,985,481	\$	\$ 6,985,481
SAVINGS	\$ 1,287,200	\$	\$ 1,287,200

# Illustrations



PROJECT: **Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County**

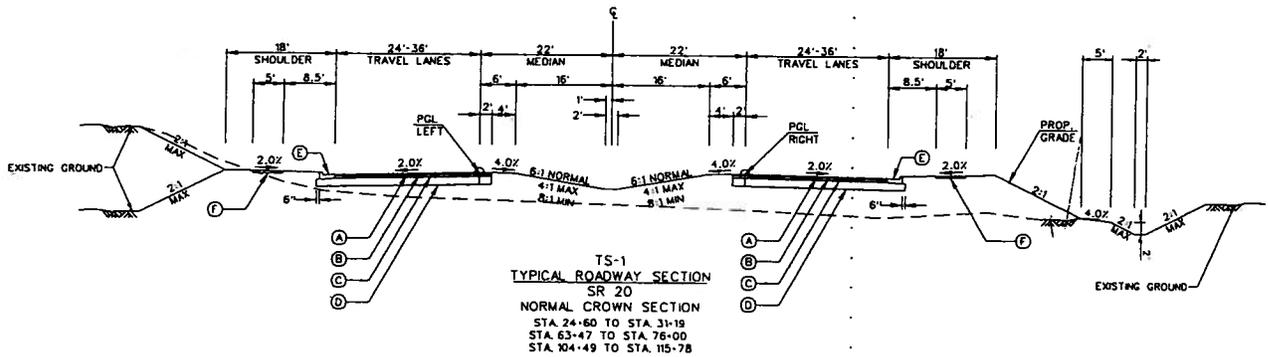
ALTERNATIVE NO.:

**RD-1**

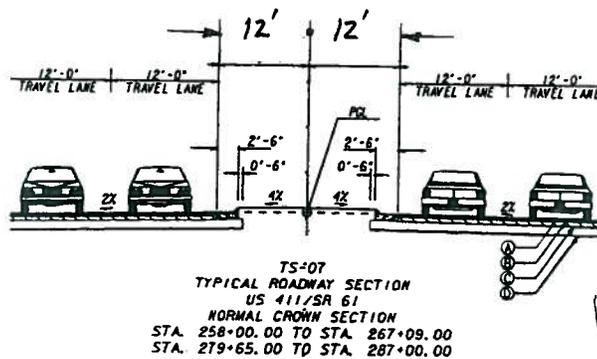
DESCRIPTION: **REDUCE MEDIAN WIDTHS TO 24' IN RURAL SECTIONS**

SHEET NO.:

**2 of 4**



ORIGINAL DESIGN



PROPOSED ALTERNATE

# Calculations



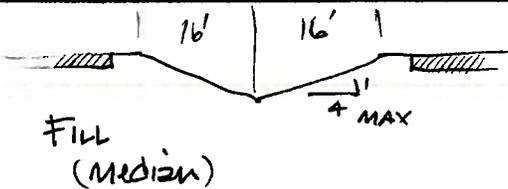
PROJECT: Georgia Department of Transportation  
 STP-012-1(71) - P.I. No. 621350  
 SR 20 Widening & Relocation - Bartow County

ALTERNATIVE NO.:

**RD-1**

DESCRIPTION: **REDUCE MEDIAN WIDTHS TO 24' IN RURAL SECTIONS**

SHEET NO.: 3 of 4



STA 59+00 to STA 133+83  
 $7,483 \text{ LF} \times 16 \times 4 = 17,737 \text{ cy}$   
 @ \$7.48/cy = \$132,672.  
 (borrow excav)

ROW —  $7,483 \text{ LF} \times 20' = 149,660 \text{ SF}$        $AC = \frac{149,660}{43,560} = 3.44 \text{ AC}$   
 $3.44 \text{ AC} @ \$385,000/\text{AC} (\text{zoned commercial}) = \$1,324,400$

Reduce fill (shoulder) use 15,000 cy @ \$7.48/cy = \$112,200.

curb/gutter type 2  $2(7,483 \text{ LF}) = 14,966 \text{ LF} @ \$17.54 = \$262,504.$

eliminate median drainage

		APPROX LF	\$
STA 58+96	18" SD	6'	3827
STA 67+22	18" SD	40'	2261
STA 70+80	18" SD	92'	3772
STA 80+10	2 inlets		4652
STA 82+00	18" SD	32'	1933
STA 91+10	42" SD	136'	21674
STA 96+30	18" SD	80'	3901
STA 104+10	48" SD	140'	22995
STA 117+70	42" SD	152'	23593
			<u>88,108</u>



# Value Analysis Design Alternative



<b>PROJECT:</b> Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening & Relocation – Bartow County	<b>ALTERNATIVE NO.:</b>  <div style="text-align: center; font-size: 1.2em;"><b>RD-4</b></div>
<b>DESCRIPTION:</b> REPLACE TYPE 'B' MEDIAN CROSSOVERS WITH TYPE 'A' MEDIAN CROSSOVERS	<b>SHEET NO.:</b> 1 of 4

**Original Design:**

The original design provides for Type 'A' Median Crossovers .

**Alternative:**

The alternative design proposes the utilization of Type 'B' Crossovers

**Opportunities:**

- Preferable in low volume turning situations
- More flexible drainage considerations
- Improve operations

**Risks:**

- Moderate increase in design effort

**Technical Discussion:**

In this rural section we feel that a Type 'A' Crossover would suffice due to the lower traffic volumes which could provide additional savings through the elimination of some paving in these areas.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,491,963	\$	\$ 4,491,963
ALTERNATIVE	\$ 4,298,530	\$	\$ 4,298,530
SAVINGS	\$ 193,433	\$	\$ 193,433

# Illustrations

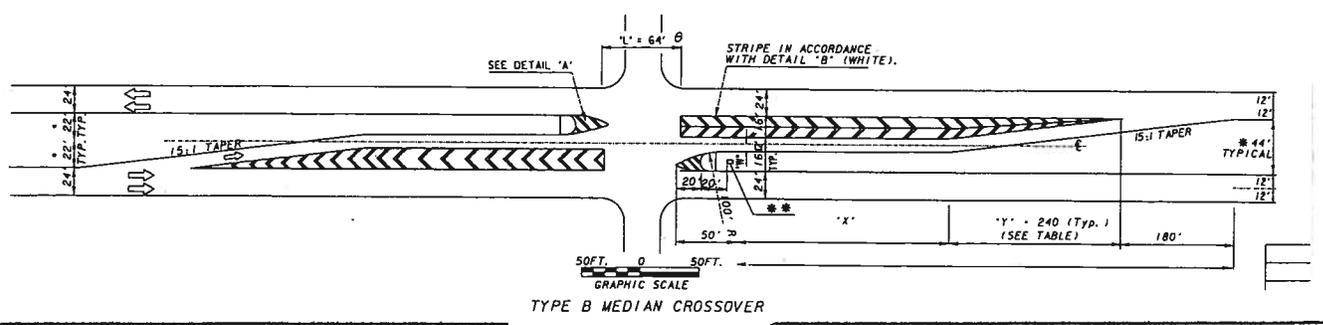
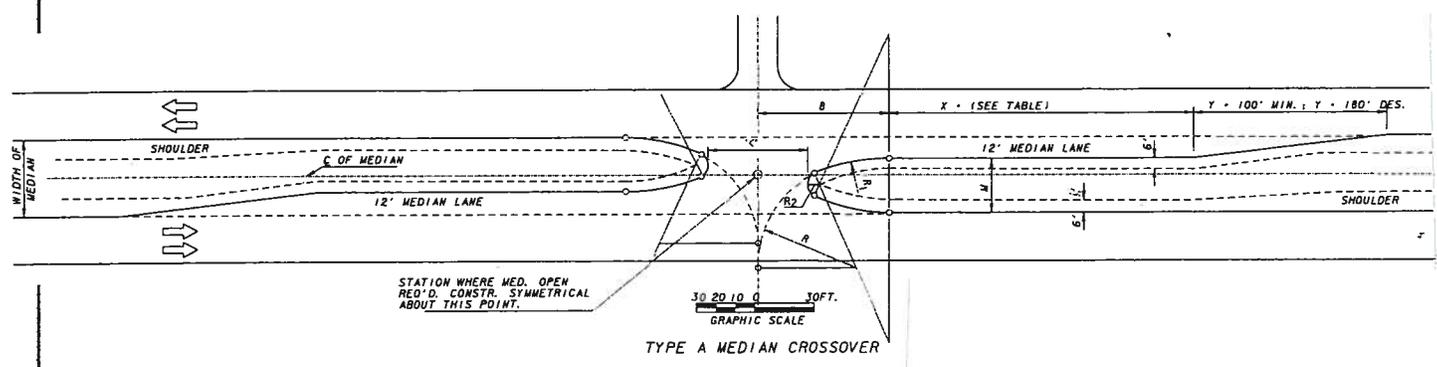
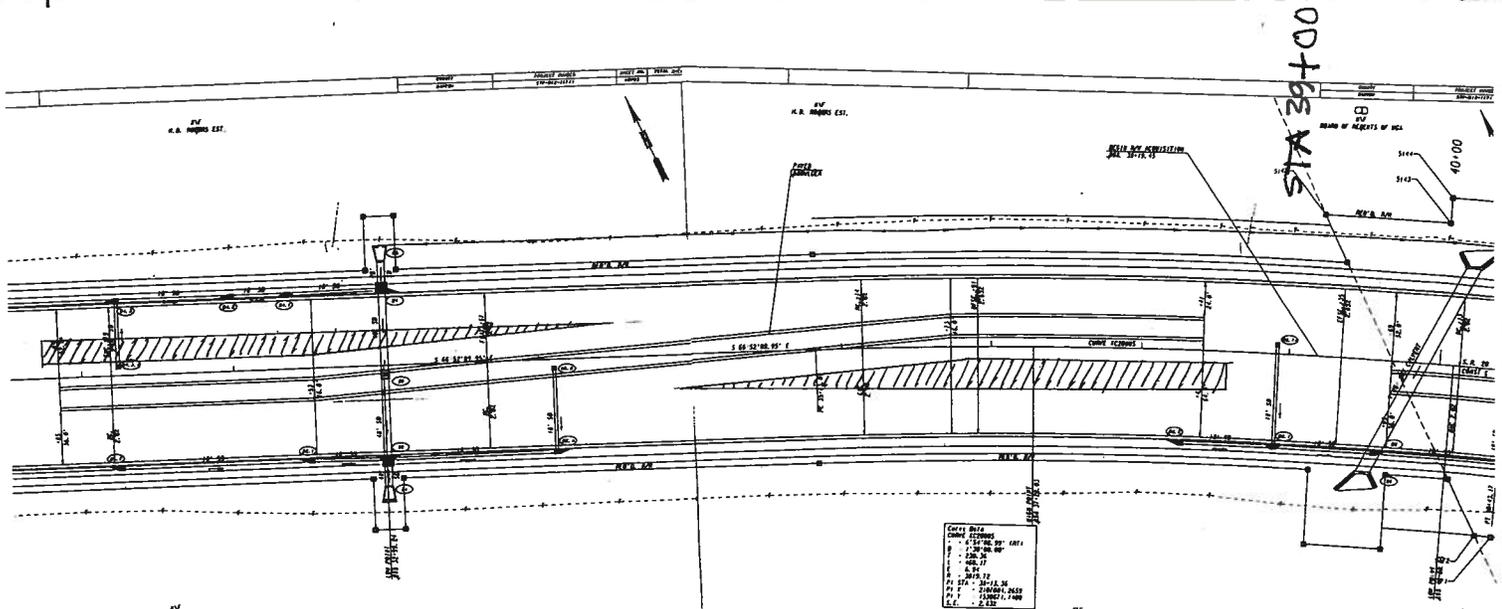


PROJECT: Georgia Department of Transportation  
 STP-012-1(71) – P.I. No. 621350  
 SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.: RD-4

DESCRIPTION: REPLACE TYPE 'B' MEDIAN CROSSOVERS WITH TYPE 'A' MEDIAN CROSSOVERS

SHEET NO.: 2 of 4



# Calculations



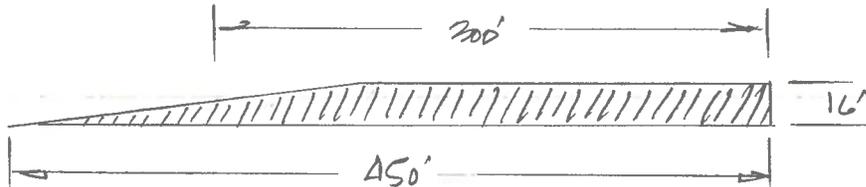
PROJECT: Georgia Department of Transportation  
 STP-012-1(71) – P.I. No. 621350  
 SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.:

**RD-4**

DESCRIPTION: **REPLACE TYPE 'B' MEDIAN CROSSOVERS WITH  
 TYPE 'A' MEDIAN CROSSOVERS**

SHEET NO.: 3 of 4



Pavement  
 Savings

$$300' \times 16' = 4800' \text{ ft} = 533 \text{ sy ea}$$

$$2 \text{ req'd } \Rightarrow \text{ each turn lane} = 1066 \text{ sy}$$

12.5 MM	}	@ \$41.24/sy = \$	<u>43,962</u>
19.0 MM			
25.0 MM			
GAB			

Could be utilized at turn lanes:

- STA 30+00
- STA 39+00
- STA 95+00
- STA 111+00

$$40 - 4(43,962) = \underline{\underline{\$175,848}}$$



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening &amp; Relocation – Bartow County</b>	ALTERNATIVE NO.:	<b>RD-6</b>
DESCRIPTION:	<b>USE AN URBAN SECTION FROM STATION 100+00 TO STATION 133+00</b>	SHEET NO.:	<b>1 of 4</b>

**Original Design:**

The Original Design proposes building a 4-lane divided roadway with curb and gutter and 18’ “urban shoulders” on the outside and a 44’ depressed/grassed median.

**Alternative:**

The Alternative Design proposes building a 4-lane divided roadway with curb and gutter and 18’ “urban shoulders” on the outside and a 24’ raised/curbed median.

**Opportunities:**

- Reduce right-of-way
- Reduce median drainage costs
- Reduce roadway excavation
- Reduce stream relocation impacts

**Risks:**

- Increased cost for curb and gutter

**Technical Discussion:**

The section of roadway from Station 100+00 to Station 133+00 goes through a large cut section. By going to an “urban section” with curbs on the inside and outside we can narrow the backbone of the roadway and reduce the right of way, the roadway excavation and th streambed relocation impacts.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 15,162,635	\$	\$ 15,162,635
ALTERNATIVE	\$ 14,964,227	\$	\$ 14,964,227
SAVINGS	\$ 198,408	\$	\$ 198,408

# Illustrations



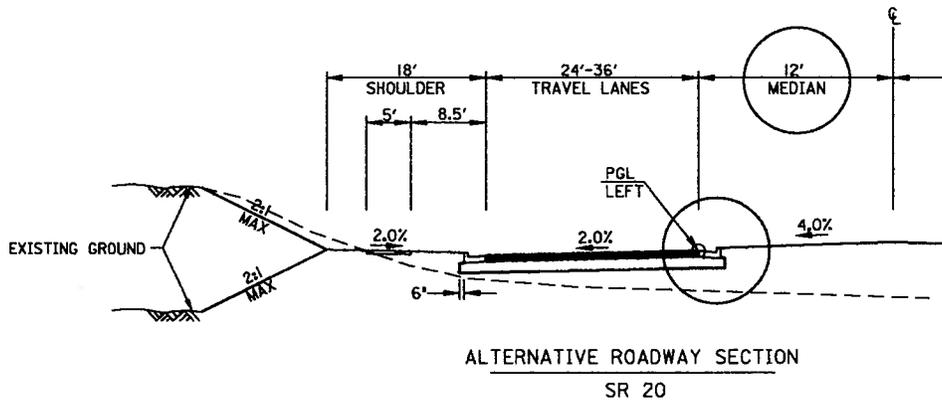
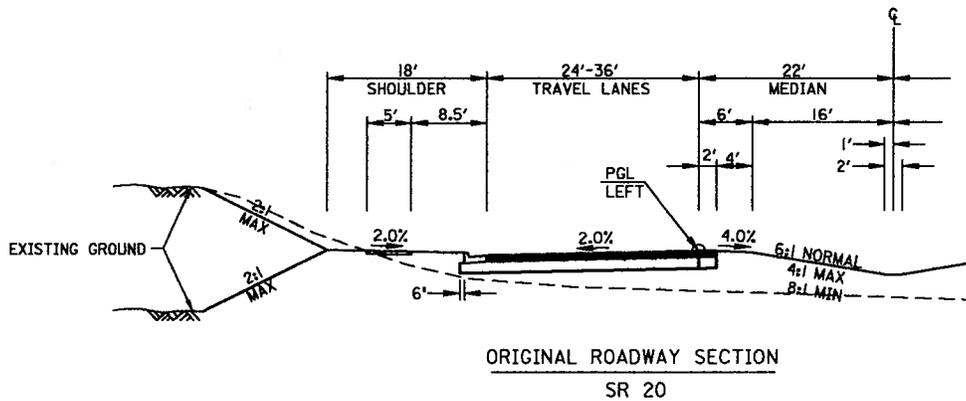
PROJECT: Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.:

**RD-6**

DESCRIPTION: USE URBAN SECTION FROM STATION 100+00 TO  
STATION 133+00

SHEET NO.: 2 of 4



NOT TO SCALE

# Calculations



PROJECT: **Georgia Department of Transportation**  
**STP-012-1(71) – P.I. No. 621350**  
**SR 20 Widening & Relocation – Bartow County**

ALTERNATIVE NO.:

**RD-6**

DESCRIPTION: **USE AN URBAN SECTION FROM STATION 100+00 TO**  
**STATION 133+00**

SHEET NO.: 3 of 4

Excavation (reduction): Assume 10' deep in major cut from Station 116+50 to Station 119+50

$$(20' \times 3300 \text{ lf} \times 60') / 27 \text{ cf / cy} \Rightarrow 6,667 \text{ cy}$$

Cut and fill for the median increase and the roadway backbone decrease should approximately balance.

Curb and gutter:

$$3300 \text{ lf} \times 2 \text{ ea} \Rightarrow 6600 \text{ lf}$$

GAB:

$$[(16' / 12'') \times 6'' \times 3300 \text{ lf}] \times (135 \# / \text{cf}) / (2000 \# / \text{ton}) \Rightarrow 1782 \text{ cy}$$

Right of way:

$$20' \times 3300 \text{ lf} / (43560 \text{ sf / acre}) = 1.5152 \text{ ACRES}$$

$$\text{Pro rata cost reduction} = 1.515 \text{ AC} / 23.391 \text{ AC} = 0.0648\%$$

$$0.0648 \times \$11,534,000 = \$747,115$$



# Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening & Relocation – Bartow County	ALTERNATIVE NO.:	RD-8
DESCRIPTION:	RELOCATE ONE SIDEWALK TO OTHER SIDE OF THE ROADWAY AND COMBINE WITH A MULTI USE TRAIL	SHEET NO.:	1 of 4

**Original Design:**

The Original Design proposes building a 4-lane divided roadway with a 44’ depressed/grassed median and 18’ “urban shoulders” with a 5’ sidewalk on both sides.

**Alternative:**

The Alternative Design proposes building a 4-lane divided roadway with a 44’ depressed/grassed median and 18’ “urban shoulders” with a 10’ multi-use trail on one side and an 8’ shoulder on the other side .

**Opportunities:**

- Reduce right-of-way.
- Reduce roadway excavation.

**Risks:**

- Moderate design effort
- GDOT policy exception required.

**Technical Discussion:**

By relocating the pedestrians to one side of the roadway the backbone of the typical section can be reduced.

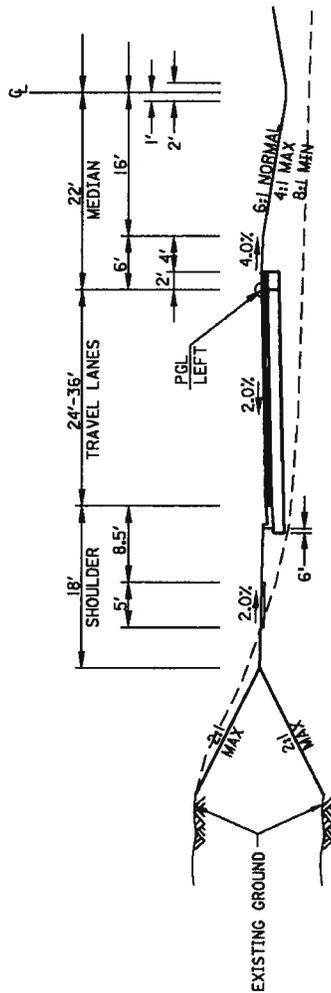
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 13,016,520	\$	\$ 13,016,520
ALTERNATIVE	\$ 11,804,626	\$	\$ 11,804,626
SAVINGS	\$ 1,211,894	\$	\$ 1,211,894

PROJECT: Georgia Department of Transportation  
 STP-012-1(71) – P.I. No. 621350  
 SR 20 Widening & Relocation – Bartow County

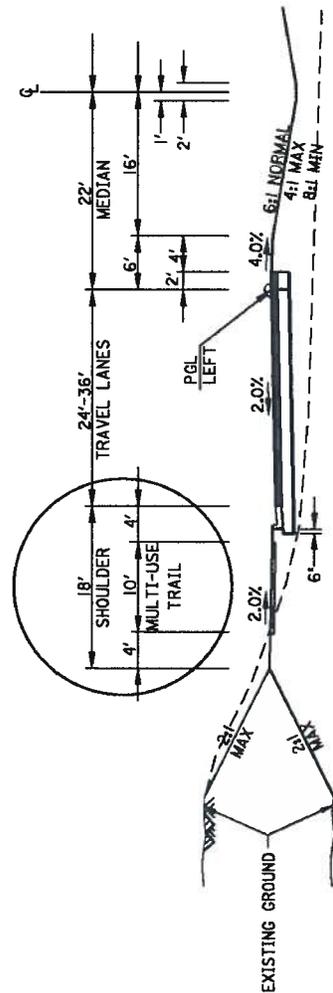
ALTERNATIVE NO.:  
**RD-8**

DESCRIPTION: **RELOCATE ONE SIDEWALK TO OTHER SIDE OF THE ROADWAY AND COMBINE WITH A MULTI USE TRAIL**

SHEET NO.: 2 of 4



ORIGINAL ROADWAY SECTION  
 SR 20



ALTERNATIVE ROADWAY SECTION  
 SR 20

NOT TO SCALE

# Calculations



PROJECT: **Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County**

ALTERNATIVE NO.:

**RD-8**

DESCRIPTION: **RELOCATE ONE SIDEWALK TO OTHER SIDE OF THE  
ROADWAY AND COMBINE WITH A MULTI USE TRAIL**

SHEET NO.: 3 of 4

Excavation (reduction): Assume 1' deep for 9500 lf

$(10' \times 1' \times 9500') / 27 \text{ cf/cy} \Rightarrow 3520 \text{ cy}$

Right of way:

$10' \times 9500 \text{ lf} / (43560 \text{ sf/acre}) = 2.181 \text{ ACRES}$

Pro rata cost reduction =  $2.181 \text{ AC} / 23.391 \text{ AC} = 0.0932\%$

$0.0932 \times \$11,534,000 = \$1,074,969$



# Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation  
 STP-012-1(71) – P.I. No. 621350  
 SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.:

**RD-10**

DESCRIPTION: **VERTICALLY BIFURCATE THE ROADWAY TO  
 REDUCE EARTHWORK**

SHEET NO.: 1 of 4

**Original Design:**

The original design provides for both roadways to have a common profile grade line.

