

# Value Engineering Study Report

*Project No. BRSTO-0998-00(001)*

*P.I. No. 142285*

*SR 324 Gravel Springs Road @ I-85*

*Gwinnett County*



Value Management Team



Design Team



January 2009



February 5, 2009

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

RE: Submittal of the final Value Engineering Report  
Project No.: BRSTO-0998-00(001)  
P.I. No.: 142285  
SR 324 Gravel Springs Road @ I-85  
Gwinnett County

Dear Ms. Myers:

Please find enclosed two (2) hard copies and one (1) CD of our final Value Engineering Report for the replacement of the bridge on SR 325 over I-85 and approach widening.

This Value Engineering Study, which was performed during the period January 13 through January 16, 2009, identified **21 Alternative Ideas** of which **13 ideas are recommended for implementation**. The VE team also identified **2 Design Suggestions**. We believe that the **Alternative Ideas** recommended may have a significant positive affect on the project.

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

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

Yours truly,

**PBS&J**

A handwritten signature in black ink, appearing to read 'Charles McDuff', written in a cursive style.

Charles McDuff, PE, CVS, CCE, LEED-AP  
VE Team Leader

# ***Value Engineering Study Report***

***Project No. BRST0-0998-00(001)***

***P.I. No. 142285***

***SR 324 Gravel Springs Rd. @ I-85***

***Gwinnett County***

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# *Executive Summary*

# ***EXECUTIVE SUMMARY***

## **INTRODUCTION**

This report summarizes the analysis and conclusions by the PBS&J Value Engineering workshop team as they performed a Value Engineering study during the period of January 20 – January 23, 2009 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study was Federal Aid Highway Project BRSTO-0998-00(001), P.I. No. 142285, S.R. 324 Gravel Springs Road at I-85, Gwinnett County. The design for the project has been prepared by Gresham Smith and Partners (GS&P). At the time of the workshop the plans had advanced to the final design level.

## **PROJECT DESCRIPTION**

This project is located on S.R. 324 over I-85 in Gwinnett County. S.R. 324 is also known as Gravel Springs Road. The total project length on S.R. 324 is 0.8 miles, with additional lengths of 0.8 mile on Morgan Road and 0.5 mile on Camp Branch Road.

The project consists of the replacement of the bridge over I-85 and widening of S.R. 324 approaching and crossing the bridge. S.R. 324 will be widened to a four-lane divided roadway facility with a 24-foot raised median. The project is part of the widening of S.R. 324 from S.R. 20 to S.R. 124. In earlier design stages, the proposed bridge was designed to allow for a future HOV lane interchange with I-85. Recently, the design was modified to eliminate the need for the HOV aspect of the project. This was due to the fact that the HOV interchange was shifted to another interchange south of S.R. 324. At present, the revised typical section provides for 2-12' travel lanes northbound and 2-12' travel lanes southbound, curb and gutter with a 36' median and 5' sidewalks on each side. The 36' median will transition to a 24' median prior to Camp Branch Road and Morgan Road intersections. The 36' median will provide for enhanced safety and not preclude providing for two future left-turn lanes on the bridge; one continuous turn lane in each direction on the full bridge length, and one left turn lane transitioning between northbound and southbound.

The revised bridge, reflected in the final design submittal, is one bridge 102' – 5" in width and 466' in length, eliminating the retaining walls and HOV box section. The bents on the three-span bridge will be located between the future collector-distributor lanes and the travel lanes on I-85. No changes to the horizontal alignment on I-85 will be required.

The estimated construction and right-of-way costs for this project totaled \$21,950,000. At the VE kick-off meeting, on the first day of the workshop, it was reported that \$600,000 should be added as an approximation of the Reimbursable Utility costs.

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

## **PROJECT CONCERNS AND OBJECTIVES**

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

- The project is in the final design stage but has not clearly been funded at this time.
- Changes to the bridge will likely necessitate a significant redesign cost.
- The final bridge plans have been submitted, DOT has sent their comments to the designers and the consultant is working on addressing these comments.
- The designers were instructed to avoid disturbing two trees that are recognized as being historically significant/specimen trees. This necessitated moving Camp Branch Road closer to the I-85 alignment than might have been desired.

## **VALUE ENGINEERING PROCESS**

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

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

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

## CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified **21 *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, **13 *Alternative Ideas*** and **2 *Design Suggestions*** remained for further consideration. These Alternative Ideas and Design Suggestions may be found, in their documented form, in the section of this report entitled ***Study Results***.

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

# Summary of Alternatives & Design Suggestions



PROJECT: **Georgia Department of Transportation**  
**BRST0-0998-00(001) – P.I. No.: 12285**  
**SR 324 Gravel Springs Rd. @ I-85**  
**Gwinnett County**

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

ALTERNATIVE NUMBER	DESCRIPTION OF ALTERNATIVE	INITIAL COST SAVINGS
<b>ROADWAY (RD)</b>		
RD-1	Cul-de-sac the County roads	\$3,435,973
RD-3	Use concrete pavement in lieu of asphalt in future interchange area	DS
RD-4	Provide sidewalk on south side of SR 324 only	\$71,062
RD-5	In lieu of phased bridge construction, use detour and construct bridge in one phase	\$825,000
RD-6	Signalize County road intersections	DS
RD-10	Use 11' travel lanes on County roads	\$68,971
RD-11	Use 11' inside and turn lanes, and 12' outside lanes for typical section on SR 324	\$212,315
RD-12	Reduce paved shoulders on County roads from 4' to 2'	\$137,875
RD-13	Provide crosswalks where needed	-\$13,228
RD-15	Reduce pavement thickness on County roads	\$508,862
<b>BRIDGE (BR)</b>		
BR-1	Provide intermediate bent in future I-85 median and reconfigure span arrangement	\$2,624,939
BR-2	Eliminate raised median and use striping only	\$106,311
BR-3	Provide sidewalk on south side of bridge only	\$492,096
BR-4	Provide twin structure with no turn lanes	\$2,417,890
BR-6	Use BT 63 girders on end spans in-lieu of steel girders	\$1,650,446

## *Study Results*

## INTRODUCTION

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

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

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

## COST CALCULATIONS

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

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

# SR 324 Gravel Springs Road over I-85

Project No. BRST0-0998-00(001) – P.I. No. 142285  
Gwinnett County



# Summary of Alternatives & Design Suggestions



PROJECT: **Georgia Department of Transportation**  
**BRST0-0998-00(001) – P.I. No.: 12285**  
**SR 324 Gravel Springs Rd. @ I-85**  
**Gwinnett County**

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

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# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-1**

DESCRIPTION: **Cul-de-sac the County roads**

SHEET NO.: **1 of 4**

## Original Design:

The original design relocates the intersections of Morgan and Camp Branch Roads approximately 1200' east and west of their current respective locations.

## Alternative:

The alternative would propose constructing Cul-de-sacs on Camp Branch Road and Morgan Road where they become parallel to I-85.

## Opportunities:

- Reduced paving costs
- Reduced Right of Way costs
- Improved operation of SR 324
- Improved operation of future interchange
- Reduced future signalization cost

## Risks:

- Minimal impact to the designer
- More circuitous access for adjacent neighborhoods
- Need to confirm that this changes does not adversely access emergency vehicles to homes, businesses, and schools
- Need to confirm that using cul-de-sacs will harmonize with school bus routing to schools in the area

## Technical Discussion:

The existing road network provides sufficient access for the areas serviced by the County roads. An additional option could be to provide a right-in / right-out connection to the future collector distributor roads on I-85.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,484,157	\$ 0	\$ 8,484,157
ALTERNATIVE	\$ 5,048,184	\$ 0	\$ 5,048,184
SAVINGS	\$ 3,435,973	\$ 0	\$ 3,435,973

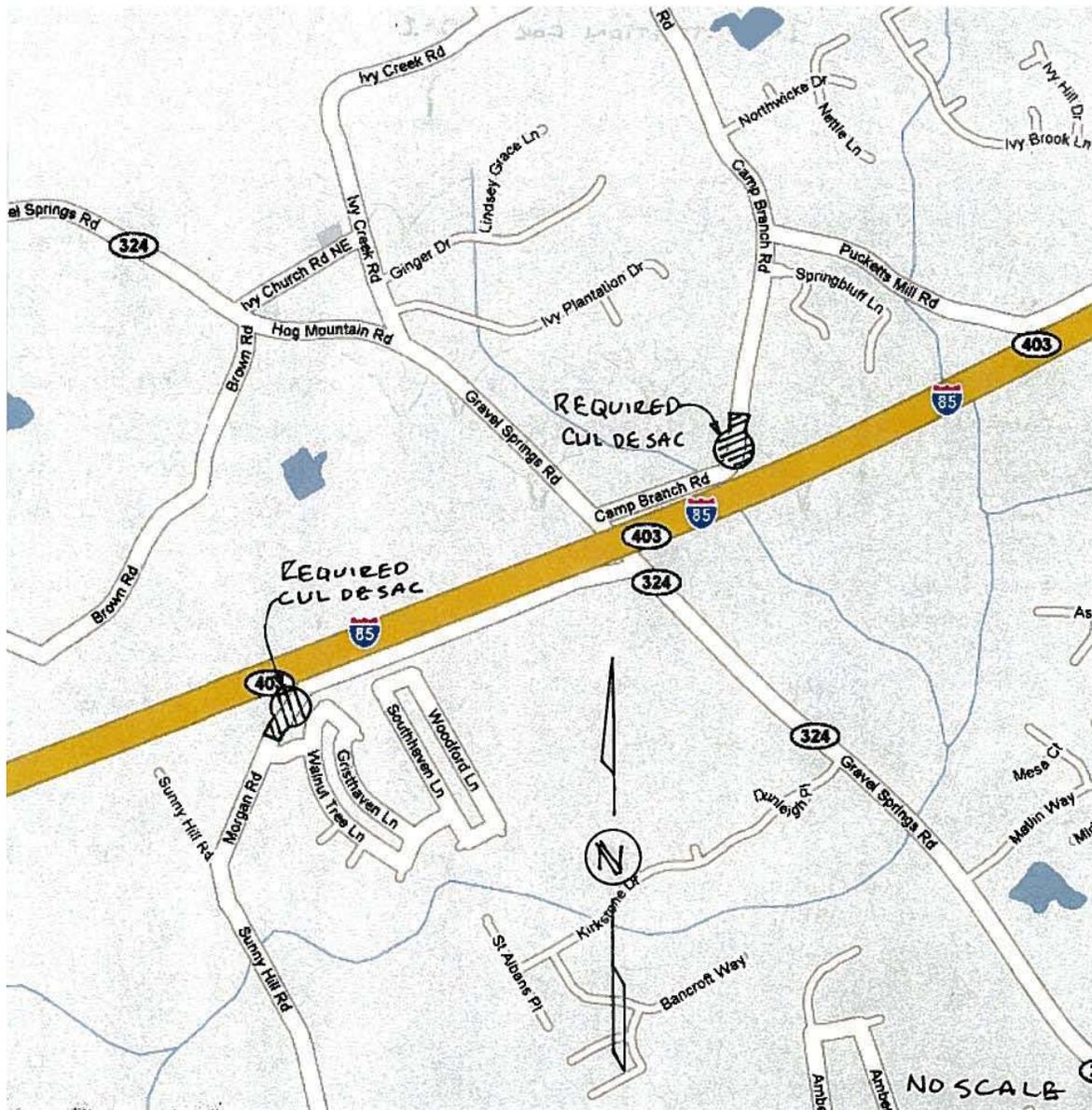
# Illustration

PROJECT: Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County

ALTERNATIVE NO.:  
**RD-1**

DESCRIPTION: Cul-de-sac the County roads

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-1**

DESCRIPTION: **Cul-de-Sac the County Roads**

NO.: **3 of 4**

## REDUCED PAVEMENT AREA:

Morgan Road: Station 330+00 to Station 301+49 = 3051 lf  
Camp Branch Road: Station 223+50 to Station 220+50 = 2350 lf  
Total Area – (2350 lf + 3151 lf) x (32') / (9sf/sy) = 18,840 sy  
G.A.B.- (2350 lf + 3151 lf) x (32') x (1.0') = 176,032 cf

## AFFECTED PAY ITEMS:

12.5 mm Superpave- (18,840 sy X 165#/sy) / (2000#/ton) => 1554 tons  
19.0 mm Superpave- (18,840 sy X 440#/sy) / (2000#/ton) => 4145 tons  
25.0 mm Superpave- (18,840 sy X 550#/sy) / (2000#/ton) => 5181 tons  
G.A.B.- (176,032 cf) x (135#/cf) / (2000#/ton) => 11,882 tons

## REQUIRED PAVEMENT:

2- Cul de Sacs = (75' x 75' x 3.142) + (50' x 32') = 19,274 sf  
19,274 sf / (9sf/sy) = 2,142 sy

12.5 mm Superpave- (2,142 sy X 165#/sy) / (2000#/ton) => 176 tons  
19.0 mm Superpave- (2,142 sy X 440#/sy) / (2000#/ton) => 471 tons  
25.0 mm Superpave- (2,142 sy X 550#/sy) / (2000#/ton) => 589 tons  
G.A.B.- (19,274 cf) x (135#/cf) / (2000#/ton) => 1301 tons

Assume 2/3 of the clearing and grubbing, unclassified excavation, borrow excavation and right of way cost will be attributed to the county roads.

# Cost Worksheet



<b>PROJECT:</b>	<b>Georgia Department of Transportation</b> <b>BRST0-0998-00(001)- P.I. No. 142285</b> <b>SR 324 Gravel Springs Rd. @ I-85</b> <b>Gwinnett County</b>	<b>ALTERNATIVE NO.:</b>	<b>RD-1</b>
<b>DESCRIPTION:</b>	<b>Cul-de-sac the County roads</b>	<b>SHEET NO.:</b>	<b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE			
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL	
12.5 mm Superpave	tons	1,554	\$ 75.00	\$ 116,550	176	\$ 75.00	\$ 13,200	
19.0 mm Superpave	tons	4,145	\$ 75.00	\$ 310,875	471	\$ 75.00	\$ 35,325	
25.0 mm Superpave	tons	5,181	\$ 75.00	\$ 388,575	589	\$ 75.00	\$ 44,175	
G.A.B.	tons	11,882	\$ 18.67	\$ 221,837	1301	\$ 18.67	\$ 24,290	
Right of Way	ls	1	\$ 6,000,000	\$ 6,000,000	0.67	\$ 6,000,000	\$ 4,020,000	
Clearing and Grubbing	ls	1	\$ 150,000	\$ 150,000	0.67	\$ 150,000	\$ 100,500	
Unclassified Excavation	cy	92,392	\$ 3.23	\$ 298,426	61902	\$ 3.23	\$ 199,943	
Borrow Excavation	cy	50,923	\$ 4.45	\$ 226,607	34118	\$ 4.45	\$ 151,825	
<b>Sub-total</b>				<b>\$ 7,712,870</b>				<b>\$ 4,589,258</b>
<b>Mark-up at 10.00%</b>				<b>\$ 771,287</b>				<b>\$ 458,926</b>
<b>TOTAL</b>				<b>\$ 8,484,157</b>				<b>\$ 5,048,184</b>
<b>Estimated Savings:</b>							<b>\$3,435,973</b>	

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-4**

DESCRIPTION: **Provide sidewalk on south side of SR 324 only**

SHEET NO.: **1 of 4**

## Original Design:

The original design calls for sidewalks on the north side and south side of SR 324.

## Alternative:

The alternative would provide for sidewalks on the south side of the roadway only.

## Opportunities:

- Initial cost savings in sidewalk, earthwork, and right-of-way
- Might be combined with same idea on bridge for more significant cost savings

## Risks:

- Moderate increase in design effort
- Does not accommodate connectivity of pedestrian traffic on the north side of the roadway

## Technical Discussion:

The existing design does not provide a sidewalk on the north side of SR 324 from Sta. 132+00 to 136+79 due to limitations imposed by the historic tree preservation condition and renders a discontinuity for pedestrian access. The best idea would be to eliminate the sidewalk completely on the north side of SR 324. This would result in a cost savings on approximately 4100 linear feet of sidewalk construction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 144,706	\$ 0	\$ 144,706
ALTERNATIVE	\$ 73,645	\$ 0	\$ 73,645
SAVINGS	\$ 71,061	\$ 0	\$ 71,061

# Illustration

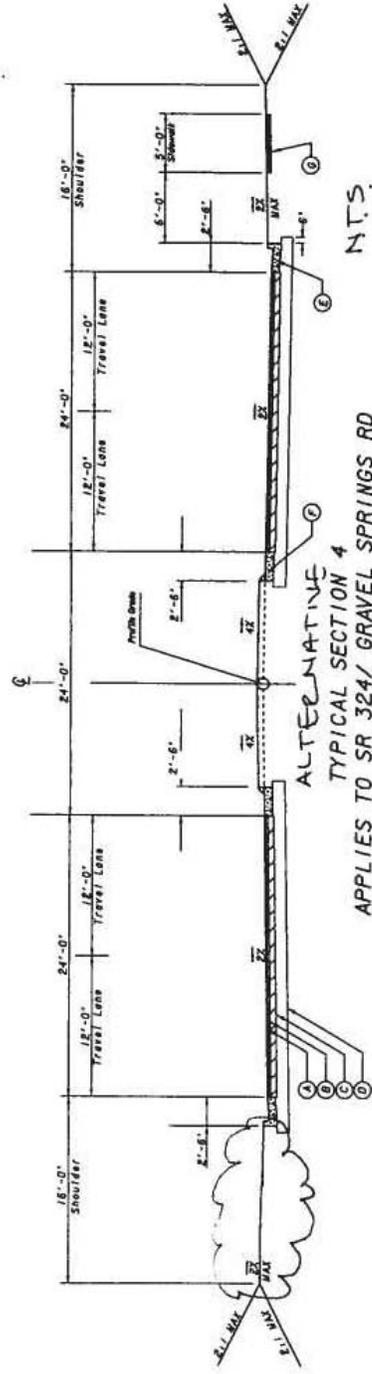
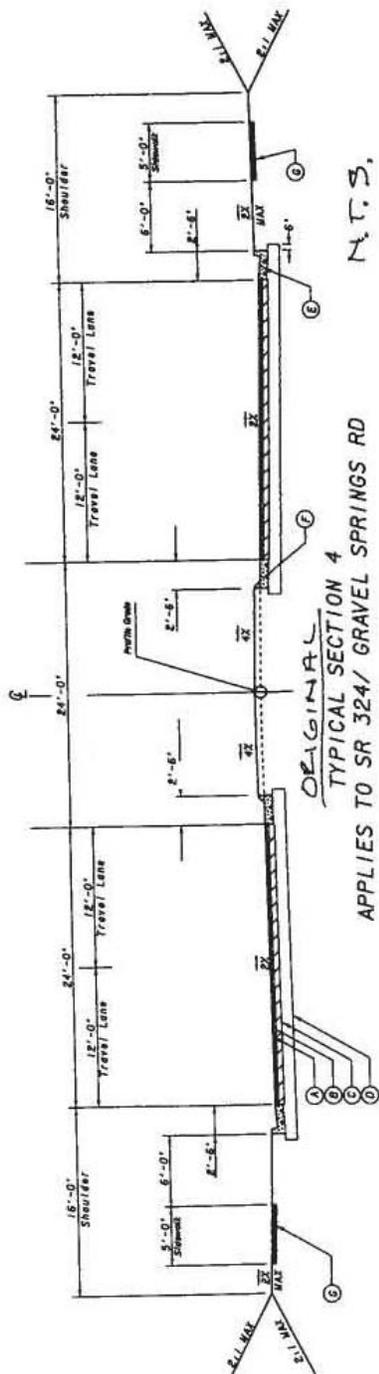


PROJECT: Georgia Department of Transportation  
 BRST0-0998-00(001) – P.I. No.: 142285  
 SR 324 Gravel Springs Rd. @ I-85  
 Gwinnett County

ALTERNATIVE NO.:  
**RD-4**

DESCRIPTION: Provide sidewalk on south side of SR 324 only

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD- 4**

DESCRIPTION: **Provide sidewalks on one side of SR 324 instead of on  
both sides.**

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

## Original affected pay item

Estimated plan quantity = 3884 SY

## Reduction in quantity

Sta 127+30 to 145+50 = 1820 LF – 70 LF (minus 5 EA 14' driveway)  
= 1750 LF

Sta 150+20 to 160+00 = 1080 LF – 14 LF (minus 1EA 14' driveway)  
= 1066 LF

Sta 161+00 to 186+10 = 710 LF – 28 LF (minus 2 EA 14' driveway)  
= 682 LF

Add for return at Gordon = 60 LF

Total length = 3558 LF

Total area for sidewalk = 1977 SY

## Alternative

Estimated alternative quantity = 1907 SY



# Value Analysis Design Alternative

PROJECT:	<b>Georgia Department of Transportation BRST0-0998-00(001) – P.I. No.: 142285 SR 324 Gravel Springs Rd. @ I-85 Gwinnett County</b>	ALTERNATIVE NO.:	<b>RD- 5</b>
DESCRIPTIO	<b>Instead of phased bridge construction use a detour and construct bridge in one phase</b>	SHEET NO.:	<b>1 of 4</b>

### Original Design:

The original design proposes the new bridge to be constructed in phases with the use of shoring.

