Value Engineering Study Report

Georgia Department of Transportation
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

GDOT
Keeping Georgia on the Move

Value Engineering Team

PBS&J

Design Team

1925 - 2005 80 VOLKERT

April 24, 2009

April 24, 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.: CSSTP-0006-00(416)
P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

Dear Ms. Myers:

Please find enclosed two (2) hard copies and one (1) CD of our final Value Engineering Report for the SFR 53 reconstruction in Gordon/Pickens Counties.

This Value Engineering Study, which was performed during the period April 6 through April 9, 2009, identified **20 *Alternative Ideas*** of which **8 *Alternative Ideas* are recommended for implementation**. In addition, the team is recommending ***1 Design Suggestion*** for your consideration. 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

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

Randy S. Thomas, CVS
Assistant Team Leader

Value Engineering Study Report

Project No. CSSTP-006-00(416)
P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

Table of Contents

EXECUTIVE SUMMARY

INTRODUCTION

The subject of this Value Engineering Study is project No. CSTTP-0006-00(416) - P.I. No. 0006416. This project is the reconstruction and realignment of a portion of SR 53 in Gordon and Pickens County. The length of the project is approximately 1.5 miles beginning from a point 3,700' east of Ryo Mountain Road in Gordon County, and ends 1,700' west of Davis Road in Pickens County. The design is in the preliminary stage. The designer is Volkert and Associates, Inc.

PROJECT DESCRIPTION

Currently, this section of road consists of three twelve-foot lanes with 0' to 3' shoulders on 80' of existing right of way. The accident rates for 2001 through 2004 exceeded the statewide average for this type of roadway. The existing horizontal alignment has nine curves that do not meet AASHTO's minimum requirements. In addition, five curves do not meet the minimum vertical profile requirements.

Design speed will be 65 mph and posted speed will be 55mph. The proposed design re-aligns SR 53 to bring existing curves up to current design standards. The road will remain a three lane facility with shoulders added to the entire length of the project. Construction will be staged to maintain traffic flow.

The estimated construction costs are $8,481,456 with additional Right-of-Way costs of $2,450,000 and reimbursable utility costs of $500,000. The projected total project cost is $11,431,456.

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:

- Due to the existing terrain, it is necessary to reconstruct the highway on a new alignment.
- To maintain uninterrupted use of the road, it is necessary to intersect the new alignment with the old alignment at some point between the beginning and ending points.
- The majority of all accidents occur on the west bound travel lane.

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 **20** ***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, ***8 Alternative Ideas*** remained for further consideration. In addition, the team developed 1 ***Design Suggestion***. These Alternative Ideas may be found, in their documented form, in the section of this report entitled ***Study Results***.

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

Summary of Alternatives & Design Suggestions

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

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

ALTERNATIVE NUMBER	DESCRIPTION OF ALTERNATIVE	INITIAL COST SAVINGS
	ROADWAY (RD)	
RD-4	Use 4'-0" paved shoulder	$225,199
RD-6	Utilize a new alignment north of existing SR 53	$3,641,551
RD-13	Eliminate retaining walls from Sta. 146+60 to Sta. 148+30	$355,394
RD-14	Shift traffic in construction sequence (Phase 2C) and eliminate proposed shoring	$209,000
RD-16	Provide westbound passing lanes	0
RD-17	Use 8'-0" shoulders	$65,622
RD-18	Reduce clear zone to 32' from 30'	$69,841
RD-19	Reduce pavement thickness on shoulders	$365,640
RD-20	Extend Right-of-Way to accommodate pipe maintenance at Sta. 147+36	DS

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.

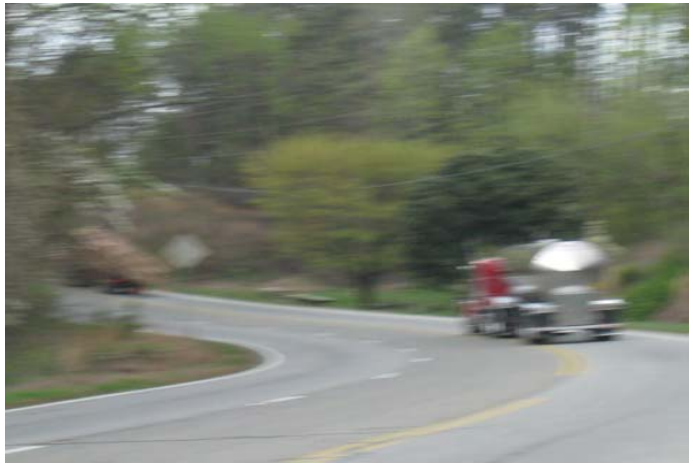
The users of this report are asked to consider these alternatives and design suggestions as a smorgasbord of choices for selection and use as the project moves forward. The enclosed ***Summary of Alternatives & Design Suggestions*** may also be used as a "score sheet" within the bounds of an implementation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

Georgia Department of Transportation
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties



Summary of Alternatives & Design Suggestions

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

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

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Value Analysis Design Alternative

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.:	**RD-4**
DESCRIPTION:	**Use 4'-0" paved shoulder**	SHEET NO.:	**1** of **4**

Original Design:

The original design proposes constructing a 10'-0" shoulder, 6'-0" paved.

Alternative:

The alternative proposes constructing a 10'-0" shoulder, 4'-0" paved.

Opportunities:

- Reduction in pavement quantities
- Reduction in construction time

Risks:

- Minimal design impacts
- Reduces improved shoulder width

Technical Discussion:

See "A Policy on Geometric Designs of Highways and Streets", AASHTO 2004 Ed, Page 252, Para 2. It states that the adjoining shoulder should be at least 4'-0" wide, and goes on to say that a full shoulder "is not as needed on a passing lane section as on a conventional two-lane highway because the vehicles likely to stop are few and there is little difficulty in passing a vehicle with only two wheels on the shoulder." Bearing in mind these factors, the VE team recommends reducing the width of the paved shoulder from 6' -0" to 4-'0", and keeping the overall width of the shoulder at 10'-0".

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 3,000,866	$ 0	$ 3,000,866
ALTERNATIVE	$ 2,775,667	$ 0	$ 2,775,667
SAVINGS	$ 225,199	$ 0	$ 225,199

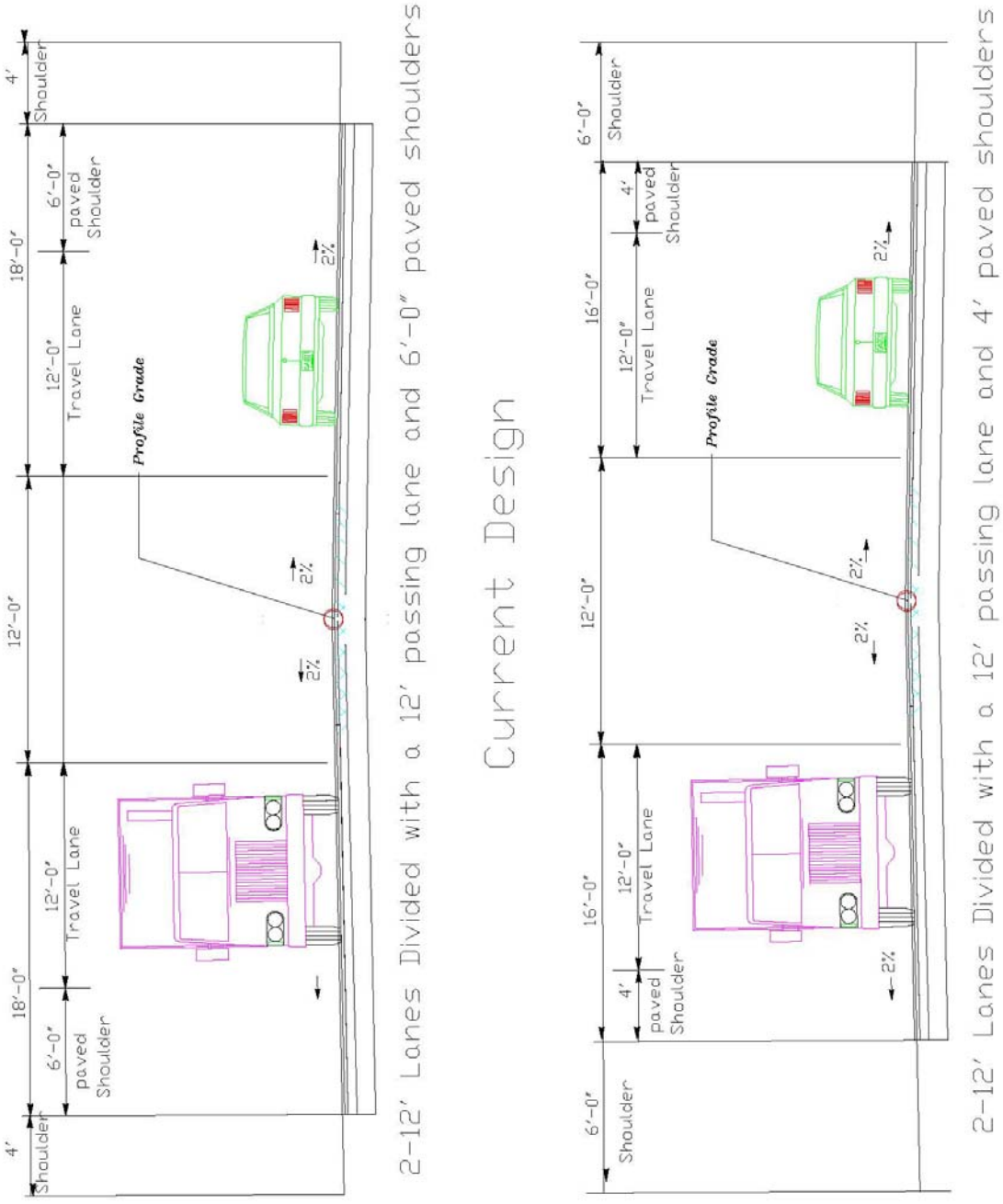
Illustration

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-4**

DESCRIPTION: **Use 4'-0" paved shoulder**

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



Calculations

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-4**
DESCRIPTION:	**Use 4'-0" paved shoulder**	SHEET NO.: **3** of **4**

Assumptions:

-Reduce paved shoulder width throughout proposed reconstruction.

-Project limits= STA 93+40-STA 168+85= 7545LF.

-7545LF x 2'w x 2 sides/9=3353 SY reduction in shoulder buildup.