**Alternative:**

The alternative design proposes bifurcating the vertical alignment of the roadway and increase the side slopes of the median to reduce the amount of borrow required to construct the roadway.

**Opportunities:**

- Reduce the required borrow
- Increase/maintain median ditch capacity

**Risks:**

- Moderate increase in design effort

**Technical Discussion:**

A minor bifurcation (~ 1-foot) in conjunction with steeper side slopes in the median will allow you to lower the roadway on one side in order to reduce the required fill material.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,238,160	\$	\$ 1,238,160
ALTERNATIVE	\$ 982,840	\$	\$ 982,840
SAVINGS	\$ 255,320	\$	\$ 255,320

# Illustrations

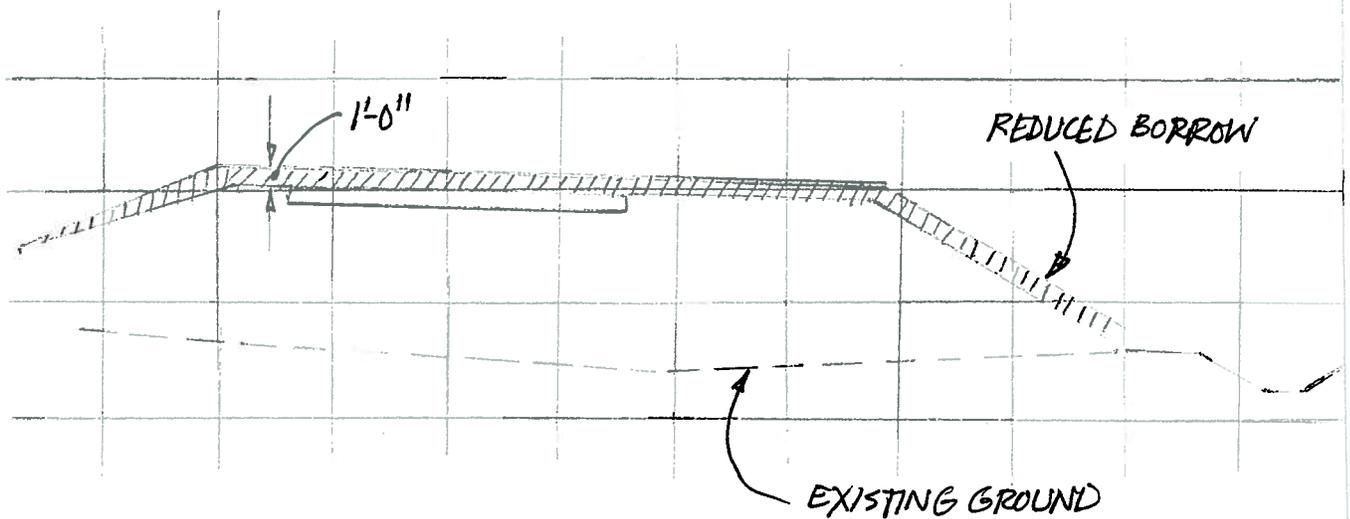


PROJECT: Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.:

RD-10

DESCRIPTION: VERTICALLY BIFURCATE THE ROADWAY TO REDUCE EARTHWORK SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation**  
**STP-012-1(71) – P.I. No. 621350**  
**SR 20 Widening & Relocation – Bartow County**

ALTERNATIVE NO.:

**RD-10**

DESCRIPTION: **VERTICALLY BIFURCATE THE ROADWAY TO**  
**REDUCE EARTHWORK**

SHEET NO.: 3 of 4

## Assumptions:

- Bifurcation of 1 foot
- Fill area average of 75' in width
- Fill area 25% of the project

## Reduced Fill/Borrow

$$(1' \times 75') (0.25 \times 62358) / (27 \text{cf/cy}) \Rightarrow 43,304 \text{ cy}$$

## Required Borrow

$$231,000 - 43,304 \Rightarrow 187,696 \text{ cy}$$



# Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening & Relocation – Bartow County	ALTERNATIVE NO.:	RD-13
DESCRIPTION:	EXTEND SR-20 DIRECTLY WEST AND TIE TO US-41 USING A FLYOVER AND A PARCLO-B INTERCHANGE	SHEET NO.:	1 of 4

### Original Design:

The Original Design proposes building 5-lanes on new location and relocating the SR-20/US-411 intersection approximately 2200' further north of the US-411/US-41 interchange, widening US-411 to 6 lanes from Felton Road to north of "new" SR-20 and reconfiguring the US-411/US-41 interchange to a modified Parclo-B.

### Alternative:

The Alternative Design proposes building a 3-lane roadway for SR-20 on new location tie-ing it to Market Street going south bound and US-411 going northbound. Modify the existing US-411/US-41 interchange to become a Parclo-B and construct a "flyover" to connect SR-20 to US-41.

### Opportunities:

- Improve traffic operations
- Better route continuity and less route overlap

### Risks:

- Increased cost

### Technical Discussion:

This design provides several operational advantages. The flyover provides direct access for the SR-20 traffic wanting to continue westbound on US-41 and the US-41 traffic wanting to access I-75 via eastbound SR-20. It puts both the heaviest movements in the interchange in a merge condition instead of a sub standard weave and a left turn conflict. A cursory review of the traffic suggests that the weaving section between ramp 'e' and ramp 'c' is close to capacity and will limit the ability of this interchange to handle any increase in traffic beyond the current 20 year design window.

The Project Concept Report suggests that Hospital access for this alternative was an issue. However the proposed design requires the people on SR-20 traveling westbound from Cline Smith Road to take a circuitous route by going left through a signalized intersection, right at a second signalized intersection and then left again at the hospital entrance. The Alternative Design is simpler requiring them to go straight at the first light and to u-turn at the flyover and then right turn into the hospital. Although the travel distance is about 1500' further the travel time should be reduced.

The "standard" Parclo-B interchange should be more consistent with driver expectation than the modified version.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,843,956	\$	\$ 3,843,956
ALTERNATIVE	\$ 8,014,796	\$	\$ 8,014,796
SAVINGS	\$ (4,170,840)	\$	\$ (4,170,840)

# Illustrations

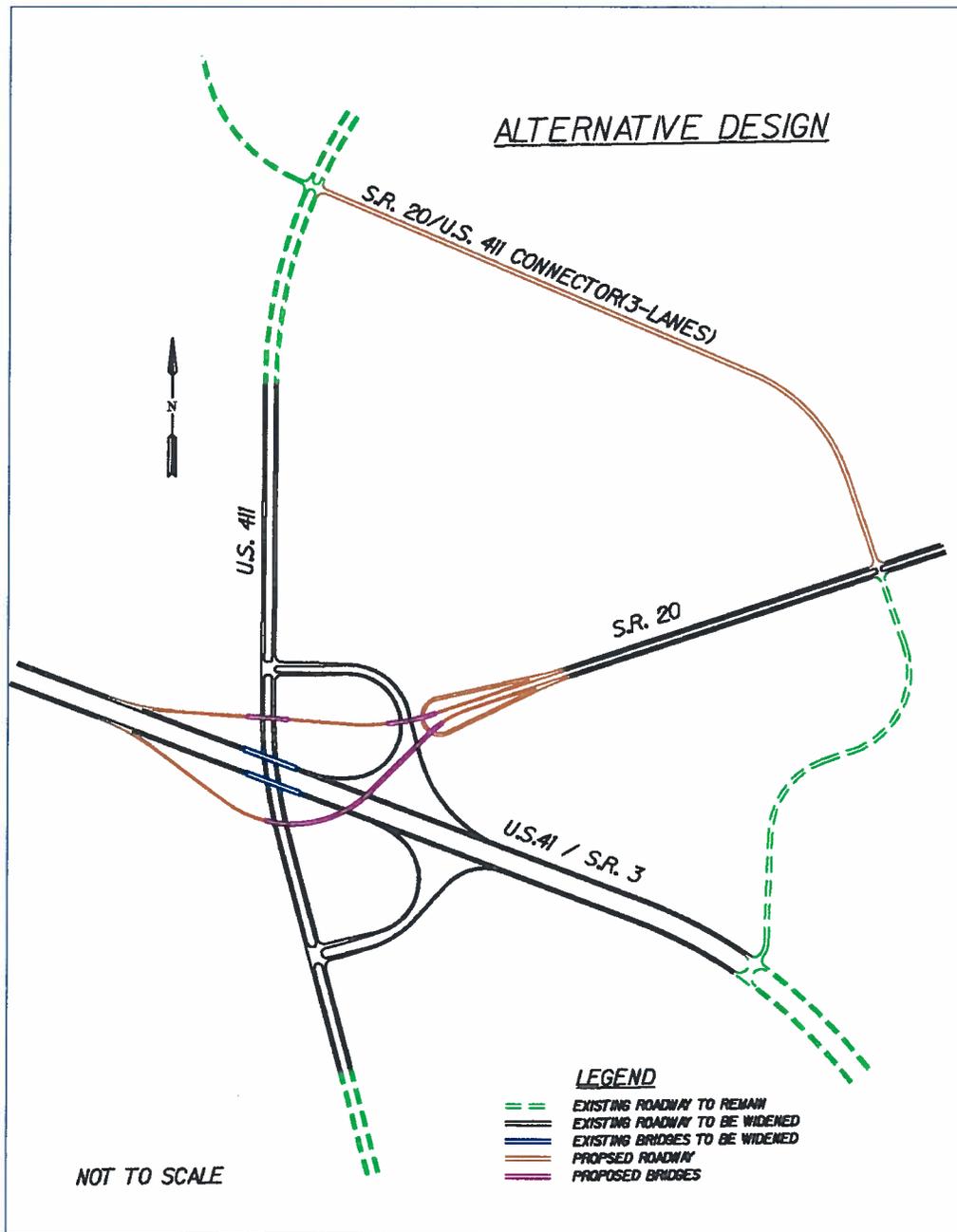


PROJECT: **Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County**

ALTERNATIVE NO.:  
**RD-13**

DESCRIPTION: **EXTEND SR-20 DIRECTLY WEST AND TIE TO US-41  
USING A FLYOVER AND A PARCLO-B INTERCHANGE**

SHEET NO.: 2 of 4



# Calculations



PROJECT: Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.:

**RD-13**

DESCRIPTION: **EXTEND SR-20 DIRECTLY WEST AND TIE TO US-41  
USING A FLYOVER AND A PARCLO-B INTERCHANGE**

SHEET NO.: 3 of 4

## Original Design (Additional Paving Required that can be eliminated)

### US 41 Paving:

-SB-258+00 to 290+00

$$(12' \times 3200') / (9\text{sf/sy}) \Rightarrow 4267 \text{ sy}$$

-NB-268+00 to 290+00

$$(12' \times 2200') / (9\text{sf/sy}) \Rightarrow 2933 \text{ sy}$$

-SB & NB-290+00 to 300+00

$$(84' \times 1000') / (9\text{sf/sy}) \Rightarrow 9333 \text{ sy}$$

-SB & NB-300+00 to 305+00

$$(60' \times 500') / (9\text{sf/sy}) \Rightarrow 3333 \text{ sy}$$

-SB & NB-305+00 to 310+75

$$[(48' + 72') / 2 \times 500'] / (9\text{sf/sy}) \Rightarrow 3833 \text{ sy}$$

### US 411 Paving:

-WB-180+00 to 195+00

$$(12' \times 800') / (9\text{sf/sy}) \Rightarrow 1067 \text{ sy}$$

$$[(12' + 0') / 2 \times 250'] / (9\text{sf/sy}) \Rightarrow 167 \text{ sy}$$

### SR 20 Paving:

-EB & WB-20+00 to 50+00

$$(88' - 38') \times (3000') / (9\text{sf/sy}) \Rightarrow 16667 \text{ sy}$$



# Value Analysis Design Suggestion



PROJECT: **Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County**

ALTERNATIVE NO.:  
**RD-16**

DESCRIPTION: **EXTEND SR 20 WESTERLY FROM US 411 AND TIE-IN  
TO US 41 AVOIDING DOWNTOWN.**

SHEET NO.:

1 of 1

## Original Design:

The original design calls for the northerly re-routing of SR 20 from an easterly intersection with US 411 and US 41 such that it joins US 41 north of the existing interchange and thence enters the interchange with US 41.

## Alternative:

The alternative design would be to re-route SR 20 northerly as proposed but, instead of joining US 41 and routing the traffic south back into the intersection, simply extend SR 20 due west, south-west and intercept US 41 west of the existing interchange.

## Opportunities:

- Totally remove the traffic load, from SR 20, out of the US 41 – US 411 interchange
- Upgrade and Extend the current and future LOS of the US 41 – US 411 interchange without a major or possibly future investment
- Limit disruption of service during construction
- Limit or reduce the restructuring of the existing interchange adjacent users
- Streamline the flow of traffic for now and the future

## Risks:

- Increase the first cost of the project
- Increase the environmental impact
- Increase the design costs
- Delay the start of construction

## Technical Discussion:

The current design does not appear to remove the traffic load from the interchange, but rather shifts where it will enter the interchange. The alternative may completely remove a significant traffic load from the existing interchange and nearby users such that a long term solution has been provided rather than a short term fix.

# Value Analysis Design Alternative



PROJECT: <b>Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening &amp; Relocation – Bartow County</b>	ALTERNATIVE NO.:  <b>RD-19</b>
DESCRIPTION: <b>DELETE CURB AND GUTTER</b>	SHEET NO.: 1 of 4

**Original Design:**

The Original Design proposes building a 4-lane divided roadway with curb and gutter and 18’ “urban shoulders” on the outside and a 44’ depressed/grassed median.

**Alternative:**

The Alternative Design proposes building a 4-lane divided roadway with curb and gutter and 10’ “rural shoulders” ( 6.5’ paved) on the outside and a 24’ raised/curbed median. This typical would also propose elimination of the sidewalk and relocation of bike and pedestrian traffic to the shoulder.

**Opportunities:**

- Elimination of sidewalks.
- Elimination of storm sewer.

**Risks:**

- Nominal increase in design effort.

**Technical Discussion:**

The proposed design is a “hybrid”(rural/urban) section with curb and gutter on the outside and open ditch on the inside. Traditionally this type of section is proposed with curbed median and open ditches on the outside.

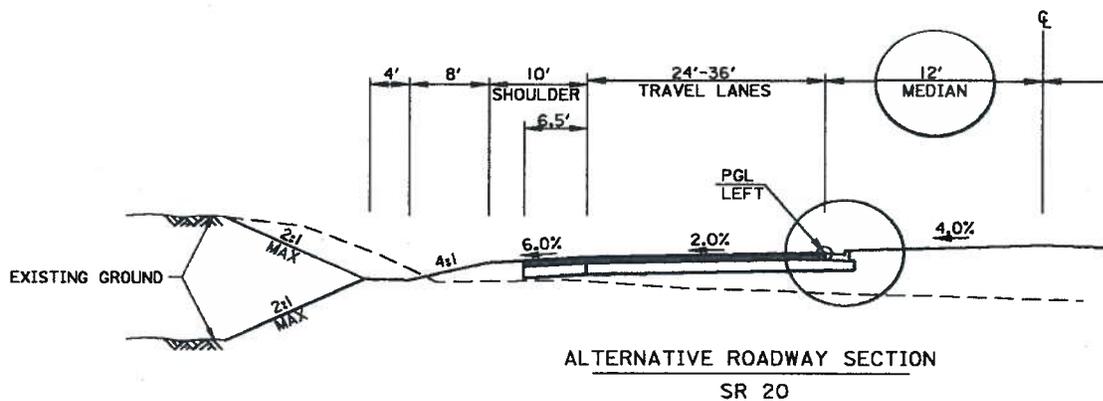
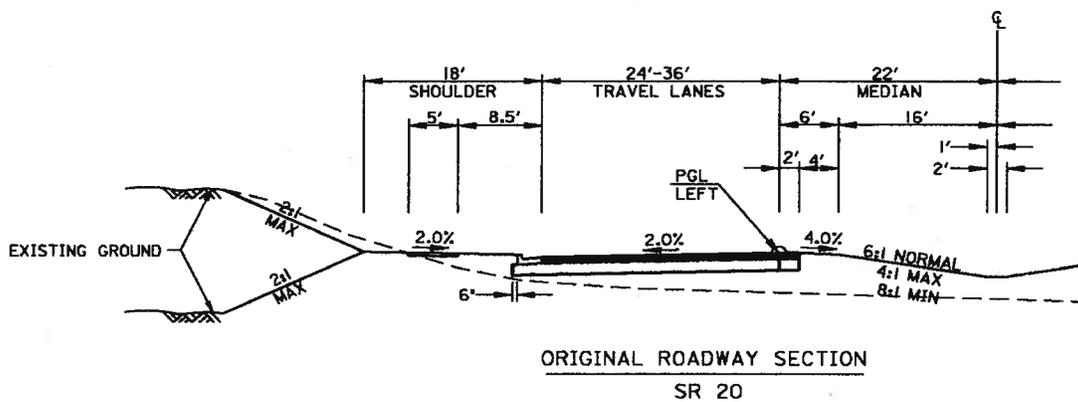
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,174,853	\$	\$ 1,174,853
ALTERNATIVE	\$ 494,172	\$	\$ 494,172
SAVINGS	\$ 680,682	\$	\$ 680,682

PROJECT: Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.:  
**RD-19**

DESCRIPTION: DELETE CURB AND GUTTER

SHEET NO.: 2 of 4



NOT TO SCALE

# Calculations



PROJECT: **Georgia Department of Transportation**  
**STP-012-1(71) – P.I. No. 621350**  
**SR 20 Widening & Relocation – Bartow County**

ALTERNATIVE NO.:

**RD-19**

DESCRIPTION: **EXTEND SR-20 DIRECTLY WEST AND TIE TO US-41**  
**USING A FLYOVER AND A PARCLO-B INTERCHANGE**

SHEET NO.: 3 of 4

Original Design (Additional Paving Required for shoulders)

$(11,500 \text{ lf} \times 6.5' \times 2 \text{ ea}) / (9 \text{ sf} / \text{sy}) \Rightarrow 16,611 \text{ sy}$

12.5 mm Superpave  
 $(16,611 \text{ sy} \times 165\#/\text{sy}) / (2000\# / \text{ton}) \Rightarrow 1370 \text{ tons}$

19.0 mm Superpave  
 $(16,611 \text{ sy} \times 220\#/\text{sy}) / (2000\# / \text{ton}) \Rightarrow 1827 \text{ tons}$

25.0 mm Superpave  
 $(16,611 \text{ sy} \times 440\#/\text{sy}) / (2000\# / \text{ton}) \Rightarrow 3654 \text{ tons}$

Drainage:

(See Project Estimate)



# COST WORKSHEET

PROJECT: **Georgia Department of Transportation** ALTERNATIVE NO.: **RD-19**

STP-012-1(71) – P.I. No. 621350 - SR 20 Widening & Relocation – Bartow County

DESCRIPTION: **DELETE OUTSIDE CURB AND GUTTER** 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	
CONC SIDEWALK	SY	15300	38.38	\$ 587,214	0	38.38	\$ -	
STORM DRAIN 18"	LF	8000	41.05	\$ -	0	41.05	\$ -	
STORM DRAIN 24"	LF	800	52.59	\$ 42,072	0	52.59	\$ -	
CATCH BASIN	EA	100	2,326.85	\$ 232,685	0	2,326.85	\$ -	
CATCH BASIN ADDL DEPTH	EA	20	237.07	\$ 4,741	0	237.07	\$ -	
DROP INLET	EA	45	4,333.98	\$ 195,029	0	4,333.98	\$ -	
DROP INLET ADDL DEPTH	EA	10	277.64	\$ 2,776	0	277.64	\$ -	
MANHOLE	EA	10	65.32	\$ 653	0		\$ -	
MANHOLE AADL DEPTH	EA	10	287.81	\$ 2,878	0	287.81	\$ -	
12.5 mm SUPERPAVE	SY	0	66.19	\$ -	1370	66.19	\$ 90,680	
19.0 mm SUPERPAVE	SY	0	65.62	\$ -	1827	65.62	\$ 119,888	
25.0mm SUPERPAVE	SY	0	65.32	\$ -	3654	65.32	\$ 238,679	
<b>Sub-total</b>				\$ 1,068,049				\$ 449,247
<b>Mark-up at 10.00%</b>				\$ 106,805				\$ 44,925
<b>TOTAL</b>				\$ 1,174,854				\$ 494,172
<b>Estimated Savings:</b>							<b>\$680,682</b>	

# Value Analysis Design Alternative



<b>PROJECT:</b> Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening & Relocation – Bartow County	<b>ALTERNATIVE NO.:</b>  <b>RD-20</b>
<b>DESCRIPTION:</b> RECYCLE EXISTING PAVEMENT ON SR 20	<b>SHEET NO.:</b> 1 of 4

**Original Design:**

The original design made no provisions for the possible recycling of existing roadway sections on SR 20

**Alternative:**

The alternative would be to recycle existing roadway base and paving.