### Alternative:

The alternative design proposed is to close the bridge, provide a detour and complete the bridge construction in one phase without the need for shoring.

### Opportunities:

- Reduction of construction time
- Reduction in construction cost due to shoring
- Reduction of traffic control cost

### Risks:

- Moderate increase in design effort
- Additional travel time for vehicles during detour
- Permitting may be required for county roads for detour

### Technical Discussion:

The original design proposes to construct the bridge in phases. If the bridge is closed and the vehicles are provided a detour, it will significantly reduce traffic control costs and construction cost. Road closure will also help in reducing the construction schedule.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,650,000	\$ 0	\$ 1,650,000
ALTERNATIVE	\$ 825,000	\$ 0	\$ 825,000
SAVINGS	\$ 825,000	\$ 0	\$ 825,000

# Illustration

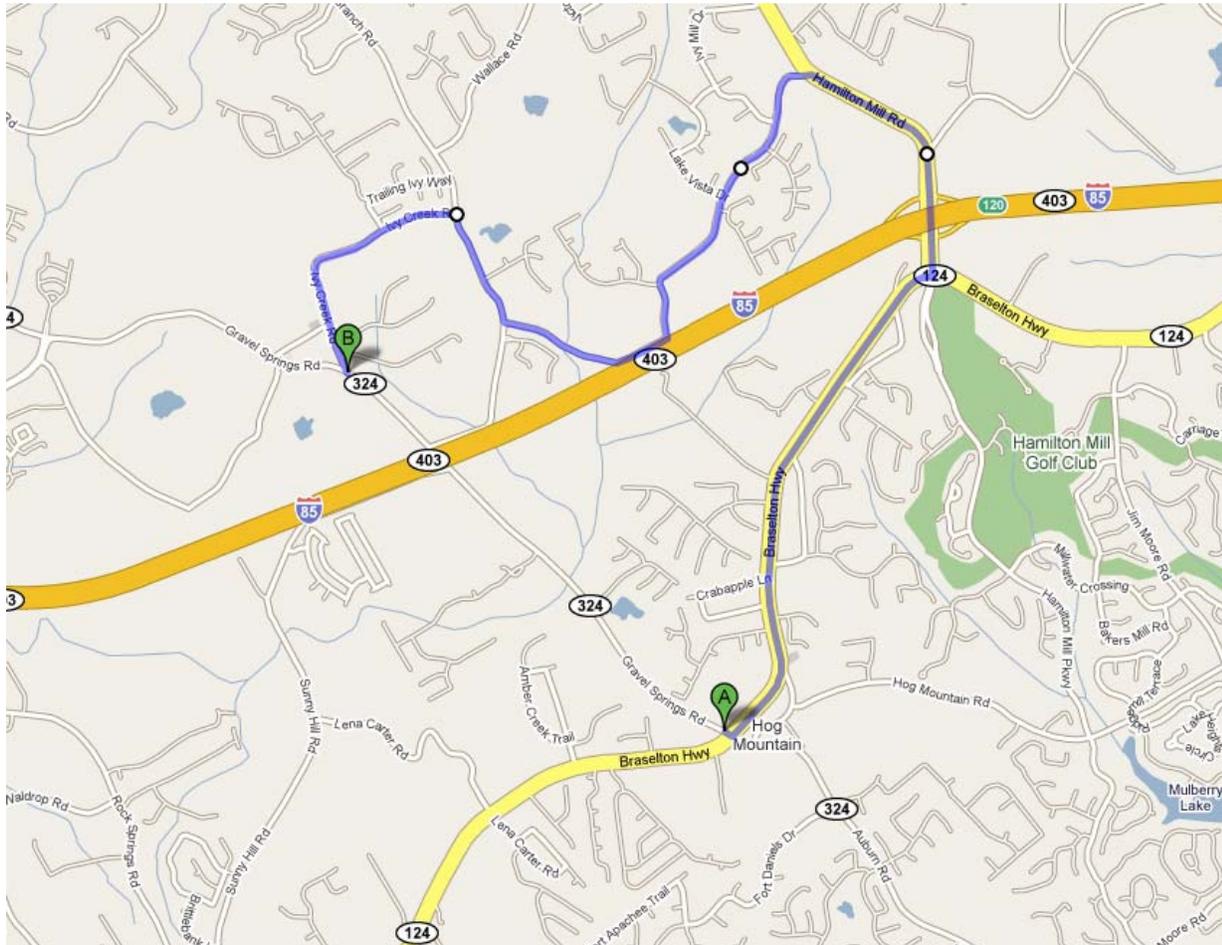


PROJECT: **Georgia Department of Transportation  
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SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-5**

DESCRIPTION: **Instead of phased bridge construction use a detour and  
construct bridge in one phase**

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



- |   |        |
|---|--------|
| 1. Head southeast on GA-324/Gravel Springs Rd toward GA-124 | 157 ft |
| 2. Turn left at GA-124                                      | 1.8 mi |
| 3. Turn left at Hamilton Mill Pkwy                          | 0.1 mi |
| 4. Continue on Hamilton Mill Rd                             | 0.8 mi |
| 5. Turn left at Pucketts Mill Rd                            | 1.7 mi |
| 6. Turn right at Camp Branch Rd                             | 0.4 mi |
| 7. Turn left at Ivy Creek Rd                                | 0.9 mi |
| 8. Slight left at GA-324/Gravel Springs Rd/Hog Mountain Rd  | 7 ft   |

# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD- 5**

DESCRIPTION: **Instead of phased bridge construction use a detour and  
construct bridge in one phase**

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

## Original Affected Pay Items :

Traffic control

For phased construction estimated construction schedule = 18 months

Total estimated cost for temporary traffic control = \$900,000.00

Estimated cost for temporary traffic control for 1 month =  $\$900,000.00/18 = \$50,000.00$

Bridge Construction

If a detour is provided shoring can be avoided

## Reduction In Quantity

Traffic control

If a detour is provided and bridge demolished and constructed in one phase an estimated 3 months can be saved on the construction schedule.

Estimated time savings = 3 months

## Alternative

Traffic control - Total estimated time = 18 months – 3 months = 15 months

Bridge Construction - Eliminate shoring



# Value Analysis Design Suggestion

PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-6**

DESCRIPTION: **Signalize the County road intersections**

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

## **Original Design:**

The original design provides stop signs on the relocated County roads.

## **Alternative:**

The alternative design is to provide signals at the relocated County road intersections.

## **Opportunities:**

- Improve traffic operations
- Improve traffic safety

## **Risks:**

- Moderate to significant effort on the part of the designer
- Increased initial capital cost.

## **Technical Discussion:**

An initial evaluation of the existing peak hour traffic indicates the county road intersections would operate at Level of Service 'F'. Without more detailed traffic data and time to conduct a complete analysis, determining a cost benefit for installation of the signals is not possible. However, it does appear that the signals will be justified under warrant #3.

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD- 10**

DESCRIPTION: **Use 11’ travel lanes on County roads**

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

## Original Design:

The original design utilizes 12’ travel lanes on both County roads – Morgan Road and Camp Branch Road.

## Alternative:

The alternative design proposes using 11’ travel lanes on Morgan Road and Camp Branch Road.

## Opportunities:

- Initial cost savings in pavement costs, earthwork costs, and right-of-way

## Risks:

- Moderate increase in design effort
- Requires an exception to GDOT policy

## Technical Discussion:

The reduction of width of travel lanes from 12’ to 11’ on the County road would result in a reduction of 2’ of the full build up of the County roads. Although 11’ lanes would require an exception to GDOT policy, AASHTO’s “Policy on Geometric Design of Highways 2004” permits 11’ feet lanes. It also states that under interrupted flow - operating conditions at low speeds (45mph or lower) narrower lanes are normally adequate and have some advantages. Both the relocated county roads have been marked for 40mph speed limit and have low truck percentage and hence should pose no operational issues.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 827,299	\$ 0	\$ 827,299
ALTERNATIVE	\$ 758,328	\$ 0	\$ 758,328
SAVINGS	\$ 68,971	\$ 0	\$ 68,971

# Illustration

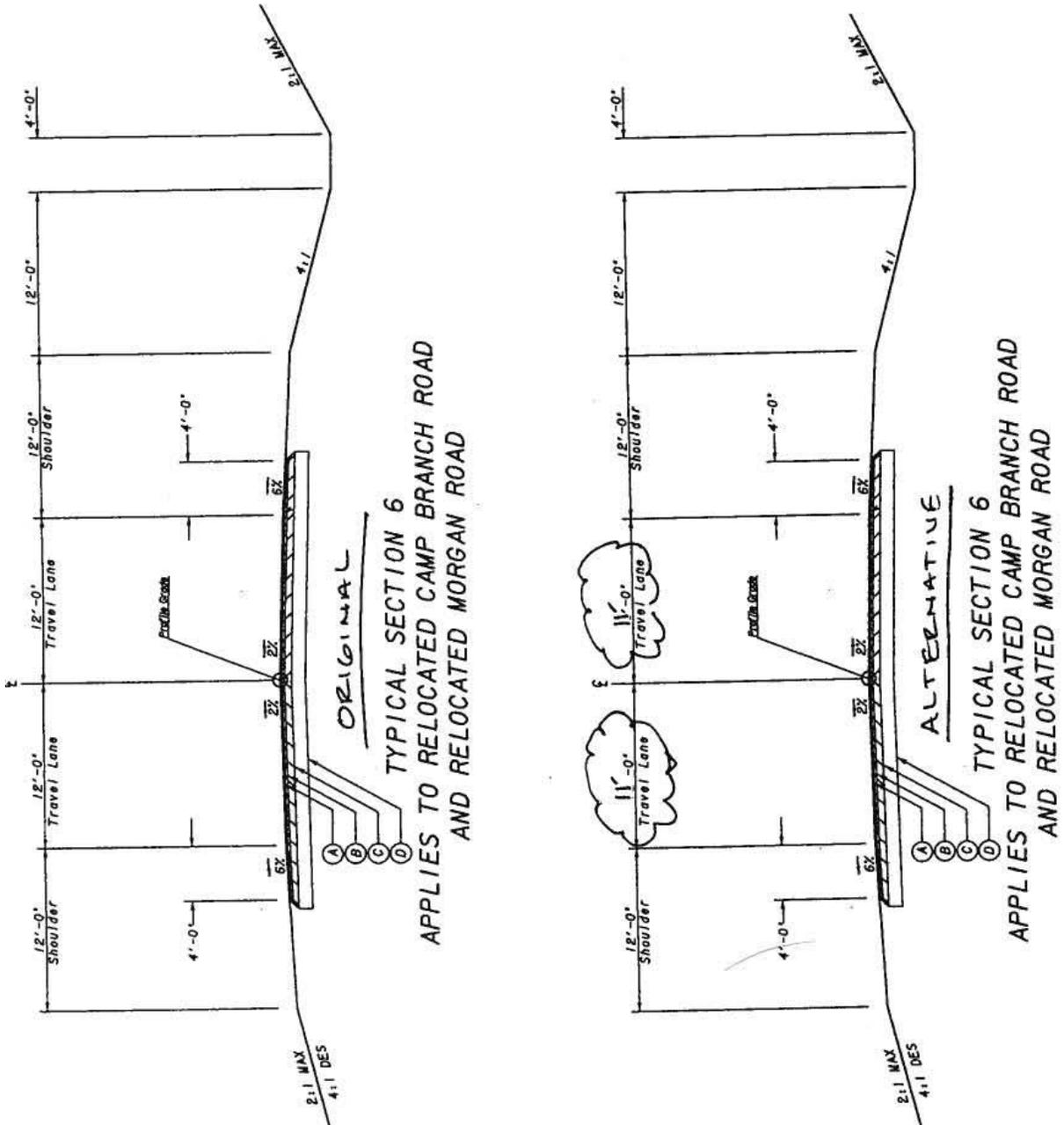


PROJECT: Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County

ALTERNATIVE NO.:  
**RD-10**

DESCRIPTION: Use 11' travel lanes on County roads

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD- 10**

DESCRIPTION: **Use 11' travel lanes on County roads**

NO.: **3 of 4**

## Original Affected Pay Item

### Camp Branch Road

Length = 223+50.00 – 200+00.00 = 2350 feet

Area of 12 feet lane paved surface =  $12 * 2 * 2350 = 56400$  sq ft = 6267 sq yds

12.5 mm superpave =  $(6267 \text{ sq yds} * 165 \text{ lb/yd}) / 2000 = 517.03$  tons

19.0 mm superpave =  $(6267 \text{ sq yds} * 440 \text{ lb/yd}) / 2000 = 1378.74$  tons

25.0 mm superpave =  $(6267 \text{ sq yds} * 550 \text{ lb/yd}) / 2000 = 1723.43$  tons

12" GAB =  $(56400 \text{ cu ft} * 135 \text{ lb/cu ft}) / 2000 = 3807.00$  tons

### Morgan Road

Length = 329+59.00 - 301+49.00 = 2810 feet

Area of 12 feet paved surface =  $12 * 2 * 2810 = 67440.00$  sq ft = 7494 sq yds

12.5 mm superpave =  $(7494 \text{ sq yds} * 165 \text{ lb/yd}) / 2000 = 618.25$  tons

19.0 mm superpave =  $(7494 \text{ sq yds} * 440 \text{ lb/yd}) / 2000 = 1648.68$  tons

25.0 mm superpave =  $(7494 \text{ sq yds} * 550 \text{ lb/yd}) / 2000 = 2060.85$  tons

12" GAB =  $(67440 \text{ cu ft} * 135 \text{ lb/cu ft}) / 2000 = 4552.2$  tons

## Reduction in Quantity

### Camp Branch Road

Length = 223+50.00 – 200+00.00 = 2350 feet

Area of 2 ft paved surface =  $2 * 2350 = 4700$  sq ft = 522.22 sq yds

12.5 mm superpave =  $(522.22 \text{ sq yds} * 165 \text{ lb/yd}) / 2000 = 43.08$  tons

19.0 mm superpave =  $(522.22 \text{ sq yds} * 440 \text{ lb/yd}) / 2000 = 114.89$  tons

25.0 mm superpave =  $(522.22 \text{ sq yds} * 550 \text{ lb/yd}) / 2000 = 143.61$  tons

12" GAB =  $(4700 \text{ cu ft} * 135 \text{ lb/cu ft}) / 2000 = 317.25$  tons

### Morgan Road

Length = 329+59.00 - 301+49.00 = 2810 feet

Area of 2 ft paved surface =  $2 * 2810 = 5620$  sq ft = 624.44 sq yds

12.5 mm superpave =  $(624.44 \text{ sq yds} * 165 \text{ lb/yd}) / 2000 = 51.52$  tons

19.0 mm superpave =  $(624.44 \text{ sq yds} * 440 \text{ lb/yd}) / 2000 = 137.38$  tons

25.0 mm superpave =  $(624.44 \text{ sq yds} * 550 \text{ lb/yd}) / 2000 = 171.72$  tons

12" GAB =  $(5620 \text{ cu ft} * 135 \text{ lb/cu ft}) / 2000 = 379.35$  tons



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation BRST0-0998-00(001) – P.I. No.: 142285 SR 324 Gravel Springs Rd. @ I-85 Gwinnett County</b>	ALTERNATIVE NO.:	<b>RD- 11</b>
DESCRIPTIO	<b>Use 11’ inside lanes, 11’ turn lanes, and 12’ outside lanes for typical section on SR 324</b>	SHEET NO.:	<b>1 of 4</b>

### Original Design:

The original design utilizes 12’ travel lanes on SR 324

### Alternative:

The alternative proposes using 11’ inside travel lanes and turn lanes on SR 324.

### Opportunities:

- Reduction in pavement cost
- Reduction in earthwork cost
- Reduction of right of way cost

### Risks:

- Moderate increase in design effort
- Requires an exception to GDOT policy

### Technical Discussion:

The reduction of width of inside travel lanes and turn lanes from 12’ to 11’ on the SR 324 would result in a reduction of 2’ of the full build up of the county roads. Although 11’ lanes would require an exception to GDOT policy, AASHTO’s “Policy on Geometric Design of Highways 2004” permits 11’ feet lanes. It also states that under interrupted flow - operating conditions at low speeds (45mph or lower) narrower lanes are normally adequate and have some advantages. SR 324 has a design speed of 45mph and has low truck percentage and hence should pose no operational issues.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 5,095,561	\$ 0	\$ 5,095,561
ALTERNATIVE	\$ 4,883,245	\$ 0	\$ 4,883,245
SAVINGS	\$ 212,316	\$ 0	\$ 212,316

# Illustration

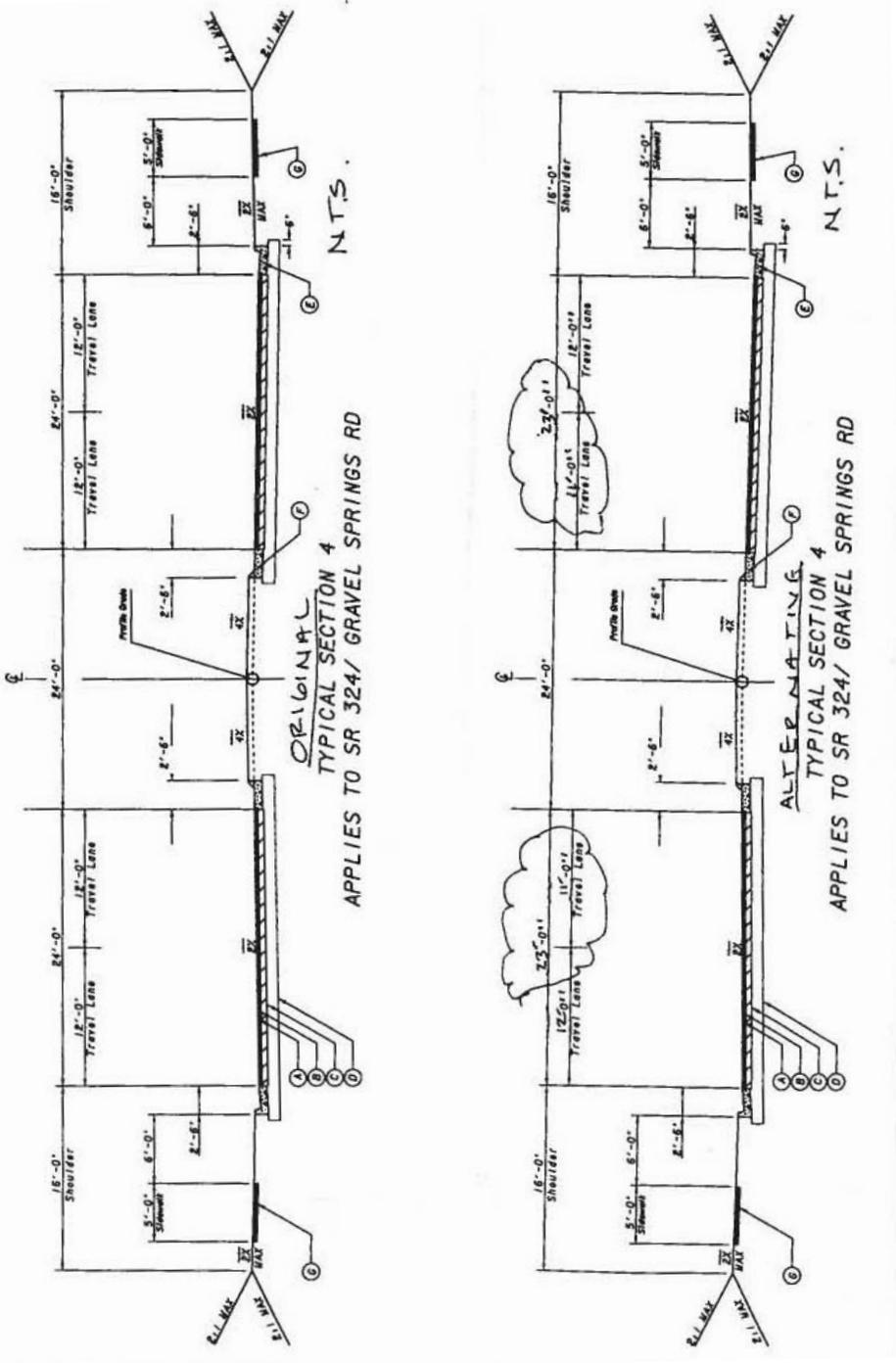


PROJECT: Georgia Department of Transportation  
 BRST0-0998-00(001) – P.I. No.: 142285  
 SR 324 Gravel Springs Rd. @ I-85  
 Gwinnett County