Pavement Build-up: (per Typical Sections in plans provided)

-GAB, 10" thickness

-25mm Superpave= 660LB/SY

-19mm Superpave= 220LB/SY

-9.5mm Superpave=135LB/SY

Alternative Pavement Quantity Reductions:

-GAB- 3353 SY reduction

-25mm Superpave=3353SY x 660LB/SY/2000=1106 ton reduction

-19mm Superpave= 3353SY x 220LB/SY/2000=369 ton reduction

-9.5mm Superpave= 3353SY x 135LB/SY/2000=226 ton reduction

Cost Worksheet

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PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-4**

DESCRIPTION: **Use 4' paved shoulder**

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
GAB 10"	SY	43,900	$ 15.40	$ 676,060	40,547	$ 15.40	$ 624,424
25mm Superpave	TN	14,500	$ 90.00	$ 1,305,000	13,394	$ 90.00	$ 1,205,460
19mm Superpave	TN	5,100	$ 90.00	$ 459,000	4,731	$ 90.00	$ 425,790
9.5mm Superpave	TN	3,200	$ 90.00	$ 288,000	2,974	$ 90.00	$ 267,660
Sub-total				$ 2,728,060			$ 2,523,334
Mark-up at 10.00%				$ 272,806			$ 252,333
TOTAL				**$ 3,000,866**			**$ 2,775,667**
Estimated Savings:							$225,199

Value Analysis Design Alternative

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-6**
DESCRIPTION:	**Utilize a new alignment north of existing SR-53**	SHEET NO.: **1** of **4**

Original Design:

The original design provides an alignment that goes south of existing SR-53 east of Pleasant Grove Church and then crosses existing SR-53 and extends eastward approximately parallel to the SR-53 tangent at Davis Road.

Alternative:

The alternative would propose an alignment almost exactly east and west with a curve at either end and tying approximately at the current begin and end points

Opportunities:

- Reduced relocations
- Reduced waste and improved earthwork balance
- Reduced Utility impacts
- Elimination of intersection with existing SR-53
- Reduced rock excavation
- Simplified construction sequencing

Risks:

- Major impact to the designer

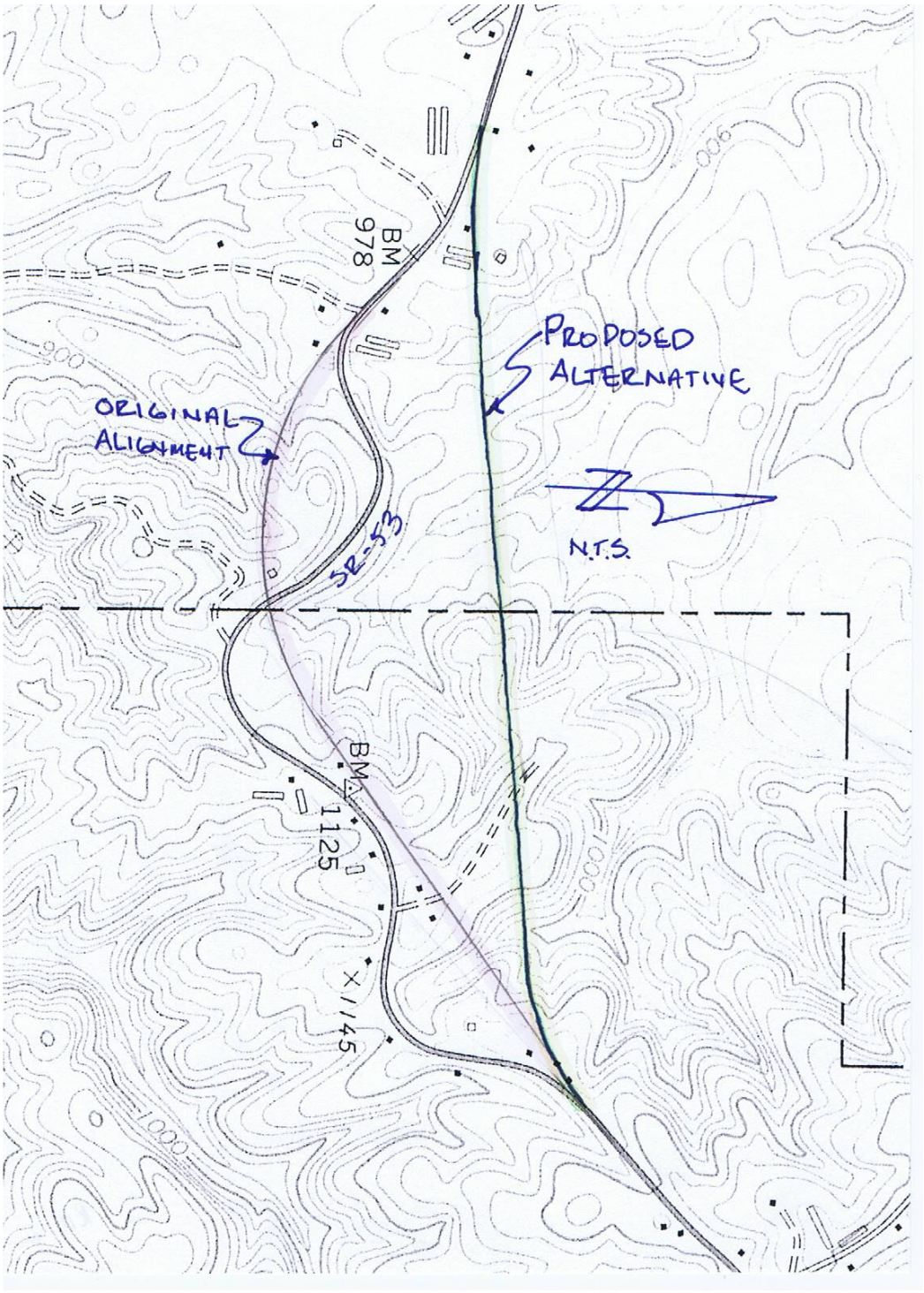
Technical Discussion:

The new location will allow the designer more flexibility to adjust the grade by eliminating the intermediate tie to existing SR-53. While the absolute changes in elevation for the new alignment may be greater, these changes occur less often and over a greater distance, thus providing the opportunity to more closely follow the elevation change of the natural ground. The new alignment will require more fill providing better earthwork balance. The total project length would remain almost identical so no savings in pavement quantities can be realized.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 5,863,331	$ 0	$ 5,863,331
ALTERNATIVE	$ 2,221,780	$ 0	$ 2,221,780
SAVINGS	$ 3,641,551	$ 0	$ 3,641,551

Illustration

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-6**
DESCRIPTION:	**Utilize a new alignment north of existing SR-53**	SHEET NO.: **2** of **4**



Assume water tank relocation not required

Utilities-

Water tank = $500,000

Assume a net savings of four residential relocations

Right of Way-
Improvements- (4/6) x $325,000 = $216,667
Relocations- 4 x $40,000 each = $160,000

Net cost	= $376,667
Scheduling @ 55%	= $207,167
Court cost @ 60%	= $226,000
Market Appreciation@ 40%	= $150,667
Total	= $960,501

Construction Sequence-

Assume a reduction in MOT costs of 40% of $300,000 => $120,00
Elimination of temporary barrier => 660 LF

Earthwork-

Assume total earthwork will not be reduced
Assume rock excavation will be approximately 150,000 CY
Assume by more closely following natural ground rock excavation can be reduced by 50,000 CY
Assume waste can be reduced by 100,000 cy at a premium of $1.50 / CY

Cost Worksheet

PBS&J

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-6**

DESCRIPTION: **Utilize a new alignment north of existing SR-53**

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
Retaining Wall	LS	1	$ 500,000	$ 500,000	0	$ -	$ -
Waste Reduction	CY	100,000	$ 1.50	$ 150,000	0	$ 1.50	$ -
Unclassified Excav.(Rock)	CY	150,000	$ 20.00	$ 3,000,000	100,000	$ 20.00	$ 2,000,000
Shoring	LS	1	$ 200,000	$ 200,000	0	$ -	$ -
Temporary Barrier	LF	660	$ 30.00	$ 19,800	660	$ 30.00	$ 19,800
Right of Way	LS	1	$ 960,501	$ 960,501	0	$ -	$ -
Utilities	LS	1	$ 500,000	$ 500,000	0	$ -	$ -
Sub-total				$ 5,330,301			$ 2,019,800
Mark-up at 10.00%				$ 533,030			$ 201,980
TOTAL				**$ 5,863,331**			**$ 2,221,780**
Estimated Savings:							$3,641,551

Value Analysis Design Alternative

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-13**
DESCRIPTION:	**Eliminate retaining walls from Station 146+60 to Station 148+30**	SHEET NO.: **1** of **3**

Original Design:

The original design provides retaining walls to limit stream impacts at the cross drain located at Station 147+36.41.

Alternative:

The alternative would propose eliminating the retaining walls and extending the cross drain and fill slope.

Opportunities:

- Reduced retaining wall costs

Risks:

- Increased Right-of-Way
- Additional length of cross drain
- Additional required permitting
- Minor impact to the designer

Technical Discussion:

The stream located at Station 147+36.41 was identified as an ephemeral stream so the retaining walls were proposed to limit the linear impacts to less than 300 feet. In response to the VE team's questions about the permitting of the subject stream, they were directed to speak to Ms. Lisa Westbury of GDOT OEL. Ms Westbury spoke with the project ecologist and determined that conditions warranted getting a field determination from the USACE. Even if an individual permit is required, the cost savings will still be in excess of $350,000.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 404,868	$ 0	$ 404,868
ALTERNATIVE	$ 49,473	$ 0	$ 49,473
SAVINGS	$ 355,394	$ 0	$ 355,394

Calculations

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-13**
DESCRIPTION:	**Eliminate retaining walls from Station 146+60 to Station 148+30**	SHEET NO.: **2** of **3**

Station 146+61.85 to Station 148+ 20.41 (Left) =>159' length and 44' maximum height.
Station 146+77.76 to Station 148+ 30.00 (Right) => 152' length and 36' maximum height.

Earthwork – Assume no cost due to the job being in a waste condition.

Right of Way-

(310' x 60') / 43,560 SF/AC => 0.5 Acres
0.5 ac x $15,000 => $7,500

Right of way: Net cost	=	$7,500
Scheduling @ 55%	=	$4,125
Court cost @ 60%	=	$4,500
Market Appreciation@ 40%	=	$3,000
Total	=	$19,125

Cost Worksheet

PBS&J

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-13**

DESCRIPTION: **Eliminate retaining walls from Station 146+60 to Station 148+30**

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

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Retaining Wall	SF	8,000	$ 44.00	$ 352,000	0	$ 44.00	$ -
Right of Way	LS	0	$ -	$ -	1	$ 19,125.00	$ 19,125
Storm Drain 24"	LF	292	$ 55.00	$ 16,060	470	$ 55.00	$ 25,850
Sub-total				$ 368,060			$ 44,975
Mark-up at 10.00%				$ 36,806			$ 4,498
TOTAL				**$ 404,866**			**$ 49,473**
Estimated Savings:							$355,394

Value Analysis Design Alternative

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-14**
DESCRIPTIO	**Shift traffic in Construction Sequence (Phase 2C) and eliminate proposed shoring**	SHEET NO.: **1** of **3**

Original Design:

The original design calls for constructing temporary shoring from Station 135+50 to Station 138+75.

Alternative:

The alternative proposes to reduce the quantity of temporary shoring by revising the construction sequence.

Opportunities:

- Reduced shoring cost

Risks:

- Increased MOT costs
- Minor impact to the designer

Technical Discussion:

The alternative would propose shifting the traffic to the shoulder and utilizing a section of temporary barrier on the new roadway to eliminate the necessity of using shoring to construct the roadway.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 220,000	$ 0	$ 220,000
ALTERNATIVE	$ 11,000	$ 0	$ 11,000
SAVINGS	$ 209,000	$ 0	$ 209,000

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-14**
DESCRIPTION:	**Shift traffic in Construction Sequence – Phase 2C and eliminate proposed shoring**	SHEET NO.: **2** of **3**

Assume an additional $10,000 for striping and maintenance of traffic.