**Opportunities:**

- May serve to reduce pavement costs
- Reduces the amount of material to be hauled

**Risks:**

- May require additional site testing and design changes

**Technical Discussion:**

An alternate use for the existing roadway is not addressed in the plans or the estimate. The proposed new profile eliminates the possibility of reusing the existing pavement as part of the new roadway. The existing pavement and base from STA 59+00 to STA 133+83 could therefore be recycled which should result in significant savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	\$	\$ 0
ALTERNATIVE	\$ 2,284,288	\$	\$ 2,284,288
SAVINGS	\$ 2,284,288	\$	\$ 2,284,288

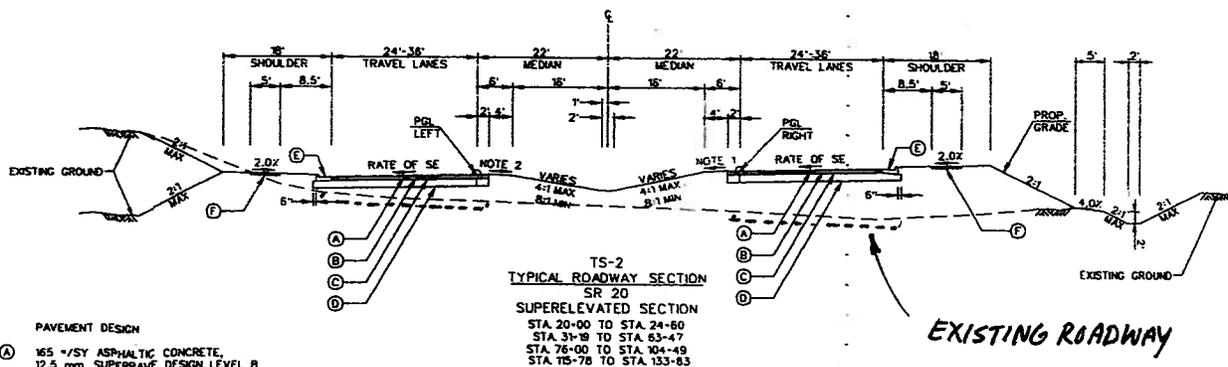
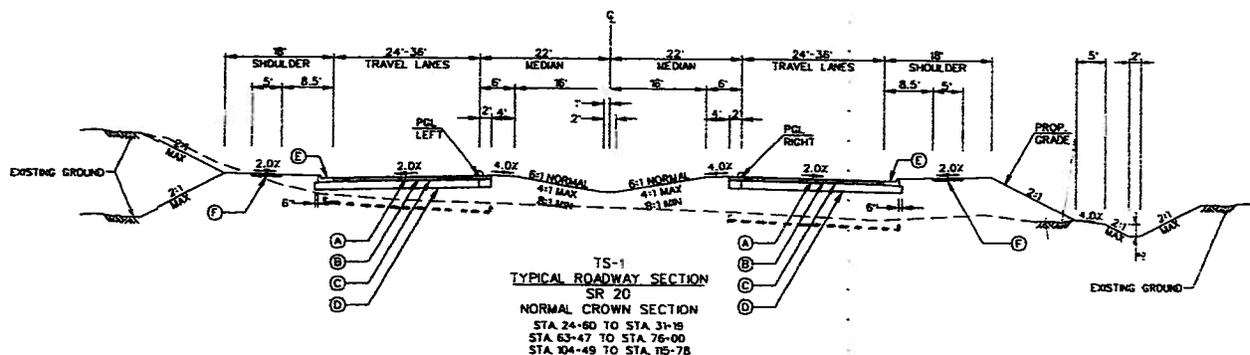
PROJECT: **Georgia Department of Transportation**  
**STP-012-1(71) – P.I. No. 621350**  
**SR 20 Widening & Relocation – Bartow County**

ALTERNATIVE NO.:

**RD20**

DESCRIPTION: **RECYCLE EXISTING PAVEMENT ON SR 20**

SHEET NO.: **2 of 4**



- PAVEMENT DESIGN**
- (A) 165 #/SY ASPHALTIC CONCRETE, 12.5 mm SUPERPAVE, DESIGN LEVEL B
  - (B) 220 #/SY ASPHALTIC CONCRETE, 19 mm SUPERPAVE, DESIGN LEVEL B
  - (C) 440 #/SY ASPHALTIC CONCRETE BASE, 25 mm SUPERPAVE, DESIGN LEVEL A
  - (D) 16" GRADED AGGREGATE BASE
  - (E) 8" X 30" TYPE 2 CONCRETE CURB & GUTTER
  - (F) 4" CONCRETE SIDEWALK

- NOTES:**
1. SHOULDER TO SLOPE AT NORMAL RATE OR SUPERELEVATION RATE, WHICHEVER IS GREATER.
  2. SHOULDER TO SLOPE AT NORMAL RATE, HOWEVER, THE ALGEBRAIC DIFFERENCE IN PAVING SLOPE AND SHOULDER SLOPE SHALL NOT EXCEED 7.0%. MINIMUM SHOULDER SLOPE TO BE 2.0%.

*EXISTING ROADWAY*

# Calculations



PROJECT: Georgia Department of Transportation  
STP-012-1(71) - P.I. No. 621350  
SR 20 Widening & Relocation - Bartow County

ALTERNATIVE NO.:

RD20

DESCRIPTION: RECYCLE EXISTING PAVEMENT ON SR 20

SHEET NO.:

3 of 4

STA 59+00 to STA 133+83 = 7,483 LF

TRAVEL LANES VARY 24'-36' ... ASSUME 30' WIDTH IN EACH DIRECTION

$$\begin{aligned} \underline{12.5MM} \quad & 2 (7,483 LF \times 30' WIDTH) = 49,887 SY \\ & @ 165\#/SY = 4,116 tons \\ & @ \$66.19/ton = \underline{\$272,438.} \end{aligned}$$

$$\begin{aligned} \underline{19.0MM} \quad & 2 (7,483 LF \times 30' WIDTH) = 49,887 SY \\ & @ 220\#/SY = 5,487 tons \\ & @ \$65.62/ton = \underline{\$360,057.} \end{aligned}$$

$$\begin{aligned} \underline{25.0MM} \quad & 2 (7,483 LF \times 30' WIDTH) = 49,887 SY \\ & @ 440\#/SY = 10,975 tons \\ & @ \$65.32/ton = \underline{\$716,887.} \end{aligned}$$

$$\begin{aligned} \underline{GAP} \quad & 2 (7,483 LF \times 31' WIDTH) = 51,550 SY \\ @ 135\#/LF \quad & 51,550 SY \times 1616\#/SY = 41,652 ton \\ & @ \$17.46/ton = \underline{\$727,244.} \end{aligned}$$

\\$2,076,626



**SUMMARY OF ALTERNATIVES & DESIGN SUGGESTIONS**



**Georgia Department of Transportation**

**US 41 Interchange Improvements - Bartow County STP-0002-00(626) - P.I. No. 0002626**

<b>Alternative Number</b>	<b>Description of Alternative</b>	<b>Initial Cost Savings</b>
	<b>US 41/ 411 Interchange Bridge (BR ITX)</b>	
BR-ITX-1	Build one new 33' structure in between the two existing bridges; route traffic onto new bridge; construct new bridges north and south	\$22,328
BR-ITX-3	Use 8' and 2' shoulders	\$206,712
BR-ITX-4	Use 6'-6" and 2' shoulders	\$284,229
	<b>US 41 Railroad Bridge (BRRR)</b>	
BRRR-1	Use an 8' and a 2' shoulder	\$178,200
BRRR-2	Reduce length by eliminating end spans	\$2,581,734
BRRR-3	Use 6'-6" and 2' shoulders	\$245,025
BRRR-4	Build one new 21' structure in between the two existing bridges; route traffic onto new bridge; construct new bridges north and south	\$112,303
	<b>US 41 Creek Bridge (BRCR)</b>	
BRCR-1	Use an 8' and a 2' shoulder	\$122,760
BRCR-2	Build one new 33' structure in between the two existing bridges; route traffic onto new bridge; construct new bridges north and south	\$63,246
BRCR-3	Use 6'-6" and 2' shoulders	\$168,795
	<b>US 41 Roadway (RD)</b>	
RD-2	Recycle existing pavement on US 41/SR 3	\$906,007

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US 41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRITX-1</b>
DESCRIPTION:	<b>BUILD ONE NEW STRUCTURE (33' WIDER, IN THE MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF USING TEMPORARY BRIDGE</b>	SHEET NO.:	1 of 4

**Original Design:**

The original design calls for the replacement of the existing substandard twin bridges carrying US 41 over US 411, which are designated “historic”, with new twin bridges. The new twin bridges are 261’ long, 3 span structures (55’ end spans and 151’ intermediate span) and are 53’-11” (out-to-out) to accommodate 8’ outside shoulders, three 12’ lanes and 6’ inside shoulders. The bridge rails on the new bridges will be designed to match the existing bridge rails.

In the original design, the construction sequence proposes the use of a 31’-3” wide temporary bridge for maintenance of traffic during construction.

**Alternative:**

The alternative proposes the construction of a single bridge, 131’-11” wide within the limits of the original design.

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- Potential savings in temporary bridge costs
- Provides a wider bridge for possible future use and interchange enhancements

**Risks:**

- Minimal redesign effort
- Redesign of construction staging

**Technical Discussion:**

The middle portion of the new bridge, 28’ wide, could be constructed to the required elevation first and Southbound traffic routed onto it. The existing Southbound bridge can be removed and the previously constructed middle portion can be extended Southward by 53’-11”. Traffic from both directions can now be shifted on to the completed 81’-11” available portion of the new bridge. The Northbound bridge can then be removed and the previously constructed portion extended Northward by 53’-11” to complete the bridge construction and route all traffic to the appropriate lanes. The finished bridge section will be 131’-11”. This alternative eliminates the requirement of the temporary bridge.

See following sheets for calculations in savings. **Note:** Additional cost savings can be realized when the bridge design is developed further and detailed cost estimates are made. The reduction of special barrier rails in the Alternative could be one major component in addition to possible reduction in substructure costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 644,531	\$	\$ 644,531
ALTERNATIVE	\$ 622,203	\$	\$ 622,203
SAVINGS	\$ 22,328	\$	\$ 22,328

# Illustrations



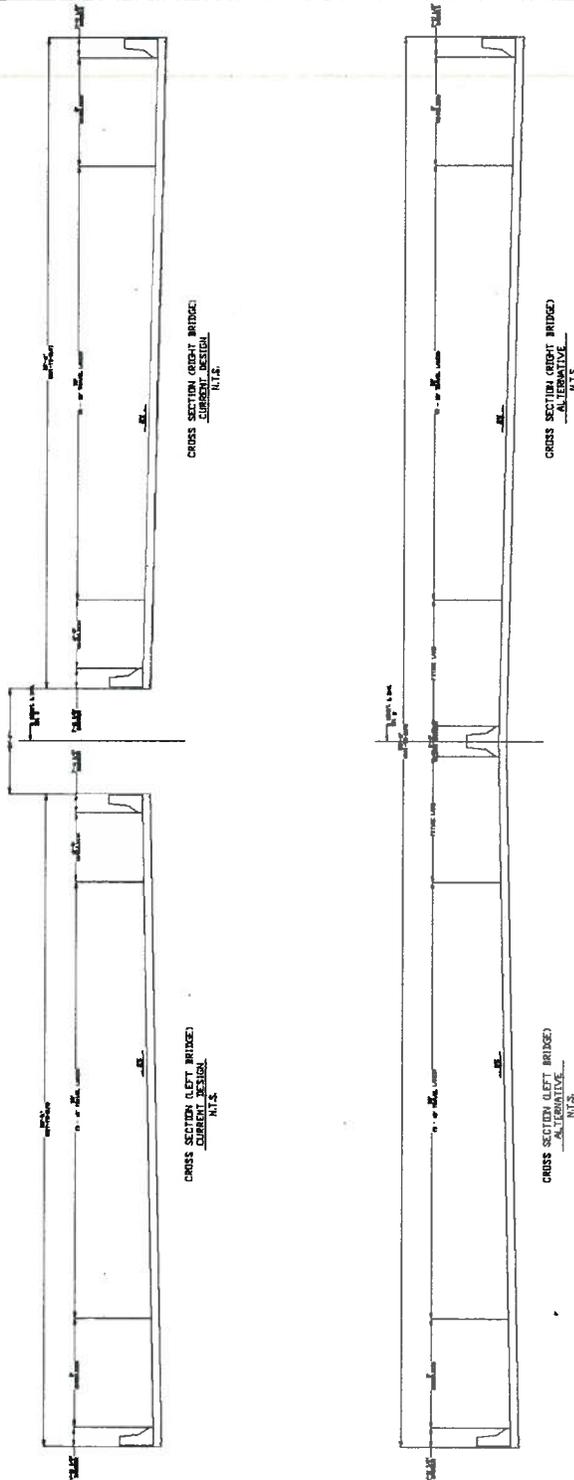
PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRITX-1**

DESCRIPTION: **BUILD ONE NEW STRUCTURE (33' WIDER, IN THE  
MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF  
USING TEMPORARY BRIDGE**

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US 41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRITX-1**

DESCRIPTION: **BUILD ONE NEW STRUCTURE (33' WIDER, IN THE  
MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF  
USING TEMPORARY BRIDGE**

SHEET NO.: 3 of 4

## Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

## Current Design:

Twin 53'-11" wide bridges and existing bridges removal. Use of temporary bridge for staging.

## Alternative BRITX-1:

This alternative proposes building a single structure 131'-11" wide with no temporary bridge.

Increase in width of Deck =  $[131.92' - 2*53.92'] = 24.08'$

Area of increased bridge surface =  $[24.08' \times 261'] = 6,284.88$  SF

Reduction due to not using a 31'-3" wide, 250' long (approximate) temporary bridge = savings in Alternative.

Area of Temporary bridge =  $31.25' \times 250 = 7,812.5$  SF

(Note: For cost of temporary bridge, pay items 541-5419, 5420, 5428, 5438 & 5470 were used for reference.)

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

## NOTE:

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# COST WORKSHEET

PROJECT: **Georgia Department of Transportation** ALTERNATIVE NO.: **BRITX-1**

STP-0002-00(626) – P.I. No. 0002626 - US 41 Interchange  
Improvements - Bartow County

DESCRIPTION: ***BUILD ONE NEW STRUCTURE (33' WIDER, IN THE MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF USING TEMPORARY BRIDGE*** 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
Bridge	SF	0	\$ 90.00	\$ -	6284.88	\$ 90.00	\$565,639.20
Temporary Bridge**	SF*	7813	\$ 75.00	\$ 585,937.50	0	\$ 75.00	\$ -
<b>**Note: For cost of temporary bridge pay items 541-5419, 5420, 5428, 5438 &amp; 5470 were used for reference.</b>							
<b>(This is the cost that would be incurred for the current design)</b>							
<b>Sub-total</b>				<b>\$ 585,938</b>			<b>\$ 565,639</b>
<b>Mark-up at 10.00%</b>				<b>\$ 58,594</b>			<b>\$ 56,564</b>
<b>TOTAL</b>				<b>\$ 644,531</b>			<b>\$ 622,203</b>
<b>Estimated Savings:</b>							<b>\$22,328</b>

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRITX-3</b>
DESCRIPTION:	<b>USE 8' OUTSIDE AND 2' INSIDE SHOULDERS</b>	SHEET NO.:	1 of 4

**Original Design:**

The original design calls for the replacement of the existing substandard twin bridges carrying US 41 over US 411, which are designated “historic”, with new twin bridges. The new twin bridges are 261’ long, 3 span structures (55’ end spans and 151’ intermediate span) and are 53’-11” (out-to-out) to accommodate 8’ outside shoulders, three 12’ lanes and 6’ inside shoulders. The new bridge rails will be designed to match the existing bridge rails.

**Alternative:**

The alternative proposes the construction of the twin bridges with 8’ outside and 2’ inside shoulders in-lieu of 6’ inside shoulders. All other geometry will be the same as in the original design.

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- More staging area between the bridges during construction

**Risks:**

- Minimal redesign effort
- Design exception may be required

**Technical Discussion:**

A 2’ buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the inside buffer width will closely match the typical roadway cross section.

The width of each of the twin bridges will be 49’-11”.

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 206,712	\$	\$ 206,712
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 206,712	\$	\$ 206,712

# Illustrations



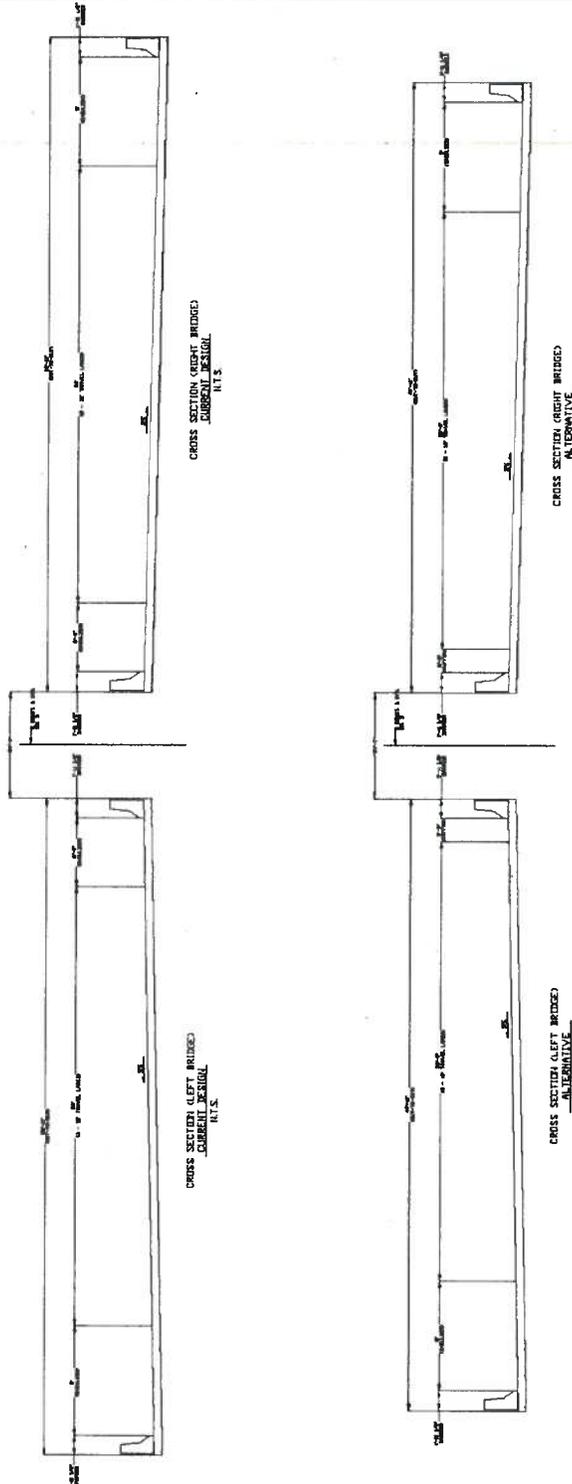
PROJECT: Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County

ALTERNATIVE NO.:

**BRITX-3**

DESCRIPTION: USE 8' OUTSIDE AND 2' INSIDE SHOULDERS

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRITX-3**

DESCRIPTION: **USE 8' OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.: 3 of 4

**Note:**

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

**Current Design:**

Twin 53'-11" wide bridges and existing bridges removal. Use of temporary bridge for staging.

**Alternative BRITX-3:**

This alternative proposes building each of the twin bridges 49'-11" wide.

Total reduction in width of Deck =  $[2*53.92' - 2*49.92'] = 8'$

Area of decreased bridge surface =  $[8' X 261'] = 2088 \text{ SF}$

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

**NOTE:**

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRITX-4**

DESCRIPTION: **USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.: 1 of 4

## Original Design:

The original design calls for the replacement of the existing substandard twin bridges carrying US 41 over US 411, which are designated "historic", with new twin bridges. The new twin bridges are 261' long, 3 span structures (55' end spans and 151' intermediate span) and are 53'-11" (out-to-out) to accommodate 8' outside shoulders, three 12' lanes and 6' inside shoulders. The new bridge rails will be designed to match the existing bridge rails.

## Alternative:

The alternative proposes the construction of the twin bridges with 6'-6" outside and 2' inside shoulders in-lieu of 8' outside and 6' inside shoulders. All other geometry will be the same as in the original design.

## Opportunities:

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- More staging area between the bridges during construction

## Risks:

- Minimal redesign effort
- Design exception may be required

## Technical Discussion:

A 6'-6" outside shoulder and a 2' buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the outside shoulder and inside buffer widths will closely match the typical roadway cross section.

The width of each of the twin bridges will be 48'-5".

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 284,229	\$	\$ 284,229
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 284,229	\$	\$ 284,229

# Illustrations



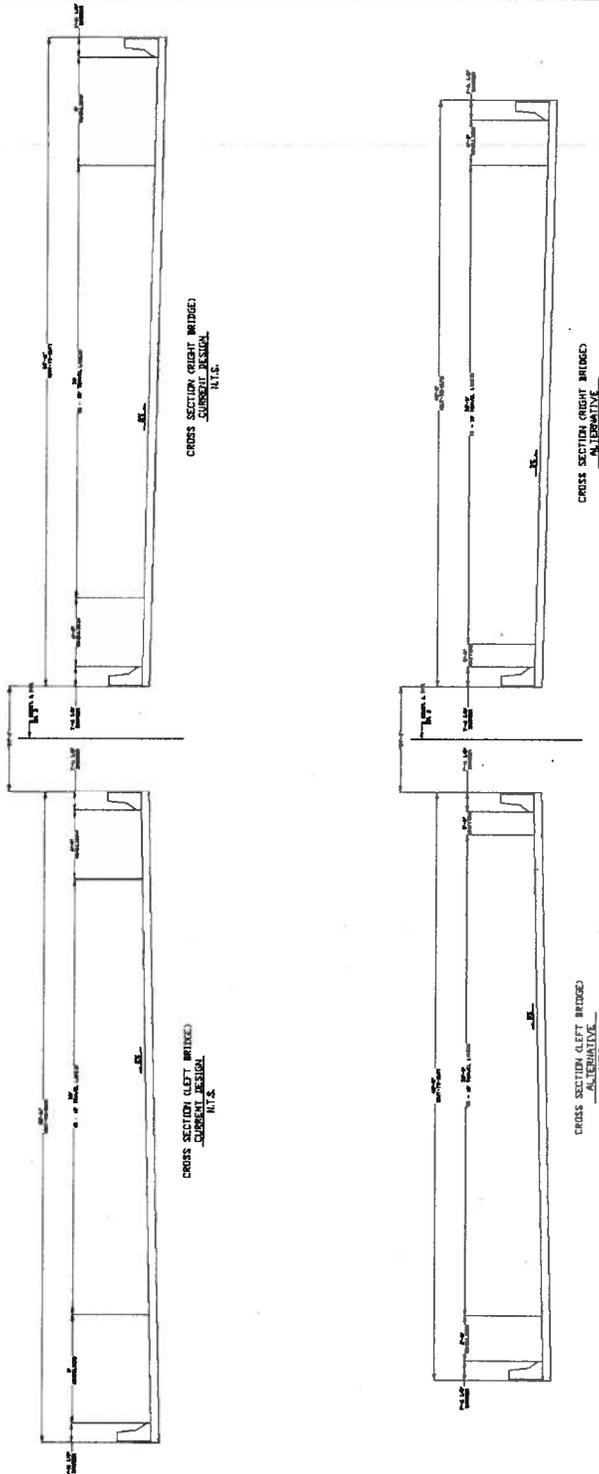
PROJECT: Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County

ALTERNATIVE NO.:

**BRITX-4**

DESCRIPTION: USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRITX-4**

DESCRIPTION: **USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.:

3 of 4

## Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

## Current Design:

Twin 53'-11" wide bridges and existing bridges removal. Use of temporary bridge for staging.