ALTERNATIVE NO.:  
**RD-11**

DESCRIPTION: Use 11' inside lanes, 11' turn lanes, and 12' outside lanes for typical section on SR 324

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-11**

DESCRIPTION: **Use 11' inside lanes, 11' turn lanes, and 12' outside lanes for typical section on SR 324** NO.: **3** of **4**

### Original affected pay item

Roadway Length =  $(145+85.02 \quad 127+30.00) + (168+10.00 - 150+51.02) = 3614.00$  ft

Width of each lane = 12.00 ft

No of lanes = 4.00

Area of four 12 feet lanes paved surface =  $12*4*3614 = 173472$  sq ft = 19274.67 sq yds

12.5 mm superpave (165lb/sqyd) =  $(19274.67 \text{ sy} * 165 \text{ lb/sy}) / 2000 = 1590.16$  tons

19.0 mm superpave (440lb/sqyd) =  $(19274.67 \text{ sy} * 440 \text{ lb/sy}) / 2000 = 4240.43$  tons

25.0 mm superpave (550lb/sqyd) =  $(19274.67 \text{ sy} * 550 \text{ lb/sy}) / 2000 = 5300.53$  tons

12" GAB (135lb/cuyd) =  $(173472.00 \text{ cf} * 135 \text{ lb/cf}) / 2000 = 11709.36$  tons

Bridge Length =  $(150+51.02 - 145+85.02) = 466$  feet

Total area =  $466 * (4*12) = 22368$  sq ft

### Reduction in quantity

Length =  $(145+85.02 \quad 127+30.00) + (168+10.00 - 150+51.02) = 3614.00$  ft

Length of deduction on each lane = 1.00ft

No of lanes = 2.00

Area =  $1*2*3614 = 7228.00$  sq ft = 803.11 sq yds

12.5 mm superpave (165lb/sqyd) =  $(19274.67 \text{ sqyds} * 165 \text{ lb/sqyd}) / 2000 = 66.26$  tons

19.0 mm superpave (440lb/sqyd) =  $(19274.67 \text{ sqyds} * 440 \text{ lb/sqyd}) / 2000 = 176.68$  tons

25.0 mm superpave (550lb/sqyd) =  $(19274.67 \text{ sqyds} * 550 \text{ lb/sqyd}) / 2000 = 220.86$  tons

12" GAB (135lb/cuyd) =  $(173472.00 \text{ cuft} * 135 \text{ lb/cuft}) / 2000 = 487.89$  tons

### Bridge

Total Area =  $466 * (2) = 932$  sq ft

### Alternative

Having 11'-0" inside lanes on SR 324

12.5 mm superpave = 1523.9 Tons

19.0 mm superpave = 4063.75 tons

25.0 mm superpave = 5079.67 tons

12" GAB = 11221.47 tons

# Cost Worksheet



PROJECT:	Georgia Department of Transportation BRST0-0998-00(001)- P.I. No. 142285 SR 324 Gravel Springs Rd. @ I-85 Gwinnett County	ALTERNATIVE NO.:	
		<b>RD-11</b>	
DESCRIPTION:	Use 11' inside lanes, 11' turn lanes, and 12' outside lanes for typical section on SR 324	SHEET NO.:	4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
12.5 mm superpave	TONS	1,590	\$ 75.00	\$ 119,262	1523.90	\$ 75.00	\$ 114,293
19.0 mm superpave	TONS	4,240	\$ 75.00	\$ 318,032	4063.75	\$ 75.00	\$ 304,781
25.0 mm superpave	TONS	5,301	\$ 75.00	\$ 397,540	5079.67	\$ 75.00	\$ 380,975
12" GAB	TONS	11,709	\$ 18.67	\$ 218,614	11221.47	\$ 18.67	\$ 209,505
				\$ -			\$ -
Bridge deck	SF	22,368	\$ 160.00	\$ 3,578,880	21436.00	\$160.00	\$ 3,429,760
<b>Sub-total</b>				\$ 4,632,328			\$ 4,439,314
<b>Mark-up at 10.00%</b>				\$ 463,233			\$ 443,931
<b>TOTAL</b>				<b>\$ 5,095,561</b>			<b>\$ 4,883,245</b>

Estimated Savings: \$212,315

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD- 12**

DESCRIPTION: **Reduce paved shoulders on County roads from 4' to 2'**

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

## Original Design:

The original design utilizes a 4' paved shoulder (on each side) on both County roads – Morgan Road and Camp Branch Road.

## Alternative:

The alternative design proposes using 2' paved shoulders on both sides of Morgan Road and Camp Branch Road.

## Opportunities:

- Initial savings in pavement costs, earthwork costs and right-of-way

## Risks:

- Moderate increase in design effort
- Requires an exception to GDOT policy

## Technical Discussion:

Reduction of paved shoulder width from 4' to 2' on both sides of the County road will result in a reduction of 4' of full build up on both County roads. The GDOT policy calls for a 2' paved shoulders for local roads and 6.5' outside paved shoulder on collector roads. Since both these roads experience low traffic volumes and low truck percentage, 2" paved shoulders on each side should pose no operational issues.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 275,750	\$ 0	\$ 275,750
ALTERNATIVE	\$ 137,875	\$ 0	\$ 137,875
SAVINGS	\$ 137,875	\$ 0	\$ 137,875

# Illustration

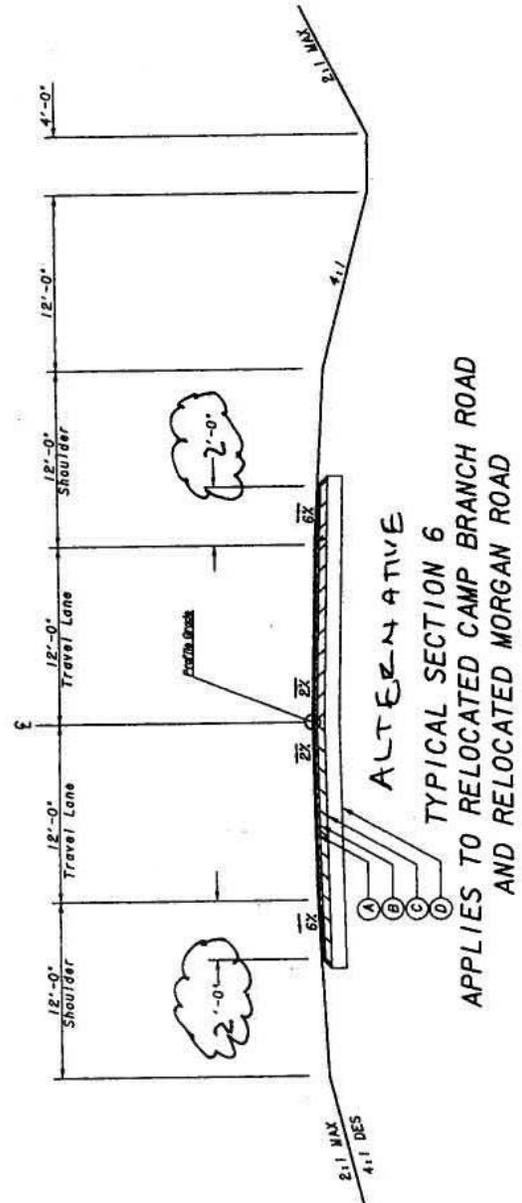
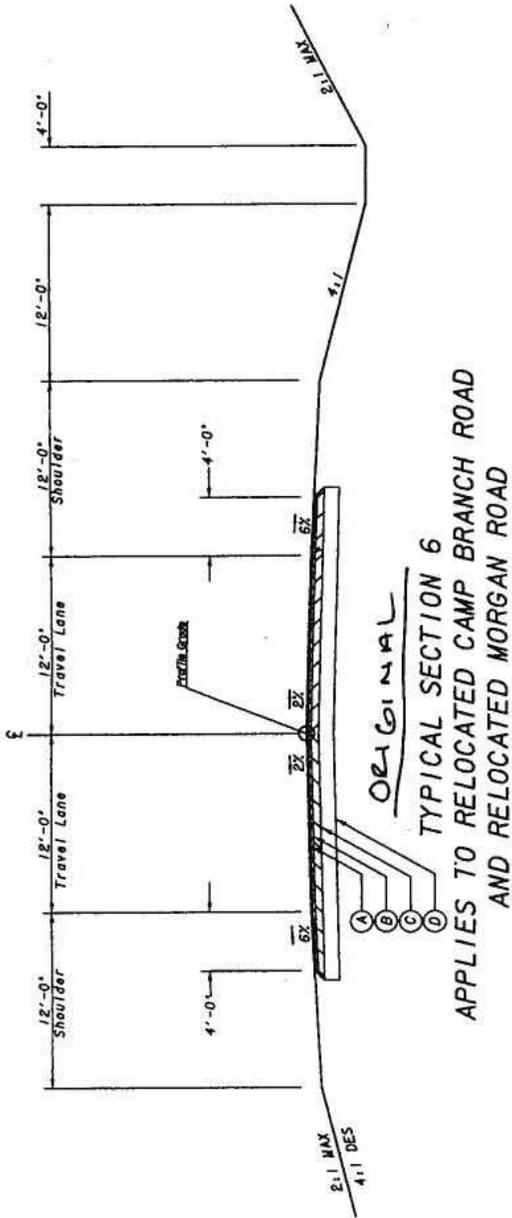


PROJECT: Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County

ALTERNATIVE NO.:  
**RD-12**

DESCRIPTION: Reduce paved shoulders on County roads from 4' to 2'

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD- 12**

DESCRIPTION: **Reduce paved shoulders on County roads from 4' to 2'** NO.: **3 of 4**

## Original affected pay item

Total length of both County Roads = 5160.00 ft

Width of each Shoulder = 4.00 ft

No of Shoulders = 2.00

Area of two 4 feet paved shoulder surface =  $4*2*5160 = 41280.00$  sq ft = 4586.67 sq yds

12.5 mm superpave (165lb/sqyd) =  $(4586.67\text{sqyds}*165 \text{ lb/sqyd})/2000 = 378.40$  tons

19.0 mm superpave (440lb/sqyd) =  $(4586.67\text{sqyds}*440 \text{ lb/sqyd})/2000 = 1009.07$  tons

25.0 mm superpave (550lb/sqyd) =  $(4586.67\text{sqyds}*550 \text{ lb/sqyd})/2000 = 1261.33$  tons

12" GAB (135lb/cf) =  $(41280 \text{ cf} * 135 \text{ lb/cf})/2000 = 2786.40$  tons

Total cost = \$250,682.09

## Reduction in quantity

Total length of both County Roads = 5160.00ft

Length of deduction on each shoulder = 2.00 ft

No of shoulder = 2.00

Area =  $2*2*5160 = 20640.00$  sq ft = 2293.33 sq yds

12.5 mm superpave (165 lb/sqyd) =  $(19274.67\text{sqyds}*165 \text{ lb/sqyd})/2000 = 189.20$  tons

19.0 mm superpave (440 lb/sqyd) =  $(19274.67\text{sqyds}*440 \text{ lb/sqyd})/2000 = 504.53$  tons

25.0 mm superpave (550 lb/sqyd) =  $(19274.67\text{sqyds}*550 \text{ lb/sqyd})/2000 = 630.67$  tons

12" GAB (135 lb/cf) =  $(173472.00 \text{ cf} * 135 \text{ lb/cf})/2000 = 1393.20$  tons

Total reduction in cost = \$125,341.04

## Alternative

12.5 mm superpave = 189.2 tons

19.0 mm superpave = 504.53 tons

25.0 mm superpave = 630.67 tons

12" GAB = 1393.20 tons



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD- 13**

DESCRIPTION: **Provide crosswalks where needed**

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

## Original Design:

The original design provides for sidewalks on each side of the roadway but does not indicate crosswalks to permit pedestrians to cross SR 324.

## Alternative:

The alternative would provide SR 324 crosswalks in three places – at the termination of the sidewalk near the specimen trees at Camp Branch Road, at Camp Branch Road and at Morgan Road (see enclosed sketch).

## Opportunities:

- Provides a recognized place for pedestrians to cross the roads
- Enhanced safety

## Risks:

- Some minimal redesign cost
- Minimal additional cost

## Technical Discussion:

There is no formalized provision for pedestrians crossing the SR 324 roadway, in spite of the fact that sidewalks are to be constructed on both sides of the new roadway. Crosswalks should be striped and warning signs posted to help protect the few pedestrians that are likely to use the crosswalk. The attached sketch illustrates the three problem areas and identifies the crosswalk locations that might be considered. This would obviously work better if these locations were signalized. Signalization would not be likely at the location identified with a star. Consideration might be given to extending the sidewalk in this location by running it behind the protected trees. This appears to be the only location for the sidewalk since the tree-protecting guardrails are placed directly behind the curb.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	\$ 0	\$ 0
ALTERNATIVE	\$ 13,228	\$ 0	\$ 13,228
SAVINGS	\$ (13,228)	\$ 0	\$ (13,228)

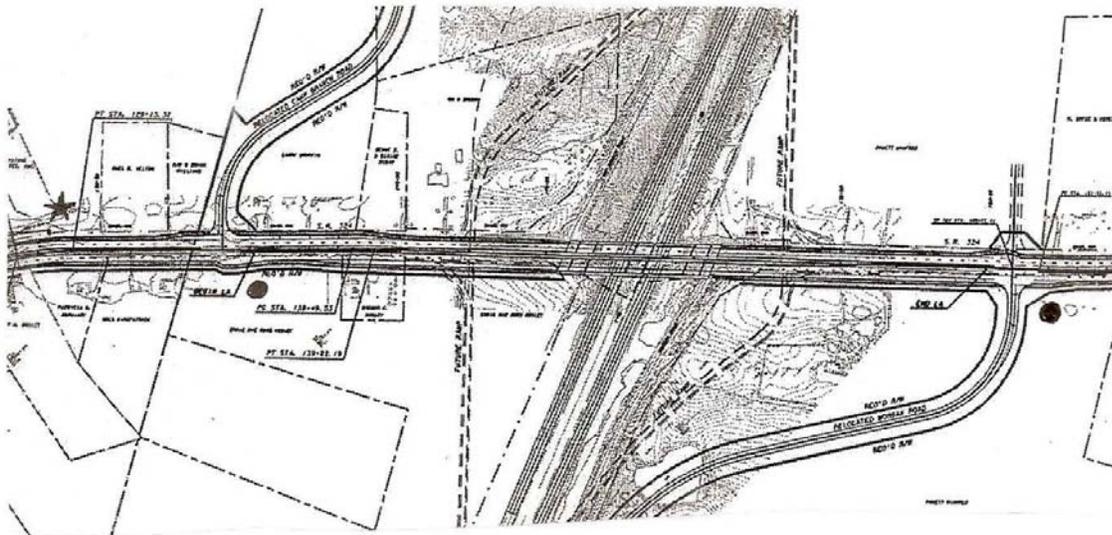
# Illustration

PROJECT: Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County

ALTERNATIVE NO.:  
**RD-13**

DESCRIPTION: Provide crosswalks where needed

SHEET NO.: 2 of 4



★ SIDEWALK TERMINATION POINT ★

- IF PEDESTRIAN IS MOVING TOWARD I-85 BRIDGE, MUST EITHER STEP OUT INTO TRAFFIC OR CROSS OVER S.R. 324 TO OTHER SIDEWALK TO PROCEED
- INSTALL CROSSWALK AT THIS LOCATION

● PROBABLE LOCATIONS FOR CROSSWALKS ●

# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-13**

DESCRIPTION: **Provide crosswalks where needed**

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

What is needed at:

- Crosswalk near historic property/trees
  - H/C ramp – 2 each
  - Striping
  - Warning signs
  - Cut at median (raised)
  
- Crosswalk at Camp Branch Road
  - H/C ramp – 2 each
  - Striping
  - Warning signs
  - Cut at median
  
- Crosswalk at Morgan Road
  - Same as at Camp Branch Road

# Cost Worksheet



<b>PROJECT:</b>	<b>Georgia Department of Transportation</b> <b>BRST0-0998-00(001)- P.I. No. 142285</b> <b>SR 324 Gravel Springs Rd. @ I-85</b> <b>Gwinnett County</b>	<b>ALTERNATIVE NO.:</b>	<b>RD-13</b>
<b>DESCRIPTION:</b>	<b>Provide crosswalks where needed</b>	<b>SHEET NO.:</b>	<b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Handicap Ramp	EA	0		0.00	6	\$ 1,200.00	\$ 7,200
Striping	LS			0.00	1	\$ 1,200.00	\$ 1,200
Signage	LS			0.00	1	\$ 2,500.00	\$ 2,500
Raised Median	SY	15	\$ 35.00	525.00			\$ -
Adjust Raised Median	EA			0.00	3	\$ 550.00	\$ 1,650
<b>Sub-total</b>				\$ 525			\$ 12,550
<b>Mark-up at 10.00%</b>				\$ 53			\$ 1,255
<b>TOTAL</b>				<b>\$ 578</b>			<b>\$ 13,805</b>

Estimated Savings: (\$13,228)

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-15**

DESCRIPTION: **Reduce pavement thickness for County roads**

SHEET NO.: **1 of 4**

## Original Design:

The original design uses a pavement section that is the same as for SR 324 which is 165# wearing layer, 440# binder, 660# base (from approved pavement design) and 12" of G.A.B.

## Alternative:

The alternative would propose constructing a pavement section consisting of 165# wearing layer, 220# binder, 330# base and 8" of G.A.B.