Cost Worksheet

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PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-14**

DESCRIPTION: **Shift traffic in Construction Sequence – Phase 2C and eliminate proposed shoring**

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

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Shoring	LS	1	$ 200,000	$ 200,000	1	$ -	$ -
Striping and MOT	LS	0	$ -	$ -	1	$ 10,000	$ 10,000
Sub-total				$ 200,000			$ 10,000
Mark-up at 10.00%				$ 20,000			$ 1,000
TOTAL				**$ 220,000**			**$ 11,000**
Estimated Savings:							$209,000

Value Analysis Design Alternative

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-16**
DESCRIPTION:	**Provide westbound passing lanes**	SHEET NO.: **1** of **2**

Original Design:

The original design provides additional passing lane all for the eastbound traffic.

Alternative:

The alternative would propose restriping the roadway to more evenly redistribute the passing lanes between the eastbound and westbound roadways.

Opportunities:

- Additional striping costs
- Increased safety

Risks:

- Minor impact to the designer

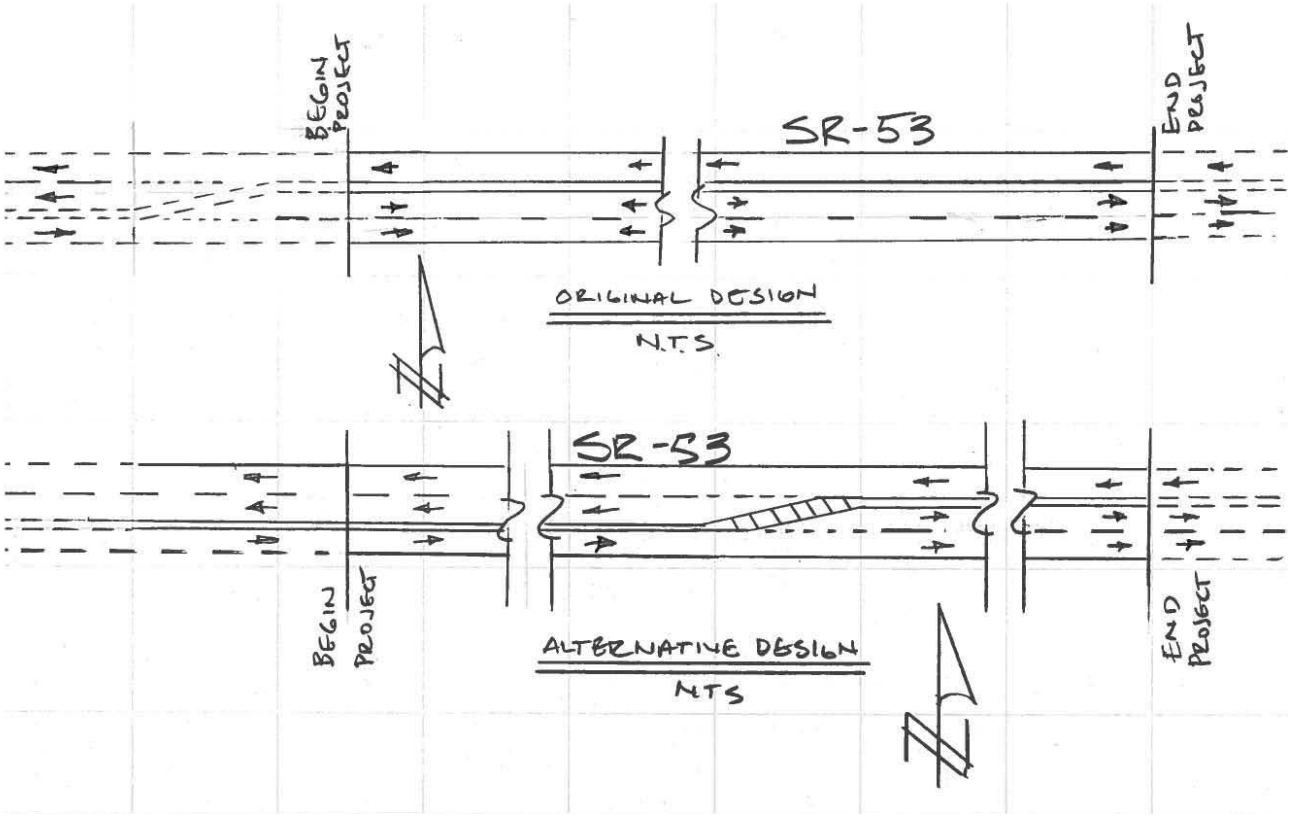
Technical Discussion:

The proposed project would correct the geometrics and provide an additional length of passing lane. However, all of the passing lane is in the eastbound direction. It needs to be noted that 21 of the 26 accidents involved westbound traffic. The VE team felt that consideration should be given to restriping SR-53 to provide a westbound passing lane from the westbound passing lane east of Pleasant Grove Church to a point on the new location. An eastbound passing lane would be provided from the middle of the new location and tie into the eastbound passing lane at the east end of the project. This would provide additional length of passing lane for the westbound traffic and a more even directional distribution. It would provide passing on the upgrade for the eastbound traffic and passing and eventually a merge for the westbound at the bottom of the mountain in an area with flatter grades. It may be prudent to make further operational analysis to determine the optimum distribution of the eastbound and westbound lanes.

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

Illustration

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-16**
DESCRIPTION:	**Provide westbound passing lanes**	SHEET NO.: **2** of **2**



Value Analysis Design Alternative

PBS&J

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.: **RD-17**
DESCRIPTION:	**Use 8'-0" shoulders**	SHEET NO.: **1** of **4**

Original Design:

The original design calls for the construction of 10'-0" shoulders, with 6'-0" paved.

Alternative:

The alternative proposes construction of 8'-0" shoulders, 6'-0" paved.

Opportunities:

- Reduction in ROW costs
- Reduction in excavation costs

Risks:

- Minimal design impacts
- Reduces width of traversable shoulder

Technical Discussion:

The alternative seeks to reduce the shoulder width from 10' width to a narrower 8'-0" width, while maintaining the 6'-0" paved portion. The alternative would result in cost savings in excavation, and would reduce the ROW required by 4'-0" total throughout the project. The reduction in width of the shoulder will result in having a narrower traversable shoulder, and may need to be widened to accommodate guardrail end anchors.

For Arterial Roadways with an ADT of over 2000 vpd, AASHTO Policy (Exhibit 7-3, Page 448) allows the use of an 8' usable shoulder. Although this section of roadway has a relatively high volume of trucks, due to the fact that it includes passing lanes use of a more narrow shoulder section may be reasonable based on the discussion on pages 250-252 of the Green Book.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 5,115,000	$ 0	$ 5,115,000
ALTERNATIVE	$ 5,049,378	$ 0	$ 5,049,378
SAVINGS	$ 65,622	$ 0	$ 65,622

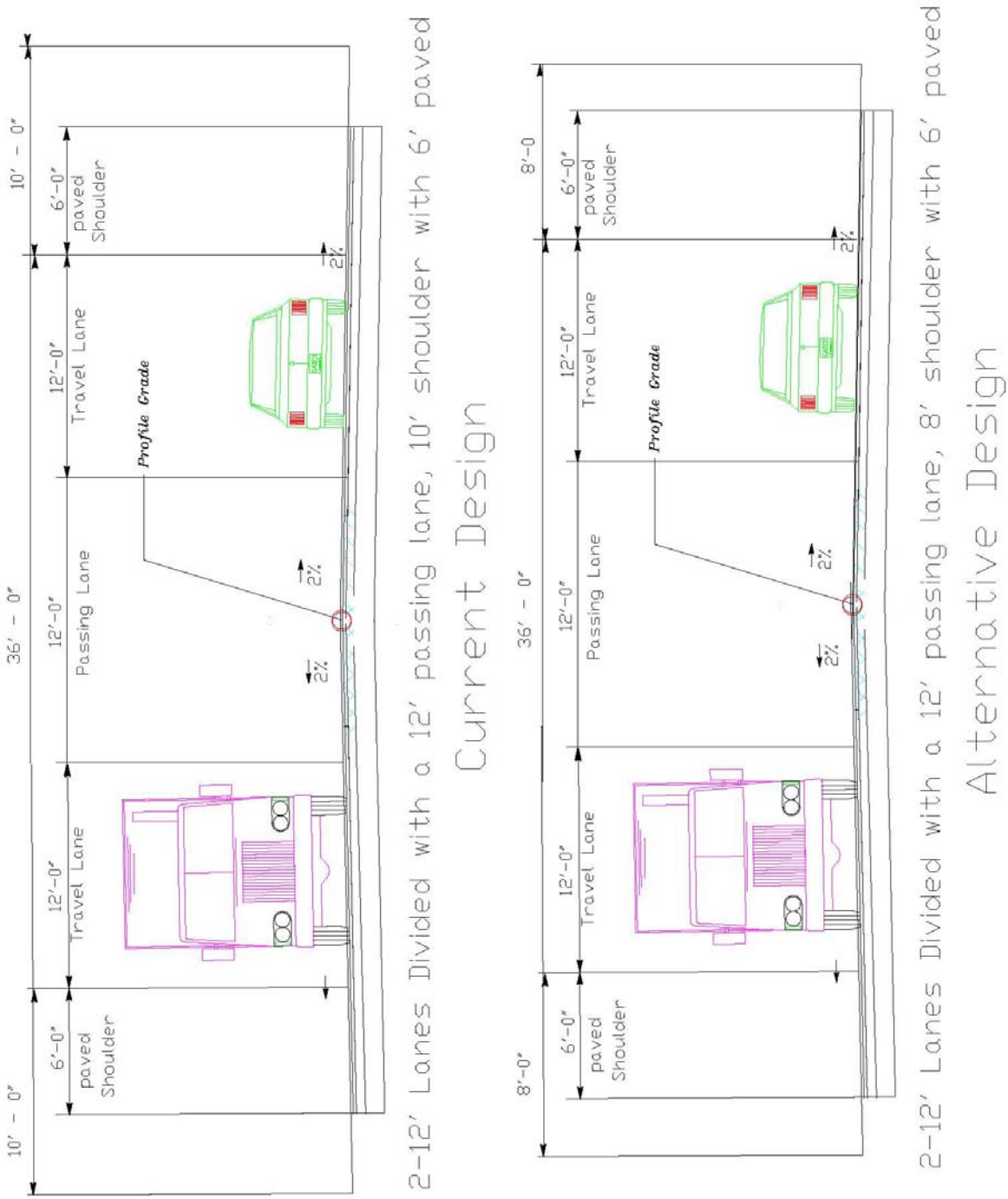
Illustration

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-17**

DESCRIPTION: **Use 8'-0" shoulders**

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



Assumptions:

-Reduce shoulder width throughout proposed reconstruction by 2'.

-Project limits= STA 93+40-STA 168+85= 7545LF.