## Alternative BRITX-4:

This alternative proposes building each of the twin bridges 48'-5" wide.

Total reduction in width of Deck =  $[2*53.92' - 2*48.42'] = 11'$

Area of decreased bridge surface =  $[11' X 261'] = 2871 \text{ SF}$

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

## **NOTE:**

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRRR-1</b>
DESCRIPTION:	<b>USE 8' OUTSIDE AND 2' INSIDE SHOULDERS</b>	SHEET NO.:	1 of 4

**Original Design:**

The original design calls for the replacement of the existing substandard (including low clearance) twin bridges carrying US 41 over CSX RR, with new twin bridges. The new twin bridges are 225' long, 3 span structures (67' end spans and 91' intermediate span). The Northbound Lane bridge is 65'-3" and the Southbound Lane bridge is 53'-3" (out-to-out) to accommodate 8' outside shoulders, three 12' lanes (four 12' lanes on the Northbound Lane Bridge) and 6' inside shoulders. The bridge rails are standard Jersey type.

**Alternative:**

The alternative proposes the construction of the twin bridges with 2' inside shoulders in-lieu of 6' inside shoulders. All other geometry will be the same as in the original design.

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- More staging area between the bridges during construction

**Risks:**

- Minimal redesign effort
- Design exception may be required

**Technical Discussion:**

A 2' buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the inside buffer width will closely match the typical roadway cross section.

The widths will be 61'-3" and 49'-3" for the Northbound and Southbound Lane bridges respectively.

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 178,200	\$	\$ 178,200
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 178,200	\$	\$ 178,200

# Illustrations



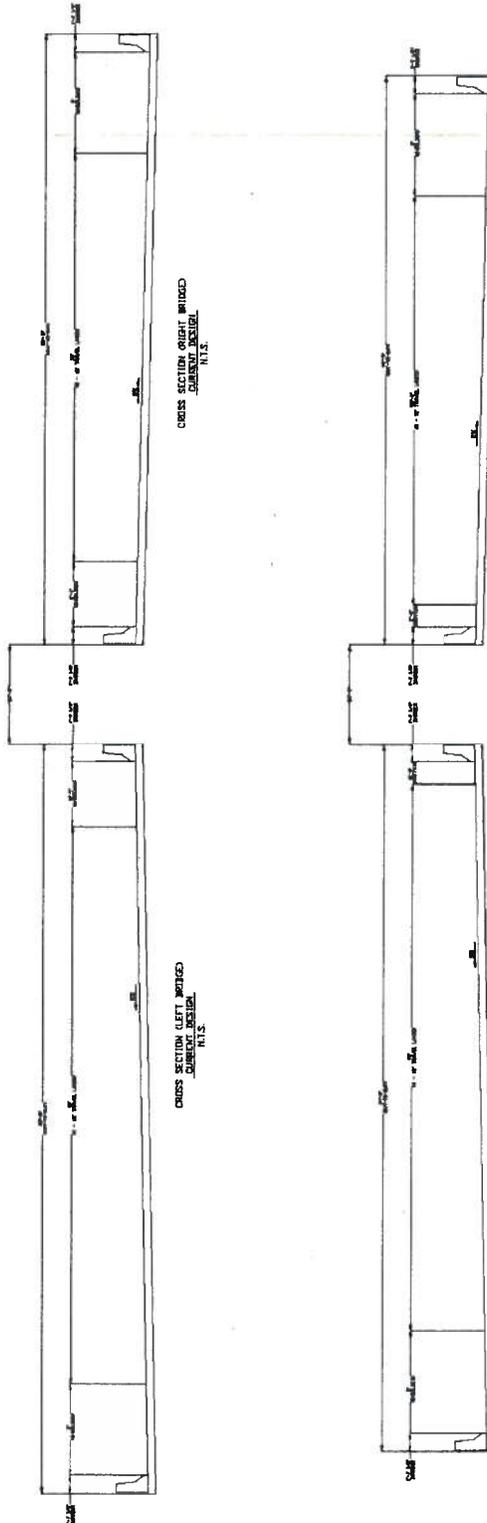
PROJECT: Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County

ALTERNATIVE NO.:

**BRRR-1**

DESCRIPTION: USE 8' OUTSIDE AND 2' INSIDE SHOULDERS

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRRR-1**

DESCRIPTION: **USE 8' OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.: 3 of 4

## Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

## Current Design:

Twin 65'-3" and 53'-3" wide bridges and existing bridges removal.

## Alternative BRRR-1:

This alternative proposes building the twin bridges 61'-3" and 49'-3" wide.

Total reduction in width of Deck =  $[(65.25' + 53.25') - (61.25' + 49.3')] = 8'$

Area of decreased bridge surface =  $[8' \times 225'] = 1800 \text{ SF}$

Bridge removal costs will be the same for both designs.

{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}

## NOTE:

Reduction from current design = savings for alternative.

Cost of Bridge Construction assumed to be \$90 per SF.



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRRR-2</b>
DESCRIPTION:	<b>REDUCE LENGTH BY ELIMINATING END SPANS AND PROVIDING WALLED ABUTMENTS</b>	SHEET NO.:	1 of 4

**Original Design:**

The original design calls for the replacement of the existing substandard (including low clearance) twin bridges carrying US 41 over CSX RR, with new twin bridges. The new twin bridges are 225' long, 3 span structures (67' end spans and 91' intermediate span). The Northbound Lane bridge is 65'-3" and the Southbound Lane bridge is 53'-3" (out-to-out) to accommodate 8' outside shoulders, three 12' lanes (four 12' lanes on the Northbound Lane Bridge) and 6' inside shoulders. The bridge rails are standard Jersey type.

In the original design, the construction sequence proposes the use of a 31'-3" wide temporary bridge for maintenance of traffic during construction.

**Alternative:**

The alternative proposes the construction of the bridges of reduced length by eliminating the end spans and providing walled abutments. All that geometry remains the same.

**Risks:**

- Minimal redesign effort
- Redesign of construction staging

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- Potential savings in temporary bridge costs

**Technical Discussion:**

The 67' end spans on the bridges can be eliminated and MSE walled abutments can be provided instead. The intermediate span may have to be increased to about 100' to accommodate drainage ditches. BT 54 girders can still be used for this span configuration.

See following sheets for calculations in savings.

**Note:** Additional cost savings can be realized when the bridge design is developed further and detailed cost estimates are made. The reduction of special barrier rails in the Alternative could be one major component in addition to possible reduction in substructure costs.

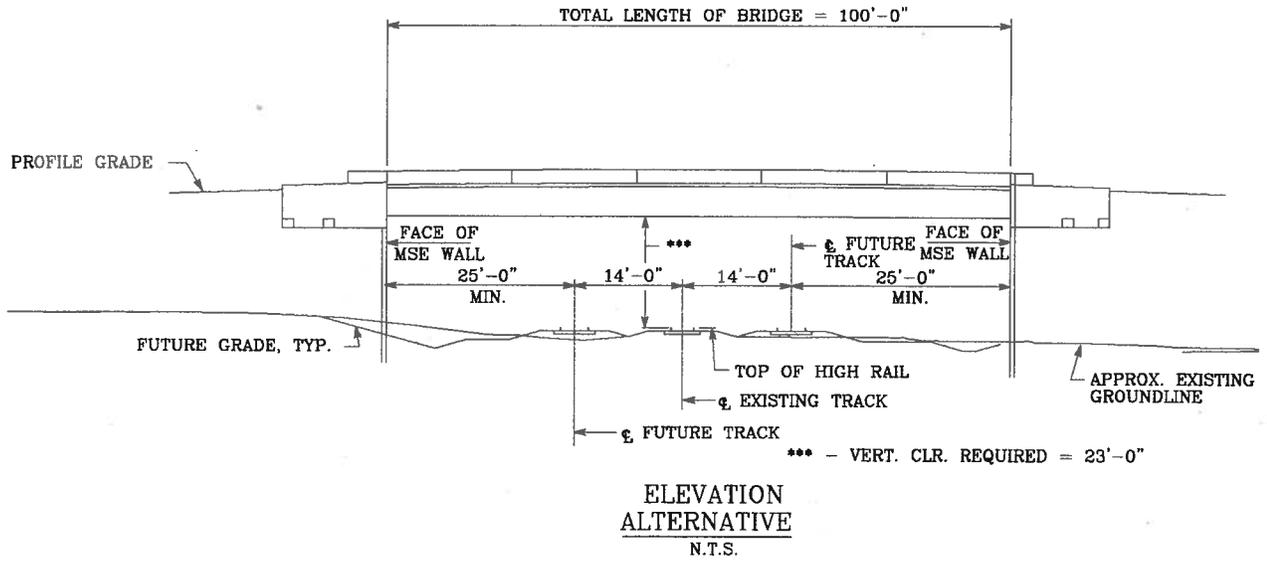
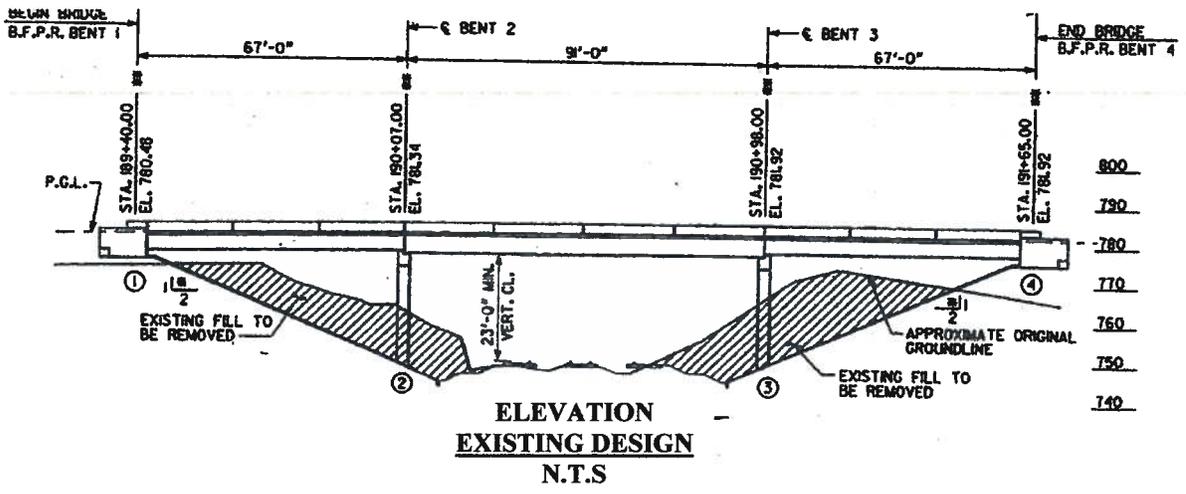
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,512,953	\$	\$ 3,512,953
ALTERNATIVE	\$ 931,219	\$	\$ 931,219
SAVINGS	\$ 2,581,734	\$	\$ 2,581,734

PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

DESCRIPTION: **REDUCE LENGTH BY ELIMINATING END SPANS AND  
PROVIDING WALLED ABUTMENTS**

ALTERNATIVE NO.: **BRRR-2**

SHEET NO.: **2 of 4**



# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRRR-2**

DESCRIPTION: **REDUCE LENGTH BY ELIMINATING END SPANS AND  
PROVIDING WALLED ABUTMENTS**

SHEET NO.: 3 of 4

## Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

## Current Design:

Twin 65'-3" and 53'-3" wide bridges and existing bridges removal. Use of temporary bridge for staging.

## Alternative BRRR-2:

This alternative proposes building a single span structures 100' long with MSE walled abutments with a temporary bridge of reduced length (from the original design) for staging.

Reduction in lengths of Deck =  $[2 * 2 * 67' - 2 * 9'] = 250'$

Area of reduced bridge surface =  $[65.25' + 53.25'] * 250 = 29,625$  SF

Reduction due to using a 31'-3" wide, 150' long (approximate) temporary bridge = savings in Alternative.

Area of Temporary bridge in original design =  $31.25' * 225 = 7,031.25$  SF

Area of Temporary bridge in alternative =  $31.25' * 150' = 4,687.5$  SF

Assuming "U" shaped MSE Walls 160' long in front of the abutments and wrapping around the abutments up to 20', area of MSE Walls, 25' high (assumed) =  $2 * [160' * 25'] + 4 * [0.5 * 20' * 25'] = 9000$  SF

{The above is an estimate only}

(Note: For cost of temporary bridge, pay items 541-5419, 5420, 5428, 5438 & 5470 were used for reference.)

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

## **NOTE:**

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRRR-3</b>
DESCRIPTION:	<b>USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS</b>	SHEET NO.:	1 of 4

**Original Design:**

The original design calls for the replacement of the existing substandard (including low clearance) twin bridges carrying US 41 over CSX RR, with new twin bridges. The new twin bridges are 225' long, 3 span structures (67' end spans and 91' intermediate span). The Northbound Lane bridge is 65'-3" and the Southbound Lane bridge is 53'-3" (out-to-out) to accommodate 8' outside shoulders, three 12' lanes (four 12' lanes on the Northbound Lane Bridge) and 6' inside shoulders. The bridge rails are standard Jersey type.

**Alternative:**

The alternative proposes the construction of the twin bridges with 6'-6" outside and 2' inside shoulders in-lieu of 8' outside and 6' inside shoulders. All other geometry will be the same as in the original design.

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- More staging area between the bridges during construction

**Risks:**

- Minimal redesign effort
- Design exception may be required

**Technical Discussion:**

A 6'-6" outside shoulder and a 2' buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the outside shoulder and inside buffer widths will closely match the typical roadway cross section.

The widths will be 59'-9" and 47'-9" for the Northbound and Southbound Lane bridges respectively.

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 245,025	\$	\$ 245,025
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 245,025	\$	\$ 245,025

# Illustrations



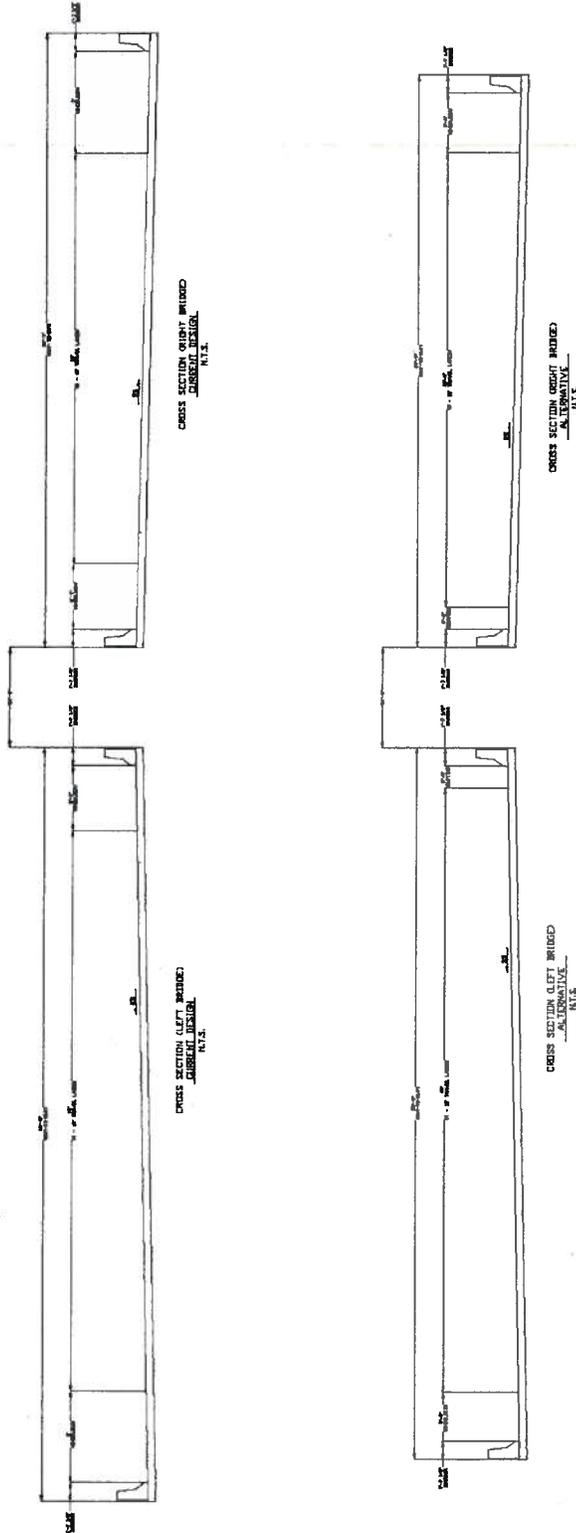
PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRRR-3**

DESCRIPTION: **USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.: **2 of 4**



# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRRR-3**

DESCRIPTION: **USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.: 3 of 4

## Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

## Current Design:

Twin 65'-3" and 53'-3" wide bridges and existing bridges removal. Use of temporary bridge for staging.

## Alternative BRRR-3:

This alternative proposes building 59'-9" and 47'-9" wide for the Northbound and Southbound Lanes respectively.

Total reduction in width of Deck =  $[(65.25 + 53.25) - (59.75 + 47.75')] = 11'$

Area of decreased bridge surface =  $[11' \times 225'] = 2475 \text{ SF}$

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

## NOTE:

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRRR-4</b>
DESCRIPTION:	<b>BUILD ONE NEW STRUCTURE (21' WIDER, IN THE MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF USING TEMPORARY BRIDGE</b>	SHEET NO.:	1 of 4

**Original Design:**

The original design calls for the replacement of the existing substandard (including low clearance) twin bridges carrying US 41 over CSX RR, with new twin bridges. The new twin bridges are 225' long, 3 span structures (67' end spans and 91' intermediate span). The Northbound Lane bridge is 65'-3" and the Southbound Lane bridge is 53'-3" (out-to-out) to accommodate 8' outside shoulders, three 12' lanes (four 12' lanes on the Northbound Lane Bridge) and 6' inside shoulders. The bridge rails are standard Jersey type.

In the original design, the construction sequence proposes the use of a 31'-3" wide temporary bridge for maintenance of traffic during construction.

**Alternative:**

The alternative proposes the construction of a single bridge, 139'-6" wide within the limits of the original design.

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- Potential savings in temporary bridge costs
- Provides a wider bridge for possible future use and interchange enhancements

**Risks:**

- Minimal redesign effort
- Redesign of construction staging

**Technical Discussion:**

The middle portion of the new bridge, 21' wide, could be constructed to the required elevation first and Southbound traffic routed onto it. This stage may require partial demolition of the existing bridges to construct a wider middle portion in order to accommodate 2 lanes of Southbound traffic. The existing Southbound bridge can be removed and the previously constructed middle portion can be extended Southward by 53'-3". Traffic from both directions can now be shifted on to the completed 64'-3" (or more) available portion of the new bridge. The Northbound bridge can now be removed and the previously constructed portion extended Northward by 65'-3" to complete the bridge construction and route all traffic to the appropriate lanes. The finished bridge section will be 139'-6". This alternative eliminates the requirement of the temporary bridge.

See following sheets for calculations in savings. **Note:** Additional cost savings can be realized when the bridge design is developed further and detailed cost estimates are made. The reduction of special barrier rails in the Alternative could be one major component in addition to possible reduction in substructure costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 580,078	\$	\$ 580,078
ALTERNATIVE	\$ 467,775	\$	\$ 467,775
SAVINGS	\$ 112,303	\$	\$ 112,303

# Illustrations



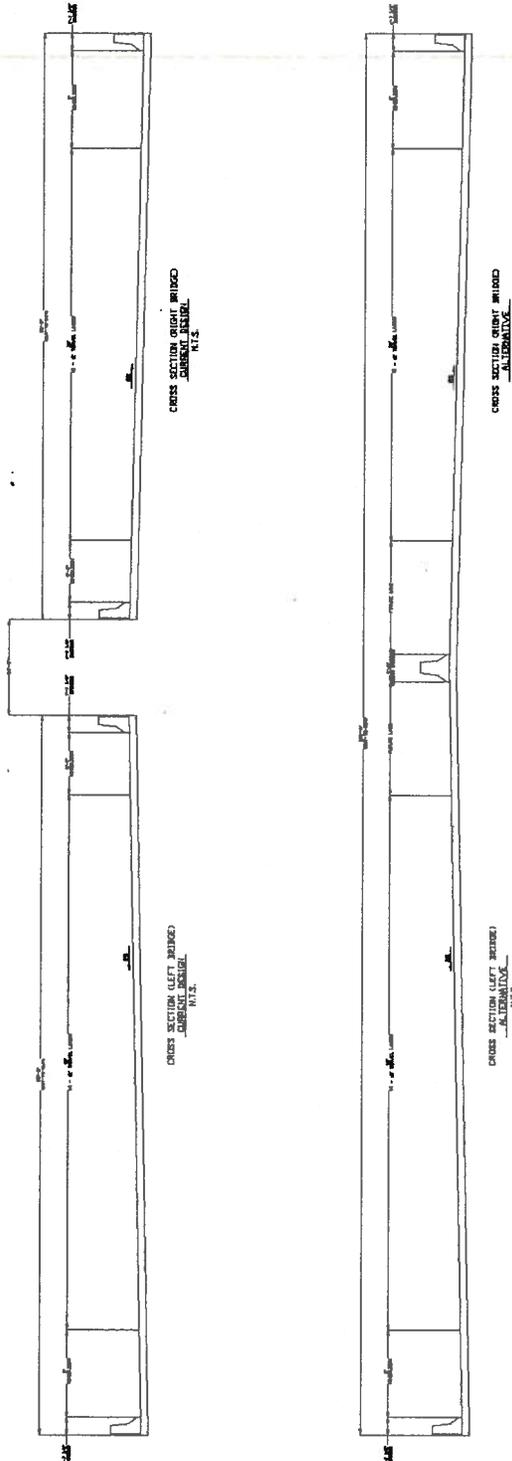
PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRRR-4**

DESCRIPTION: **BUILD ONE NEW STRUCTURE (21' WIDER, IN THE  
MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF  
USING TEMPORARY BRIDGE**

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRRR-4**

DESCRIPTION: **BUILD ONE NEW STRUCTURE (21' WIDER, IN THE  
MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF  
USING TEMPORARY BRIDGE**

SHEET NO.: 3 of 4

## Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

## Current Design:

Twin 65'-3" and 53'-3" wide bridges and existing bridges removal. Use of temporary bridge for staging.