## Opportunities:

- Reduced paving costs

## Risks:

- Minimal impact to the designer

## Technical Discussion:

A separate pavement design was not prepared for the county roads. The traffic volumes per lane on SR 324 are as much as 3.5 times more and the percentage of trucks should also be significantly higher due to the fact the county roads service primarily residential areas.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,227,091	\$ 0	\$ 1,227,091
ALTERNATIVE	\$ 718,229	\$ 0	\$ 718,229
SAVINGS	\$ 508,862	\$ 0	\$ 508,862

# Illustration

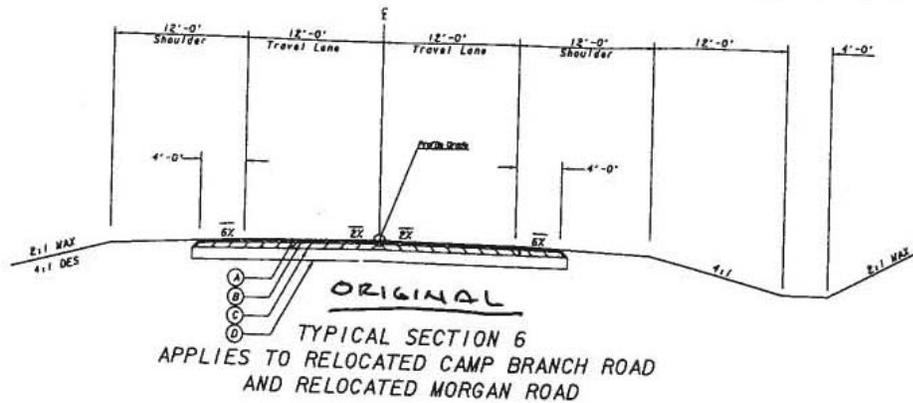


PROJECT: Georgia Department of Transportation  
 BRST0-0998-00(001) – P.I. No.: 142285  
 SR 324 Gravel Springs Rd. @ I-85  
 Gwinnett County

ALTERNATIVE NO.:  
**RD-15**

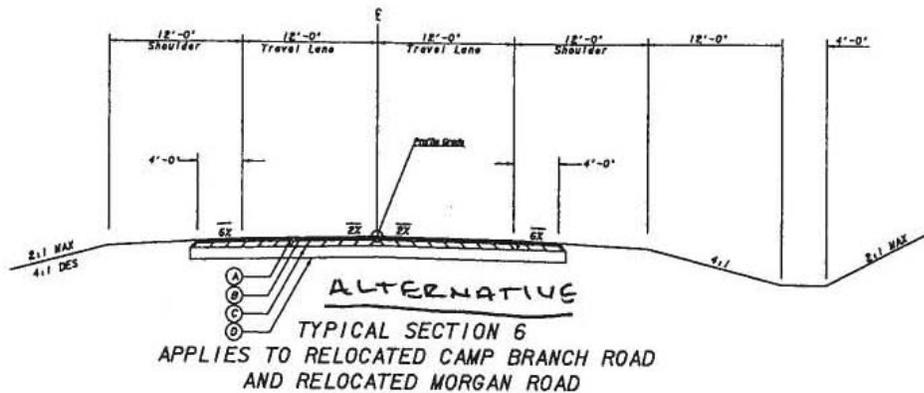
DESCRIPTION: Reduce pavement thickness for County roads

SHEET NO.: 2 of 4



**REQUIRED PAVEMENT**

- (A) RECYCLED ASPHALTIC CONCRETE 9.5 mm, SUPERPAVE, GP 2 ONLY, INCL. BITUM MAT'L & H. LIME (165 LB/SQ. YD.)
- (B) RECYCLED ASPHALTIC CONCRETE 19 mm, SUPERPAVE, GP 1 OR 2, INCL. BITUM MAT'L & H. LIME (440 LB/SQ. YD.)
- (C) RECYCLED ASPHALTIC CONCRETE 25 mm, SUPERPAVE, GP 1 OR 2, INCL. BITUM MAT'L & H. LIME (660 LB/SQ. YD.)
- (D) GRADED AGGREGATE BASE, 12 IN
- (E) CONCRETE CURB & GUTTER - 6 IN X 30 IN, GA STD. 9032B, TYPE 2
- (F) CONCRETE CURB & GUTTER - 6 IN X 30 IN, GA STD. 9032B, TYPE 7
- (G) 4' CONCRETE SIDEWALK
- (H) RAISED CONCRETE MEDIAN



**REQUIRED PAVEMENT**

- (A) RECYCLED ASPHALTIC CONCRETE 9.5 mm, SUPERPAVE, GP 2 ONLY, INCL. BITUM MAT'L & H. LIME (165 LB/SQ. YD.)
- (B) RECYCLED ASPHALTIC CONCRETE 19 mm, SUPERPAVE, GP 1 OR 2, INCL. BITUM MAT'L & H. LIME (210 LB/SQ. YD.)
- (C) RECYCLED ASPHALTIC CONCRETE 25 mm, SUPERPAVE, GP 1 OR 2, INCL. BITUM MAT'L & H. LIME (330 LB/SQ. YD.)
- (D) GRADED AGGREGATE BASE, 8 IN
- (E) CONCRETE CURB & GUTTER - 6 IN X 30 IN, GA STD. 9032B, TYPE 2
- (F) CONCRETE CURB & GUTTER - 6 IN X 30 IN, GA STD. 9032B, TYPE 7
- (G) 4' CONCRETE SIDEWALK

# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**RD-15**

DESCRIPTION: **Reduce pavement thickness for County roads**

NO.: **3 of 4**

## REDUCED PAVEMENT AREA:

Morgan Road: Station 330+00 to Station 301+49 = 3051 lf  
Camp Branch Road: Station 223+50 to Station 220+50 = 2350 lf  
Total Area – (2350 lf + 3151 lf) x (32') / (9sf/sy) = 18,840 sy  
G.A.B.- (2350 lf + 3151 lf) x (32') x (0.33') = 176,032 cf

## AFFECTED PAY ITEMS:

12.5 mm Superpave- (18,840 sy X 165#/sy) / (2000#/ton) => 1554 tons  
19.0 mm Superpave- (18,840 sy X 440#/sy) / (2000#/ton) => 4145 tons  
25.0 mm Superpave- (18,840 sy X 660#/sy) / (2000#/ton) => 6217 tons  
G.A.B.- (176,032 cf) x (135#/cf) / (2000#/ton) => 11,882 tons

## REQUIRED PAVEMENT:

12.5 mm Superpave- (18,840 sy X 165#/sy) / (2000#/ton) => 1554 tons  
19.0 mm Superpave- (18,840 sy X 220#/sy) / (2000#/ton) => 2072 tons  
25.0 mm Superpave- (18,840 sy X 330#/sy) / (2000#/ton) => 3108 tons  
G.A.B.- (176,032 cf) x (135#/cf) x (8/12) / (2000#/ton) => 7921 tons

# Cost Worksheet



<b>PROJECT:</b>	<b>Georgia Department of Transportation</b> <b>BRST0-0998-00(001)- P.I. No. 142285</b> <b>SR 324 Gravel Springs Rd. @ I-85</b> <b>Gwinnett County</b>	<b>ALTERNATIVE NO.:</b>  <b>RD-15</b>
<b>DESCRIPTION:</b>	<b>Reduce pavement thickness for county roads</b>	<b>SHEET NO.: 4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
12.5 mm Superpave	tons	1,554	\$ 75.00	\$ 116,550	1,554	\$ 75.00	\$ 116,550
19.0 mm Superpave	tons	4,145	\$ 75.00	\$ 310,875	2,072	\$ 75.00	\$ 155,400
25.0 mm Superpave	tons	6,217	\$ 75.00	\$ 466,275	3,108	\$ 75.00	\$ 233,100
G.A.B.	tons	11,882	\$ 18.67	\$ 221,837	7,921	\$ 18.67	\$ 147,885
<b>Sub-total</b>				<b>\$ 1,115,537</b>			<b>\$ 652,935</b>
<b>Mark-up at 10.00%</b>				<b>\$ 111,554</b>			<b>\$ 65,294</b>
<b>TOTAL</b>				<b>\$ 1,227,091</b>			<b>\$ 718,229</b>

Estimated Savings: \$508,862

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation BRST0-0998-00(001) – P.I. No.: 142285 SR 324 Gravel Springs Rd. @ I-85 Gwinnett County</b>	ALTERNATIVE NO.:	<b>BR-1</b>
DESCRIPTION:	<b>Provide intermediate bent in future I-85 median and reconfigure span arrangement</b>	SHEET NO.:	<b>1 of 5</b>

**Original Design:**

The original design calls for a skewed, 466' long, 3 span bridge with MSE walled abutments. The end spans are 146.5' and the intermediate span is 173.0' long. From final bridge plans made available to the VE Team, it appears that the superstructure comprises a concrete deck on steel plate girders, approximately 75" deep, made continuous over the 3 spans. The bridge crosses the future (conceptual) widened sections of I-85. The out-to-out width of the bridge is 102'-5" to accommodate 6' raised sidewalks on each side, a 32' median (6' raised) and two 12' travel lanes in each direction. It is proposed that the raised median be removed in the future to accommodate two turn lanes when this crossing is converted to a TUD Interchange. The intermediate bents are made up of concrete caps and columns and founded on pile caps supported by Steel H Piles.

**Alternative:**

The alternative suggests placing an intermediate bent in the future I-85 median and reconfiguring the spans to provide 4 spans. BT-63 girders with 10 ksi strength concrete, spaced approximately 5.5', could be used in-lieu of the steel plate girders for the revised span configuration. The deck section in the alternative will be the same as in the current design.

**Opportunities:**

- Potential savings in construction costs and construction time due to larger number of similar sized concrete beams
- Bridge with PPC is easier to construct than with steel
- Lowering of profile could benefit the entire project including additional vertical clearance for widened I-85

**Risks:**

- Redesign effort required

**Technical Discussion:**

BT 63" Girders with 10 ksi concrete could span the longer 146.5' spans (beam chart attached). The configuration of the future I-85 widening will easily accommodate a bent in the median, facilitating a four span bridge with reduced intermediate span lengths (see illustration). It is worth noting that most existing bridges on the I-85 corridor have an intermediate bent in the median.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,399,806	\$ 0	\$ 8,399,806
ALTERNATIVE	\$ 5,774,867	\$ 0	\$ 5,774,867
SAVINGS	\$ 2,624,939	\$ 0	\$ 2,624,939

# Illustration

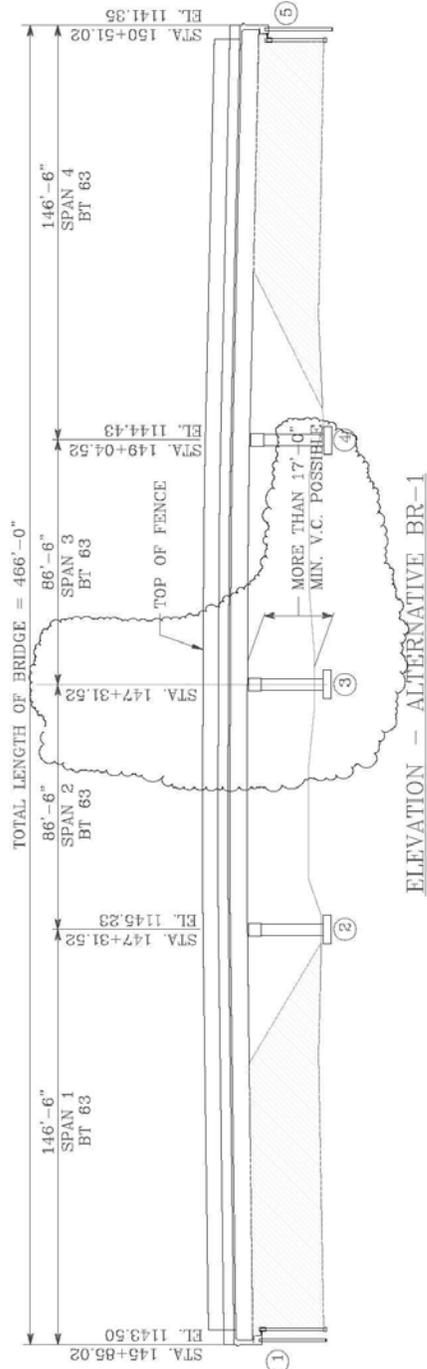
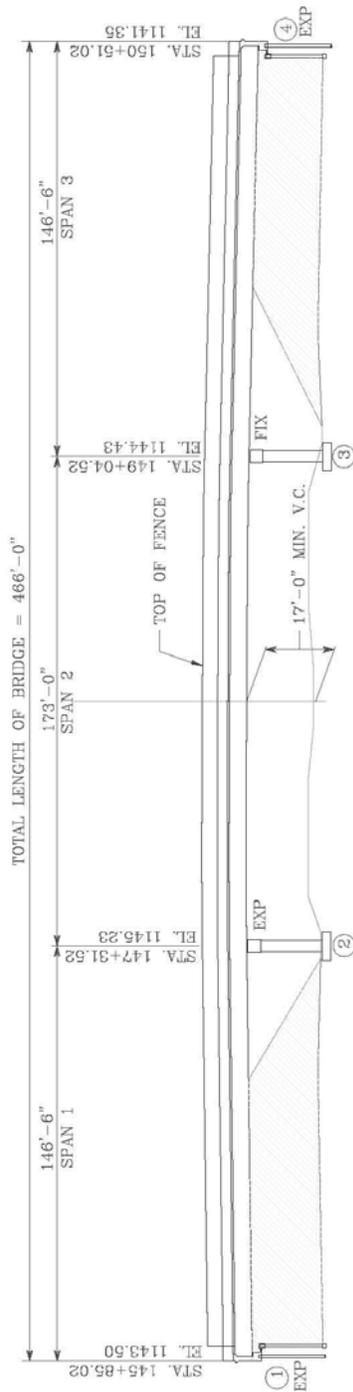


PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-1**

DESCRIPTION: **Provide intermediate bent in future I-85 median and  
reconfigure span arrangement**

SHEET NO.: **2** of **5**



# Illustration



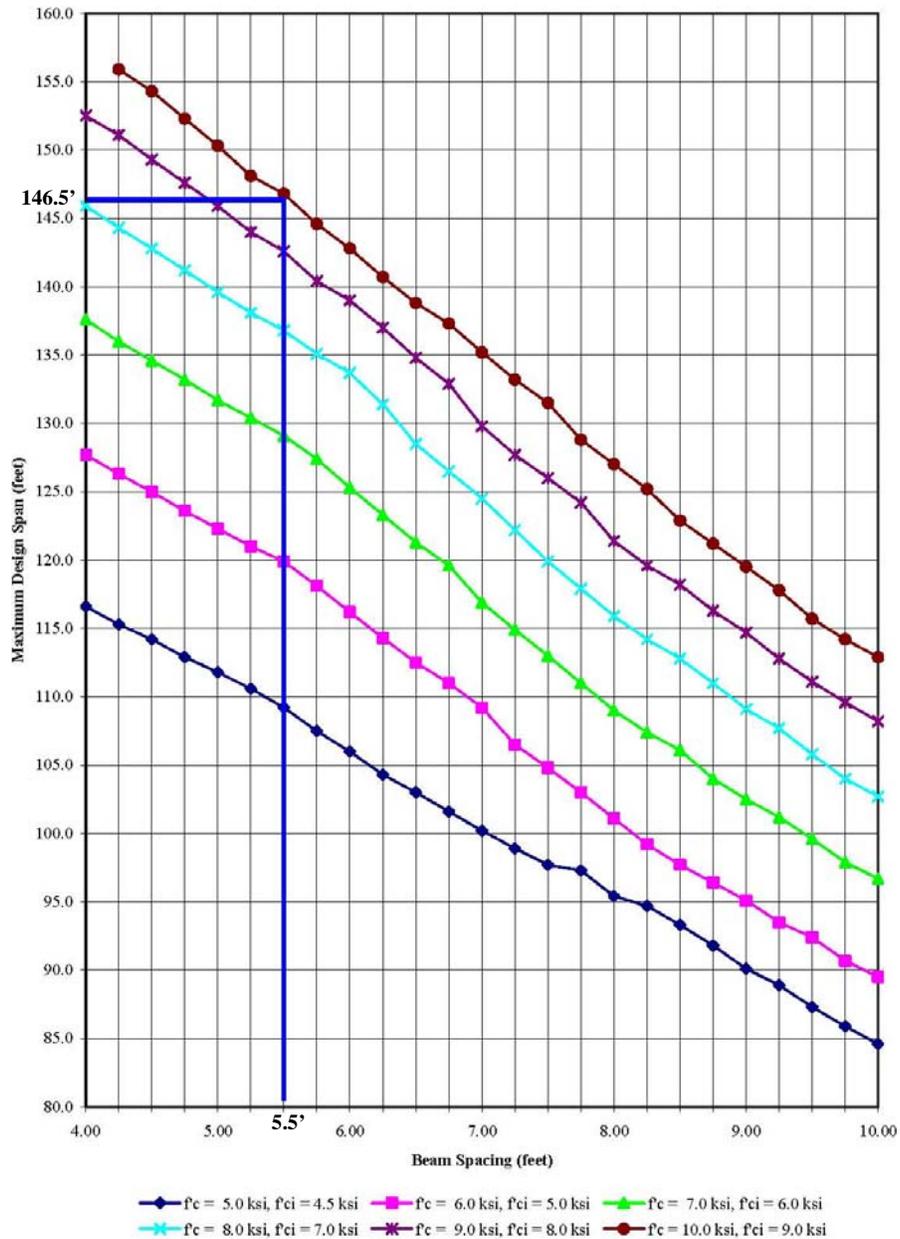
PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-1**

DESCRIPTION: **Provide intermediate bent in future I-85 median and  
reconfigure span arrangement**

SHEET NO.: **3** of **5**

## 63" Bulb Tee Beam (GDOT – Design Manual)



All strands are .6" diameter low relaxation strands.  
The 4 top flange strands are stressed to 10,000 pounds each and all remaining strands are stressed to 43,943 pounds each.

**Figure 5-01g**

# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-1**

DESCRIPTION: **Provide intermediate bent in future I-85 median and reconfigure span arrangement**

SHEET NO.: **4** of **5**

**Note:**

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

**Current Design (3 Span – 466' Long – 146.5' + 173.0' + 146.5', 102'-5" Out-to-Out Bridge)**

**Alternative Design (4 Span – 466' Long – 146.5' + 173.0' + 2 X 86.5', 102'-5" Out-to-Out Bridge)**

**Total Deck area of Bridge (Current & Alternative) = 466' \* 102.42' = 47,726.17 SF**

\$160 per SF used for cost estimate on the current design.

Assume \$110 per SF (conservative) for an all concrete bridge.

Excavation / other treatments (assumed same for current design & alternative, therefore, not considered - conservative).

**NOTE:**

**A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.**

**\$160 per SF was used for cost estimate on the current design (as provided to the VE Team). Assume \$110 per SF (conservative) for an all concrete bridge.**



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-2**

DESCRIPTION: **Eliminate raised median and use striping only**

SHEET NO.: **1 of 4**

## Original Design:

The original design calls for a skewed, 466' long, 3 span bridge with MSE walled abutments. The end spans are 146.5' and the intermediate span is 173.0' long. From final bridge plans made available to the VE Team, it appears that the superstructure comprises of a concrete deck on steel plate girders, approximately 75" deep, made continuous over the 3 spans. The bridge crosses the future (conceptual) widened sections of I-85. The out-to-out width of the bridge is 102'-5" to accommodate 6' raised sidewalks on each side, a 32' median (6' raised) and two 12' travel lanes in each direction. It is proposed that the raised median be removed in the future to accommodate two turn lanes when this crossing is converted to a TUD Interchange. The intermediate bents are made up of concrete caps and columns and founded on pile caps supported by Steel H Piles.

## Alternative:

The alternative suggests replacing the 6" raised median on the bridge with pavement markings. All other geometry in the alternative will be the same as in the current design.