-7545LF x 2'w x 2 sides/9=3353 SY reduction in shoulder buildup.

ROW estimated savings: (Figures derived from ROW cost estimate dated March 27, 2007)

-Reduces ROW by 2' on each side throughout the project. Total ROW burdened cost = $2,450,000.

-Total acreage for acquisition= +/-34 AC. Total burdened cost per acre average=$72,058/AC(includes land, improvements, proximity damages, scheduling contingency, market appreciation, and admin/court costs. ($2,450,000/34AC=$72,058/AC)

-ROW reduction= 7545' x 2' x 2'=30,180SF saved /43,560SF/AC=0.69AC saved

-0.69AC x $72,058/AC=$49,720

Unclassified Excavation:

-20' average height assumed for shoulders throughout the project.

-3353SY x 20' AVG H/27=2484 CY Unclassified Excavation saved.

Cost Worksheet

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-17**

DESCRIPTION: **Use 8' shoulders**

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
Unclassified Excavation	CY	550,000	$ 4.00	$ 2,200,000	547,516	$ 4.00	$ 2,190,064
ROW estimated savings	LS	1	$ 2,450,000	$ 2,450,000	1	$2,400,280	$ 2,400,280
				$ -			$ -
Sub-total				$ 4,650,000			$ 4,590,344
Mark-up at 10.00%				$ 465,000			$ 459,034
TOTAL				**$ 5,115,000**			**$ 5,049,378**
Estimated Savings:							$65,622

Value Analysis Design Alternative

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-18**

DESCRIPTION: **Reduce clear zone from 32’ to 30’**

SHEET NO.: **1** of **3**

Original Design:

The original design calls for a 32’ clear zone consistent throughout the realignment.

Alternative:

The alternative reduces the clear zone from 32’ to 30’ throughout the realignment.

Opportunities:

- Reduction in ROW costs
- Reduction in excavation costs

Risks:

- Minimal design impacts
- Reduction of clear zone may adversely impact designed safety features

Technical Discussion:

From Table 3-1 on page 3-6 of the Roadside Design Guide, the allowable range for the Clear Zone is 30’-34’, based on 6:1 slopes, an ADT of greater than 6000 and a Design Speed of 65 mph. Due to this project being located in a more mountainous area, the use of the lower range value may be reasonable.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 5,115,000	$ 0	$ 5,115,000
ALTERNATIVE	$ 5,030,801	$ 0	$ 5,030,801
SAVINGS	$ 84,199	$ 0	$ 84,199

Assumptions:

-Reduce clear zone width throughout proposed reconstruction by 2’ on each side.

-Project limits= STA 93+40-STA 168+85= 7545LF.

-7545LF x 2’w x 2 sides=30,180 SF area reduction

ROW estimated savings: (Figures derived from ROW cost estimate dated March 27, 2007)

-Reduces ROW by 2’ on each side throughout the project. Total ROW burdened cost = $2,450,000.

-Total acreage for acquisition= +/-34 AC. Total burdened cost per acre average=$72,058/AC(includes land, improvements, proximity damages, scheduling contingency, market appreciation, and admin/court costs.

-ROW reduction= 7545’ x 2’ x 2 sides= 30,180SF saved /43,560SF/AC= 0.69 AC saved

Unclassified Excavation:

-Assume wedge of unclassified excavation saved at or near toe averaging 3’ depth.

-60,360SF x 3’D/27=6706CY Unclassified Excavation saved.

Cost Worksheet

PBS&J

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-18**

DESCRIPTION: **Reduce clear zone from 32' to 30'**

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

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Unclassified Excavation	CY	550,000	$ 4.00	$ 2,200,000	$ 543,294	$ 4.00	$ 2,173,176
ROW required	AC	34	$ 72,059	$ 2,450,000	$ 33.31	$ 72,059	$ 2,400,279
Sub-total				$ 4,650,000			$ 4,573,455
Mark-up at 10.00%				$ 465,000			$ 457,346
TOTAL				**$ 5,115,000**			**$ 5,030,801**
Estimated Savings:							$84,199

Value Analysis Design Alternative

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.:
RD-19

DESCRIPTION: **Reduce pavement thickness on shoulder**

SHEET NO.: **1** of **3**

Original Design:

The original design proposes constructing the improved shoulders with the same pavement build-up used on the roadway.

Alternative:

The alternative proposes reducing the pavement build-up on the proposed shoulders.

Opportunities:

- Reduction in pavement costs
- Has the effect of reducing construction time.

Risks:

- Minimal design impacts
- Subgrade elevation differentials between roadway and shoulder
- May be detrimental for future widening efforts.

Technical Discussion:

The alternative proposes reducing the pavement build-up on the shoulders using 6” GAB, omitting the 25mm Superpave, placing 220LB/SY of 19 mm Superpave, and 135LB/SY of 9.5mm Superpave. The effect would be a substantial reduction in pavement quantities required to construct the proposed shoulders. Identified risks include: Subgrade elevation differentials in the roadway and shoulders, contractor would not be able to place GAB in a continuous fashion for roadway and shoulders, and the reduced pavement thickness would likely require removal should outside widening be considered in the future.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 3,000,866	$ 0	$ 3,000,866
ALTERNATIVE	$ 2,635226	$ 0	$ 2,635226
SAVINGS	$ 365,640	$ 0	$ 365,640

Pavement Build-up: (per Typical Sections in plans provided)

-GAB, 10” thickness

-25mm Superpave= 660LB/SY

-19mm Superpave= 220LB/SY

-9.5mm Superpave=135LB/SY

Alternate proposed shoulder pavement build-up:

GAB, 6” thickness

-25mm Superpave= 0LB/SY

-19mm Superpave= 220LB/SY

-9.5mm Superpave=135LB/SY

Area:

-Project limits= STA 93+40-STA 168+85= 7545LF.

-7545LF x 6’w x 2 sides/9=10060 SY

Pavement Reduction:

GAB, 6” thickness=10060 SY addition, reduce 10” GAB by same amount

-25mm Superpave= 0LB/SY=10060SY x 660/2000=3320 TN reduction

-19mm Superpave= 220LB/SY=>Unchanged

-9.5mm Superpave=135LB/SY=>Unchanged

Cost Worksheet

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

ALTERNATIVE NO.: **RD-19**

DESCRIPTION: **Reduce pavement thickness on shoulder**

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

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
GAB 10"	SY	43,900	$ 15.40	$ 676,060	33,840	$ 15.40	$ 521,136
25mm Superpave	TN	14,500	$ 90.00	$ 1,305,000	11180	$ 90.00	$ 1,006,200
19mm Superpave	TN	5,100	$ 90.00	$ 459,000	5100	$ 90.00	$ 459,000
9.5mm Superpave	TN	3,200	$ 90.00	$ 288,000	3200	$ 90.00	$ 288,000
				$ -			$ -
GAB 6"	SY	0	$ 12.06	$ -	10060	$ 12.06	$ 121,324
Sub-total				$ 2,728,060			$ 2,395,660
Mark-up at 10.00%				$ 272,806			$ 239,566
TOTAL				**$ 3,000,866**			**$ 2,635,226**
Estimated Savings:							$365,640

Value Analysis Design Suggestion

PROJECT:	**Georgia Department of Transportation** **CSSTP-0006-00(416) – P.I. No. 0006416** **SR 53 Reconstruction** **Gordon/Pickens Counties**	ALTERNATIVE NO.:	**RD-20**
DESCRIPTION:	**Extend Right of Way to accommodate pipe maintenance at Station 147+36**	SHEET NO.:	**1** of **1**

Original Design:

The original design calls for an additional width of Right of Way at both ends of the subject culvert.

Alternative:

The alternative would propose to modify the proposed right of way to provide both additional width and length to in the vicinity of the outlet end of the subject pipe.

Opportunities:

- Improved access for maintenance of the proposed culvert.

Risks:

- Additional Right of Way cost

Technical Discussion:

Due to the location of the retaining walls and the steep side slopes, it appears that there is insufficient room to access the outfall end of the subject culvert to perform routine maintenance.

PROJECT DESCRIPTION

INTRODUCTION

The subject of this Value Engineering Study is project No. CSTTP-0006-00(416) - P.I. No. 0006416. This project is the reconstruction and realignment of a portion of SR 53 in Gordon and Pickens County. The length of the project is approximately 1.5 miles beginning from a point 3,700' east of Ryo Mountain Road in Gordon County, and ends 1,700' west of Davis Road in Pickens County. The design is in the preliminary stage. The designer is Volkert and Associates, Inc.

Currently, this section of road consists of three twelve-foot lanes with 0' to 3' shoulders. The existing horizontal alignment has nine curves that do not meet AASHTO's minimum requirements. In addition, five curves do not meet the minimum vertical profile requirements.

Design speed will be 65 mph and posted speed will be 55mph. The proposed design re-aligns SR 53 to bring existing curves up to current design standards. The road will remain a three lane facility with shoulders added to the entire length of the project. Construction will be staged to maintain traffic flow.

The estimated construction costs are $8,481,456 with additional Right-of-Way costs of $2,450,000 and reimbursable utility costs of $500,000. The projected total project cost is $11,431,456.

R**EPRESENTATIVE DOCUMENTS**

- Georgia Department of Transportation
    - Construction Cost Estimates
    - Preliminary Right-of-Way Cost Estimate
    - Concept Report
    - Project Location Map
    - Accident Data

The VE Team utilized the supplied project materials noted above plus plans and specifications prepared by Volkert & Associates, Inc.

PRELIMINARY COST ESTIMATE
OFFICE OF CONSULTANT DESIGN

DATE: 02/16/09 PREPARED BY: Volkert & Associates.