## Alternative BRRR-4:

This alternative proposes building a single structure 139'-6" wide with no temporary bridge.

Increase in width of Deck =  $[139.5' - (65.25 + 53.25)] = 21'$

Area of increased bridge surface =  $[21' \times 225'] = 4,725$  SF

Reduction due to not using a 31'-3" wide, 225' long (approximate) temporary bridge = savings in Alternative.

Area of Temporary bridge =  $31.25' \times 225 = 7,031.25$  SF

(Note: For cost of temporary bridge, pay items 541-5419, 5420, 5428, 5438 & 5470 were used for reference.)

Bridge removal costs will be the same for both designs.

{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}

## NOTE:

Reduction from current design = savings for alternative.

Cost of Bridge Construction assumed to be \$90 per SF.



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US 41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRCR-1</b>
DESCRIPTION:	<b>USE 8' OUTSIDE AND 2' INSIDE SHOULDERS</b>	SHEET NO.:	1 of 4

**Original Design:** (At the time of the VE Study, no Preliminary drawings were available for these bridges)

The original design calls for the replacement of the existing substandard twin bridges carrying US 41 over Pettit Creek, with new twin bridges. The new twin bridges are assumed 155' long, 3 span structures (assumed 40' end spans and 75' intermediate span). The Northbound Lane Bridge is 55'-11" and the Southbound Lane Bridge is 43'-11" (out-to-out) to accommodate 8' outside shoulders, two 12' lanes (three 12' lanes on the Northbound Lane Bridge) and 6' inside shoulders. The bridge rails will be designed to match the existing bridge rails.

**Alternative:**

The alternative proposes the construction of the twin bridges with 2' inside shoulders in-lieu of 6' inside shoulders. All other geometry will be the same as in the original design.

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- More staging area between the bridges during construction

**Risks:**

- Minimal redesign effort
- Design exception may be required

**Technical Discussion:**

A 2' buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the inside buffer width will closely match the typical roadway cross section.

The widths will be 51'-11" and 39'-11" for the Northbound and Southbound Lane bridges respectively.

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 122,760	\$	\$ 122,760
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 122,760	\$	\$ 122,760

# Illustrations



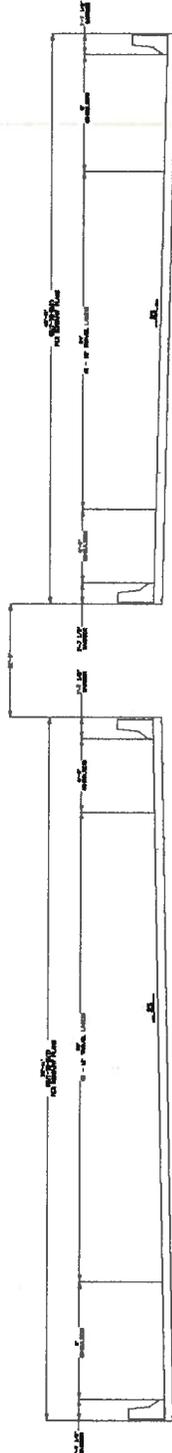
PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRCR-1**

DESCRIPTION: **USE 8' OUTSIDE AND 2' INSIDE SHOULDERS**

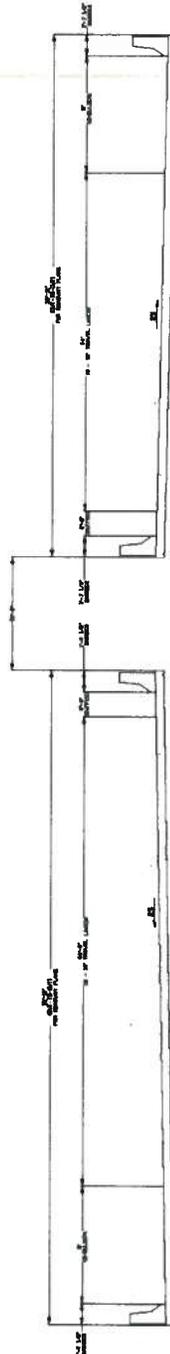
SHEET NO.: **2 of 4**



CROSS SECTION (LEFT BRIDGE)  
CURRENT DESIGN  
N.T.S.



CROSS SECTION (RIGHT BRIDGE)  
CURRENT DESIGN  
N.T.S.



CROSS SECTION (LEFT BRIDGE)  
ALTERNATIVE  
N.T.S.



CROSS SECTION (RIGHT BRIDGE)  
ALTERNATIVE  
N.T.S.

# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US 41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRCR-1**

DESCRIPTION: **USE 8' OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.: 3 of 4

**Note:**

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

**Current Design (Assumed):**

Twin 55'-11" and 43'-11" wide bridges and existing bridges removal.

**Alternative BRCR-1:**

This alternative proposes building the twin bridges 51'-11" and 39'-11" wide.

Total reduction in width of Deck =  $[(55.92' + 43.92') - (51.92 + 39.92')] = 8'$

Area of decreased bridge surface =  $[8' \times 155'] = 1240 \text{ SF}$

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

**NOTE:**

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US 41 Interchange Improvements – Bartow County</b>	ALTERNATIVE NO.:	<b>BRCR-2</b>
DESCRIPTION:	<b>BUILD ONE NEW STRUCTURE (21' WIDER, IN THE MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF USING TEMPORARY BRIDGE</b>	SHEET NO.:	1 of 4

### Original Design:

The original design calls for the replacement of the existing substandard twin bridges carrying US 41 over Pettit Creek, with new twin bridges. The new twin bridges are assumed 155' long, 3 span structures (assumed 40' end spans and 75' intermediate span). The Northbound Lane Bridge is 55'-11" and the Southbound Lane Bridge is 43'-11" (out-to-out) to accommodate 8' outside shoulders, two 12' lanes (three 12' lanes on the Northbound Lane Bridge) and 6' inside shoulders. The bridge rails will be designed to match the existing bridge rails.

In the original design, the construction sequence proposes the use of a 31'-3" wide temporary bridge for maintenance of traffic during construction.

### Alternative:

The alternative proposes the construction of a single bridge, 120'-11" wide within the limits of the original design.

### Opportunities:

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- Potential savings in temporary bridge costs
- Provides a wider bridge for possible future use

### Risks:

- Minimal redesign effort
- Redesign of construction staging

### Technical Discussion:

The middle portion of the new bridge, 21' wide, could be constructed to the required elevation first and Southbound traffic routed onto it. This stage may require partial demolition of the existing bridges to construct a wider middle portion in order to accommodate 2 lanes of Southbound traffic. The existing Southbound bridge can be removed and the previously constructed middle portion can be extended Southward by 43'-11". Traffic from both directions can now be shifted on to the completed 64'-11" (or more) available portion of the new bridge. The Northbound bridge can now be removed and the previously constructed portion extended Northward by 55'-11" to complete the bridge construction and route all traffic to the appropriate lanes. The finished bridge section will be 120'-11". This alternative eliminates the requirement of the temporary bridge.

See following sheets for calculations in savings. **Note:** Additional cost savings can be realized when the bridge design is developed further and detailed cost estimates are made. The reduction of special barrier rails in the Alternative could be one major component in addition to possible reduction in substructure costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 386,719	\$	\$ 386,719
ALTERNATIVE	\$ 323,473	\$	\$ 323,473
SAVINGS	\$ 63,246	\$	\$ 63,246

# Illustrations



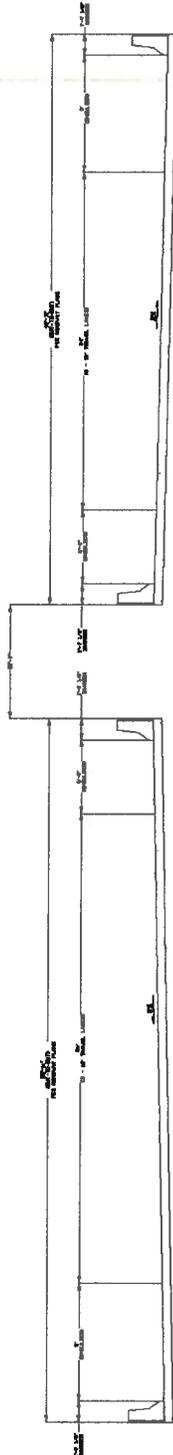
PROJECT: Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County

ALTERNATIVE NO.:

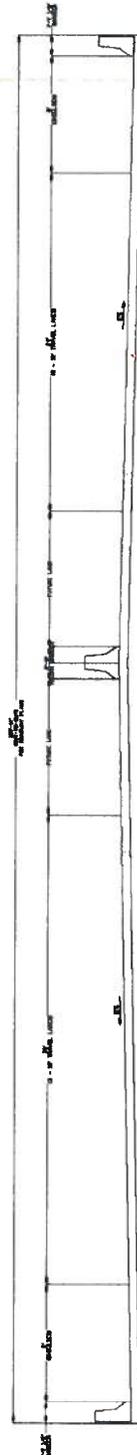
**BRCR-2**

DESCRIPTION: BUILD ONE NEW STRUCTURE (21' WIDER, IN THE MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF USING TEMPORARY BRIDGE

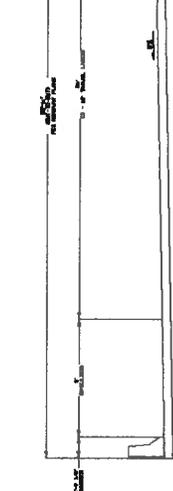
SHEET NO.: 2 of 4



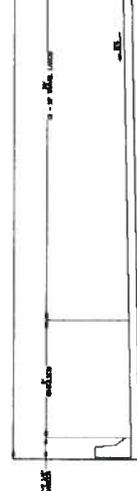
CROSS SECTION (RIGHT BRIDGE)  
CURRENT DESIGN  
N.T.S.



CROSS SECTION (RIGHT BRIDGE)  
ALTERNATIVE  
N.T.S.



CROSS SECTION (LEFT BRIDGE)  
CURRENT DESIGN  
N.T.S.



CROSS SECTION (LEFT BRIDGE)  
ALTERNATIVE  
N.T.S.

# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRCR-2**

DESCRIPTION: **BUILD ONE NEW STRUCTURE (21' WIDER, IN THE  
MIDDLE) TO FACILITATE CONSTRUCTION IN-LIEU OF  
USING TEMPORARY BRIDGE**

SHEET NO.: 3 of 4

**Note:** (At the time of the VE study the project was in the conceptual phase and no bridge plans or elevations were available at Pettit. The discussion below is based on information provided by the designers and certain assumptions).

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Roadway Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

### **Current Design (Assumed):**

43'-11" and 55'-11" wide bridges and existing bridges removal. Use of temporary bridge for staging.

### **Alternative BRCR-2:**

This alternative proposes building a single structure 120'-11" wide with no temporary bridge.

Increase in width of Deck =  $[120.92' - (43.92' + 55.92')] = 21.08'$

Area of increased bridge surface =  $[21.08' \times 150'] = 3,267.4$  SF

Reduction due to not using a 31'-3" wide, 150' long (approximate) temporary bridge = savings in Alternative.

Area of Temporary bridge =  $31.25' \times 150' = 4,687.5$  SF

(Note: For cost of temporary bridge, pay items 541-5419, 5420, 5428, 5438 & 5470 were used for reference.)

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

### **NOTE:**

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation STP-0002-00(626) – P.I. No. 0002626 US41 Interchange Improvements – Bartow County	ALTERNATIVE NO.:	BRCR-3
DESCRIPTION:	USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS	SHEET NO.:	1 of 4

**Original Design:** (At the time of the VE Study, no Preliminary drawings were available for these bridges)

The original design calls for the replacement of the existing substandard twin bridges carrying US 41 over Pettit Creek, with new twin bridges. The new twin bridges are assumed 155' long, 3 span structures (assumed 40' end spans and 75' intermediate span). The Northbound Lane Bridge is 55'-11" and the Southbound Lane Bridge is 43'-11" (out-to-out) to accommodate 8' outside shoulders, two 12' lanes (three 12' lanes on the Northbound Lane Bridge) and 6' inside shoulders. The bridge rails will be designed to match the existing bridge rails.

**Alternative:**

The alternative proposes the construction of the twin bridges with 6'-6" outside and 2' inside shoulders in-lieu of 8' outside and 6' inside shoulders. All other geometry will be the same as in the original design.

**Opportunities:**

- Potential savings in construction cost and construction time
- Potential savings in bridge cost
- More staging area between the bridges during construction

**Risks:**

- Minimal redesign effort
- Design exception may be required

**Technical Discussion:**

A 6'-6" outside shoulder and a 2' buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the outside shoulder and inside buffer widths will closely match the typical roadway cross section.

The widths will be 50'-5" and 38'-5" for the Northbound and Southbound Lane bridges respectively.

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 168,795	\$	\$ 168,795
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 168,795	\$	\$ 168,795

# Illustrations



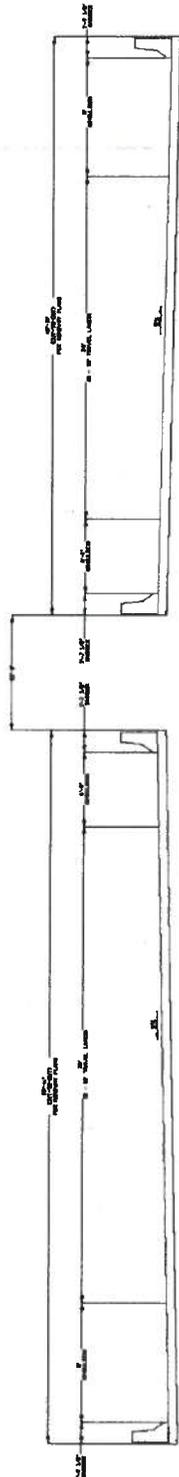
PROJECT: Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County

ALTERNATIVE NO.:

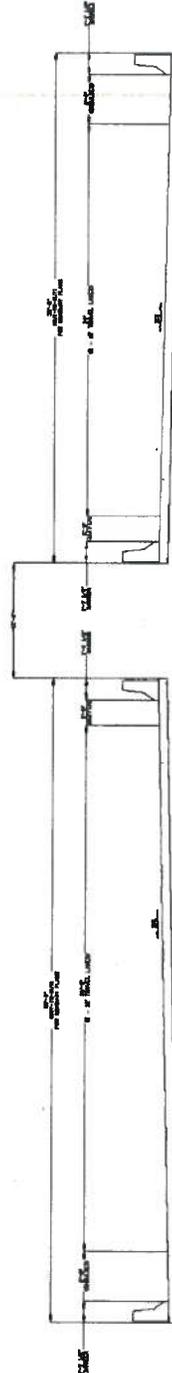
**BRCR-3**

DESCRIPTION: USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS

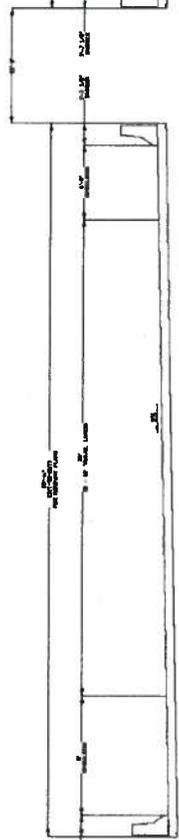
SHEET NO.: 2 of 4



CROSS SECTION (RIGHT BRIDGE)  
CURRENT DESIGN  
N.T.S.



CROSS SECTION (RIGHT BRIDGE)  
ALTERNATIVE  
N.T.S.



CROSS SECTION (LEFT BRIDGE)  
CURRENT DESIGN  
N.T.S.



CROSS SECTION (LEFT BRIDGE)  
ALTERNATIVE  
N.T.S.

# Calculations



PROJECT: **Georgia Department of Transportation  
STP-0002-00(626) – P.I. No. 0002626  
US41 Interchange Improvements – Bartow County**

ALTERNATIVE NO.:

**BRCR-3**

DESCRIPTION: **USE 6'-6" OUTSIDE AND 2' INSIDE SHOULDERS**

SHEET NO.: 3 of 4

**Note:**

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

**Current Design (Assumed):**

Twin 55'-11" and 43'-11" wide bridges and existing bridges removal.

**Alternative BRCR-3:**

This alternative proposes building the twin bridges 50'-5" and 38'-5" wide.

Total reduction in width of Deck =  $[(55.92' + 43.92') - (50.42' + 38.42')] = 11'$

Area of decreased bridge surface =  $[11' \times 155'] = 1705 \text{ SF}$

Bridge removal costs will be the same for both designs.

**{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}**

**NOTE:**

**Reduction from current design = savings for alternative.**

**Cost of Bridge Construction assumed to be \$90 per SF.**



# Value Analysis Design Alternative



**PROJECT:** Georgia Department of Transportation  
 STP-0002-00(626) – P.I. No. 0002626  
 US41 Interchange Improvements – Bartow County

ALTERNATIVE NO.:

**RD-2**

**DESCRIPTION:** RECYCLE EXISTING PAVEMENT ON US 41/SR 3

SHEET NO.: 1 of 4

**Original Design:**

The original design made no provisions for the possible recycling of existing roadway sections on US41/SR3

**Alternative:**

The alternative would be to recycle existing roadway base and paving.

**Opportunities:**

- May serve to reduce pavement costs
- Reduces the amount of material to be hauled

**Risks:**

- May require additional site testing and design changes

**Technical Discussion:**

An alternate use for the existing roadway is not addressed in the plans or the estimate. The proposed new profile eliminates the possibility of reusing the existing pavement as part of the new roadway. Various sections of existing pavement and base from STA 159+60 to STA 215+00 could therefore be recycled which should result in significant savings

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	\$	\$ 0
ALTERNATIVE	\$ 906,007	\$	\$ 906,007
SAVINGS	\$ 906,007	\$	\$ 906,007

# Illustrations



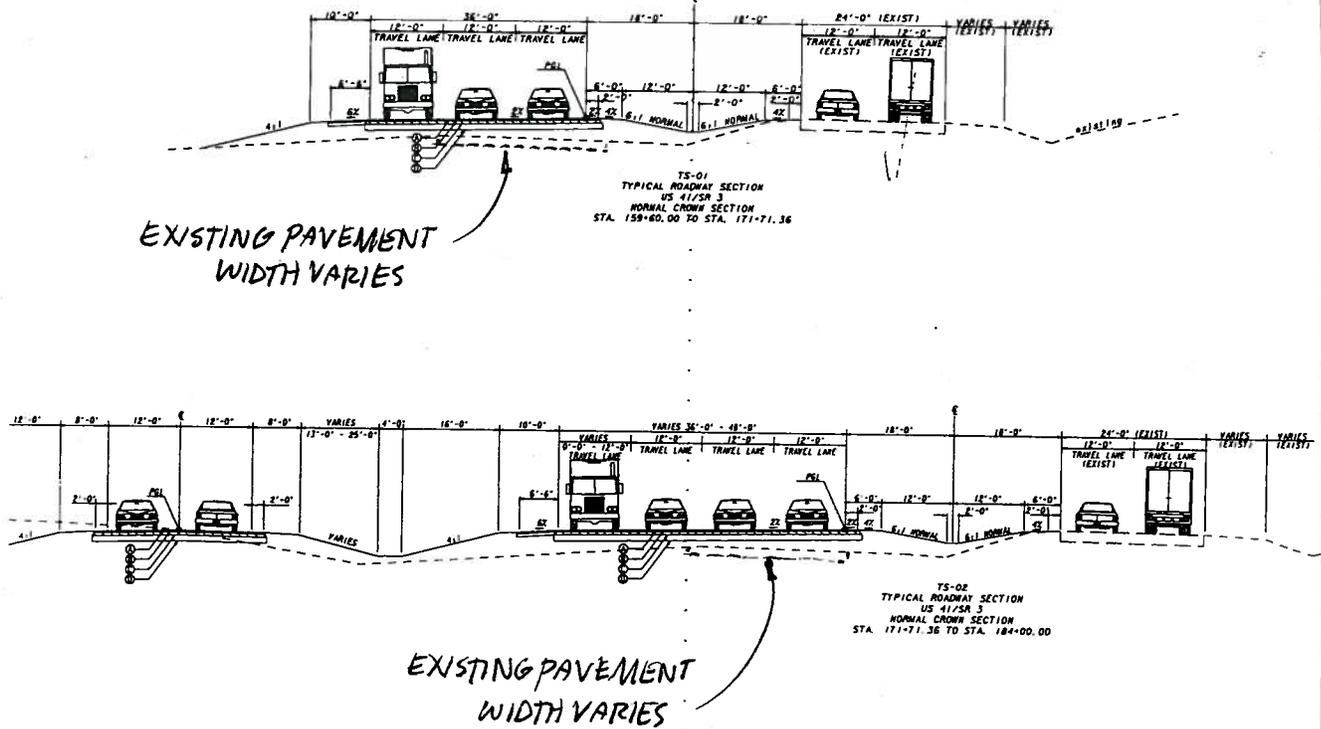
PROJECT: Georgia Department of Transportation  
STP-012-1(71) – P.I. No. 621350  
SR 20 Widening & Relocation – Bartow County

ALTERNATIVE NO.:

RD-2

DESCRIPTION: RECYCLE EXISTING PAVEMENT ON US 41/SR 3

SHEET NO.: 2 of 4



# Calculations



PROJECT: Georgia Department of Transportation  
 STP-012-1(71) - P.I. No. 621350  
 SR 20 Widening & Relocation - Bartow County

ALTERNATIVE NO.:

RD-2

DESCRIPTION: RECYCLE EXISTING PAVEMENT ON US 41/SR 3

SHEET NO.:

3 of 4

APPROX. STA.	AVG WIDTH (VARIES)	LF	SY
STA 159+60 to STA 171+00	30'	1200'	4000
STA 171+00 to STA 175+00	38'	400'	1689
STA 175+00 to STA 184+00	38'	900'	3800
STA 184+00 to STA 187+00	30'	300'	1000
STA 187+00 to STA 192+00	30'	500'	1667
STA 192+00 to STA 215+00	30'	2300'	7667
			19,823 sy

12.5MM  $19,823 \text{ sy} \times 165 \#/\text{sy} = 1636 \text{ ton} @ \$66.19 = \$108,287.$

19.0MM  $19,823 \text{ sy} \times 220 \#/\text{sy} = 2180 \text{ ton} @ 65.62 = 143,052.$

25.0MM  $19,823 \text{ sy} \times 440 \#/\text{sy} = 4361 \text{ ton} @ 65.32 = 284,861.$

GAP  $19,823 \text{ sy} \times 1661 \#/\text{sy} = 16,463 \text{ ton} @ 17.46 = 287,444.$

\$ 823,644.