## Opportunities:

- Potential savings in construction costs and removal costs for proposed future interchange modifications
- Reduced dead loads on the bridge girders

## Risks:

- Minimal to no redesign effort

## Technical Discussion:

Since it is proposed that the raised median be removed to accommodate two turn lanes when an interchange is built at this location, the alternative suggests not building the raised median on the current project. The bridge deck can be striped to current traffic configuration and re-striped when the future project (interchange) is built. This eliminates the cost of removal, construction time, traffic control, etc, which may be required when the median has to be eventually removed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 106,311	\$ 0	\$ 106,311
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 106,311	\$ 0	\$ 106,311

# Illustration

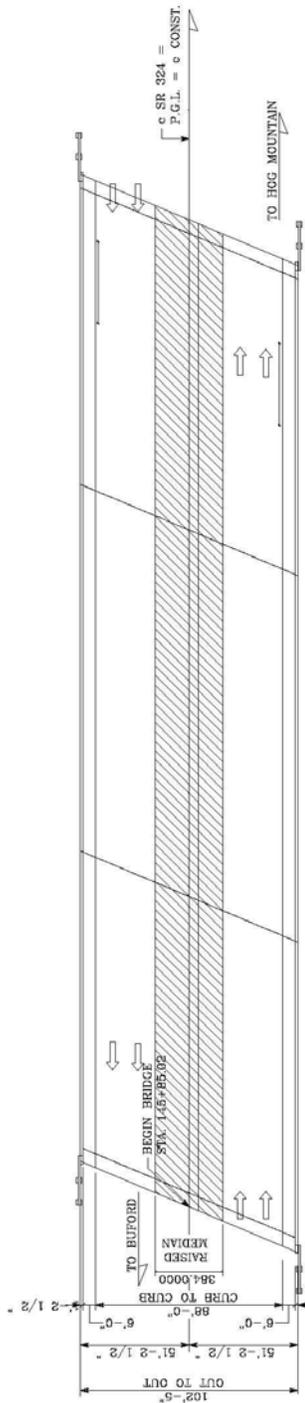


PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

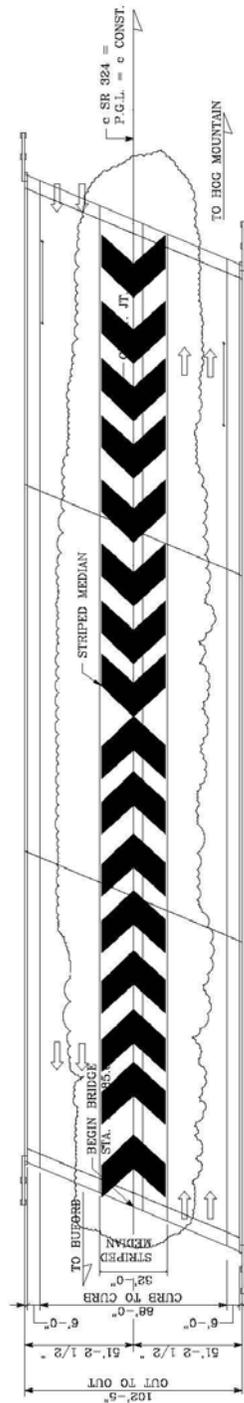
ALTERNATIVE NO.:  
**BR-2**

DESCRIPTION: **Eliminate raised median and use striping only**

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



PLAN - CURRENT DESIGN



PLAN - ALTERNATIVE BR-2

# Calculations



PROJECT: Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County

ALTERNATIVE NO.:  
**BR-2**

DESCRIPTION: Eliminate raised median and use striping only

SHEET NO.: 3 of 4

**Note:**

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

**Current Design (3 Span – 466’ Long – 146.5’ + 173.0’ + 146.5’, 102’-5” Out-to-Out Bridge) WITH 6” Raised Median.**

**Alternative Design (3 Span – 466’ Long – 146.5’ + 173.0’ + 146.5’, 102’-5” Out-to-Out Bridge) WITHOUT 6” Raised Median.**

**Total Raised Median area on Current Bridge Deck =  $(466' * 32')/9 = 1656.89$  SY**

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

**NOTE:**

**A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.**



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-3**

DESCRIPTION: **Provide sidewalk only on south side of bridge**

SHEET NO.: **1 of 4**

## Original Design:

The original design calls for a skewed, 466' long, 3 span bridge with MSE walled abutments. The end spans are 146.5' and the intermediate span is 173.0' long. From final bridge plans made available to the VE Team, it appears that the superstructure comprises of a concrete deck on steel plate girders, approximately 75" deep, made continuous over the 3 spans. The bridge crosses the future (conceptual) widened sections of I-85. The out-to-out width of the bridge is 102'-5" to accommodate 6' raised sidewalks on each side, a 32' median (6' raised) and two 12' travel lanes in each direction. It is proposed that the raised median be removed in future to accommodate two turn lanes when this crossing is converted to a TUD Interchange. The intermediate bents are made up of concrete caps and columns and founded on pile caps supported by Steel H Piles.

## Alternative:

The alternative suggests providing a 6" raised sidewalk only on the South side of the bridge. All other geometry in the alternative will be the same as in the current design.

### Opportunities:

- Potential savings in construction costs due to reduce bridge width
- Reduced dead loads on the exterior bridge girders
- Reduced exposure of pedestrians to accident risk as there is no provision for crosswalks at intersections in current design

### Risks:

- Minimal redesign effort

### Technical Discussion:

Since there is discontinuity in the sidewalk along the north side of the roadway at approximate Station 135+00, the alternative suggests eliminating/discontinuing the sidewalk along this side of the Bridge as well. Additionally, sidewalks may not serve the intended purpose as safety measures, such as crosswalks and signalized intersections, have not been incorporated into the project. The new out-to-out width of Bridge will be 96'-5". Optionally, the lanes may be reduces to 11.5' in order to accommodate a 4' shoulder on the north side of the bridge and comply with minimum AASHTO requirements for shoulder widths on long bridges (4' for >200').

This Alternative can work in conjunction with Alternative RD-4 of this VE Study. (See full report).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 492,096	\$ 0	\$ 492,096
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 492,096	\$ 0	\$ 492,096

# Illustration

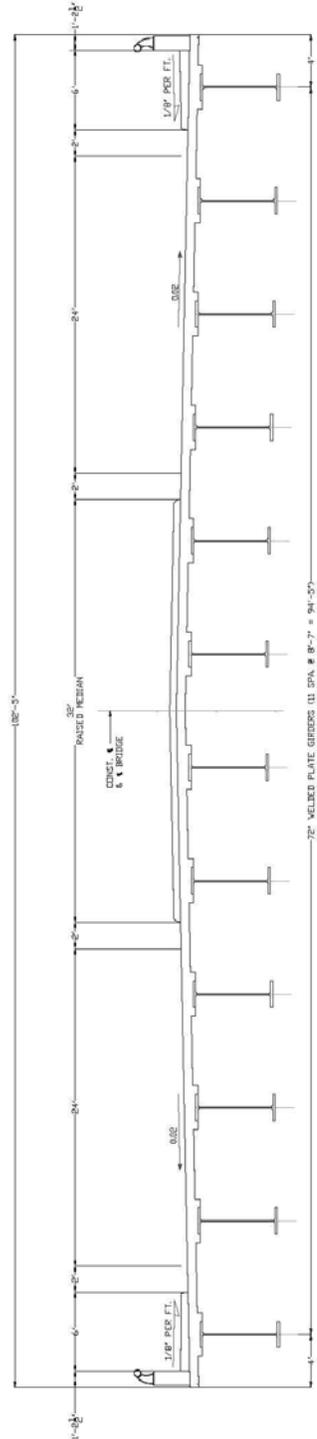


PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

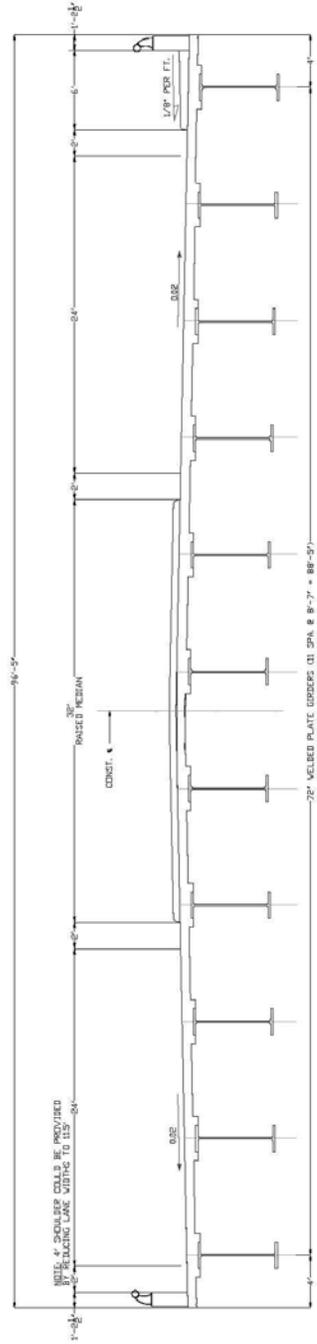
ALTERNATIVE NO.:  
**BR-3**

DESCRIPTION: **Provide sidewalk only on south side of bridge**

SHEET NO.: **2 of 4**



DECK SECTION - CURRENT DESIGN



DECK SECTION - ALTERNATIVE BR-3

# Calculations



PROJECT: Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County

ALTERNATIVE NO.:  
**BR-3**

DESCRIPTION: Provide sidewalk only on south side of bridge

SHEET NO.: 3 of 4

## Note:

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

Current Design (3 Span – 466' Long – 146.5' + 173.0' + 146.5', 102'-5" Out-to-Out Bridge) WITH 6" Raised Sidewalks on Both Sides of Bridge.

Alternative Design (3 Span – 466' Long – 146.5' + 173.0' + 146.5', 96'-5" Out-to-Out Bridge) WITHOUT 6" Raised Sidewalk on North Side of Bridge.

Area of 6" Sidewalk along North side of Bridge =  $(466' * 6') = 2796 \text{ SF}$

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

## NOTE:

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



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-4**

DESCRIPTION: **Provide twin structures with no turn lanes**

SHEET NO.: **1 of 4**

## Original Design:

The original design calls for a skewed, 466' long, 3 span bridge with MSE walled abutments. The end spans are 146.5' and the intermediate span is 173.0' long. From final bridge plans made available to the VE Team, it appears that the superstructure comprises of a concrete deck on steel plate girders, approximately 75" deep, made continuous over the 3 spans. The bridge crosses the future (conceptual) widened sections of I-85. The out-to-out width of the bridge is 102'-5" to accommodate 6' raised sidewalks on each side, a 32' median (6' raised) and two 12' travel lanes in each direction. It is proposed that the raised median be removed in future to accommodate two turn lanes when this crossing is converted to a TUD Interchange. The intermediate bents are made up of concrete caps and columns and founded on pile caps supported by Steel H Piles.

## Alternative:

The alternative suggests replacing the single 102'-5" wide structure with twin, 36'-5" wide structures.

## Opportunities:

- Savings in construction costs and construction time
- Ease of phasing construction and maintaining traffic during construction which translates to cost savings

## Risks:

- Redesign effort required
- Facilitates construction of a future partial clover leaf connecting to the CD Roads and not a TUD

## Technical Discussion:

Providing twin structures in-lieu of a single wide bridge with future turn lanes eliminates the option of a TUD Interchange in future. Nevertheless, the future interchange could be made a partial clover leaf to connect to the future CD Roads.

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

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,399,806	\$ 0	\$ 8,399,806
ALTERNATIVE	\$ 5,981,916	\$ 0	\$ 5,981,916
SAVINGS	\$ 2,417,890	\$ 0	\$ 2,417,890

# Illustration

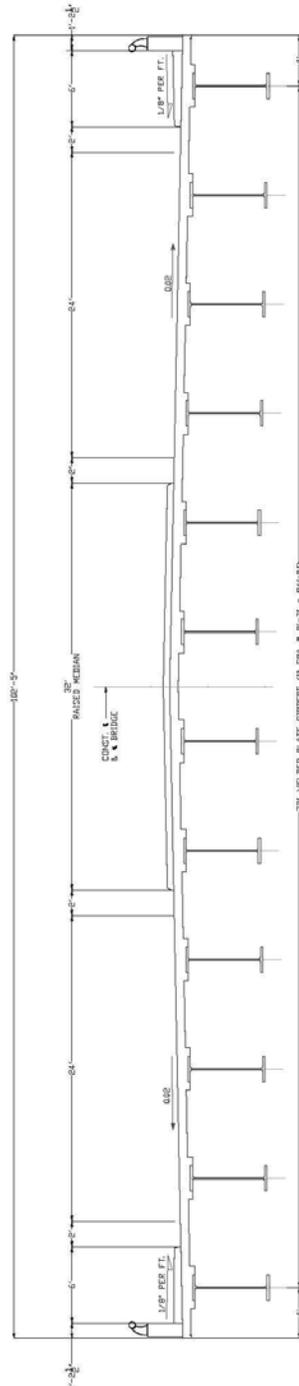


PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

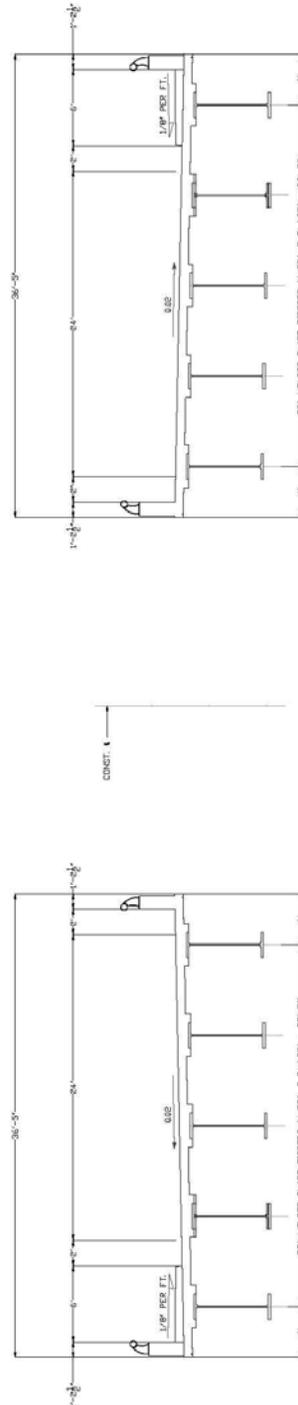
ALTERNATIVE NO.:  
**BR-4**

DESCRIPTION: **Provide twin structures with no turn lanes**

SHEET NO.: **2 of 4**



DECK SECTION - CURRENT DESIGN



DECK SECTION - ALTERNATIVE BR-4

# Calculations



PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-4**

DESCRIPTION: **Provide twin structures with no turn lanes**

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

**Note:**

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

**Current Design (3 Span – 466' Long – 146.5' + 173.0' + 146.5', 102'-5" Out-to-Out Bridge)**

**Alternative Design (Twin, 3 Span – 466' Long – 146.5' + 173.0' + 146.5', 36'-5" Out-to-Out Bridges)**

**Total Deck area of Bridge (Current) =  $466' * 102.42' = 47,726.17$  SF**

**Total Deck area of Bridge (Alternative) =  $2 * 466' * 36.42' = 33,943.44$  SF**

**Type W Guard Rails at approaches on each end of the bridges in the alternative =  $2 * 150' = 300$  LF**

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

**NOTE:**

**A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.**



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation BRST0-0998-00(001) – P.I. No.: 142285 SR 324 Gravel Springs Rd. @ I-85 Gwinnett County</b>	ALTERNATIVE NO.:	<b>BR-6</b>
DESCRIPTION:	<b>Use BT 63 girders on end spans in-lieu of steel girders</b>	SHEET NO.:	<b>1 of 5</b>

**Original Design:**

The original design calls for a skewed, 466' long, 3 span bridge with MSE walled abutments. The end spans are 146.5' and the intermediate span is 173.0' long. From final bridge plans made available to the VE Team, it appears that the superstructure comprises of a concrete deck on steel plate girders, approximately 75" deep, made continuous over the 3 spans. The bridge crosses the future (conceptual) widened sections of I-85. The out-to-out width of the bridge is 102'-5" to accommodate 6' raised sidewalks on each side, a 32' median (6' raised) and two 12' travel lanes in each direction. It is proposed that the raised median be removed in the future to accommodate two turn lanes when this crossing is converted to a TUD Interchange. The intermediate bents are made up of concrete caps and columns and founded on pile caps supported by Steel H Piles.

**Alternative:**

The alternative suggests using BT-63 Girders with 10 ksi strength concrete, spaced approximately 5.5', in-lieu of the Steel Plate Girders on the end spans. The deck section in the alternative will be the same as in the current design.

**Opportunities:**

- Potential savings in construction costs and construction time due to larger number of similar sized concrete beams
- Bridge with PPC is easier to construct than with steel
- Possible lowering of profile could benefit the entire project including additional Vertical clearance for widened I-85
- 

**Risks:**

- Redesign effort required

**Technical Discussion:**

BT 63" Girders with 10 ksi concrete could be used on the end, 146.5', spans (beam chart attached). Pre-cast girders are relatively easier to fabricate and install compared to Steel girders. {On the same note, feasibility of BT 74 girders may be investigated for the 173' intermediate span. This option has not been developed for the current VE Study.}

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,399,806	\$ 0	\$ 8,399,806
ALTERNATIVE	\$ 6,749,360	\$ 0	\$ 6,749,360
SAVINGS	\$ 1,650,446	\$ 0	\$ 1,650,446