PROJECT NO: CSSTP-0006-00(416) FILE NAME:

P.I. NO: 0006416 MILEAGE: 1.17 miles

PROJECT DESCRIPTION/CONCEPT: SR 53 Gordon and Pickens County

EXISTING ROADWAY: SR 53

TRAFFIC: CURRENT AADT (2010) 4,450 PROJECTED AADT (2030) 9,760

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

PROJECT COSTS

A. MOBILIZATION	1 LS		SUBTOTAL	$200,000.00
B. TRAFFIC CONTROL	1 LS		SUBTOTAL	$300,000.00
C. RIGHT OF WAY	1 LS		SUBTOTAL	$2,450,000.00
D. UTILITIES	1 LS		SUBTOTAL	$500,000.00
E. CLEARING AND GRUBBING	1 LS		SUBTOTAL	$200,000.00
F. EARTHWORK				
Excavation	550,000 CY @	$4.00		$2,200,000.00
			SUBTOTAL	$2,200,000.00
G. STRUCTURES				
Temporary Shoring Wall	1 LS			$200,000.00
Retaining Wall	8,000 SF @	$44.00		$400,000.00
			SUBTOTAL	$600,000.00
H. BASE AND PAVING				
Aggregate Base				
Graded Aggregate, 10"	43,900 SY @	$15.40		$676,060.00
Asphalt Paving				
9.5 mm Superpave	3,200 ton @	$90.00		$288,000.00
19 mm Superpave	5,100 ton @	$90.00		$459,000.00
25 mm Superpave	14,500 ton @	$90.00		$1,305,000.00
Bituminous Tack Coat	8,100 gal @	$4.00		$32,400.00
Leveling	1,000 ton @	$90.00		$90,000.00
			SUBTOTAL	$2,850,460.00
I. DRAINAGE				
Storm Drain pipe,18" H 1-10	940 LF @	$37.00		$34,780.00
Storm Drain pipe,18" H 15-20	424 LF @	$36.00		$15,264.00
Storm Drain pipe,18" H 25-30	248 LF @	$65.00		$16,120.00
Storm Drain pipe,18" H 35-40	316 LF @	$72.00		$22,752.00
Storm Drain pipe,24" H 30-35	292 LF @	$55.00		$16,060.00
Side Drain pipe,18" H 1-10	456 LF @	$32.00		$14,592.00
F.E.S. 18", Storm Drain	6 EA @	$630.00		$3,780.00
F.E.S. 18", Side Drain	4 EA @	$411.00		$1,644.00
S.E.S. 18", Storm Drain	3 EA @	$635.00		$1,905.00
S.E.S. 18", Side Drain	9 EA @	$575.00		$5,175.00
Drop Inlet, GP 1	1 EA @	$2,461.40		$2,461.40
Class "B" Conc	4 CY	$440.00		$1,760.00
Class "A" Conc, incl reinf. Steel	4 CY	$640.00		$2,560.00
Junction Box	5 EA @	$2,383.87		$11,919.35
			SUBTOTAL	$150,772.75
K. EROSION CONTROL	1 LS		SUBTOTAL	$760,000.00
L. GUARDRAIL	1 LS		SUBTOTAL	$106,000.00
M. SIGNS, STRIPING	1 LS		SUBTOTAL	$75,000.00

SUBTOTAL CONSTRUCTION	$10,392,232.75
Engineering and Inspection (5%)	$519,611.64
Construction Contingency (5%)	$519,611.64
SUBTOTAL CONSTRUCTION	$11,431,456.03
Fuel Adjustment (Roadway) 125% cap)	$976,549.66
Liquid AC Adjustment (125% cap)	$1,042,051.60
TOTAL CONSTRUCTION COSTS	$13,450,057.29

Preliminary Right of Way Cost Estimate

Date: March 27, 2007
Project: SR 53 (CSSTP 0006-00(416)) **P.I. Number: 0006416**
Existing/Required R/W: 33.5 acres **No. Parcels: 21**
Project Termini: SR 53 from 3,700' East of Ryo Mountain Road to 1,700' West of Davis Road
Project Description: SR 53 (Gordon/Pickens County)

Land:

Commercial	2.5 ac	@ $15,000	/ac =	$37,500	
Industrial	0 ac	@ $	/ac =	$	
Residential	31.5 ac	@ $10,000	/ac =	$315,000	
Agricultural	0 ac	@ $	/ac =	$	
TOTAL					**$352,500**

Improvements:
Six residential structures and misc. site improvements **$325,000**

Relocation:

Commercial @ $25,000/parcel	=	$
Residential 6 @ $40,000/parcel	=	$240,000
TOTAL		**$240,000**

Damages:

Proximity -	$45,000	
Consequential -	$0	
Cost to Cure -	$0	
TOTAL		**$45,000**

SUB-TOTAL: **$962,500**

Net Cost		$962,500
Scheduling Contingency	55 %	$529,375
Adm/Court Cost	60 %	$577,500
Market Appreciation	40 %	$385,000
TOTAL		$2,454,375

Total Cost **$2,450,000**

Prepared By: R. David Bell

Approved: Howard P. Copeland
R/W Administrator

REVISED: 12-8-06

Gordon & Pickens County Land Sales

Highest & Best Use	Size (acres)	Value ($ per Acre)	Sales Price
Commercial	0.580	$25,862	$15,000
	11.050	$24,163	$267,000
	79.000	$2,443	$193,027
Residential	162.357	$9,480	$1,539,180
	72.130	$5,268	$380,000
	48.285	$9,000	$434,565
	10.000	$3,500	$35,000
	1.500	$9,333	$14,000
	5.760	$13,715	$79,000

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENTAL CORRESPONDENCE

FILE: P.I. No. 0006416, Gordon/Pickens Counties
CSSTP-0006-00(416)
SR 53 Reconstruction

OFFICE: Preconstruction

DATE: July 17, 2007

FROM: Genetha Rice-Singleton, Assistant Director of Preconstruction

TO: David E. Studstill, Jr., P.E., Chief Engineer

SUBJECT: ***PROJECT CONCEPT REPORT***

This project is a reconstruction and rehabilitation on SR 53. The project limits begin 3700' east of Ryo Mountain Road in Gordon County and ends 1700' west of Davis Road in Pickens County. There are several horizontal and vertical curves that exceed the AASHTO Geometric Standards. State Route 53 is a three lane rural roadway with 0' to 3' shoulders on 80' of existing right-of-way. The accident rates for 2001 through 2004 exceeded the statewide average for this type of roadway. There were 15 accidents resulting in 23 injuries in a four year period that extended to 2004. The base year traffic (2011) is 4500 VPD and the design year traffic (2031) is 9900 VPD. The posted speed is 55 MPH and the design speed is 65 MPH.

The proposed project includes the re-alignment of SR 53 to bring the existing horizontal and vertical curves up to current design standard and adding shoulders for the entire project length. Traffic will be maintained during construction via staging.

Environmental concerns include requiring a Categorical Exclusion will be prepared; a Public hearing is not required; Time saving procedures is appropriate.

The estimated costs for this project are:

	PROPOSED	APPROVED	FUNDING	PROG DATE
Construction (includes E&C)	$ 6,536,000	$ 7,086,000	LS30	LUMP
Right-of-way &	$ 2,450,000	$ 2,450,000	LS30	LUMP
Utilities	$ 500,000			

P.I. No. 0006416, Gordon/Pickens Counties
July 17, 2007

I recommend this project concept be approved.

GRS: JDQ

Attachment

CONCUR _____
Todd I. Long, P.E., Director of Preconstruction

APPROVED _____
David E. Studstill, Jr., P.E., Chief Engineer

SCORING RESULTS AS PER MOG 2440-2

Project Number:	County:	PI No.:
CSSTP-0006-00(416)	Gordon/Pickens	0006416

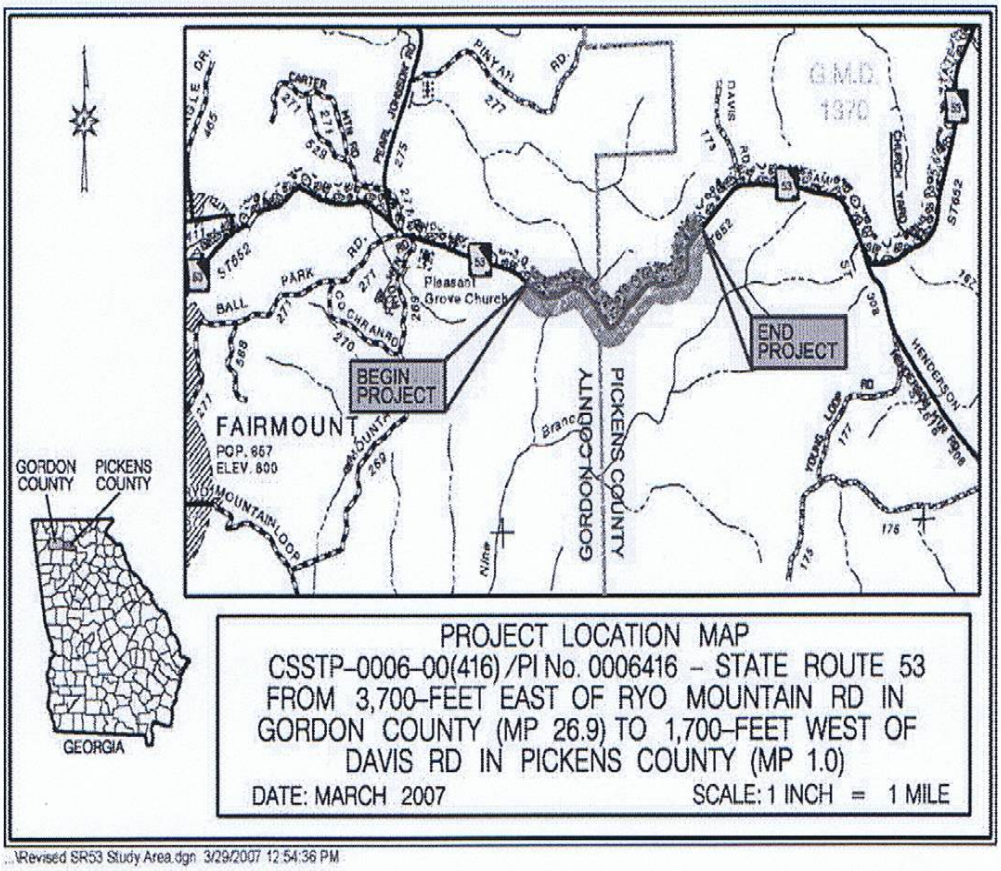
Report Date:	Concept By:
June 11,2007	DOT Office: District 6
	Consultant- Volkert & Associates
☒ Concept Stage	

Project Type: Choose One From Each Column			
	☒ Major ☐ Minor	☐ Urban ☒ Rural	☐ ATMS ☐ Bridge Replacement ☐ Building ☐ Interchange Reconstruction ☐ Intersection Improvement ☐ Interstate ☐ New Location ☒ Widening & Reconstruction ☐ Miscellaneous

FOCUS AREAS	SCORE	RESULTS
Presentation	100	
Judgment	100	
Environmental	100	
Right of Way	100	
Utility	100	
Constructability	100	
Schedule	100	

Project No. CSSTP-0006-00(416) Gordon & Pickens County, Georgia
P.I. No. 0006416

Project Location Map



Need and Purpose:

- Roadway Conditions

  The existing roadway of SR-53 from a point 3,700-feet east of Ryo Mountain Road in Gordon County (MP 26.9) east to a point 1,700-feet west of Davis Road in Pickens County (MP 1.0) for an approximate distance of 1.5 miles consists of three twelve-foot travel lanes and several inadequate horizontal and vertical curves.

- Existing Horizontal Alignment

  The existing horizontal alignment consists of nine (9) horizontal curves with radii ranging from 475-feet to 1,500-feet. The transitions between the curves vary in length from 60-feet to 375-feet. The existing curves radii were compared to the minimum curve radii specified for the design speed of 65 mph and a maximum superelevation rate of 6% from *A Policy On Geometric Design of Highways and Streets, 2004 Edition (The Green Book)* from AASHTO. Using the 85th percentile speed of the traveling public of 65 mph on SR-53 and a maximum superelevation rate of 6%, the minimum required curve radius was determined to be 1,660 feet.

  The table below shows a comparison of the radii of the existing curves and the minimum radius required to meet the specifications of The Green Book.