---

## ***Project Description***

## **PROJECT DESCRIPTION**

STP-0002-00(626) - P.I. No. 0002626, US 41 Interchange Improvements, Bartow County. This project consists of the reconstruction of the existing US 41/ US 411/ SR 20 interchange and portions of US 41 and US 411 to increase the capacity of the interchange. The modifications include the replacement and enlargement of six (6) Bridges. The estimated construction cost is \$32,673,102.

STP-012-1(71) – P.I. No. 621350, SR 20 Widening and Relocation, Bartow County. This project consists of the widening and relocation of SR 20 from US 411/SR 61 to Market Place to I-75. The improvements from US 411/SR 61 to Market Place consists of a new alignment constructing a rural section 44' depressed median with curb and gutters and sidewalks; and from Market Place to I-75 by constructing along the same alignment a 4/6 lane section with a 44' depressed median and urban type curb and gutters, sidewalks facility. The estimated construction cost is \$27,653,826.

## **REPRESENTATIVE DOCUMENTS**

- Jordan Jones and Goulding, Inc.
  - The Concept Report and Plans
  - Construction Cost Estimates

The VE Team utilized the supplied project materials noted above and the current GDOT standard drawings, details and specifications.

Representative documents follow:



DATE	PROJECT NUMBER	SHEET NUMBER	TOTAL SHEETS
05/11/00	CA. STP-0002-006(26)	1	1

**EACH BRIDGE CONSISTS OF**

- 2 - 55'-0" TYPE II PSC BEAM SPANS WITH 74 IN BULB TEE FASCIA --- SPECIAL DESIGN
- 1 - 80'-0" BULB TEE 74 IN PSC BEAM SPAN --- SPECIAL DESIGN
- 2 - PILE END BENTS --- SPECIAL DESIGN
- 2 - CONCRETE INTERMEDIATE BENTS --- SPECIAL DESIGN
- TRAFFIC BARRIER --- SPECIAL DESIGN

**DESIGN DATA**

SPECIFICATIONS (DESIGNED FOR SEISMIC PERFORMANCE CATEGORY B)  
 AASHTO 17TH EDITION, 2002  
 TYPICAL HS20-44 AND/OR MILITARY LOADING --- IMPACT ALLOWED  
 FUTURE PAVING ALLOWANCE --- 30 LBS PER SQ FT

**TRAFFIC DATA**

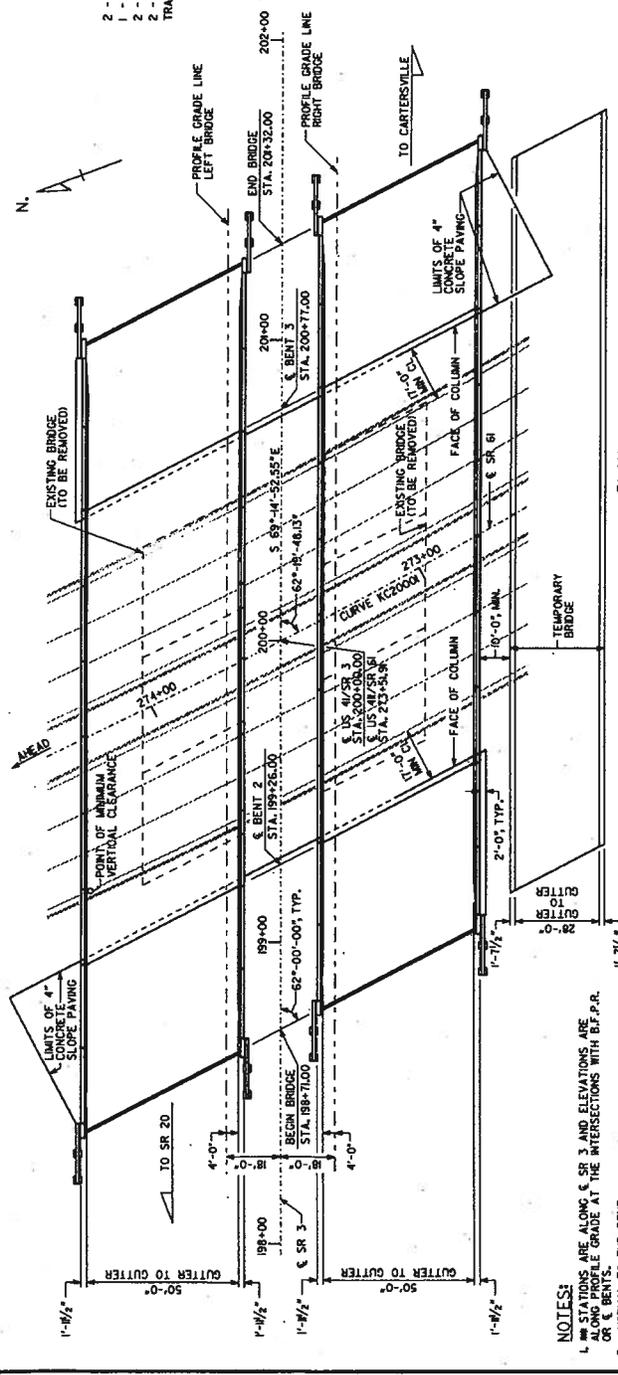
TRAFFIC --- ADT = 5303/2000  
 DESIGN SPEED --- ADT = 2292/2023  
 DIRECTIONAL DIST. --- 55 MPH  
 2 TRUCKS --- 50%  
 2 24 HR. TRUCKS --- 10%  
 2 --- 1%

**CONSTRUCTION SEQUENCE**

- BUILD TEMPORARY BRIDGE TO THE SOUTH OF THE EXISTING BRIDGES.
- SHIFT EXISTING RIGHT EASTBOUND BRIDGE TRAFFIC TO THE TEMPORARY BRIDGE.
- DEMOLISH EXISTING LEFT BRIDGE AND BUILD PROPOSED LEFT BRIDGE.
- SHIFT WESTBOUND TRAFFIC FROM EXISTING RIGHT BRIDGE TO PROPOSED LEFT BRIDGE.
- SHIFT TRAFFIC FROM TEMPORARY BRIDGE TO PROPOSED RIGHT BRIDGE AND REMOVE TEMPORARY BRIDGE.

**UTILITIES**

NONE

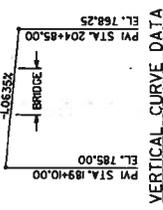


**PLAN**  
SCALE: 1" = 20'-0"

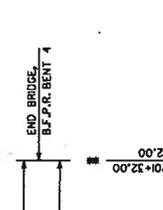
- NOTES:**
- ALL STATIONS ARE ALONG S.R. 3 AND ELEVATIONS ARE ALONG PROFILE GRADE AT THE INTERSECTIONS WITH B.F.P.R. OR BENTS.
  - \* NORMAL TO END BENT.
  - END BENT PILES NOT SHOWN.
  - BENTS ARE PARALLEL AND RIGHT BRIDGE BECS ARE TO BE BUILT ON A CONSTANT CROSS SLOPE OF 2% SLOPING DOWN TO THE LEFT AND RIGHT, RESPECTIVELY.

**BENCHMARK**

STATION 187+71.34  
 OFFSET 192.27' CASTER SQUARE  
 IN THE CORNER OF HEADWALL.  
 ELEVATION 751.3  
 D.C. = 2.066072-7162

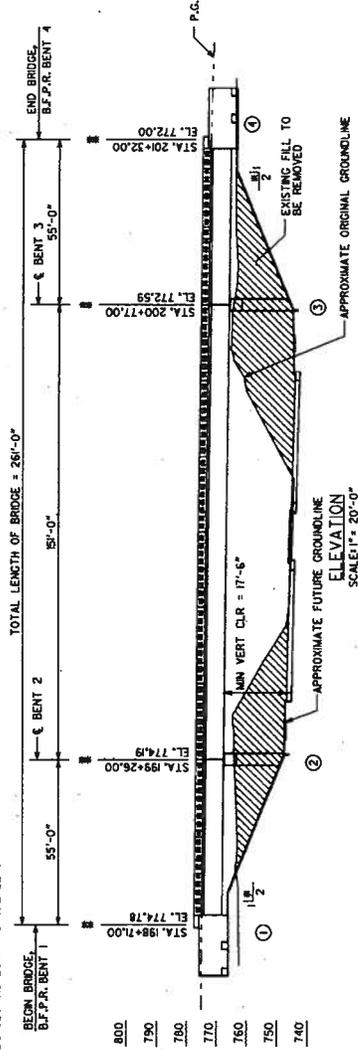


**VERTICAL CURVE DATA**  
SR 3



**VERTICAL CURVE DATA**  
SR 6

EXISTING LEFT BRIDGE SERIAL NO. 05-0000-0  
 EXISTING RIGHT BRIDGE SERIAL NO. 05-0009-0  
 EXISTING LEFT BRIDGE I.D. NO. 05-00003D-0L47M  
 EXISTING RIGHT BRIDGE I.D. NO. 05-00003D-0L61M



**ELEVATION**  
SCALE: 1" = 20'-0"

TOP OF BERM ELEVATIONS		
LOCATION	LEFT BRIDGE	RIGHT BRIDGE
BENT 1, LEFT	764.63	765.32
BENT 1, RIGHT	765.16	764.26
BENT 4, LEFT	761.91	762.55
BENT 4, RIGHT	762.89	761.40

\* FOR BRIDGE ENDROLL STAMPING PURPOSES ONLY

**CURVE KC2000J**

STA. 187+71.34  
 DELTA = 157°56'28"PT.  
 DC = 2'30"00"00"  
 PL = 2281.83'  
 L = 608.63'  
 P.L. = 528745.940  
 S.E. = 2.01%

DEPARTMENT OF TRANSPORTATION  
 PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT

SR 3 (US 41) OVER SR 6 (US 411)

BARTOW COUNTY  
 STP-0002-006(26)

SCALE: AS SHOWN

JOB NO. 284-08  
 DRAWN: JLR  
 CHECKED: JLR  
 DATE: MAY 2007



# Preliminary Right of Way Cost Estimate

Date: 5-26-07

Project: STP-012-1(71) Bartow

Existing/Required R/W:

Project Termini:

Project Description:

P.I. Number: 621350

No. Parcels: 55

## Land:

Res., Comm., Indus., Govt., etc.

7.281 acres at \$385,000 per acre (commercial)

16.11 acres at \$ 45,000 per acre (residential)

\$ 3,321,690

## Improvements:

0

\$ 0

## Relocation:

0 - Commercial @ \$25,000/parcel = \$0

0 - Residential @ \$40,000/parcel = \$0

## TOTAL

\$0

## Damages:

Proximity - \$

Consequential - \$

Cost to Cure - \$

## TOTAL

\$0

## SUB-TOTAL:

\$3,322,000

Net Cost \$ 3,322,000

Scheduling Contingency 55 % \$ 5,149,100

Adm/Court Cost 60 % \$ 8,238,560

Market Appreciation 40 % \$ 11,533,984

## TOTAL

\$ 11,533,984

**Total Cost**

**\$ 11,534,000**

Prepared By: \_\_\_\_\_

Approved: \_\_\_\_\_

Howard P. Copeland  
R/W Administrator

REVISED: 12-8-06

# Preliminary Right of Way Cost Estimate

Date: 5-26-07

Project: STP-002-00(626) Bartow

Existing/Required R/W:

Project Termini:

Project Description:

P.I. Number: 0002626

No. Parcels: 55

**Land:**

Res., Comm., Indus., Govt., etc.

9.49 acres at \$385,000 per acre (commercial)

0.151 acres at \$ 45,000 per acre (residential)

\$ 3,661,000

**Improvements:**

0

\$ 0

**Relocation:**

0 - Commercial @ \$25,000/parcel = \$0

0 - Residential @ \$40,000/parcel = \$0

**TOTAL**

\$0

**Damages:**

Proximity - \$

Consequential - \$

Cost to Cure - \$

**TOTAL**

\$0

**SUB-TOTAL:**

\$3,661,000

Net Cost \$ 3,661,000

Scheduling Contingency 55 % \$ 5,674,550

Adm/Court Cost 60 % \$ 9,079,280

Market Appreciation 40 % \$ 12,710,992

**TOTAL**

\$ 12,710,992

**Total Cost**

**\$12,712,000**

Prepared By: \_\_\_\_\_

Approved: \_\_\_\_\_

Howard P. Copeland  
R/W Administrator

REVISED: 12-8-06

## Estimate Report for file "0002626"

Section MAJOR STRUCTURES					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
207-0203	148	CY	61.62	FOUND BKFFILL MATL, TP II	9119.76
500-3101	424	CY	586.16	CLASS A CONCRETE	248531.84
511-1000	39348	LB	0.95	BAR REINF STEEL	37380.60
540-1102	2	LS	220000.00	REMOVAL OF EXISTING BR, BR NO - 1 - US 41/SR 3 OVER PETTIT CREEK (2 BRIDGES)	440000.00
540-1102	2	LS	220000.00	REMOVAL OF EXISTING BR, BR NO - 2 - US 41/SR 3 OVER CSX RR (2 BRIDGES)	440000.00
540-1102	2	LS	220000.00	REMOVAL OF EXISTING BR, BR NO - 3 - US 41/SR 3 OVER US 411/SR 61 (2 BRIDGES)	440000.00
999-9999	28145	SF	90.00	BRIDGE REPLACEMENT - US 41/SR 3 OVER US 411/SR 61 (261 x 107.83)	2533050.00
999-9999	18368	SF	90.00	BRIDGE REPLACEMENT - US 41/SR 3 OVER PETTIT CREEK (155 x 65.25 LT & 53.25 RT)	1653120.00
999-9999	26663	SF	90.00	BRIDGE REPLACEMENT - US 41/SR 3 OVER CSX RR (225 x 65.25 LT & 53.25 RT)	2399670.00
<b>Section Sub Total:</b>					<b>\$8,200,872.20</b>

Section GRADING AND DRAINAGE					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
205-0001	231000	CY	5.36	UNCLASS EXCAV	1238160.00
441-6222	5800	LF	17.54	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	101732.00
441-6740	5800	LF	14.85	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	86130.00
550-1180	3240	LF	41.05	STORM DRAIN PIPE, 18 IN, H 1-10	133002.00
550-1240	720	LF	52.59	STORM DRAIN PIPE, 24 IN, H 1-10	37864.80
550-1300	480	LF	69.27	STORM DRAIN PIPE, 30 IN, H 1-10	33249.60
550-1360	640	LF	80.95	STORM DRAIN PIPE, 36 IN, H 1-10	51808.00
550-2180	240	LF	36.02	SIDE DRAIN PIPE, 18 IN, H 1-10	8644.80
550-2240	80	LF	40.70	SIDE DRAIN PIPE, 24 IN, H 1-10	3256.00
550-4118	12	EA	620.75	FLARED END SECTION 18 IN, SIDE DRAIN	7449.00
550-4124	4	EA	725.38	FLARED END SECTION 24 IN, SIDE DRAIN	2901.52
550-4218	10	EA	683.48	FLARED END SECTION 18 IN, STORM DRAIN	6834.80
550-4224	4	EA	870.43	FLARED END SECTION 24 IN, STORM DRAIN	3481.72
550-4230	2	EA	886.41	FLARED END SECTION 30 IN, STORM DRAIN	1772.82
550-4236	6	EA	1251.04	FLARED END SECTION 36 IN, STORM DRAIN	7506.24
576-1010	200	LF	3.72	SLOPE DRAIN PIPE, 10 IN	744.00
576-1018	350	LF	31.04	SLOPE DRAIN PIPE, 18 IN	10864.00
577-1100	10	EA	712.70	METAL DRAIN INLET - COMPLETE ASSEMBLY	7127.00
668-1100	30	EA	2326.85	CATCH BASIN, GP 1	69805.50
668-1110	10	LF	237.07	CATCH BASIN, GP 1, ADDL DEPTH	2370.70
668-1200	0	EA	2915.00	CATCH BASIN, GP 2	0.00
668-2100	5	EA	4333.98	DROP INLET, GP 1	21669.90
668-2110	5	LF	277.64	DROP INLET, GP 1, ADDL DEPTH	1388.20
668-2200	0	EA	4007.38	DROP INLET, GP 2	0.00
668-4300	5	EA	2246.96	STORM SEWER MANHOLE, TP 1	11234.80
668-4311	5	LF	287.81	STORM SEWER MANHOLE, TP 1, ADDL DEPTH, CL 1	1439.05
668-4400	0	EA	3260.83	STORM SEWER MANHOLE, TP 2	0.00
<b>Section Sub Total:</b>					<b>\$1,850,436.45</b>

Section BASE AND PAVING					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
310-1101	93900	TN	17.46	GR AGGR BASE CRS, INCL MATL	1639494.00
402-1812	2500	TN	62.50	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME	156250.00
402-3121	23200	TN	65.32	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	1515424.00
402-3130	8700	TN	66.19	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME	575853.00
402-3190	11600	TN	65.62	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	761192.00
413-1000	12250	GL	1.98	BITUM TACK COAT	24255.00
432-5010	1500	SY	2.55	MILL ASPH CONC PVMT, VARIABLE DEPTH	3825.00
441-0740	3030	SY	30.69	CONCRETE MEDIAN, 4 IN	92990.70
446-1100	12000	LF	5.10	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	61200.00
500-9999	50	CY	199.31	CLASS B CONC, BASE OR PVMT WIDENING	9965.50

**Section Sub Total: \$4,840,449.20**

<b>Section GRASSING AND EROSION CONTROL</b>					
<b>Item Number</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Price</b>	<b>Item Description</b>	<b>Cost</b>
163-0232	17	AC	574.21	TEMPORARY GRASSING	9761.57
163-0240	300	TN	177.56	MULCH	53268.00
163-0300	4	EA	2728.85	CONSTRUCTION EXIT	10915.40
163-0503	19	EA	569.81	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 3	10826.39
163-0520	1000	LF	16.82	CONSTRUCT AND REMOVE TEMPORARY PIPE SLOPE DRAIN	16820.00
163-0521	200	EA	227.16	CONSTRUCT AND REMOVE TEMPORARY DITCH CHECKS	45432.00
163-0530	1000	LF	3.75	CONSTRUCT AND REMOVE BALED STRAW EROSION CHECK	3750.00
163-0550	30	EA	299.42	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	8982.60
165-0010	3000	LF	0.92	MAINTENANCE OF TEMPORARY SILT FENCE, TP A	2760.00
165-0030	9000	LF	1.78	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	16020.00
165-0040	100	EA	89.08	MAINTENANCE OF EROSION CONTROL CHECKDAMS/DITCH CHECKS	8908.00
165-0070	500	LF	2.35	MAINTENANCE OF BALED STRAW EROSION CHECK	1175.00
165-0087	19	EA	199.53	MAINTENANCE OF SILT CONTROL GATE, TP 3	3791.07
165-0101	16	EA	633.17	MAINTENANCE OF CONSTRUCTION EXIT	10130.72
165-0105	30	EA	108.30	MAINTENANCE OF INLET SEDIMENT TRAP	3249.00
167-1000	2	EA	1323.90	WATER QUALITY MONITORING AND SAMPLING	2647.80
167-1500	30	MO	1078.76	WATER QUALITY INSPECTIONS	32362.80
171-0010	6000	LF	2.01	TEMPORARY SILT FENCE, TYPE A	12060.00
171-0030	18000	LF	4.03	TEMPORARY SILT FENCE, TYPE C	72540.00
201-1500	1	LS	480000.00	CLEARING & GRUBBING -	480000.00
441-0204	900	SY	33.00	PLAIN CONC DITCH PAVING, 4 IN	29700.00
603-2024	380	SY	53.20	STN DUMPED RIP RAP, TP 1, 24 IN	20216.00
603-7000	1280	SY	5.04	PLASTIC FILTER FABRIC	6451.20
700-6910	34	AC	917.26	PERMANENT GRASSING	31186.84
700-7000	34	TN	59.55	AGRICULTURAL LIME	2024.70
700-7010	85	GL	19.21	LIQUID LIME	1632.85
700-8000	39	TN	350.05	FERTILIZER MIXED GRADE	13651.95
700-8100	1700	LB	2.08	FERTILIZER NITROGEN CONTENT	3536.00
716-2000	10000	SY	1.24	EROSION CONTROL MATS, SLOPES	12400.00
<b>Section Sub Total:</b>					<b>\$926,199.89</b>

<b>Section SIGNING AND MARKING</b>					
<b>Item Number</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Price</b>	<b>Item Description</b>	<b>Cost</b>
636-1020	100	SF	14.79	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	1479.00
636-1031	500	SF	28.96	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING TP 6	14480.00
636-1032	100	SF	38.62	HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING TP 6	3862.00
636-2070	400	LF	8.63	GALV STEEL POSTS, TP 7	3452.00
639-4004	12	EA	6220.74	STRAIN POLE, TP IV	74648.88
647-1000	1	LS	65000.00	TRAFFIC SIGNAL INSTALLATION NO - 1: NW QUAD RAMPS	65000.00
647-1000	1	LS	65000.00	TRAFFIC SIGNAL INSTALLATION NO - 2: SW QUAD RAMPS	65000.00
647-1000	1	LS	50000.00	TRAFFIC SIGNAL INSTALLATION NO - 3: SIGNAL MODIFICATIONS AT FELTON ROAD	50000.00
653-0120	60	EA	70.58	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	4234.80
653-0170	20	EA	76.44	THERMOPLASTIC PVMT MARKING, ARROW, TP 7	1528.80
653-1501	20000	LF	0.59	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	11800.00
653-1502	20000	LF	0.59	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	11800.00
653-1704	500	LF	5.20	THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	2600.00
653-1804	3500	LF	1.87	THERMOPLASTIC SOLID TRAF STRIPE, 8 IN, WHITE	6545.00
653-3501	28000	GLF	0.56	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	15680.00
653-6004	1000	SY	2.73	THERMOPLASTIC TRAF STRIPING, WHITE	2730.00
653-6006	1000	SY	3.35	THERMOPLASTIC TRAF STRIPING, YELLOW	3350.00