# Illustration

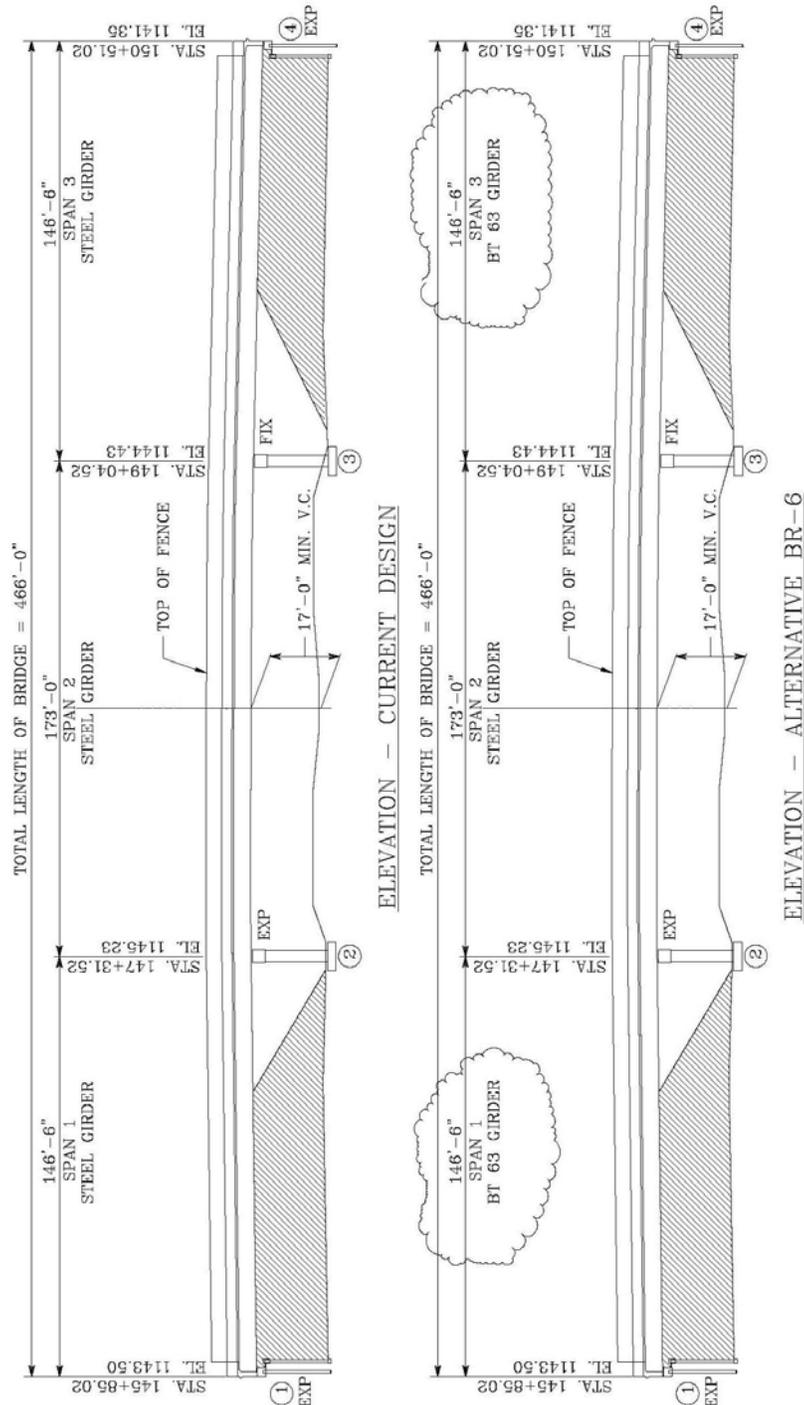


PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-6**

DESCRIPTION: **Use BT 63 girders on end spans in-lieu of steel girders**

SHEET NO.: **2** of **5**



# Illustration



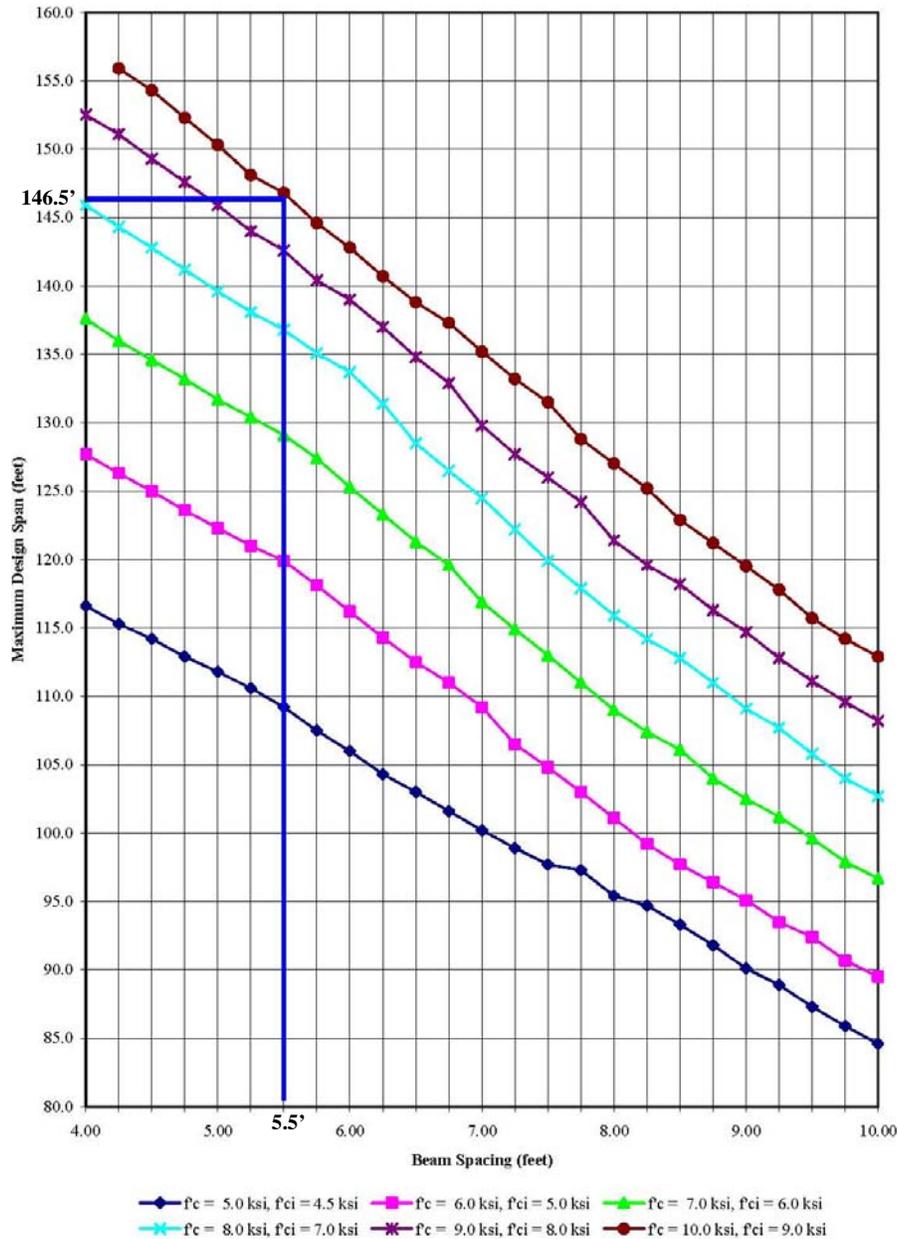
PROJECT: **Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County**

ALTERNATIVE NO.:  
**BR-6**

DESCRIPTION: **Use BT 63 girders on end spans in-lieu of steel  
girders**

SHEET NO.: **3** of **5**

**63" Bulb Tee Beam (GDOT – Design Manual)**



All strands are .6" diameter low relaxation strands.  
The 4 top flange strands are stressed to 10,000 pounds each and all remaining strands are stressed to 43,943 pounds each.

**Figure 5-01g**

# Calculations



PROJECT: Georgia Department of Transportation  
BRST0-0998-00(001) – P.I. No.: 12285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County

ALTERNATIVE NO.:  
**BR-6**

DESCRIPTION: **Use BT 63 girders on end spans in-lieu of steel girders**

SHEET NO.: 4 of 5

## Note:

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

### Current Design (3 Span – 466' Long – 146.5' + 173.0' + 146.5', 102'-5" Out-to-Out Bridge), Steel Girders on All Spans

Total Deck area of Bridge (Current – all steel girders) =  $466' * 102.42' = 47,726.17$  SF

### Alternative Design (3 Span – 466' Long – 146.5' + 173.0' + 146.5', 102'-5" Out-to-Out Bridge), B-63 Girders on End Spans and Steel Girders on Intermediate Span

Deck area of End Spans =  $2 * 146.5' * 102.42' = 30,008.08$  SF

Deck area of Intermediate Span =  $1 * 173.0' * 102.42' = 17,718.08$  SF

\$160 per SF used for cost estimate on the current design.

Assume \$110 per SF (conservative) for an all concrete bridge.

Excavation / other treatments (assumed same for current design & alternative, therefore, not considered - conservative).

## NOTE:

A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.

\$160 per SF was used for cost estimate on the current design (as provided to the VE Team). Assume \$110 per SF (conservative) for concrete bridge.



## *Project Description*

# **PROJECT DESCRIPTION**

## **PROJECT INTRODUCTION**

This project is located on S.R. 324 over I-85 in Gwinnett County. S.R. 324 is also known as Gravel Springs Road. The total project length on S.R. 324 is 0.8 miles, with additional lengths of 0.8 mile on Morgan Road and 0.5 mile on Camp Branch Road.

The project consists of the replacement of the bridge over I-85 and widening of S.R. 324 approaching and crossing the bridge. S.R. 324 will be widened to a four-lane divided roadway facility with a 24-foot raised median. The project is part of the widening of S.R. 324 from S.R. 20 to S.R. 124. In earlier design stages, the proposed bridge was designed to allow for a future HOV lane interchange with I-85. Recently, the design was modified to eliminate the need for the HOV aspect of the project. This was due to the fact that the HOV interchange was shifted to another interchange south of S.R. 324. At present, the revised typical section provides for 2-12' travel lanes northbound and 2-12' travel lanes southbound, curb and gutter with a 36' median and 5' sidewalks on each side. The 36' median will transition to a 24' median prior to Camp Branch Road and Morgan Road intersections. The 36' median will provide for enhanced safety and not preclude providing for two future left-turn lanes on the bridge; one continuous turn lane in each direction on the full bridge length, and one left turn lane transitioning between northbound and southbound.

The revised bridge, reflected in the final design submittal, is one bridge 102' – 5" in width and 466' in length, eliminating the retaining walls and HOV box section. The bents on the three-span bridge will be located between the future collector-distributor lanes and the travel lanes on I-85. No changes to the horizontal alignment on I-85 will be required.

The estimated construction and right-of-way costs for this project totaled \$21,950,000. At the VE kick-off meeting, on the first day of the workshop, it was reported that \$600,000 should be added as an approximation of the Reimbursable Utility costs.

## **REPRESENTATIVE DOCUMENTS**

- Georgia Department of Transportation
  - Plans
  - Construction Cost Estimates
  - Preliminary Right-of-Way Cost Estimate

- Concept Report
- Pavement Evaluation Summary
- Soil Survey Summary
- Bridge plans
- Traffic Analysis

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

DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE BRST0-0998-00(001) Gwinnett County      OFFICE Gainesville  
SR 324 GRAVEL SPRINGS RD @ I-85  
PI # 142285-      DATE May 7, 2008

FROM Robert W. Mahoney, P.E., District Preconstruction Engineer  
TO Todd I. Long, P.E., PTOE, Preconstruction Division Director

SUBJECT Revised Project Concept Report

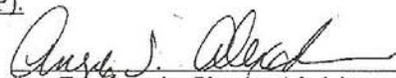
Attached is the original copy of the Revised Concept Report for your further handling for approval in accordance with the Plan Development Process (PDP).

The typical section and the alignment have been revised. The project termini, access control and controlling criteria have not changed. The Typical Section has been revised to include 2-12 ft. travel lanes northbound, 2-12 ft. travel lanes southbound, curb and gutter with a 36 ft. median and 6' sidewalks on each side. The 36 ft. median will transition to a 24 ft. median prior to the Camp Branch Road and Morgan Road intersections. The 36' median will provide for enhanced safety and not preclude providing for three future left-turn lanes on the bridge; one continuous turn lane in each direction on the full bridge length, and one left turn lane transitioning between northbound and southbound.

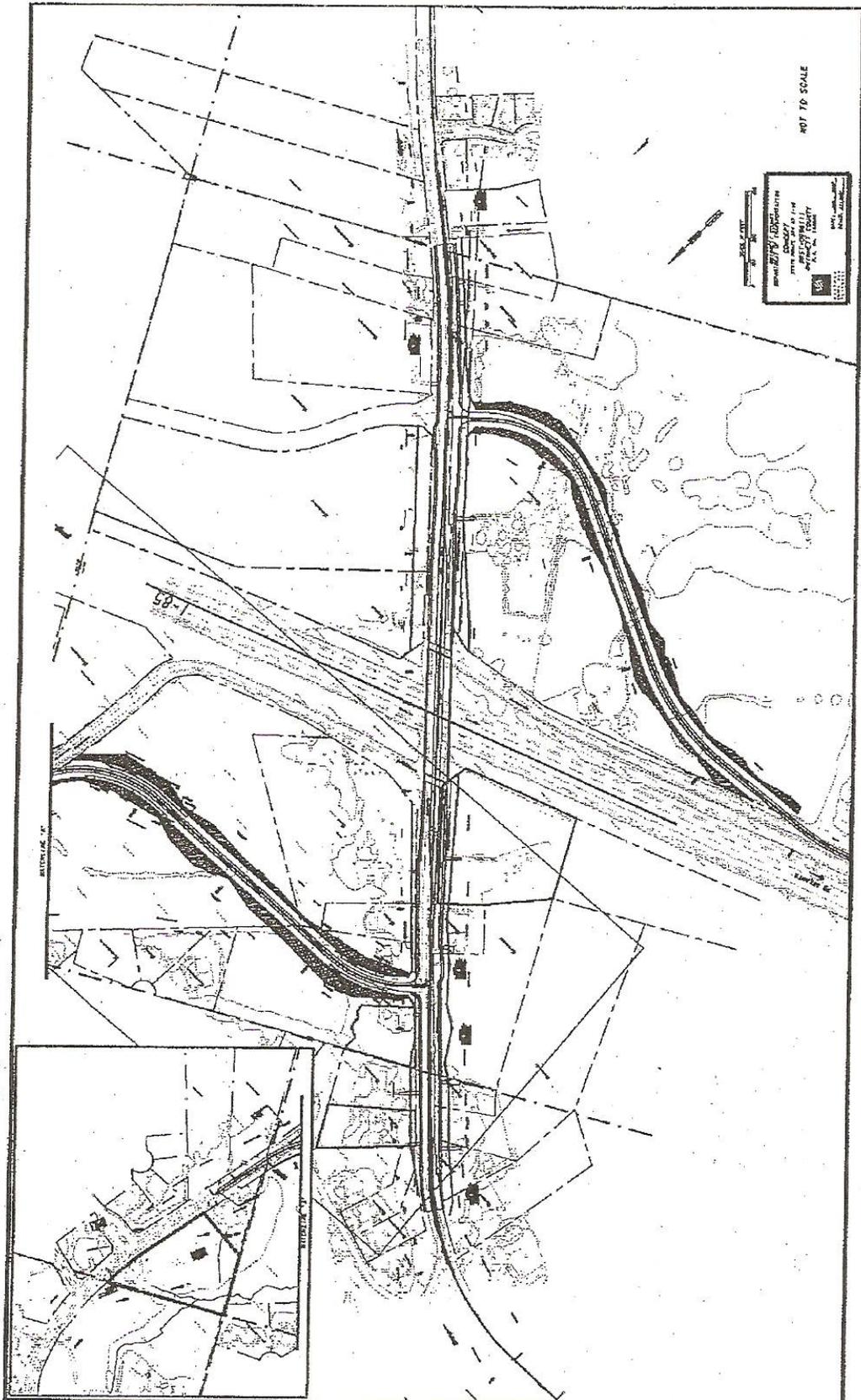
The bridge on S.R. 324 over I-85 will also be revised now to one bridge structure 102'-5" in width and 466' in length, eliminating the retaining walls and HOV box section. HOV access is planned for another location and therefore consideration for this has been removed from the project. The bents on the three span bridge will be located between the future collector-distributor lanes and the travel lanes on I-85. No changes to the horizontal alignment on I-85 will be required.

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

DATE 6/23/08

  
State Transportation Planning Administrator

*Distribution:*



# REVISED PROJECT CONCEPT REPORT

BRST-0998 (1) Gwinnett  
P.I. No. 142285

**Need and Purpose:** The purpose of the proposed project is to improve safety, operational efficiency throughout the SR 324 corridor, and to provide for future transportation needs along I-85. This proposed bridge replacement is to accompany the planned Gwinnett County Project GW-254 & GW-255 (as identified in the ARC Regional Transportation Plan) which widens SR 324 from 2 to 4 lanes.

The proposed project was added to the STIP in 1999. The project is currently scheduled for Right of Way acquisition in FY 2008 with a Construction/ Implementation date of FY 2009.

S.R. 324 functions as a major collector that connects S.R. 20 near Buford with S.R. 8 near Auburn. S.R. 324 is a major connection for commuter traffic to access I-85 and I-985. It is also one of a number of east west routes that traverse Gwinnett County linking residential areas to I-85 and I-985. Present land use for the property immediately adjacent to the corridor is a mixture of commercial, agricultural and single-family residential. Commercial areas are currently confined to the nodes at S.R. 20 and S.R. 124. The current Level of Service (LOS) is F.

The S.R. 324 corridor will continue to see new single family residential, multi-family residential and commercial growth as the area surrounding the Mall of Georgia develops. Due to residential development and high potential commercial along the project corridor in the vicinity of the Mall of Georgia, the traffic volumes along S.R. 324 have steadily increased over the last five years and will continue to increase in the years to come. The existing two lane configuration of S.R. 324 is not compatible with conveying the projected traffic volumes for the opening and design year (when traffic along the route is expected to double). See Table 1 for traffic projections. Accidents along the project route at several locations have mainly been the result of geometric deficiencies in the roadway alignment and side road intersections. The Accident Rate is below the statewide average for similar facilities (Table 2). However, as the traffic volumes further increase, both the safety and level of service will further decrease. The projected LOS is F with a no build alternate. The projected LOS of the proposed project at the open-to-traffic date is C (Table 1). The projected LOS in the design year is D (Table 1).

Table 1

Year	Volume	LOS
2008	21,000	F
2011	32,000	C
2031	41,000	D

Table 2  
 (Rates are Accidents per 100 Million Vehicle Miles Traveled)

Year	Accident Rate	Statewide Average
2000	228	515
2001	260	527
2002	259	534

**Project location:** This project is located on S.R. 324 over I-85 in Gwinnett County. S.R. 324 is also known as Gravel Springs Road. The total project length on S.R. 324 is 0.8 miles, with additional lengths of 0.8 miles on Morgan Road and 0.5 miles on Camp Branch Road.

**Description of the approved concept:** The project consists of the replacement of the bridge over I-85 and widening of SR 324 approaching the bridge. SR 324 will be widened to a four-lane divided curb and gutter facility with a 24-foot raised median. The project is part of the widening of SR 324 from SR 20 to SR 124. The proposed bridge will be designed to allow for a future HOV lane interchange with I-85. Retaining walls are proposed in the I-85 median for the future HOV interchange backfilled with earth material creating a box section. Separate bridges from the median box section to the outside of I-85 are planned. This will require permanently shifting the I-85 travel lanes 12 feet towards the outside. The bridges will also span the future HOV lanes, future additional SOV lanes, and future collector-distributor lanes on I-85. The proposed bridges will also be designed to allow a future full access interchange. Camp Branch Road and Morgan Road will be relocated on each side of the bridge to allow for future ramp locations.

The proposed project length is 0.8 miles. Two separate bridges are proposed, each 182 feet long and 102 feet wide. Additional proposed lengths of improvements are 0.8 miles on Morgan Road, 0.5 miles on Camp Branch Road, and 0.4 miles (1,900') on I-85.

**PDP Classification:**

Full Oversight (X) {Bridge over I-85 Only}, Exempt( ), SF( ), Other ( )

**Functional Classification:** Arterial

**U. S. Route Number(s):** N/A **State Route Number(s):** 324

**Traffic (AADT) as shown in the approved concept:**

Current Year: 16,700 (2002) Design Year: 55,000 (2028)

**Proposed features to be revised:** The typical section and the alignment have been revised. The project termini, access control and controlling criteria have not changed.

**Describe the revised feature(s) to be approved:** The Typical Section has been revised to include 2-12 ft. travel lanes northbound, 2-12 ft. travel lanes southbound, curb and gutter with a 36 ft. median and 6' sidewalks on each side. The 36 ft. median will transition to a 24 ft. median prior to the Camp Branch Road and Morgan Road intersections. The 36' median will provide for enhanced safety and not preclude providing for three future left-turn lanes on the bridge; one continuous turn lane in each

direction on the full bridge length, and one left turn lane transitioning between northbound and southbound.

The bridge on S.R. 324 over I-85 will also be revised now to one bridge structure 102'-5" in width and 466' in length, eliminating the retaining walls and box section. HOV access is planned for another location and therefore consideration for this has been removed from the project. The bents on the three span bridge will be located between the future collector-distributor lanes and the travel lanes on I-85. No changes to the horizontal alignment on I-85 will be required.

**Updated traffic data (AADT):**

Open to Traffic Year: 32,000 (2011)

Design Year: 41,000 (2031)

**Programmed/Schedule:**

P.E. 2000

R/W: FY 2008

Construction: FY 2008 LR

**Revised cost estimates:**

1. Construction cost including E&C,
2. Right-of-way, and
3. Utilities

~~\$12,530,000~~ \$12,918,000  
\$7,288,000  
\$0

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

The proposed project conforms to the model plans' description.