Curve No.	R_{min} (ft)	Existing R (ft)	Remarks
CUR1	1660	1494	Does not meet AASHTO Minimum
CUR2	1660	501	Does not meet AASHTO Minimum
CUR3	1660	519	Does not meet AASHTO Minimum
CUR4	1660	1157	Does not meet AASHTO Minimum
CUR5	1660	473	Does not meet AASHTO Minimum
CUR6	1660	651	Does not meet AASHTO Minimum
CUR7	1660	936	Does not meet AASHTO Minimum
CUR8	1660	495	Does not meet AASHTO Minimum
CUR9	1660	969	Does not meet AASHTO Minimum

Note: The minimum radius was determined from Exhibit 3-27 of "A Policy on Geometric Design of Highways and Streets", 2004 Edition.

- Existing Vertical Profile

Vertical Curve No.	Sag or Crest Curve	K min.	Existing K	Remarks
VCUR1	Crest	193	1036	Meets AASHTO Minimum
VCUR2	Sag	157	120	Does not meet AASHTO Minimum
VCUR3	Crest	193	374	Meets AASHTO Minimum
VCUR4	Sag	157	126	Does not meet AASHTO Minimum
VCUR5	Crest	193	141	Does not meet AASHTO Minimum
VCUR6	Sag	157	122	Does not meet AASHTO Minimum
VCUR7	Crest	193	84	Does not meet AASHTO Minimum

Note: The minimum k values were determined from Exhibits 3-72 and 3-75 of "A Policy on Geometric Design of Highways and Streets", 2004 Edition.

- Existing Capacity Analysis

Due to the re-alignment of existing SR-53, two (2) new intersections located at stations 121+60 and 153+16 will be built to maintain access to local residents and businesses along existing SR-53. Approximately three (3) to seven (7) residents and one (1) business will be served by these intersections; therefore, it was determined that traffic studies are not necessary at these intersections.

The peak hour traffic volumes for the mainline were projected 20 years from the expected date of completion, (2011), assuming a growth rate of 4% per year. The anticipated Level of Service (LOS) at the projected traffic volumes was determined and compared to the 2011 LOS. SR-53 currently operates at a LOS B and is anticipated to operate at a LOS C in the year 2031 for both the build and no-build conditions. The Capacity Analysis Reports are included in the attachments.

- Accident Data

There were a total of 26 accidents recorded within the project study area between 2001 and 2004. The analysis of the accident data yielded the following conclusions:

- Between 2001 and 2004, there were 15 accidents resulting in 23 injuries with no fatalities.
- Approximately 96% of the accidents occurred while negotiating a curve.
- In about 15% of the accidents that occurred while negotiating a curve, driver loss-of-control was the most prevalent contributory factor.
- Approximately 75% of the accidents resulting from loss-of-control struck a roadside feature and 25% of the accidents overturned.
- Approximately 8% of the accidents involved more than one vehicle (two); one sideswipe collision and one head-on collision.
- Weather conditions attributed for about 4% of the accidents.

- The accident data results in an accident rate of 274 accidents per hundred-million-vehicle-miles (HMVM), which is higher than the state average of 227 accidents per HMVM for similar type highways.

- Project Justification

  The proposed project will improve the safety of SR-53 by providing a new roadway with vertical and horizontal curves that meet current design standards. By improving the vertical and horizontal alignments, it is expected that the number of accidents will decrease as a result of the improved geometry and sight distances.

Description of Proposed Project:

The proposed SR-53 project includes re-alignment of the existing highway to bring the horizontal and vertical curves up to current design standards and adding shoulders for a distance of approximately 1.5 miles from a point 3,700-feet east of Ryo Mountain Road in Gordon County (MP 26.9) east to a point 1,700-feet west of Davis Road in Pickens County (MP 1.0).

- Logical termini

  The proposed western terminus for the SR-53 Re-alignment project is at a point along the existing roadway 3,700-feet east of Ryo Mountain Road in Gordon County. The proposed eastern terminus of the project is at a point located along the existing roadway 1,700-feet west of Davis Road in Pickens County. The western terminus is logical because the accident rate per HMVM along SR-53 is greater within the horizontal curves east of Ryo Mountain Road. The eastern terminus is logical because the accident rate per HMVM along SR-53 is greater within the horizontal curves west of Davis Road. The geometric characteristics of the curves along this section of SR-53 do not meet the minimum AASHTO specifications in curve radius and sight distance; therefore, the proposed SR-53 Re-alignment project termini were established to include the deficient curves along the existing roadway. The project termini were also set at points where the proposed alignment can transition into SR-53 at existing tangent sections.

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

PDP Classification: Major X Minor __

Federal Oversight: Full Oversight ( ), Exempt(X), State Funded ( ), or Other ( )

Functional Classification: Principal Arterial

U. S. Route Number: N/A **State Route Number:** SR-53

21 - 06
405

Traffic (AADT):

Current Year: (2011) 4500 vpd Design Year: (2031) 9900 vpd

Existing design features:

- Typical Section: Three (3) 12-foot lanes with 0 to 3-foot earth shoulders.
- Posted Speed: 55 mph Minimum radius of curve: 495-ft
- Maximum super-elevation rate for curves: 6%
- Maximum Mainline Grade: 5.2 %
- Width of right of way: 80-ft
- Major Structures: None
- Major Interchanges or Intersections along project: None
- Existing length of roadway segment is approximately 1.5 miles.

Proposed Design Features:

- Typical Section: Three (3) 12-foot lanes with 6-foot paved and 4-foot earthen shoulders for a total shoulder width of 10-feet.
- Proposed Design Speed Mainline: 65 mph
- Proposed Design Speed Side Street: 35 mph
- Proposed Maximum Grade Mainline: 5% Maximum Grade allowable: 5%
- Proposed Maximum Grade Side Street: 5.8% Maximum Grade allowable: 13%
- Proposed Maximum Grade Driveway: 25%
- Proposed Maximum degree of Curvature: 3°22'33" Maximum degree allowable: 3°27'00"
- Right of Way:
  - Width : 135-ft to 350-ft
  - Easements: Temporary (X), Permanent ( ), Utility ( ), Other ( )
  - Type of Access Control: Full ( ), Partial ( ) , By Permit (X) , Other ( )
  - Number of Parcels : 21 Total Number of Displacements: 8
    - Business: 1
    - Residences: 7
    - Mobile Homes: 0
    - Other: 0
- Structures:
  - Two retaining walls may be necessary north and south of the conceptual alignment near station 147+50 to reduce impacts to an ephemeral stream bed. Hydraulic calculations performed during the preliminary design phase of the project will determine the drainage structure requirements and the retaining wall requirements.

- Major Intersections and Interchanges: None
- Traffic Control during construction: Staging as described below.

  Stage 1:
  - Build the majority of the newly aligned SR-53
  - Build the new intersection of existing SR-53 at station 153+16
  - Build a temporary intersection at station 107+10
  - Install temporary shoring along the existing alignment between approximate stations 133+50 and 140+50 left to allow for a large cut section of roadway to be built without disrupting traffic on existing SR-53
  - Tie the new alignment into the existing alignment at the beginning and end of the project, which will require temporary lane closures; however, because the existing roadway is three lanes, a single lane closure will be possible without major disruptions to traffic
  - Shift traffic to the new alignment

  Stage 2:
  - Remove the existing SR-53 pavement at the east end of the project
  - Build the intersection at station 121+40 while maintaining access via the temporary intersection at station 107+10 and the intersection at station 153+16

  Stage 3:
  - Remove the temporary shoring system and continue the cut section for the mainline to the construction limits while building the cul-de-sacs at three different locations
  - Remove the temporary intersection at station 107+10 and the existing SR-53 pavement at the beginning of the project
  - Complete other construction items as needed

- Design Exceptions to controlling criteria anticipated :

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

- Design Variances : None anticipated

- Environmental Concerns

  - Historical Sites
    Historical records research found no previously recorded National Register of Historic Places (NRHP) listed sites within the area of potential effect (APE) for the proposed project. Twenty

structures located within the SR-53 APE meet the NRHP minimal age requirement of 50 years old or older. Of these structures, two (2) have been recommended eligible for the NRHP. The properties recommended eligible for the NRHP include Resource #4 The Daugherty House and Resource #14 The Wooten House. The NRHP eligibility boundaries have been established for these properties. Approximately 1,245 square feet (0.03 acres) of cut and fill will be required within the boundaries of NRHP boundaries of The Daugherty House; however, no property will be acquired and it is anticipated that no trees will be affected. No other work, including the parking of vehicles during construction, will take place within the NRHP boundaries. Descriptions of these resources and their NRHP boundaries are provided below.

- Station 100+00 to 109+00 Resource #4 The Daugherty House. The Daugherty House includes 5.91 acres of land located north and immediately adjacent to existing SR-53 right-of-way. Contributing elements to the Daugherty House include the house, associated outbuildings, and mature trees that contribute to the setting. The project, as planned, will not require additional right-of-way from this resource. The east and west NRHP boundaries are described as being at the legal property limits identified on Gordon County Tax Map 129 as Parcel 1. The existing SR-53 edge-of-pavement has been established as the southern border of the NRHP boundary.

- Station N/A (Along Existing SR-53 Bypassed by Conceptual Alternative) Resource #14 The Wooten House. The Wooten House includes 2.87 acres of land located east and immediately adjacent to existing SR-53 right-of-way. The proposed project, as planned, will not require additional right-of-way from this resource. The north, south, and east NRHP boundaries are described as being at the legal property limits identified on Pickens County Tax Map 36 as Parcel 42. The existing SR-53 edge-of-pavement has been established as the western border of the NRHP boundary.

- Archaeological Impacts
  Archaeological records research found no previously recorded NRHP listed or potentially eligible sites within the APE for the proposed project.

- Relocation
  It is anticipated that the proposed project will require the structural take and displacement of one (1) business and seven (7) residences.

- Neighborhoods
  No neighborhoods are located within the project area.

- Special Interest Groups
  To date, no special interest groups have been identified for the proposed project.

- Context Sensitive Design
  Context sensitive designs will be evaluated during the early development phases of the project.

- Cemeteries
  No cemeteries are located within the project area.

- Parks and Recreation
  No public parks or recreation facilities are located within the APE for the proposed project.

- Wetlands and Streams, including PARs

The proposed project is located entirely within Hydrologic Unit Code (HUC) unit 03150102, Coosawattee Watershed. The project, as planned, will impact less than 0.50 acre of wetland/open water and/or less than 300 linear feet of stream at any single crossing. It is also anticipated that the project will impact less than 10 acres of wetland/open water and 1,500 feet of stream within the Coosawattee HUC unit. The proposed project will not impact any U.S. Army Corps of Engineers' approved mitigation sites. As a result, an Individual Permit or a Practical Alternatives Report (PAR) will not be necessary for Project CSSTP-0006-00(416). No wetland sites were identified within the APE. One (1) ephemeral stream site will be impacted by the proposed project. The project, as planned, crosses the ephemeral stream bed perpendicularly near Station 147+40. The total stream bed impact at this site and for the project is 292 feet.

- Threatened and Endangered Species (USFWS & GaDNR)

The US Fish and Wildlife Service and the Georgia Department of Natural Resources currently lists twenty-one (21) species of plants and animals as protected or endangered within Gordon and Pickens Counties, Georgia. The species for each county are listed below. "US" = Federally Protected, Candidate or Partial Status species. "GA" = Georgia Protected Species.