654-1002	200	EA	3.68	RAISED PVMT MARKERS TP 2	736.00
654-1003	350	EA	3.71	RAISED PVMT MARKERS TP 3	1298.50
657-1054	2000	LF	4.75	PREFORMED PLASTIC SOLID PVMT MKG, 5 IN, WHITE, TP PB	9500.00
657-3054	4000	GLF	3.54	PREFORMED PLASTIC SKIP PVMT MKG, 5 IN, WHITE, TP PB	14160.00
657-6054	2000	LF	4.60	PREFORMED PLASTIC SOLID PVMT MKG, 5 IN, YELLOW, TP PB	9200.00
<b>Section Sub Total:</b>					<b>\$373,084.98</b>

<b>Section MISCELLANEOUS</b>					
<b>Item Number</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Price</b>	<b>Item Description</b>	<b>Cost</b>
150-1000	1	LS	1200000.00	TRAFFIC CONTROL - PROJECT NO. STP-0002-00 (626)	1200000.00
441-0104	3300	SY	38.38	CONC SIDEWALK, 4 IN	126654.00
621-3020	300	LF	160.00	CONCRETE BARRIER, TYPE 20	48000.00
621-3021	300	LF	98.21	CONCRETE BARRIER, TYPE 21	29463.00
621-3022	300	LF	216.66	CONCRETE BARRIER, TYPE 22	64998.00
622-1070	1000	LF	50.00	PRECAST CONCRETE MEDIAN BARRIER, METHOD 5	50000.00
641-1100	700	LF	54.27	GUARDRAIL, TP T	37989.00
641-1200	5000	LF	18.34	GUARDRAIL, TP W	91700.00
641-5001	24	EA	638.12	GUARDRAIL ANCHORAGE, TP 1	15314.88
641-5012	24	EA	1819.11	GUARDRAIL ANCHORAGE, TP 12	43658.64
648-1300	3	EA	18000.00	IMPACT ATTENUATOR UNIT/ARRAY, TYPE P-	54000.00
<b>Section Sub Total:</b>					<b>\$1,761,777.52</b>

**Total Estimated Cost: \$17,952,820.24**

<b>Subtotal Construction Cost</b>	<b>\$17,952,820.24</b>
E&C Rate 10.0 %	\$1,795,282.02
Inflation Rate 5.0 % @ 0.0 Years	\$0.00
<hr/>	
<b>Total Construction Cost</b>	<b>\$19,748,102.26</b>
Right Of Way	\$12,712,000.00
ReImb. Utilities	\$213,000.00
<hr/>	
<b>Grand Total Project Cost</b>	<b>\$32,673,102.26</b>

DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA  
OFFICE OF ROAD AND AIRPORT DESIGN  
**REVISED**  
**PROJECT CONCEPT REPORT**

**STATE ROUTE 20**

**STP-012-1(71)**  
**P.I. NO. 621350**  
**BARTOW COUNTY**

**FEDERAL ROUTE NO: F 12-1**  
**STATE ROUTE NO: 20, 61, 3**  
**GADOT P.I. NO: 621350**

**Date of Report: DECEMBER 20, 1999**

**RECOMMENDATION FOR APPROVAL**

\_\_\_\_\_  
DATE

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

\_\_\_\_\_  
DATE

\_\_\_\_\_  
State Programming Engineer

\_\_\_\_\_  
DATE

\_\_\_\_\_  
State Road and Airport Design Engineer

\_\_\_\_\_  
DATE

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

\_\_\_\_\_  
DATE

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

\_\_\_\_\_  
DATE

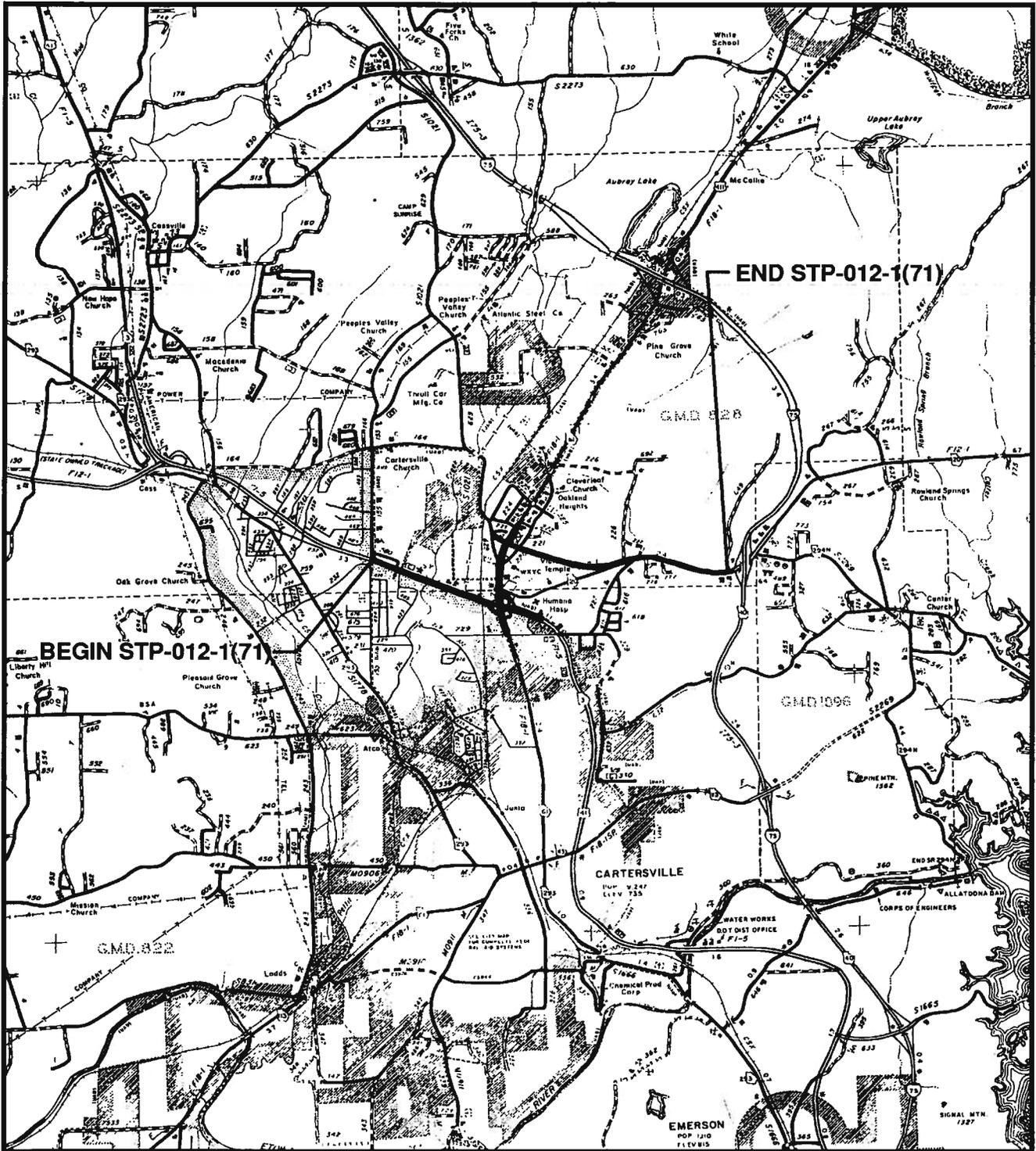
\_\_\_\_\_  
State Traffic Operations Engineer

\_\_\_\_\_  
DATE

\_\_\_\_\_  
State Bridge & Structural Design Engineer

\_\_\_\_\_  
DATE

\_\_\_\_\_  
State Environmental/Location Engineer



PROJECT MAP - Project No. : STP-012-1(71) Bartow County

**PROJECT NUMBER: STP-012-1(71) Bartow County**

<b>PROJECT LOCATION &amp; DESCRIPTION</b>
<p>This project encompasses the widening of SR 20 from 2 lanes to 4 lanes with a 44 ft. depressed median and widening SR 61 to provide 4 through lanes with turn lanes to accommodate projected turning movements. It also includes the relocation of the SR 20 intersection with SR 61 and improvements to the SR 61 and SR 3/US 41 interchange in Bartow County.</p>
<p>PROJECT LENGTH: 2.47 Miles</p>

<b>TRAFFIC</b>			
<b>CURRENT</b>		<b>PROJECTED</b>	
<u>YEAR</u>	<u>AADT</u>	<u>YEAR</u>	<u>AADT</u>
2003	33190	2023	49130

<b>ACCIDENT HISTORY</b>			
<u>YEAR</u>	<u>Accident Rate</u>	<u>Injury Rate</u>	<u>Fatality Rate</u>
1995	222 (661)	94 (316)	0 (1.59)
1996	354 (671)	279 (319)	0 (1.56)
1997	326 (N/A)	264 (N/A)	0 (N/A)

Note: All rates are per 100 million vehicle miles of travel. Numbers in parentheses are statewide average rates.

<b>PDP CLASSIFICATION</b>	<b>FUNCTIONAL CLASSIFICATION</b>
MAJOR	PRINCIPAL ARTERIAL

FOS ( )	EXEMPT ( X )	SF ( )
---------	--------------	--------

### PROJECT NEED & PURPOSE

The proposed project is to provide a multi-lane facility by widening and relocating the existing SR 20, to four lanes from I-75 to US. 411/SR61 in Bartow County. The project would also involve the reconstruction of the existing interchange at SR 61 and US 411/SR 3. This portion of SR 20 is a major access point to I-75 for both the SR 20 and SR 3 Corridors.

Traffic volumes on SR 20 in the project area are expected to increase from 33,190 AADT (2003) average annual daily traffic to 49,130 (2023). Currently, the projected land use for the area is Commercial, office and light industry. A planned community college is projected to be built on the north side of State route 20 east of Market Place Boulevard. Property owned by the Georgia Board of Regents adjoins the proposed widening of SR 20 to the north and south. Low density housing is projected for an area north SR 20 and east of Cline-Smith Road.

Capacity analysis of the existing conditions for the intersections of SR 20/SR 61, SR 20 ramp from US 41, and SR 20/Market Place Boulevard, concluded that the level of service in the PM peak would operate at an inadequate level of service (LOS=F). This level would create delays exceeding the threshold set for that level of service.

The 2023 Level of Service for this project is 'D'. To maintain a LOS D, the Northern Arc would have to be built and accommodate a percentage of the proposed traffic for SR 20. If the outer perimeter is not constructed, an additional lane in each direction for SR 20, from I-75 to SR 61, would have to be constructed to insure a level of service 'D'. This is documented in a report by Day-Wilburn Associates for Bartow County. The report is available for review.

Accident history shows that the accident rate witnessed a substantial increase from 1995 to 1996 for both the accident rate (+60%) and the injury rate (+197 %), although the arterial is well below the state average for a principal arterial. There was no state average for 1997.

From a 1985 Origin and Destination Survey, it was discovered that over 60% of all through traffic surveyed in the SR 20 Corridor west of SR 3 utilized the segment of SR 20 east of SR 61 to enter or exit the area. Also 50% of all trucks interviewed either entered or exited the area via this segment of SR 20 and passed through the interchange at SR 61. The SR 20/SR 3/SR 61 interchange is of substandard design when compared to today's design guidelines. This contributes to congestion and confusion at the convergence point of three of the most heavily traveled routes in Bartow County.

This project has been included in the Bartow Countywide Transportation Study for the City of Cartersville and Bartow County. The Study will be used to identify future transportation facility needs and their estimated costs. All transportation modes including roads, aviation, transit, rail, bike and pedestrian facilities will be addressed in this study. This study is a joint project between the City of Cartersville and Bartow County. Geographically, the study also includes the towns of Emerson, Euharlee, Adairsville and Kingston. Construction of this project would alleviate the congestion at this vital intersection in Bartow County and improve capacity and safety for the traveling public along this corridor.

<b>EXISTING ROADWAY</b>		
TYPICAL SECTION: 2-12' lanes with ± 8 ft. shoulders from SR 61 to County Road 227		
R/W WIDTH: Variable - 100' to 200'		
POSTED SPEED	MAX DEGREE OF CURVE	MAXIMUM GRADE
<u>45 to 55 mph</u>	<u>6° - 0'</u>	<u>4.5%</u>
MAJOR STRUCTURES:		
1. 27.8' x 118' Bridge - N. SR 3 over SR 61, 1992 Sufficiency Rating = 76.3		
2. 27.8' x 118' Bridge - S. SR 3 over SR 61, 1992 Sufficiency Rating = 76.3		
3. 28.0' x 142' Bridge - N. SR 3 over R.R., 1992 Sufficiency Rating = 75.3		
4. 28.0' x 142' Bridge - N. SR 3 over R.R., 1992 Sufficiency Rating = 58.8		
5. 28.0' x 152' Bridge - N. SR 3 over Pettit Creek, 1992 Sufficiency Rating = 77.9		

<b>PROPOSED ROADWAY</b>			
TYPICAL SECTION: The basic typical section for SR 20 consists of 2-12 ft. lanes in each direction separated by a 44 ft. depressed median with rural shoulders between I-75 and Market Place Blvd. and urban shoulders between Market Place Blvd. and SR 61. SR 61 will include 2-12 ft. lanes in each direction separated by a variable width median and urban shoulders. Additional lanes will be provided at intersections to accommodate turning movements.			
LOCATION	DESIGN SPEED	MAX DEGREE OF CURVE	MAX GRADE
SR 20 from I-75 to Market Place Blvd.	<u>55 mph</u>	<u>4° - 30'</u>	<u>4.5%</u>
US 41 from SR 20 to Massell Dr.			
SR 20 From Market Pl. Blvd. to SR 61	<u>45 mph</u>	<u>8° - 00'</u>	<u>5%</u>
SR 61 From US 41 to Relocated SR 20			

**PROPOSED ROADWAY**

MAJOR STRUCTURES:

1. Existing Bridge - N. SR 3 over SR 61, Remove and replace
2. Existing Bridge - S. SR 3 over SR 61, Remove and replace
3. Existing Bridge - N. SR 3 over R.R., Widen to allow for 3 lanes and tapers on SR 3 northbound
4. Existing Bridge - S. SR 3 over R.R., Widen to allow for 3 lanes and tapers on SR 3 southbound
5. Existing Bridge - S. SR 3 over Pettit Cr., Widen to allow for 3 lanes and tapers on SR 3 northbound

**PROPOSED RIGHT OF WAY**

R/W WIDTH: Variable - 140' to 200'

DISPLACEMENTS

RES: 5      BUS: 2      M.H.: 0

TYPE OF ACCESS CONTROL: By Permit

NUMBER OF PARCELS: 66

**COORDINATION**

CONCEPT TEAM MEETING DATE: April 19, 1991    SUPPLEMENTAL: June 3, 1999

CONFORMS TO TIP/STIP: Yes

MEETS LOGICAL TERMINI REQUIREMENTS: Yes

P.A.R. MEETING: To Be Determined

LOCATION INSPECTION DATE: None

PERMITS REQUIRED (4f,COE,404,etc.): Nationwide Permit (under current requirements)

LEVEL OF PUBLIC INVOLVEMENT: :    Public Hearing

TIME SAVING PROCEDURES APPROPRIATE: No

OTHER PROJECT IN THE AREA: STP 018-1(51) Bartow County

<b>SCHEDULING CONSIDERATIONS</b>	
TIME TO COMPLETE ENVIRONMENTAL:	6 MONTHS
TIME TO COMPLETE PRELIMINARY RD/RW PLANS:	8 MONTHS
TIME TO COMPLETE 404 PERMIT:	6 MONTHS
TIME TO COMPLETE FINAL CONSTRUCTION PLANS:	10 MONTHS
TIME TO BUY RIGHTS-OF-WAY:	12 MONTHS

<b>MISCELLANEOUS</b>			
TRAFFIC CONTROL DURING CONSTRUCTION: Traffic to be maintained on existing roadways during construction.			
LEVEL OF ENVIRONMENTAL ANALYSIS: Categorical Exclusion Anticipated			
DESIGN VARIATIONS REQUIRED:			
	YES	NO	UNDETERMINED
SUBST HORIZ ALIGNMENT	( )	(X)	( )
SUBST ROADWAY WIDTH	( )	(X)	( )
SUBST SHOULDER WIDTH	( )	(X)	( )
SUBST VERT GRADES	( )	(X)	( )
SUBST CROSS SLOPES	( )	(X)	( )
SUBST STOPPING SIGHT DIST( )	( )	(X)	( )
SUBST SUPERELEV RATES	( )	(X)	( )
SUBST HORIZ CLEARANCE	( )	(X)	( )
SUBST SPEED DESIGN	( )	(X)	( )
SUBST VERTICAL CLEARANCE	( )	(X)	( )
SUBST BRIDGE WIDTH	( )	(X)	( )
SUBST BR STRUCT CAPACITY	( )	(X)	( )
UNDERGROUND STORAGE TANKS: To be determined by survey			
HAZARDOUS SITES: To be determined by survey			

### ALTERNATIVES CONSIDERED

1. Widen SR 20 to four lanes, with a 20 ft. raised median, using existing lanes as eastbound lanes. Begin construction on SR 20 at the intersection of SR 61 and end construction at existing four-lane section at I-75. Reconstruct the interchange at SR 20 and US 41 using a partial diamond design, with a short section of SR 20 relocated to intersect with the westbound ramp from SR 61 to US 41. There would be a stop condition at the intersection of the northbound off ramp of US 41 and SR 20. Traffic signals would be required at the ramps north and south of US 41 on SR 61. Some relocation of all ramps would be required. Relocate the intersection of SR 20 and County Road 227 for a 90° intersection.

Replace the existing bridges over SR 61 to allow for four lanes on SR 61. Widen the existing bridges on SR 3 over the CSX Railroad for three lanes on SR 3 north and south bound.

Not selected since obliteration of the loop ramps would cause more congestion.

2. Widen SR 20 to four lanes, with a 20 ft. raised median, using existing lanes as eastbound lanes. Construct two lanes and raised median north of the existing lanes. Relocate a section of SR 20 (4000 ft. ±) to intersect SR 61 approximately 700 ft. north of the existing location at the intersection of SR 61 and County Road 629. Construction on SR 20 would begin at the intersection of the relocated SR 20, SR 61 and County Road 629 and end at the existing four-lane section at I-75. Reconstruct the interchange at SR 20 and US 41 using a diamond interchange design. Some relocation of all ramps would be required. Traffic signals would be required at the ramps north and south of US 41 on SR 61 and at County Road 629. Relocate the intersection of SR 20 and County Road 227 for a 90° intersection.

Replace the existing bridges over SR 61 to allow for four lanes on SR 61. Widen the existing bridges on SR 3 over the CSX Railroad for three lanes on SR 3 north and south bound.

Not selected since obliteration of the loop ramps would cause more congestion.

3. Relocate State Route 20 south of its present location, connecting it to US 41/SR 3 running east and west through a reconstructed tri-level interchange at SR 20 and US 41/SR 61. This would introduce a loop ramp in the southwest quadrant, relocate the existing entrance ramps in the northwest and southeast quadrants, and eliminating the loop ramp in the northeast quadrant, replacing it with a westbound off ramp from US 41 to US 411.

This alternate was not chosen because of the high cost for construction, inadequate access to the General Hospital, and other operational problems.

### ALTERNATIVES CONSIDERED

4. Widen SR 20 to four lanes, with a 20 ft. raised median, using existing lanes as eastbound lanes. Construct two lanes with a raised median north of the existing SR 20. Relocate a section of SR 20 (4000 ft. ±) to intersect SR 61 approximately 700 ft. north of the existing location at the intersection of SR 61 and County Road 629. Construction on SR 20 would begin at the intersection of the relocated SR 20, SR 61 and County Road 629 and end at the existing four-lane section at I-75. Relocate the intersection of SR 20 and County Road 227 for a 90° intersection. Reconstruct the interchange at SR 20 and US 41 using a partial diamond, partial cloverleaf interchange design. Some relocation of all ramps would be required. Traffic signals would be required at the ramps north and south of US 41 on SR 61 and at County Road 629.

Replace the existing bridges over SR 61 to allow for six lanes on SR 61. Widen the existing bridges on SR 3 over the CSX Railroad for three lanes on SR 3 north and south bound.

Revised to provide a loop ramp in the northeast quadrant of the interchange to adequately handle all traffic movements. This is the recommended alternate.

**COMMENTS:** This revision to the approved concept includes addition of a loop ramp to carry northbound SR 61 traffic to US 41/SR 3 northbound without interfering with southbound SR 61 traffic to US 41/SR 3 northbound traffic. In order to preclude an increase of travel time for emergency vehicles traveling to the hospital, the existing median opening from US 41/SR 3 is to be retained. The US 41 westbound bridge over Pettit Creek would be widened to provide for an additional northbound lane.

**Additional Required Right of Way:** In order to properly reconstruct the existing Westbound entrance ramp from U.S. 411/S.R. 61, controlled access to the north of the ramp is necessary. The two lane improved westbound entrance ramp, which requires approximately 3100' for tapers and signing, extends beyond the existing nine drives along U.S. 41 and west of the bridge at Pettit Creek.

Three alternates have been introduced to accommodate the Westbound ramp and are as follows:

1. **Proposed Right of way with Limited access rights ( No frontage road connector).** This alternate would require that limited access be acquired from Pettit Creek to the CSX Railroad with no access to U. S. 41 from any of the property on the north side of the ramp. **Cost \$4,781,000.00**
2. **Proposed Right of way with Access at Median Break (sta. 171+90):** This alternate also requires limited access along the proposed right of way , but would permit access from a local street at the median opening at Sta. 171+90. **Cost: \$2,263,750.00**
3. **Proposed Right of Way with Access Road:** This alternate introduces a frontage road along the proposed right of way with access at the median opening (171+90). This is the preferred alternate. **Cost : \$1,295,150.00 \***

- \*This cost includes the cost of construction for the proposed frontage road.

It is recommended that additional right of way, along with limited access, be acquired for controlled access along the north side of the improved westbound ramp from US 411. In doing so, access from the north side will be limited at the median break ( sta. 171+90). The existing median opening at sta. 185+30 will be closed because the location falls within the function boundaries of the entrance and exit ramps along US 41. Closing the median opening is also necessary to eliminate turning movements to the north side of US 41. The proposed frontage road, access point, and proposed right of way are shown on the attached plan view layout.