**Recommendation:** Recommend that the proposed revision to the concept be approved for implementation.

Attachments{ XE "Attachments to the Revised Concept Report" }:

1. Sketch Map
2. Cost Estimate

Concur:

Todd J. [Signature]  
Director of Preconstruction

Approve:

Richard Wayne Fedors  
for  
Division Administrator, FHWA

Approve:

[Signature]

Chief Engineer

**Estimate Report for file "142285 BRST-0998(1) - 2008-05-02"**

Section TEMPORARY EROSION CONTROL ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0232	30	AC	728.93	TEMPORARY GRASSING	21867.90
163-0240	300	TN	181.22	MULCH	54366.00
163-0300	4	EA	1807.17	CONSTRUCTION EXIT	7228.68
163-0504	20	EA	425.00	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 4	8500.00
163-0520	200	LF	16.64	CONSTRUCT AND REMOVE TEMPORARY PIPE SLOPE DRAIN	3328.00
163-0521	20	EA	200.00	CONSTRUCT AND REMOVE TEMPORARY DITCH CHECKS	4000.00
163-0530	10000	LF	4.07	CONSTRUCT AND REMOVE BALED STRAW EROSION CHECK	40700.00
163-0531	2	EA	8336.05	CONSTRUCT AND REMOVE SEDIMENT BASIN, TP 1, STA NO -	16672.10
165-0030	20000	LF	1.32	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	26400.00
165-0040	20	EA	102.10	MAINTENANCE OF EROSION CONTROL CHECKDAMS/DITCH CHECKS	2042.00
165-0060	4	EA	1400.14	MAINTENANCE OF TEMPORARY SEDIMENT BASIN, STA NO -	5600.56
165-0070	5000	LF	1.72	MAINTENANCE OF BALED STRAW EROSION CHECK	8600.00
165-0088	20	EA	100.00	MAINTENANCE OF SILT CONTROL GATE, TP 4	2000.00
165-0101	4	EA	531.92	MAINTENANCE OF CONSTRUCTION EXIT	2127.68
167-1000	2	EA	1087.83	WATER QUALITY MONITORING AND SAMPLING	2175.66
167-1500	24	MO	973.27	WATER QUALITY INSPECTIONS	23358.48
171-0030	40000	LF	3.73	TEMPORARY SILT FENCE, TYPE C	149200.00
<b>Section Sub Total:</b>					<b>\$378,167.06</b>

Section ROADWAY ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	1	LS	900000.00	TRAFFIC CONTROL - BRST-0998(1)	900000.00
150-5000	20	EA	500.00	TRAFFIC CONTROL, TEMPORARY SAND LOADED ATTENUATOR MODULE	10000.00
153-1300	1	EA	69627.91	FIELD ENGINEERS OFFICE TP 3	69627.91
201-1500	1	LS	150000.00	CLEARING & GRUBBING	150000.00
206-0002	100000	CY	6.47	BORROW EXCAV, INCL MATL	647000.00
207-2003	100	CY	33.60	IMPERFECT TRENCH BKFILL MATL, TP III	3360.00
310-5100	6250	SY	16.46	GR AGGR BASE CRS, 10 INCH, INCL MATL	102875.00
318-3000	1000	TN	23.28	AGGR SURF CRS	23280.00
402-1811	200	TN	108.73	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL	21746.00
402-3112	2444	TN	75.00	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	183300.00
402-3121	3667	TN	75.00	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	275025.00
402-3131	917	TN	75.00	RECYCLED ASPH CONC 9.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME	68775.00
413-1000	2194	GL	2.00	BITUM TACK COAT	4388.00
441-0016	300	SY	39.75	DRIVEWAY CONCRETE, 6 IN TK	11925.00
441-0740	1000	SY	35.93	CONCRETE MEDIAN, 4 IN	35930.00
550-1180	3000	LF	40.19	STORM DRAIN PIPE, 18 IN, H 1-10	120570.00
550-1240	4000	LF	46.13	STORM DRAIN PIPE, 24 IN, H 1-10	184520.00
550-1360	1000	LF	80.97	STORM DRAIN PIPE, 36 IN, H 1-10	80970.00
550-3624	4	EA	975.07	SAFETY END SECTION 24 IN, SIDE DRAIN, 6:1 SLOPE	3900.28
550-4136	2	EA	819.07	FLARED END SECTION 36 IN, SIDE DRAIN	1638.14
577-1100	4	EA	1882.31	METAL DRAIN INLET - COMPLETE ASSEMBLY	7529.24
620-0100	2000	LF	26.35	TEMPORARY BARRIER, METHOD NO. 1	52700.00
634-1200	50	EA	101.50	RIGHT OF WAY MARKERS	5075.00
635-1090	20	LF	99.82	BARRICADES	1996.40
641-1100	100	LF	42.44	GUARDRAIL, TP T	4244.00
641-1200	2000	LF	15.44	GUARDRAIL, TP W	30880.00
641-5001	4	EA	619.00	GUARDRAIL ANCHORAGE, TP 1	2476.00
641-5012	4	EA	1838.99	GUARDRAIL ANCHORAGE, TP 12	7355.96
643-8200	100	LF	2.91	BARRIER FENCE (ORANGE), 4 FT	291.00
668-8013	100	SF	40.07	SAFETY GRATE, TP 3	4007.00
<b>Section Sub Total:</b>					<b>\$3,015,384.93</b>

Section PERMANENT EROSION CONTROL ITEMS					
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Item Number	Quantity	Units	Unit Price	Item Description	Cost
166-0650	1	EA	27500.00	RESTORATION OF LAKE, STA -	27500.00
441-0204	500	SY	36.30	PLAIN CONC DITCH PAVING, 4 IN	18150.00
603-2018	50	SY	53.31	STN DUMPED RIP RAP, TP 1, 18 IN	2665.50
603-2024	100	SY	54.72	STN DUMPED RIP RAP, TP 1, 24 IN	5472.00
603-2036	100	SY	60.00	STN DUMPED RIP RAP, TP 1, 36 IN	6000.00
603-7000	250	SY	5.23	PLASTIC FILTER FABRIC	1307.50
<b>Section Sub Total:</b>					<b>\$61,095.00</b>

Section BRIDGE OVER I-85					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
000-XXXX	49162	SF	150.00	BRIDGE OVER I-85	7224300.00
500-3201	1100	CY	556.27	CLASS B CONCRETE, RETAINING WALL	611897.00
<b>Section Sub Total:</b>					<b>\$7,836,197.00</b>

Section SIGNING AND MARKING ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
000-XXXX	1	Lump Sum	100000.00	SIGNING AND MARKING - PROJECT	100000.00
<b>Section Sub Total:</b>					<b>\$100,000.00</b>

<del>Subtotal Construction Cost</del>	<del>\$11,390,843.99</del>
<del>E&amp;C Rate 10.0 %</del>	<del>\$1,139,084.40</del>
<del>Inflation Rate 0.0 % @ 0 Years</del>	<del>\$0.00</del>
<del>Total Construction Cost</del>	<del>\$12,529,928.39</del>
<del>Right Of Way</del>	<del>\$7,288,000.00</del>
<del>Reimb. Utilities</del>	<del>\$0.00</del>
<del>Grand Total Project Cost</del>	<del>\$19,817,928.39</del>

Total Estimated Cost: \$11,390,843.99

ENGINEERING @ 5% = 569,542  
 CONTINGENCY @ 8% = 956,831

TOTAL COST EST COST = 12,917,215.41  
 RIGHT-OF-WAY - 7,288,000  
 REIMB UTILITIES - -0-  
 TOTAL PROJECT COST = \$20,205,215.41

*ADD 6/23/2008*

**Estimate Report for file "142285 BRST-0998(1) Gwinnett County\_2008-10-01"**

<b>Section ROADWAY ITEMS</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	1	LS	900000.00	TRAFFIC CONTROL - BRST0-0998-00(001)	900000.00
153-1300	1	EA	67354.21	FIELD ENGINEERS OFFICE TP 3	67354.21
201-1500	1	LS	150000.00	CLEARING & GRUBBING - BRST-0998(1)	150000.00
205-0001	92392	CY	3.23	UNCLASS EXCAV	298426.16
206-0002	50923	CY	4.45	BORROW EXCAV, INCL MATL	226607.35
310-1101	37102	TN	18.67	GR AGGR BASE CRS, INCL MATL	692694.34
318-3000	300	TN	22.73	AGGR SURF CRS	6819.00
402-1812	50	TN	75.00	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME	3750.00
402-3121	13666	TN	75.00	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	1024950.00
402-3130	5294	TN	75.00	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME	397050.00
402-3190	11118	TN	75.00	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	833850.00
413-1000	3910	GL	2.17	BITUM TACK COAT	8484.70
432-0206	12318	SY	1.92	MILL ASPH CONC PVMT, 1 1/2 IN DEPTH	23650.56
433-1000	610	SY	157.44	REINF CONC APPROACH SLAB	96038.40
441-0016	594	SY	39.02	DRIVEWAY CONCRETE, 6 IN TK	23177.88
441-0104	3884	SY	33.87	CONC SIDEWALK, 4 IN	131551.08
441-0740	1105	SY	33.79	CONCRETE MEDIAN, 4 IN	37337.95
441-4020	367	SY	39.52	CONC VALLEY GUTTER, 6 IN	14503.84
441-6222	7395	LF	15.43	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	114104.85
441-6740	6862	LF	13.39	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	91882.18
446-1100	144	LF	5.08	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	731.52
522-1000	1	LS	100000.00	SHORING	100000.00
620-0100	1566	LF	31.99	TEMPORARY BARRIER, METHOD NO. 1	50095.34
627-1000	173	SF	44.03	MSE WALL FACE, 0 - 10 FT HT, WALL NO - 1	7617.19
627-1000	165	SF	44.03	MSE WALL FACE, 0 - 10 FT HT, WALL NO - 2	7264.95
627-1010	708	SF	44.96	MSE WALL FACE, 10 - 20 FT HT, WALL NO - 2	31831.68
627-1010	752	SF	44.96	MSE WALL FACE, 10 - 20 FT HT, WALL NO - 1	33809.92
627-1020	3532	SF	44.37	MSE WALL FACE, 20 - 30 FT HT, WALL NO - 1	156714.84
627-1020	4047	SF	44.37	MSE WALL FACE, 20 - 30 FT HT, WALL NO - 2	179565.39
627-1100	237	LF	70.82	COPING A, WALL NO - 2	16784.34
627-1100	230	LF	70.82	COPING A, WALL NO - 1	16288.60
634-1200	73	EA	104.77	RIGHT OF WAY MARKERS	7648.21
635-1000	24	LF	90.23	BARRICADES	2165.52
641-1100	59	LF	49.15	GUARDRAIL, TP T	2899.85
641-1200	3174	LF	16.69	GUARDRAIL, TP W	52974.06
641-5001	8	EA	644.45	GUARDRAIL ANCHORAGE, TP 1	5155.60
641-5012	8	EA	1812.79	GUARDRAIL ANCHORAGE, TP 12	14502.32
643-8200	1073	LF	3.30	BARRIER FENCE (ORANGE), 4 FT	3540.90
648-1350	2	EA	19440.25	IMPACT ATTENUATOR UNIT, TYPE P -	38880.50
<b>Section Sub Total:</b>					<b>\$5,870,704.23</b>

<b>Section DRAINAGE ITEMS</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
207-0203	79	CY	51.28	FOUND BK FILL MATL, TP II	4051.12
500-3101	341	CY	279.62	CLASS A CONCRETE	95350.42
511-1000	26041	LB	0.87	BAR REINF STEEL	22655.67
550-1180	4952	LF	35.41	STORM DRAIN PIPE, 18 IN, H 1-10	175350.32
550-1240	480	LF	43.51	STORM DRAIN PIPE, 24 IN, H 1-10	20884.80
550-1300	528	LF	64.02	STORM DRAIN PIPE, 30 IN, H 1-10	33802.56
550-1360	192	LF	72.32	STORM DRAIN PIPE, 36 IN, H 1-10	13885.44
550-1420	636	LF	91.66	STORM DRAIN PIPE, 42 IN, H 1-10	58295.76
550-1480	40	LF	110.82	STORM DRAIN PIPE, 48 IN, H 1-10	4432.80
550-2180	928	LF	31.03	SIDE DRAIN PIPE, 18 IN, H 1-10	28795.84
550-3418	6	EA	648.26	SAFETY END SECTION 18 IN, SIDE DRAIN, 4:1 SLOPE	3889.56
550-4224	1	EA	772.90	FLARED END SECTION 24 IN, STORM DRAIN	772.90
550-4230	2	EA	879.58	FLARED END SECTION 30 IN, STORM DRAIN	1759.16
550-4236	3	EA	1218.63	FLARED END SECTION 36 IN, STORM DRAIN	3655.89
603-2180	177	SY	26.08	STN DUMPED RIP RAP, TP 3, 12 IN	4616.16
603-7000	177	SY	5.36	PLASTIC FILTER FABRIC	948.72

668-1100	48	EA	2634.38	CATCH BASIN, GP 1	126450.24
668-1110	28	LF	289.78	CATCH BASIN, GP 1, ADDL DEPTH	8113.84
668-2100	9	EA	2403.81	DROP INLET, GP 1	21634.29
668-2110	3	LF	322.56	DROP INLET, GP 1, ADDL DEPTH	967.68
668-4400	2	EA	2839.85	STORM SEWER MANHOLE, TP 2	5679.70
668-4411	9	LF	295.17	STORM SEWER MANHOLE, TP 2, ADDL DEPTH, CL 1	2656.53
668-5000	1	EA	2220.22	JUNCTION BOX	2220.22
<b>Section Sub Total:</b>					<b>\$640,869.62</b>

Section BRIDGE ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
000-XXXX	47726	SF	160.00	BRIDGE OVER I-85	7636160.00
207-2003	0	CY	40.43	IMPERFECT TRENCH BKFILL MATL, TP III	0.00
500-3101	0	CY	279.62	CLASS A CONCRETE	0.00
511-1000	0	LB	0.87	BAR REINF STEEL	0.00
<b>Section Sub Total:</b>					<b>\$7,636,160.00</b>

Section EROSION CONTROL ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0232	9	AC	477.88	TEMPORARY GRASSING	4300.92
163-0240	349	TN	187.98	MULCH	65605.02
163-0300	8	EA	1521.75	CONSTRUCTION EXIT	12174.00
163-0501	2	EA	851.89	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 1	1703.78
163-0503	4	EA	542.90	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 3	2171.60
163-0520	748	LF	15.57	CONSTRUCT AND REMOVE TEMPORARY PIPE SLOPE DRAIN	11646.36
163-0523	209	EA	166.88	CONSTRUCT AND REMOVE TEMPORARY DITCH CHECKS - TYPE C SILT FENCE	34877.92
163-0550	56	EA	219.94	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	12316.64
165-0030	4635	LF	1.03	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	4774.05
165-0040	209	EA	123.02	MAINTENANCE OF EROSION CONTROL CHECKDAMS/DITCH CHECKS	25711.18
165-0085	2	EA	287.76	MAINTENANCE OF SILT CONTROL GATE, TP 1	575.52
165-0087	4	EA	131.36	MAINTENANCE OF SILT CONTROL GATE, TP 3	525.44
165-0101	8	EA	510.76	MAINTENANCE OF CONSTRUCTION EXIT	4086.08
165-0105	56	EA	96.35	MAINTENANCE OF INLET SEDIMENT TRAP	5395.60
167-1000	2	EA	783.30	WATER QUALITY MONITORING AND SAMPLING	1566.60
167-1500	24	MO	905.40	WATER QUALITY INSPECTIONS	21729.60
171-0030	9269	LF	3.92	TEMPORARY SILT FENCE, TYPE C	36334.48
700-6910	18	AC	899.19	PERMANENT GRASSING	16185.42
700-7000	37	TN	66.81	AGRICULTURAL LIME	2471.97
700-7010	46	GL	20.41	LIQUID LIME	938.86
700-8000	13	TN	382.77	FERTILIZER MIXED GRADE	4976.01
700-8100	905	LB	2.45	FERTILIZER NITROGEN CONTENT	2217.25
710-9000	4417	SY	4.77	PERMANENT SOIL REINFORCING MAT	21069.09
716-2000	14638	SY	0.89	EROSION CONTROL MATS, SLOPES	13027.82
<b>Section Sub Total:</b>					<b>\$306,381.21</b>

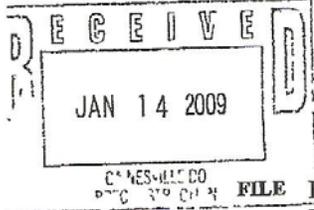
Section SIGNING AND MARKING ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
636-1020	12	SF	15.52	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	186.24
636-1029	22	SF	15.25	HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING, TP 3	335.50
636-1033	184	SF	19.62	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 9	3610.08
636-1041	12	SF	42.82	HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING, TP 9	513.84
636-2070	87	LF	8.74	GALV STEEL POSTS, TP 7	760.38
636-2080	346	LF	8.95	GALV STEEL POSTS, TP 8	3096.70
653-0120	26	EA	74.36	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	1933.36
653-0170	5	EA	83.67	THERMOPLASTIC PVMT MARKING, ARROW, TP 7	418.35
653-1501	18470	LF	0.46	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	8496.20
653-1502	18030	LF	0.46	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	8293.80
653-1704	40	LF	3.55	THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	142.00
653-1804	840	LF	1.76	THERMOPLASTIC SOLID TRAF STRIPE, 8 IN, WHITE	1478.40
653-3501	9078	GLF	0.38	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	3449.64
653-6004	396	SY	2.81	THERMOPLASTIC TRAF STRIPING, WHITE	1112.76
654-1001	128	EA	3.19	RAISED PVMT MARKERS TP 1	408.32
654-1003	240	EA	3.70	RAISED PVMT MARKERS TP 3	888.00
PREFORMED PLASTIC SOLID PVMT MKG, 8 IN,					

657-1085	1216	LF	5.12	CONTRAST (BLACK-WHITE), TP PB	6225.92
657-3085	1216	GLF	3.83	PREFORMED PLASTIC SKIP PVMT MKG, 8 IN, CONTRAST (BLACK-WHITE), TP PB	4657.28
<b>Section Sub Total:</b>					<b>\$46,006.77</b>

**Total Estimated Cost: \$14,500,121.83**

<b>Subtotal Construction Cost</b>	<b>\$14,500,121.83</b>
E&C Rate 10.0 %	\$1,450,012.18
Inflation Rate 0.0 % @ 0 Years	\$0.00
<hr/>	
<b>Total Construction Cost</b>	<b>\$15,950,134.01</b>
Right Of Way	\$6,000,000.00
ReImb. Utilities	\$0.00
<hr/>	
<b>Grand Total Project Cost</b>	<b>\$21,950,134.01</b>

**DEPARTMENT OF TRANSPORTATION**



**STATE OF GEORGIA**

INTERDEPARTMENTAL CORRESPONDENCE

**FILE** BRST0-0998-00(001) Gwinnett  
PI No 142285

**OFFICE** Materials and Research  
**DATE** January 6, 2009

**FROM** *Geary M Geary* Geary, P E, State Materials and Research Engineer  
**TO** Russell McMurry, P E, District Engineer, Gainesville  
Attention Robert Mahoney, P E, District Preconstruction Engineer

**SUBJECT** Review of Consultant's Proposed Pavement Design  
Bridge Replacement SR 324 / Gravel Springs Road over I-85

As requested, we have reviewed the pavement design submitted by Gresham, Smith and Partners, for the aforementioned project. This project is for the bridge replacement of SR 324 / Gravel Springs Road over I-85 in Gwinnett County.