ANIMALS		
Genus & Species	**Common Name**	**Status**
Gordon County, Georgia		
Epioblasma metastriata	Upland Combshell	US
Epioblasma othcaloogensis	Southern Acornshell	US
Etheostoma trisella	Trispot Darter	GA
Grpatemys pulchra	Alabama Map Turtle	GA
Medionidus acutissimus	Alabama Moccasinshell	US
Medionidus parvulus	Coosa Moccasinshell	US
Moxostoma carinatum	River Redhorse	GA
Percina aurolineata	Goldline Darter	US
Pleurobema decisum	Southern Clubshell	US
Pleurobema georgianum	Southern Pigtoe	US
Ptychobranchus greenii	Triangular Kidneyshell	US
Pickens County, Georgia		
Cyprinella caerula	Blue Shiner	US
Etheostoma etowahae	Etowah Darter	US
Etheostoma scotti	Cherokee Darter	US

PLANTS		
Genus & Species	**Common Name**	**Status**
Gordon County, Georgia		
Arabis georgiana	Georgia Rockcress	US
Carex purpurifera	Purple Sedge	GA
Sabatia capitata	Cumberland Rose Gentian	GA
Scutellaria montana	Large-flowered Skullcap	US
Thalictrum debile	Trailing Meadowrue	GA
Xyris tennesseensis	Tennessee Yellow-eyed Grass	US
Pickens County, Georgia		
Waldsteinia lobata	Piedmont Barren Strawberry	GA

Biologist conducted field surveys in July and October, 2006 to determine the presence or absence of the above listed protected species. Surveys for aquatic species, such as fish and mussels, were not conducted due to the lack of suitable habitat within the project APE. Known federally listed species were not observed within the study corridor. Based upon the results of the field survey, the project, as planned, would have no effect on current federally protected or DNR listed aquatic or terrestrial species.

- Erosion and Sediment Control / Water Quality
  No surface water intakes are located within the APE for Project CSSTP-0006-00(416). It is anticipated that the proposed project will not impact potable water resources. No state listed 303(d) water bodies are located within the APE for the project. Localized temporary water quality impacts will be minimized during construction by the use of Best Management Practices (BMPs).

- Air Quality
  No impacts anticipated. The project is located in an area designated as being in attainment for ozone and PM 2.5.

- Noise
  Several noise sensitive land uses (residences, etc) are located within the APE for the proposed project. Some of these land uses are also located in close proximity to existing SR-53. As a result, it is anticipated that noise impacts will occur at isolated receptors within the project study area. It is also anticipated that abatement will not be reasonable or feasible.

- Possible Permits Required

  - U. S. Army Corps of Engineers Section 404 – Nationwide Permit

  - Federal Emergency Management Agency (FEMA)
    No FEMA designated floodplains or floodways are located within the APE for the proposed project.

  - Tennessee Valley Authority (TVA)
    No waters regulated by the Tennessee Valley Authority are within the APE for the proposed project.

  - U. S. Coast Guard (USCG)
    No navigable waters are within the APE for the proposed project. Therefore, no USCG permit will be necessary.

- Underground Storage Tanks (USTs) & Leaking Underground Storage Tanks (LUSTs)
  No currently active or abandoned gas stations are located along SR-53 within the study area. No UST sites or LUST sites were identified within the APE for the proposed project.

- Hazardous Waste Sites
  There are four (4) potential hazardous waste sites within the APE for the proposed project. None of these sites are Resource Conservation and Reclamation Act (RCRA) registered or National Priority List sites. A land use and location description for each site is provided in the following narrative. The locations of these sites are described with reference to the conceptual SR-53 alignment stationing and each potential hazardous materials source is illustrated on the concept mapping by a triangle with a green circle.
  - Station 135+00 through 142+00: SR-53 at Auto Repair & Salvage Yard - a large auto salvage yard is located along the south side of existing SR-53 at this location. The site is not registered with any hazardous materials database. Potential hazardous materials include metals contamination and petroleum products from salvage vehicles including gasoline, diesel, oil, antifreeze, etc. No above ground storage tanks (ASTs) or USTs were observed at the site. The conceptual alternative will not require additional right-of-way from this site.
  - Station 148+50 through 149+00: Junk Cars within ravine – A ravine with several junk cars is located along the north side of the proposed conceptual alternative at this location. Potential hazardous materials include petroleum products from salvage vehicles including gasoline, diesel, oil, antifreeze, etc. The conceptual alternative will require right-of-way and removal of the cars at this location.

- Station 151+00 through 155+00: SR-53 at Farm House with Barn and Junk Cars – a farm with a large barn with several large farm implements and junk cars is located along the north side of existing SR-53 at this location. The site is not registered with any hazardous materials database. Potential hazardous materials include chemicals associated with farms (pesticides, herbicides, fertilizers) and petroleum products from salvage vehicles or farm implements including gasoline, diesel, oil, antifreeze, etc. No ASTs or USTs were observed at the site. The conceptual alternative will require the acquisition of this farm and all outbuildings at this location.
- Station 159+00: Residence with Large Auto Repair Garage – a residence with a large garage and several junk cars is located along the north side of existing SR-53 at this location. The site is not registered with any hazardous materials database. Potential hazardous materials include petroleum products from salvage vehicles including gasoline, diesel, oil, antifreeze, etc. No AST's or USTs were observed at this location. The conceptual alternative will require right-of-way at this location.

- Level of Environmental Analysis:
  - Are Time savings Procedures appropriate? Yes (X) No ( )
  - Categorical Exclusion (X)

- Utility Involvements
  - Amicalola EMC - Tim Jenkins – Ph: (706) 273-8764
  - Frontier Communications – Jerry DeBerry – Ph: (706) 337-5000
  - Pickens County Water Authority – Larry Coleman – Ph :(706) 253-8718
    The proposed alignment will involve the relocation of a water tower and the complete acquisition of a parcel.
  - City of Calhoun Water – Larry Muse – Ph: (770) 548-0359
  - City of Fairmount Water – Mayor Steve Brannon – Ph: (706) 337-5306

VE Study Required: Yes ( ) No (X)

Project Responsibilities:

- Design - Volkert & Associates, Inc.
- Environmental - Volkert & Associates, Inc.
- Right of Way Acquisition - ~~Volkert & Associates, Inc.~~ DOT ✓
- Relocation of Utilities - GDOT
- Letting of Contract - GDOT ✓
- Supervision of Construction - GDOT
- Providing Material Pits - Contractor
- Providing Detours – Contractor

Coordination:

- The Initial Concept Meeting was held on July 24, 2006 at the Georgia Department of Transportation's District 6 Conference Room. Those from Volkert & Associates, Inc., GDOT, Frontier Communications, and The City of Fairmount, GA attended the meeting. A brief overview of the project was given including the need and purpose as well as four alternative horizontal alignments. Other issues that were discussed include environmental concerns, how the project will be coordinated among several different entities including the public, and a project schedule. A copy of the meeting minutes is included in the attachments.
- The Concept Meeting was held on March 9, 2007 at the Georgia Department of Transportation's District 6 Conference Room. Representatives from GDOT, Volkert & Associates, and Gordon County attended the meeting. A copy of the meeting minutes is included in the attachments.
- P.A.R. meetings, dates and results : N/A
- FEMA, USCG and/or TVA : N/A
- Public Involvement:
  - A Public Information Open House was held on January 9, 2007.
  - Locals invited to Concept Team Meeting
- Local Government comments can be found on page 11 of this report.
- Other projects in the area :
  - PI No. 0007930 - Long Range – SR-53 from SR 61/Gordon County to 0.5 mile East of SR 136 Connector/Pickens County; 10 Miles
  - PI No. 0007931 - Long Range – SR-53 from 0.5 mile East of SR 136 Connector/Pickens County to SR 515; 9 Miles
- Railroads: N/A
- Other coordination to date:

Public Input

A comment was received by the Mayor of Fairmount, GA in response to a request for known conditions and concerns for the SR 53 Safety Improvements Project. (This comment was not a part of the Public Information Open House)

Name: Mr. Steven Brannon
Title: Mayor
Organization: City of Fairmount, GA
Address: 2567 U.S. Highway 411, SE
P.O. Box 705
Fairmount, GA 30139
Phone: (706) 337-5306
Fax: (706) 337-4676
Response Date: 5/25/2006
Comment Method: Letter
Date Received: 9/6/2006
For or Against: For
Comment: *"This letter is in response to your request dated March 13, 2006 for known project conditions or concerns for the above project. I am a life long resident of Fairmount and I am familiar with the area along the proposed construction route. I am very pleased that DOT is planning the much needed improvements along this route. I have 2 areas of concern that many members of our community and the City Council have asked me to convey to your office. (1) We are concerned that a straighter and wider roadway just west of Pearl Johnson Road will have a funnel effect on the west bound traffic. The west bound lane, down Scott Branch is steep with sharp curves. This has always been an accident prone area with many fatalities. (2) We are concerned that any additional widening or right-of-way purchases near Pleasant Grove/Ryo Church could encroach on the Cemetery. This is sacred ground for our community. Some previous improvements along this route may have interfered with some grave sites. We would ask that you please be considerate and respectful in that area. Please advise the City of any plans to improve State Route 53 west of this*

project so the City of Fairmount can plan accordingly. We are currently working on our Comprehensive Plan for the next 20 years and any information could be helpful. I am sure that you are faced with many issues on a project like this. I am confident that you and your engineers will take this challenge and will make the much needed improvements along this section of our community."

A Public Information Open House (PIOH) was held on January 9, 2007 at the Fairmount Elementary School, which is located at 130 Peachtree Street, Fairmount, GA. Displays of the conceptual alignment were on hand for the public to review and ask questions to the GDOT representatives. Seventy-four (74) citizens registered at the PIOH. Nine (9) comments were received from the PIOH meeting. Most people in attendance supported the proposed project. The summary of comments received is below. Actual comments are included in the attachments.

OPTION	#
FOR	5
AGAINST	3
UNDECIDED	1

The comments resulted in five (5) people for the project, three (3) people against the project and one (1) undecided. The comments in favor of the project focus on the dangerous curves in the area and the number of accidents that have occurred in the past. The comments against the project mention that straightening the roadway will result in higher speeds and more accidents due to vehicles leaving and entering the highway. The one undecided comment was from a property owner concerned about the loss of SR-53 frontage and the effect the project will have upon property values for properties bypassed by the project.

Scheduling – Responsible Parties' Estimate:

- Time to complete environmental process: 12 months
- Time to complete preliminary construction plans: 6 months
- Time to complete right-of-way plans: 4 months
- Time to complete final construction plans: 9 months
- Time to complete right-of-way purchase: 12 months

Other Alternates considered: No Build – This option does not address the needs for a safer and more efficient operation of SR 53 through the corridor.

Attachments:

1. Construction Cost Estimate (Includes Right-of-Way)
2. Right-of-Way Cost Estimate Approval
3. Typical Sections
4. Accident Summaries
5. Traffic Counts & Speed Studies
6. Capacity Analysis
7. Minutes of Initial Concept and Concept Meetings
8. PIOH Comments
9. PIOH Synopsis

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 April 6 through April 9, 2009 in Atlanta, Georgia, for the Georgia Department of Transportation.