<b>ESTIMATED COST</b>			
CONSTRUCTION:	\$17,103,000	RIGHT-OF-WAY:	\$3,455,713
E & C (10) :	\$1,710,300	ACQUIRED BY :	GDOT
INFLATION :	\$855,000	UTILITIES :	\$,630,324
SUB-TOTAL 19,668,450	\$	ADJUSTED BY :	LGPA
<b>TOTAL CONSTRUCTION COST:</b>		<b>\$23,754,487</b>	

**ATTACHMENTS:**

- Need and Purpose Statement
- Detailed Cost Estimate
- Typical Sections
- Traffic Data
- Concept Team Meeting Minutes
- LGPA
- Programming Documents

**PRELIMINARY COST ESTIMATE**

PROJECT NUMBER: STP-012-1(71)

COUNTY: BARTOW

DATE: FEBRUARY 1, 1999

ESTIMATED LETTING DATE: 2001

PREPARED BY: EDWARD L. BRAGG, P.E.

PROJECT LENGTH: 3.0 MI. ±

( )PROGRAMMING PROCESS (X)CONCEPT DEVELOPMENT ( )DURING PROJECT DEV.

<b>PROJECT COST</b>	
<b>A. RIGHT-TO-WAY:</b>	
1. PROPERTY (LAND & EASEMENT)	\$ 640,250
2. DISPLACEMENTS; RES:5, BUS;5, M.H.:0	\$ 1,266,350
3. OTHER COST (ADM./COST, INFLATION)	\$ 1,549,113
SUBTOTAL:A	\$ 3,455,713
<b>B. REIMBURSABLE UTILITIES:</b>	
1. RAILROAD	\$ 0
2. TRANSMISSION LINES	\$ 30,000
3. SERVICES	\$ 600,324
SUBTOTAL:B	\$ 630,324
<b>C. CONSTRUCTION:</b>	
1. MAJOR STRUCTURES	\$
a. OVERPASSES - SR 61	\$ 2,520,000
b. OTHER - CSX RAILROAD	\$ 1,750,000
SUBTOTAL:C-1	\$ 4,270,000
2. GRADING AND DRAINAGE:	
a. EARTHWORK	\$ 2,570,000
b. DRAINAGE:	\$
1) Cross Drain Pipe	\$ 143,000

<b>PROJECT COST</b>		
2) Curb and Gutter		\$ 282,000
3) Longitudinal System(include catch basins)		\$ 655,000
SUBTOTAL:C-2		\$ 3,650,000
3. BASE AND PAVING:		
a. AGGREGATE BASE		\$ 2,625,000
b. ASPHALT PAVING: Surface	\$	
	863,000	
Binder	\$	
	710,000	
Base	\$1,699,000	
SUBTOTAL:C-3.b		\$ 3,272,000
c. CONCRETE PAVING		\$
d. OTHER		\$ 90,000
SUBTOTAL:C-3		\$ 6,042,000
4. LUMP ITEMS:		
a. GRASSING		\$ 218,000
b. CLEARING AND GRUBBING		\$ 1,269,000
c. LANDSCAPING		\$
d. EROSION CONTROL		\$ 223,000
e. TRAFFIC CONTROL		\$ 496,000
SUBTOTAL:C-4		\$ 2,206,000
5. MISCELLANEOUS:		
a. LIGHTING		\$
b. SIGNING - MARKING		\$ 125,000
c. GUARDRAIL – MODIFY END OF BRIDGE AND HANDRAIL		\$ 56,000
d. SIDEWALK		\$ 250,000
SUBTOTAL:C-5		\$ 431,000
6. SPECIAL FEATURES		\$ 504,000
SUBTOTAL:C-6		



<b>ESTIMATE SUMMARY</b>		
A. RIGHT-OF-WAY	\$	3,455,713
B. REIMBURSABLE UTILITIES	\$	630,324
C. CONSTRUCTION		
1. MAJOR STRUCTURES	\$	4,270,000
2. GRADING AND DRAINAGE	\$	3,650,000
3. BASE AND PAVING	\$	6,042,000
4. LUMP ITEMS	\$	2,206,000
5. MISCELLANEOUS	\$	431,000
6. SPECIAL FEATURES	\$	504,000
SUBTOTAL CONSTRUCTION COST	\$	17,103,000
E. & C. (10%)	\$	1,710,300
INFLATION (5% PER YEAR)	\$	855,000
NUMBER OF YEARS	2	
TOTAL CONSTRUCTION COST		<b>19,668,450</b>
<b>GRAND TOTAL PROJECT COST</b>		<b>23,754,487</b>

# ***Value Engineering Process***

# ***VALUE ENGINEERING PROCESS***

## **Introduction**

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE Study during the period of Oct. 16 -19, 2007 in Atlanta, Georgia, for the Georgia Department of Transportation.

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, P.E.	Highway Design Engineer
Ramesh Kalvakaalva, P.E.,AVS	Bridge Design Engineer
Ron Hale, P.E.	Highway Construction Specialist
Randy S. Thomas, AVS	Assistant Team Leader

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 Georgia Department of Transportation (GDOT) design team and staff. This briefing included discussions of the design intent behind the project, the cost concerns, 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 suppose to do?”, and “How is it suppose 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 Level of Service**
    - **Increase Capacity**
    - **Separate Traffic**
    - **Provide for future growth**
  - **Project Basic Functions**
    - **Construct Additional Traffic Lanes**
    - **Construction Additional Turn Lanes**
    - **Provide Separation of Traffic**
    - **Provide “U” Turn Lanes**
    - **Provide Traffic Controls**
- **Speculation Phase** - The VE team performed a brainstorming session to identify ideas that might help meet the project objectives:
  - Improve Level of Service
  - Improve Safety
  - Increase Capacity
  - Reduce construction and life cycle costs
  - Reduce the time of construction

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

Based on these measurement sticks, 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. 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 FAST Diagram and **Function – Worth - Cost** Analysis, were 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.



# FUNCTION ANALYSIS AND COST-WORTH

PROJECT: Georgia Department of Transportation

STP-012-1(71) – P.I. No. 621350, SR 20 Widening & Relocation – Bartow County

SHEET NO.:

1 of 1

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	OVERALL PROJECT	Increase	Traffic Capacity	B	27,654	24,000	C/W = 1.15
		Facilitate	Access	B			
		Enhance	Safety	S			
2	ROADWAY	Support	Vehicles	B	3,911	3,200	C/W = 1.22
		Separate	Vehicles	B			
		Enhance	Safety	S			
3	EARTHWORK (EW)	Support	Road	S	1,732	1,732	C/W = 1.11
4	TRAFFIC CONTROL	Separate	Vehicles	RS	700	400	C/W = 1.11
5	DRAINAGE (DR)	Convey	Storm Water	B	1,355	1,000	C/W = 1.35
		Facilitate	Utilities	S			

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

PROJECT: Georgia Department of Transportation  
 STP-0002-00(626) - P.I. No. 0002626 US 41 Interchange Improvements;  
 Bartow County

SHEET NO.: 1 of 1

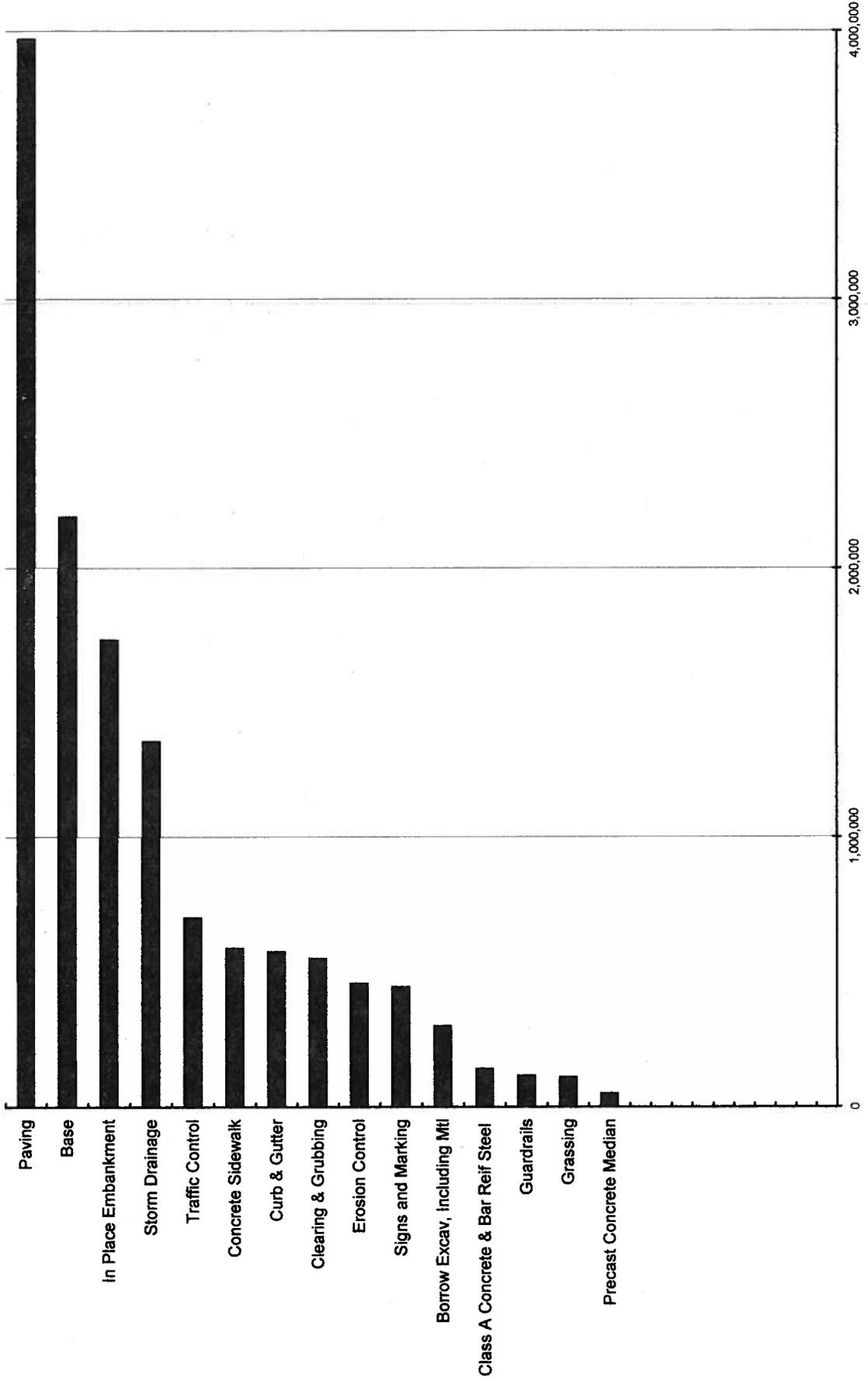
NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	OVERALL PROJECT	Increase	Traffic Capacity	B	32,673	28,000	C/W = 1.66
		Facilitate	Access	B			
		Enhance	Safety	S			
2	US 41 over US 411/SR61 BRIDGE	Cross	Highway	B	2,533	2,000	C/W = 1.26
3	US 41 over CSX BRIDGE	Cross	Highway	B	2,400	2,000	C/W = 1.20
4	US 41 over Pettit Creek BRIDGE	Cross	Highway	B	1,653	1,500	C/W = 1.10
5	EARTHWORK (EW)	Support	Road	S	1,200	1,000	C/W = 1.20
6	TRAFFIC CONTROL	Facilitate	Safe Construction	S	1,200	1,000	C/W = 1.2
7	DRAINAGE (DR)	Convey	Storm Water	B	424	424	C/W = 1.0
		Facilitate	Utilities	S			

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)



Pareto Chart 2

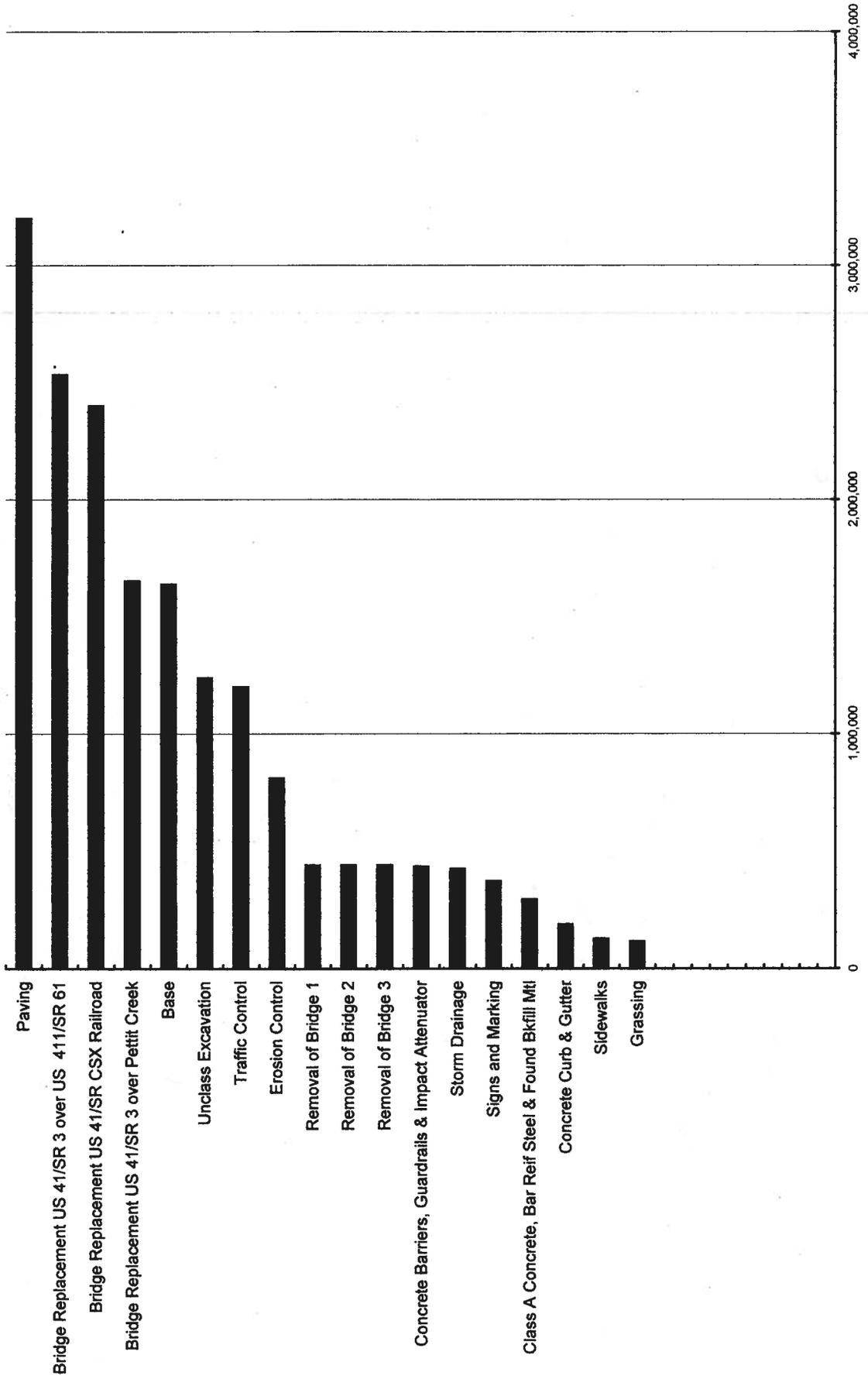
PROJECT: STP-012-1(71) - P.I. No. 621350  
Bartow County





Pareto Chart 2

PROJECT: STP-0002-00(626) - P.I. No. 0002626  
Bartow County





# DESIGNER PRESENTATION MEETING PARTICIPANTS

Geogia Department of Transportation		October 16, 2007		
STP-012-1(71) - P.I. No. 621350 - Bartow County				
NAME	ORGANIZATION & TITLE	E-MAIL	PHONE	
Lisa Myers	 GDOT - Engineering Services	<a href="mailto:lisa.myers@dot.state.ga.us">lisa.myers@dot.state.ga.us</a>	404-651-7468	
Ron Wishon	 GDOT - Engineering Services	<a href="mailto:ron.wishon@dot.state.us.ga.us">ron.wishon@dot.state.us.ga.us</a>	(404)851-7470	
Brian Summers	 GDOT - Engineering Services	<a href="mailto:brian_summers@dot.state.us.ga.us">brian_summers@dot.state.us.ga.us</a>		
Joe Ciavaro	 GDOT - Dist 6	<a href="mailto:joseph.ciavaro@dot.state.ga.us">joseph.ciavaro@dot.state.ga.us</a>	770-387-3624	
David Moore	 GDOT - Dist 6	<a href="mailto:david.moore@dot.state.ga.us">david.moore@dot.state.ga.us</a>	770-387-3622	
Nabil Raad	 GDOT	<a href="mailto:m.nabil.raad@dot.state.ga.us">m.nabil.raad@dot.state.ga.us</a>	404-635-2126	
David Robbins	 GDOT - Dist 6	<a href="mailto:david.robbins@dot.stae.ga.us">david.robbins@dot.stae.ga.us</a>	770-387-3609	
Stephen Lively	 GDOT - Dist 6	<a href="mailto:stephen.lively@dot.state.ga.us">stephen.lively@dot.state.ga.us</a>	770-387-3612	
Galen Barrow	 GDOT - Dist 6	<a href="mailto:galen.barrow@dot.state.ga.us">galen.barrow@dot.state.ga.us</a>	770-387-3685	
Les Thomas	 PBS&J	<a href="mailto:lmthomas@pbsi.com">lmthomas@pbsi.com</a>	678-677-6420	
Luke Clarke	 PBS&J - Highway/Roadway Design	<a href="mailto:lwclarke@pbsi.com">lwclarke@pbsi.com</a>	205-969-3776	
Randy Thomas	 PBS&J	<a href="mailto:rsthomas@pbsi.com">rsthomas@pbsi.com</a>	770-883-1545	
Ramesh Kaivakaalva	 CSI	<a href="mailto:rameshk@civilservicesinc.com">rameshk@civilservicesinc.com</a>	404-685-8001	
Ed Culican	 JJC	<a href="mailto:eculican@jja.com">eculican@jja.com</a>	770-287-1650	
Steve Gaston	 GDOT-Bridge Office	<a href="mailto:steve.gaston@dot.state.ga.us">steve.gaston@dot.state.ga.us</a>	770-287-1650	
Ron Hale	 PBS&J	<a href="mailto:rdhale@pbsi.com">rdhale@pbsi.com</a>	770-933-0280	



**VE TEAM PRESENTATION  
MEETING PARTICIPANTS**

October 19, 2007

Georgia Department of Transportation		STP-012-1(71) - P.I. No. 621350 - Bartow County		
NAME	ORGANIZATION & TITLE	E-MAIL	PHONE	
Lisa Myers	 GDOT - Engineering Services	<a href="mailto:lisa.myers@dot.state.ga.us">lisa.myers@dot.state.ga.us</a>	404-651-7468	
Ron Wishon	 GDOT - Engineering Services	<a href="mailto:ron.wishon@dot.state.us.ga.us">ron.wishon@dot.state.us.ga.us</a>	(404)651-7470	
Brian Summers	 GDOT - Engineering Services	<a href="mailto:brian.summers@dot.state.us.ga.us">brian.summers@dot.state.us.ga.us</a>		
David Moore	 GDOT - Dist 6	<a href="mailto:david.moore@dot.state.ga.us">david.moore@dot.state.ga.us</a>	770-387-3622	
Stephen Lively	 GDOT - Dist 6	<a href="mailto:stephen.lively@dot.state.ga.us">stephen.lively@dot.state.ga.us</a>	770-387-3612	
Galen Barrow	 GDOT - Dist 6	<a href="mailto:galen.barrow@dot.state.ga.us">galen.barrow@dot.state.ga.us</a>	770-387-3685	
Les Thomas	 PBS&J	<a href="mailto:lmthomas@pbsi.com">lmthomas@pbsi.com</a>	678-677-6420	
Luke Clarke	 PBS&J - Highway/Roadway Design	<a href="mailto:lwclarke@pbsi.com">lwclarke@pbsi.com</a>	205-969-3776	
Randy Thomas	 PBS&J	<a href="mailto:rsthomas@pbsi.com">rsthomas@pbsi.com</a>	770-883-1545	
Ramesh Kalvakaalva	 Civil Services, Inc.	<a href="mailto:rameshk@civilservicesinc.com">rameshk@civilservicesinc.com</a>	404-685-8001	
Ed Culican	JJG	<a href="mailto:eculican@jja.com">eculican@jja.com</a>	770-287-1650	
Steve Gaston	 GDOT-Bridge Office	<a href="mailto:steve.gaston@dot.state.ga.us">steve.gaston@dot.state.ga.us</a>	770-287-1650	
Ron Hale	 PBS&J	<a href="mailto:rhale@pbsi.com">rhale@pbsi.com</a>	770-933-0280	

# CREATIVE IDEA LISTING & EVALUATION



PROJECT: Georgia Department of Transportation STP-012-1(71) – P.I. No. 621350 SR 20 Widening & Relocation – Bartow County		SHEET NO.:	1 of 1
NO.	IDEA DESCRIPTION	RATING	
<b>SR 20 Roadway (RD)</b>			
RD-1	Use 24' raised medians and use 16' shoulders	4	
RD-2	Provide one opening between signalized intersections	1	
RD-3	Add eyebrows at median openings	3	
RD-4	Use type "A" intersection	4	
RD-5	Use a collector lane on the south side from Sta. 123+00 to Sta. 133+00	2	
RD-6	Use an urban section from Sta. 100+00 to Sta. 133+00	4	
RD-7	Use curbed safety noses at median openings	3	
RD-8	Relocate one sidewalk to the other side of the road and combine with the other creating a multi-use trail.	4	
RD-9	Use 44' Rural typical section	1	
RD-10	Bifurcate up to 1.5' differential	4	
RD-11	Use asphalt for sidewalk or multi-use trail	1	
RD-12	Realign SR 20 to tie directly into US 411 at Sta 290+00	1	
RD-13	Extend existing SR 20 directly west and tie in to US 41 using a fly-over	5	
RD-14	Extend SR 20 to Market Place and thence construct by-pass northerly	1	
RD-15	Extend SR 20 west from Sta 290+00 to tie into new cul-de-sac	1	
RD-16	Extend SR20 westerly from US 411 and tie-in to US41 avoiding downtown	DS	
RD-17	Provide direct intersection access to existing school	2	
RD-18	Break cross slope on third lane	2	
RD-19	Delete curb and gutters	4	
RD-20	Use existing pavement	4	
<b>US 411 Roadway (RD)</b>			
US411RD-1	Delete Sidewalks on US 411	1	
<b>SR 20 Drainage (DR)</b>			
DR-1	At stations: 104+20, 97+40, and 91+20 use a single headwall	2	

Rating: 1→2 = Generally not acceptable; 3 = Little Opportunity for Positive Change; 4→5 = Most likely to be Developed; DS = Design Suggestion; ABD = Already Being Done