We have used the following design inputs in reviewing the submitted designs:

- A 20 year design period and a terminal serviceability of 2.5
- Pavement design values considered typical for Gwinnett County
- A lane distribution factor of 90% considered typical for four lane divided highways
- One-way traffic design volumes approved by OEL as tabulated below
- An 18-K ESAL factor of 1.06 as used in the pavement designs prepared by the Consultant

Design Data					
Route	Design Life, years	Initial One-Way Traffic	Final One-Way Traffic	% SU	% MU
SR 324 / Gravel Springs Rd	20	16,400	21,000	4	2

D142285REV

The current two-way AADT is greater than 25,000 vpd Because of this AADT, the surface mix used is a polymer modified

In summary we propose the following pavement structure for this project

<b>Alternate 1 SR 324 / Gravel Springs Road over I-85</b>				
<b>PAY ITEM NUMBER</b>	<b>MATERIAL</b>	<b>COURSE</b>	<b>THICKNESS</b>	<b>SPREAD RATE</b>
402-4510	12 5 mm Superpave (Poly-Mod)	Surface	1 50 inches	165 lbs/yd <sup>2</sup>
402-3190	19 mm SP	Binder	2 inches	220 lbs/yd <sup>2</sup>
402-3121	25 mm SP	Asphalt Base	8 inches	880 lbs/yd <sup>2</sup>
310-1101	Graded Aggregate Base	Base	12 inches	N/A

The following pavement structure may also be considered Structurally, it is equivalent to Alternate 1 It replaces two inches of 25 mm SP base asphalt with two inches of 19 mm SP binder asphalt to facilitate construction staging under traffic

<b>Alternate 2: SR 324 / Gravel Springs Road over I-85</b>				
<b>PAY ITEM NUMBER</b>	<b>MATERIAL</b>	<b>COURSE</b>	<b>THICKNESS</b>	<b>SPREAD RATE</b>
402-4510	12 5 mm Superpave (Poly-Mod)	Surface	1 50 inches	165 lbs/yd <sup>2</sup>
402-3190	19 mm SP	Binder	4 inches	440 lbs/yd <sup>2</sup>
402-3121	25 mm SP	Asphalt Base	6 inches	660 lbs/yd <sup>2</sup>
310-1101	Graded Aggregate Base	Base	12 inches	N/A

BRST0-0998-00(001) Gwinnett  
Bridge Replacement SR 324 / Gravel Springs Road over I-85  
Page 3 of 3

If additional information is needed, please contact A J Jubran of the Pavement Management Branch at 404-363-7582

GMG JTR AJJ

Attachments  
Pavement Designs, SR 324 / Gravel Springs Road over I-85

Copy

Harold Mull, Area Engineer, Lawrenceville  
Sheila Hines, State Bituminous Construction Engineer, Forest Park  
file

D1422856REV



**FLEXIBLE PAVEMENT DESIGN ANALYSIS**

Project BRST0-0998-00(001)  
P.I. no 142285

County: Gwinnett

Description: Bridge Replacement SR 324 / Gravel Springs Rd over I-85

Traffic Data (NOTE AADTs are one-way)

24-hour Truck Percentage 6.00%  
AADT initial year of design period 16,400 vpd (2011)  
AADT final year of design period 21,000 vpd (2031)  
Mean AADT (one-way) 18,700 vpd

Design Loading

Mean AADT	*	LDL	*	Trucks	*	18-K ESAL	=	Total Daily Loads
18,700	*	0.90	*	0.060	*	1.06	=	1,071

Total predicted design period loading = 1071 \* 20 \* 365 = 7,818,300

Design Data

Terminal Serviceability Index 2.50  
Soil Support 2.50  
Regional Factor 1.80

**PROPOSED FLEXIBLE PAVEMENT STRUCTURE**

Material	Thickness Inches	(mm)	Structural Coefficient	Structural Value
12.5 mm Superpave <i>Poly Mod</i>	1.50	(38)	0.44	0.66
19 mm Superpave	3.00	(76)	0.44	1.32
	1.00	(25)	0.30	0.30
25 mm Superpave	6.00	(152)	0.30	1.80
Graded Aggregate Base	12.00	(305)	0.16	1.92

Required SN = 6.13

Proposed SN = 6.00

>>> Proposed pavement is 2.1% Underdesigned <<<

Remarks Full Depth Design Extra 19 mm if needed for staging

Prepared by A J Jubran December 22, 2008  
State Pavement Engineer Date

Recommended \_\_\_\_\_  
District Engineer Date

Approved  1/5/2009  
State Pavement Engineer Date

# *Value Engineering Process*

## ***VALUE ENGINEERING PROCESS***

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE Study during the period of January 20 through 23, 2009 in Atlanta, Georgia, for the Georgia Department of Transportation.

### **INTRODUCTION**

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

Charles McDuff, PE, CVS, CCE, LEED-AP	Certified Value Specialist
Ramesh Kalvakaalva, P.E., AVS	Senior Bridge Structural Engineer
Vinay Uchil, PE PMP, CCM	Highway Construction Specialist
Luke Clarke, PE, AVS	Highway and Transportation Engineer

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 the Georgia Department of Transportation (GDOT) staff. This briefing included discussions of the design intent behind the project, the cost concerns, and the physical project limitations. In the working session that followed, the VE Team developed cost models from the cost data provided by the designers and familiarized themselves with the construction drawings and other data that was available to the team. Some of the representative project information (concept report, cost estimate, and special provisions) may be found in the tabbed section of this report entitled ***Project Description***. Following this current narrative the reader will also find a cost model done in the Pareto fashion, i.e., identifying the highest costs down to the lowest costs for the larger construction cost elements. This cost model, developed by the VE Team, was used by the VE Team to help focus their week of work. The headings on the Pareto Chart also were used as headings for creative phase activities.
- **Analysis Phase** – during this phase the VE Team determined the “**Functions**” of the project. This was accomplished by reviewing the project from the simplest format in asking the questions of “What is the project supposed to do?”, and “How is it supposed to accomplish this purpose? In the Value Engineering vernacular, the answers to these questions are cast in the form of active verbs and measurable nouns. These verb/noun pairs form the basis of the function analysis which distinguishes a Value Engineering effort from a potentially damaging cost cutting exercise.

- The important functions of the project were identified as follows:
  - **Project Objective/Goals**
    - **Improve Level of Service**
    - **Complete East/West corridor**
    - **Improve safety**
    - **Accommodate economic growth**
    - **Maintain reasonable schedule**
    - **Reduce construction costs**
    - **Facilitate future I-85 expansion**
  - **Project Basic Functions**
    - **Separate traffic**
    - **Increase capacity**
    - **Reduce conflicts**
    - **Improve pavement**
- **Speculation Phase** - The VE team performed a brainstorming session to identify ideas that might help meet the project objectives:
  - **Add travel lanes**
  - **Reconfigure bridge layout**
  - **Reduce Right of Way taking**
  - **Modify pavement**
  - **Modify construction sequence**
  - **Eliminate county road relocations**

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
  - Improve value
  - Maintainability
  - Ability to implement the idea
  - General acceptability of the alternatives
  - Constructability
  - Scheduling delays

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

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

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

# VALUE ENGINEERING STUDY AGENDA

for  
Georgia Department of Transportation

Project No. BRSTO-0098-00(001)

P.I. No. 142285

SR 324 Gravel Springs Rd. @ I-85

January 20-23, 2009

## Pre-Workshop Activities

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

## Day One

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

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

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

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

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

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

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

- Brainstorming of alternative ideas

## **Day Two**

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

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

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

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

## **Day Three**

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

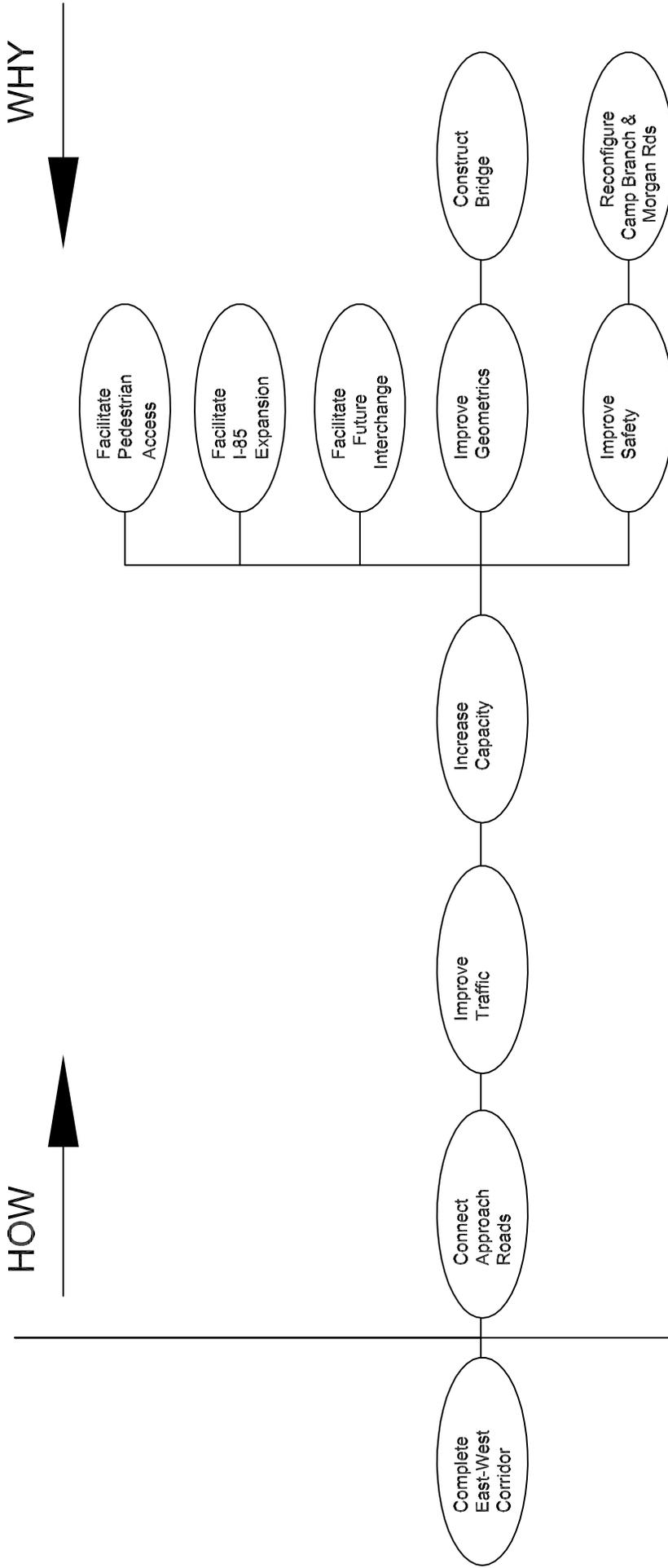
- Continue developing Alternative Ideas
- Continue developing Design Suggestions
- Prepare for presentation to Owners and Designers

## **Day Four**

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

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

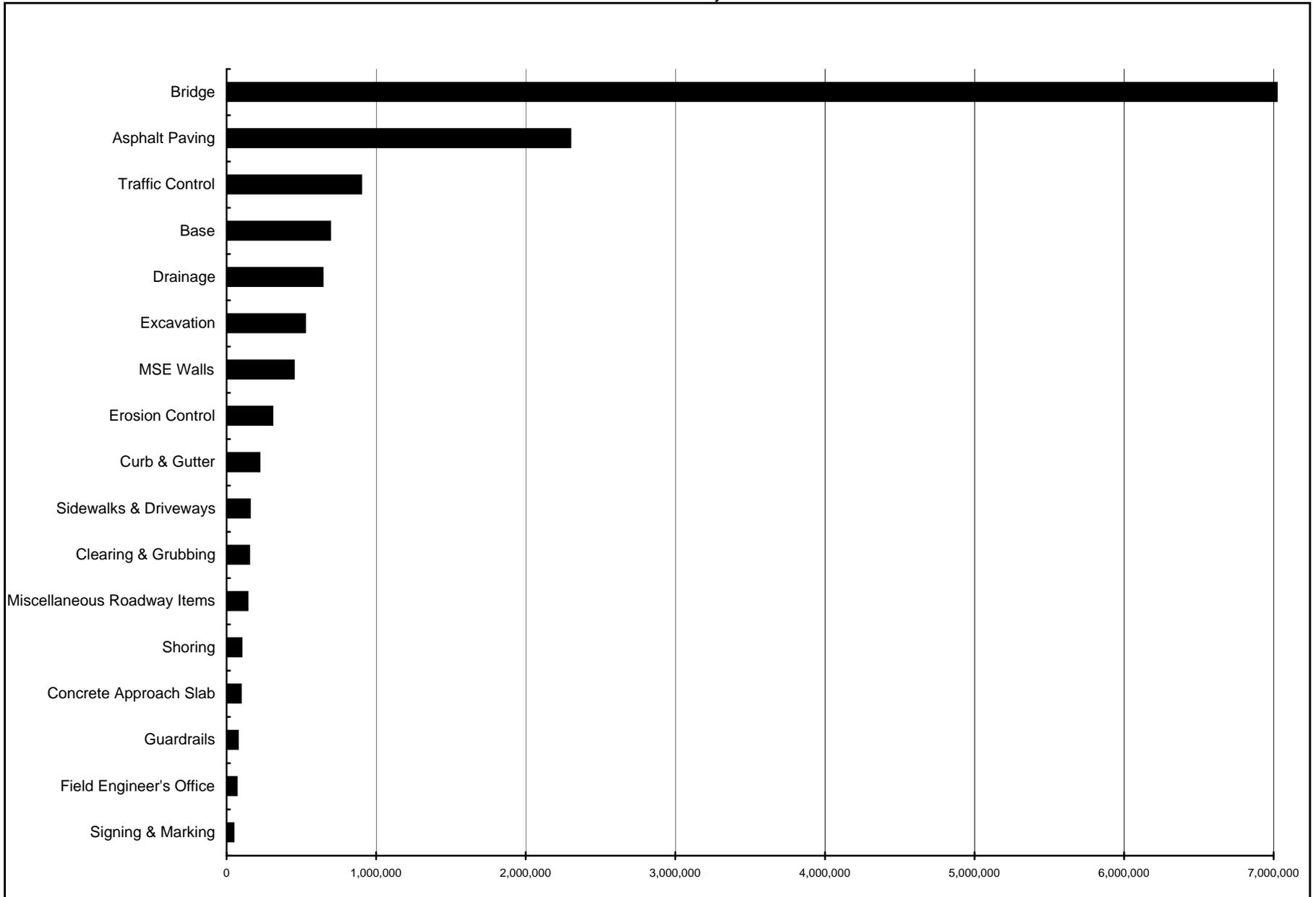
Georgia Department of Transportation  
BRSTO-0998-00(001) - P.I. No.: 142285  
SR 324 Gravel Springs Rd. @ I-85  
Gwinnett County



Functional Analysis System Technique (FAST)



Construction Costs  
Project: BRST0-0998-00(001)  
P.I. No.:142285  
Gwinnett County



# DESIGNER PRESENTATION



## MEETING PARTICIPANTS

Geogia Department of Transportation		January 20, 2009		
BRST0-098-00(001) - P.I. No.: 142285 - Gwinnett County				
NAME	ORGANIZATION & TITLE	E-MAIL	PHONE	
Lisa Myers	 GDOT - Engineering Services	<a href="mailto:lmyers@dot.ga.gov">lmyers@dot.ga.gov</a>	404-631-1770	
Ken Werho	 GDOT-Traffic Operations	<a href="mailto:kwelho@dot.ga.gov">kwelho@dot.ga.gov</a>	404-635-8144	
Douglas Fudool	 GDOT-Engineering Services	<a href="mailto:dfudool@dot.ga.gov">dfudool@dot.ga.gov</a>	404-631-1764	
Jerry Milligan	 GDOT-Right-of-Way	<a href="mailto:jmilligan@dot.ga.gov">jmilligan@dot.ga.gov</a>	404-347-0170	
Ron Wishon	 GDOT-Engineering Services	<a href="mailto:rwishon@dot.ga.gov">rwishon@dot.ga.gov</a>	404-631-1753	
Alan Chapman	 Gwinnett DOT	<a href="mailto:alan.chapman@gwinnettcountry.com">alan.chapman@gwinnettcountry.com</a>	770-822-7449	
Robert Mahoney	 GDOT-District 1	<a href="mailto:rmahoney@dot.ga.gov">rmahoney@dot.ga.gov</a>	770-532-5520	
Harold Mull	 GDOT-District 1-Area 5	<a href="mailto:hmull@dot.ga.gov">hmull@dot.ga.gov</a>	770-339-2308	
Matt Needham	 GDOT-District 7-Area 5	<a href="mailto:mneedham@dot.ga.gov">mneedham@dot.ga.gov</a>	770-339-2308	
Latoya Johnson	 FHWA	<a href="mailto:latoya.johnson@fhwa.dot.gov">latoya.johnson@fhwa.dot.gov</a>	404-562-4280	
Charles McDuff, PE, CVS, CCE, LEED-AP	 PBS&J	<a href="mailto:crmcduff@pbsj.com">crmcduff@pbsj.com</a>	919-431-5300	
Luke Clarke, PE	 PBS&J	<a href="mailto:lwclarke@pbsj.com">lwclarke@pbsj.com</a>	205-969-3776	
Vinay Uchil, P.E., PMP, CCM	 PBS&J	<a href="mailto:vuchil@pbsj.com">vuchil@pbsj.com</a>	770-736-8008	
Ramesh Kalvakaalva, P.E., AVS	 Civil Services, Inc.	<a href="mailto:rameshk@civilservicesinc.com">rameshk@civilservicesinc.com</a>	404-685-8001	
Brian O'Connor	 Gresham, Smith & Partners	<a href="mailto:brian_oconnor@gspnet.com">brian_oconnor@gspnet.com</a>	678-518-3659	
Jody Braswell	 Gresham, Smith & Partners	<a href="mailto:jody_braswell@gspnet.com">jody_braswell@gspnet.com</a>	678-518-3655	

# VE TEAM PRESENTATION



## MEETING PARTICIPANTS

Geogia Department of Transportation		January 23, 2009		
BRST0-098-00(001) - P.I. No.: 142285 - Gwinnett County				
NAME	ORGANIZATION & TITLE		E-MAIL	PHONE
Lisa Myers		GDOT - Engineering Services	<a href="mailto:lmyers@dot.ga.gov">lmyers@dot.ga.gov</a>	404-631-1770
Ken Werho		GDOT-Traffic Operations	<a href="mailto:kwerho@dot.ga.gov">kwerho@dot.ga.gov</a>	404-635-8144
Douglas Fudool		GDOT-Engineering Services	<a href="mailto:dfudool@dot.ga.gov">dfudool@dot.ga.gov</a>	404-631-1764
Jerry Milligan		GDOT-Right-of-Way	<a href="mailto:jmilligan@dot.ga.gov">jmilligan@dot.ga.gov</a>	404-347-0170
Ron Wishon		GDOT-Engineering Services	<a href="mailto:rwishon@dot.ga.gov">rwishon@dot.ga.gov</a>	404-631-1753
Alan Chapman		Gwinnett DOT	<a href="mailto:alan.chapman@gwinnettcounty.com">alan.chapman@gwinnettcounty.com</a>	770-822-7449
Robert Mahoney		GDOT-District 1	<a href="mailto:rmahoney@dot.ga.gov">rmahoney@dot.ga.gov</a>	770-532-5520
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Brian O'Connor		Gresham, Smith & Partners	<a href="mailto:brian_oconnor@gspnet.com">brian_oconnor@gspnet.com</a>	678-518-3659
Jody Braswell		Gresham, Smith & Partners	<a href="mailto:jody_braswell@gspnet.com">jody_braswell@gspnet.com</a>	678-518-3655

# CREATIVE IDEA LISTING



PROJECT: <b>Georgia Department of Transportation          BRST0-0998-00(001) – P.I. No.: 142285          SR 324 Gravel Springs Rd. @ I-85          Gwinnett County</b>		SHEET NO.: <b>1 of 2</b>
NO.	IDEA DESCRIPTION	RATING
<b>ROADWAY (RD)</b>		
RD-1	Cul-de-sac the county roads	4
RD-2	Raise profiles of Morgan and Camp Branch Roads, in place, in lieu of relocation	1
RD-3	Use concrete pavement in lieu of asphalt in future interchange area	3
RD-4	Provide sidewalk on one side only	4
RD-5	In lieu of phased bridge construction, use detour and construct bridge in one phase	5
RD-6	Signalize county road intersections	3
RD-7	Use concrete in lieu of asphalt within 300' of stop line on county roads	1
RD-8	Ensure current design accommodates future half cloverleaf options	See BR-4
RD-9	Provide right in – right out only at county road intersections. Relocate county roads in future interchange project	3
RD-10	Use 11' travel lanes on county roads	5
RD-11	Use 11' inside and turn lanes, and 12' outside lanes for typical section on S.R. 324	4
RD-12	Reduce paved shoulders on county Roads from 4' to 2'	4
RD-13	Provide crosswalks at intersections	4
RD-14	Use Gilsonite in lieu of asphalt at intersections	3
RD-15	Reduce pavement thickness on county roads	5
<b>Rating: 1→2 = Not to be Developed; 3 = Varying Degrees of Development Potential;          4→5 = Most likely to be Developed; DS = Design Suggestion; ABD = Already Being Done</b>		