INTRODUCTION

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

Les M. Thomas, P.E., CVS-Life	Certified Value Specialist
Luke Clarke, P.E, AVS	Senior Highway Design Engineer
Kevin Martin, Esq. AVS	Highway Construction Specialist
Randy S. Thomas, CVS	Assistant Team Leader

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

- **Investigation/Information Phase** – during this phase of the VE Team's work, the team received a briefing from the Georgia Department of Transportation (GDOT) staff and Parsons Engineering. 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 safety**
        - **Meet AASHTO's geometric curve standards**
        - **Reduce construction costs**
        - **Preserve historical sites**

    - **Project Basic Functions**

        - **Improve safety**
        - **Meet AASHTO's standards**
        - **Reduce accident rate**
        - **Maintain traffic during construction**

- **Speculation Phase -** The VE team performed a brainstorming session to identify ideas that might help meet the project objectives:

        - **Reduce paved shoulders**
        - **Utilize new alignment north of SR 53**
        - **Construct more westbound passing lanes**

  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

CSSTP-0006-00(416)-P.I. No. 00006416

SR 53 Reconstruction

Gordon/Pickens Counties

April 6-9, 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

1:00-2:30 Function Analysis Phase

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

2:30-5:00 Creative Phase

- Brainstorming of alternative ideas

Day Two

8:00-10:00 Evaluation Phase

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

10:00-5:00 Development Phase

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

Day Three

8:00-5:00 Development Phase

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

Day Four

8:00-9:00 Prepare Presentation
9:00-10:00 VE Team Presentation

FUNCTION ANALYSIS AND COST-WORTH

Georgia Department of Transportation
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

SHEET NO.: **1** of **2**

NO.	ELEMENT	*FUNCTION* VERB	NOUN	KIND	COST (000)	WORTH (000)	COMMENTS
1	**OVERALL PROJECT**	Enhance	Safety	B	11,431	9,500	C/W=1.20
		Improve	Traffic Operations	B			
2	**RIGHT-OF-WAY**	Accommodate	Roadway	B	2,450	2,000	C/W=1.2
		Facilitate	Utilities	RS			
3	**EARTHWORK**	Support	Road	RS	2,200	1,800	CW=/1.11
4	**ASPHALT PAVING**	Create	Lanes	B	2,174	2,000	C/W=1.1
		Support	Live	B			
5	**EROSION CONTROL-**	Stabilize	Earthwork	S	760	760	C/W=1.0
6	**AGGREGATE BASE**	Support	Road	S	676	676	C/W=1.0
7	**UTILITIES**	Replace	Utilities	S	500	0	C/W=5.0
8	**RETAINING WALL**	Reduce	Environmental Impact	S	400	200	C/W=2.0

Function defined as: Action Verb
Measurable Noun

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

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

FUNCTION ANALYSIS AND COST-WORTH

Georgia Department of Transportation
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

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

NO.	ELEMENT	*FUNCTION*			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
9	**TRAFFIC CONTROL**	Enhances	Safe Construction	S	300	210	C/W=1.4
10	**MOBILIZATION**	Mobilize	Contractor	S	200	200	C/W=1.0
11	**CLEARING & GRUBBING**	Prepare	Site	S	200	200	C/W=1.0
12	**DRAINAGE ITEMS**	Convey	Storm water	B	151	151	C/W=1.0
13	**GUARDRAIL**	Enhance	Safety	S	106	106	C/W=1.0
14	**SIGNING & STRIPING**	Enhance	Safety	S	75	75	C/W=1.0

Function defined as: Action Verb
Measurable Noun

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

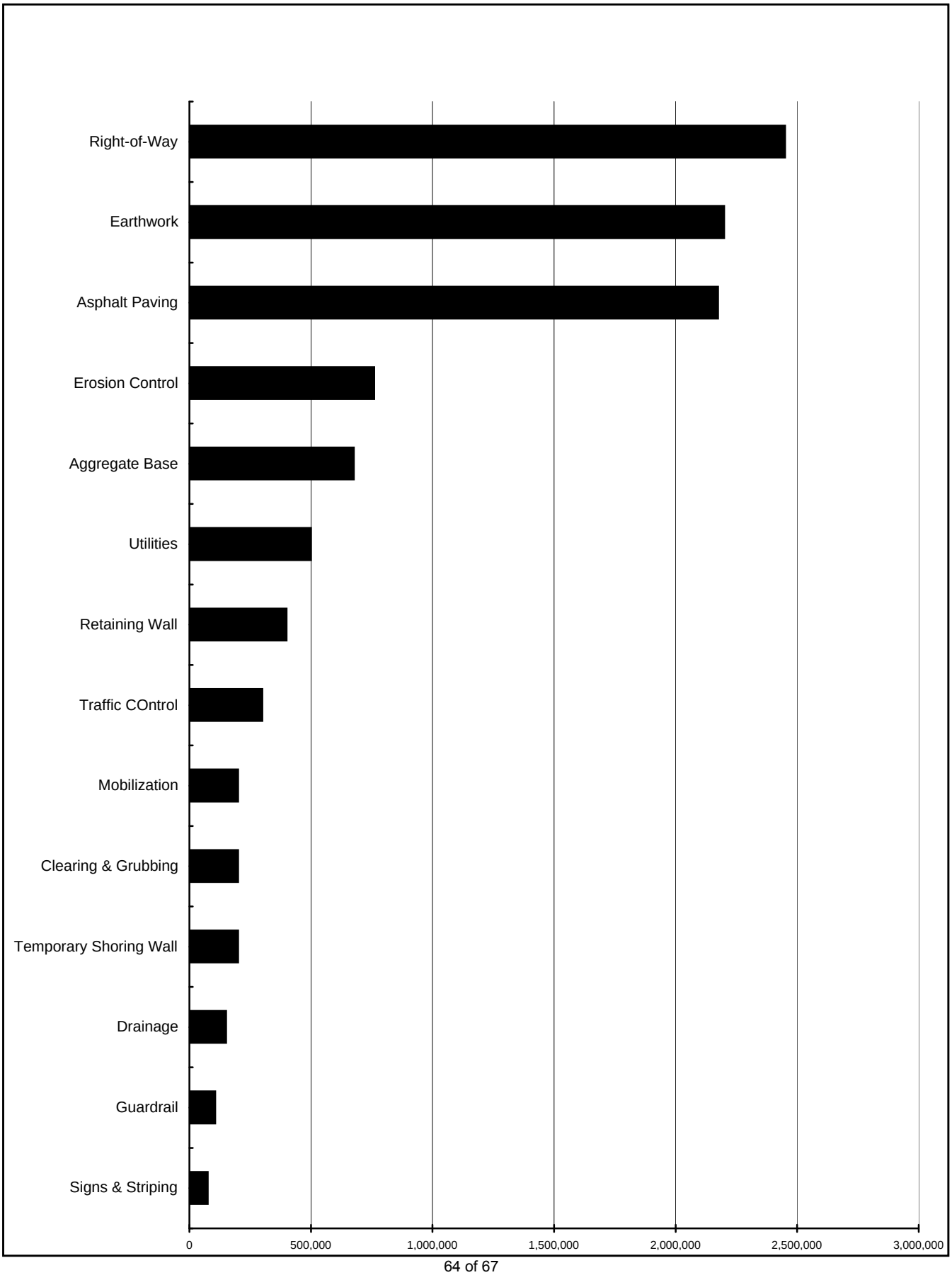
Cost/Worth Ratio =
(Total Cost ÷ Basic Worth)

PARETO CHART - COST HISTOGRAM

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) - P.I. No. 0006416
SR 53 Reocnstruction
Gordon/Pickens Counties

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Right-of-Way	2,450,000	23.58%	23.58%
Earthwork	2,200,000	21.17%	44.74%
Asphalt Paving	2,174,400	20.92%	65.67%
Erosion Control	760,000	7.31%	72.98%
Aggregate Base	676,060	6.51%	79.49%
Utilities	500,000	4.81%	84.30%
Retaining Wall	400,000	3.85%	88.15%
Traffic COntrol	300,000	2.89%	91.03%
Mobilization	200,000	1.92%	92.96%
Clearing & Grubbing	200,000	1.92%	94.88%
Temporary Shoring Wall	200,000	1.92%	96.81%
Drainage	150,773	1.45%	98.26%
Guardrail	106,000	1.02%	99.28%
Signs & Striping	75,000	0.72%	100.00%
***Subtotal Construction Cost**	**$ 10,392,233**		
E & C Rate @10%	**$ 1,039,223**		
Subtotal =	**$ 11,431,456**		
Total Construction Cost =	**$ 11,431,456**		
TOTAL	**$ 11,431,456**		

Project: csst*-0006-00(416)
P.I. No. 0006416
Gordon/Pickens Counties



DESIGNER PRESENTATION

MEETING PARTICIPANTS

Geogia Department of Transportation **April 9, 2009**

CSSTP-0006-00(416) - P.I. No. 0006416 Gordon/Pickens Counties

NAME	ORGANIZATION & TITLE		E-MAIL	PHONE
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VE TEAM PRESENTATION

MEETING PARTICIPANTS

Geogia Department of Transportation **April 9, 2009**

CSSTP-0006-00(416) - P.I. No. 0006416 Gordon/Pickens Counties

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Jason Goffinet		Volkert & Associates, Inc.	jgoffinet@volkert.com	770-288-9209
Richard Boston		Volkert & Associates, Inc.	rboston@volkert.com	770-9199520

CREATIVE IDEA LISTING

PROJECT: **Georgia Department of Transportation**
CSSTP-0006-00(416) – P.I. No. 0006416
SR 53 Reconstruction
Gordon/Pickens Counties

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

NO.	IDEA DESCRIPTION	RATING
	ROADWAY (RD)	
RD-1	Make existing SR 53 four lanes	1
RD-2	Use guardrail in-lieu of selected shoulder improvements	1
RD-3	Make proposed alignment four lanes	3
RD-4	Use 4'-0" paved shoulder	5
RD-5	Use 2'0" paved shoulder	1
RD-6	Utilize a new alignment north of existing SR 53	4
RD-7	Alter alignment to avoid at-grade intersection @ existing SR 53	1
RD-8	Adjust Station 130 to Sta. 146 to minimize rock excavation	2
RD-9	Avoid water tank relocation	1
RD-10	Review retention basins	3
RD-11	Use 14' passing lanes	1
RD-12	Eliminate retaining walls by increasing side slope	2
RD-13	Eliminate retaining walls from Station 146+60 to Station148+30	4
RD-14	Shift traffic from Station 133+00 to Station 142+00; eliminate proposed shoring	4
RD-15	Construct new two lane one way westbound; use existing as one way eastbound	1
RD-16	Provide westbound passing lanes	5
RD-17	Use eight foot shoulders	5
RD-18	Reduce clear zone from 32' to 30'	4
RD-19	Reduce pavement thickness on shoulders	4
RD-20	Extend Right-of-Way to accommodate pipe maintenance at Station 147+36	DS

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;