

Value Engineering Study Report

Projects – EDS-545 (20)(37) Franklin/Stephens Counties



SR 17

P.I. Nos. 122110 and 122260

Preserve Roadway Integrity – Serviceability – Safety

Value Management Team:

PBSJ

Design Teams:

Arcadis

G & M, Inc.

June 2007



July 17, 2007

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

RE: Submittal of the final Value Engineering Report
Projects: EDS-545 (20)(37), P.I.s 122110 and 122260
Franklin/Stephens Counties
PBS&J Project Task Order No. 12

Dear Ms. Myers:

Please find enclosed four (4) hard copies and a CD of our final Value Engineering Report for the SR 17 Franklin/Stephens Counties, as referenced above.

This Value Engineering Study, which was performed during the period June 25 through June 28, 2007, identified **10 Alternative Ideas** which are recommended for implementation. The VE Team also identified **9 Design Suggestion Ideas** which are recommended for the Engineer to consider in his final design. We believe that the **10 Alternative Ideas** recommended may have a significant positive affect on the project.

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

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

Yours truly,

PBS&J

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

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

Value Engineering Study Report

***Projects –EDS-545(20)(37)
Franklin/Stephens Counties
P.I. 122110 and 122260
SR 17***

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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 VE Study during the period of June 25 through 28, 2007 in Atlanta, Georgia for the Georgia Department of Transportation. The subject of the Value Engineering study was EDS-545 (20)(37), Franklin/Stephens Counties, which consists of two projects: P.I.s 122110 and 122260, widening and reconstruction of SR 17. These two projects, which are part of the GRIP program, are being designed by **Arcadis and G&M, Inc.**, respectively.

PROJECT DESCRIPTION

The purpose of Project EDS-545(20) is to widen the existing roadway from two lanes to a rural four lane facility on a new alignment. The project begins in Franklin County approximately 0.75 miles south of the Franklin County/Stephens County line and extends to Rumsey Road/CR 1. New parallel bridges over existing SR17, Norfolk-Southern Railroad and Eastanollee Creek will also be constructed. The length of the project is 6.86 miles.

The purpose of Project ESDS-545(37) is the widening and reconstruction of SR 17 from CR24/Scott Road to CR538/Brookhaven Circle in Stephens County along the existing alignment. The existing two and three lane road will be widened to a four-lane roadway. The project length is 3.04 miles.

More information about these projects may be found in the tabbed section of this report entitled *Project Descriptions*.

VALUE ENGINEERING PROCESS

The Value Engineering Team followed the Seven Step Value Engineering job plan as promulgated by Georgia Department of Transportation. This Seven Step Job Plan includes the following:

- Investigation
- Analysis
- Speculation
- Evaluation
- Development
- Recommendation
- Presentation

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

THE STUDY RESULTS

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

After the evaluation phase was completed, 10 *Alternative Ideas* and 9 **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 AND DESIGN SUGGESTIONS

Alternative Number	DESCRIPTION OF ALTERNATIVE	Initial Cost Savings	Implemented Cost Savings/Disposition
	Project EDS-545(20) PI Nos. 122110		
20-1	Use Asphalt Paving in lieu of Concrete Paving	\$13,854,445	
20-6	Use Walled Abutments in-lieu of End Spans	\$854,183	
20-8	Shorten the left and right turn lane storage lengths	DS	
20-9	Shorten the U turn lane storage lengths	DS	
20-10	Delete "channelized" turn feature, Use Type A if volume permits	\$1,286,174	
20-11	Use "Conspan" in-lieu of CBC's	\$462,105	
20-12	Eliminate Cross Slope Break for 2' shoulders (concrete pavement)	DS	
20-14	Review profile/cross slopes to eliminate ponding potential	DS	
20-15	Complete construction of all side roads prior to staging SR 328	DS	
20-17	Consider having approaching roadway section identical bridge section	DS	
20-18	Construct a left turn lane on Arrowhead Rd	DS	
	Project EDS-545(37) PI Nos. 122260		
37-2	Reduce Bridge Width by providing a Davis Rd. Cul-De-Sac	\$461,632	
37-3	Reduce Bridge Width by using a Type A in-lieu of Type B intersection at Eastanollee Rd.	\$230,089	
37-4	Retain and Overlay the existing pavement from Sta 485+/- to Sta 526+/-	\$309,287	
37-5	Use Keystone in-lieu of MSE walls at Sta 546+50 +/-	\$140,351	
37-6	Retain and Overlay the existing pavement from Sta 400+/- to Sta 485+/-	\$658,361	
37-7	Relocate Bike Lanes from roadway to a multi-use trail	DS	
37-8	Use "Conspan" in-lieu of CBC	\$169,108	
37-10	Review profile/cross slopes to eliminate ponding potential	DS	

Study Results

Study Results

Introduction

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

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

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

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

Cost Calculations

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

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



SUMMARY OF ALTERNATIVES AND DESIGN SUGGESTIONS

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Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-1

DESCRIPTION: **USE ASPHALT PAVING IN LIEU OF CONCRETE
PAVING**

SHEET NO.: **1** of **6**

Original Design:

The original design calls for SR 17 to be constructed utilizing 10” jointed plain concrete pavement from Sta 81+92 to Sta 371+00.

Alternative Design:

This alternative design suggests construction of SR 17 to be done utilizing hot mix asphalt construction as an alternate to the locations shown.

Opportunities:

- Cost savings
- Easier stage construction at intersections
- Simplified repair and maintenance operations

Risks:

- Different maintenance requirements

Technical Discussion:

Construction on SR 17 both to the north and south are currently being done or are proposed to be hot mix asphalt. Concrete typically requires less maintenance but joint maintenance and concrete repairs are more difficult than repairs to asphalt.

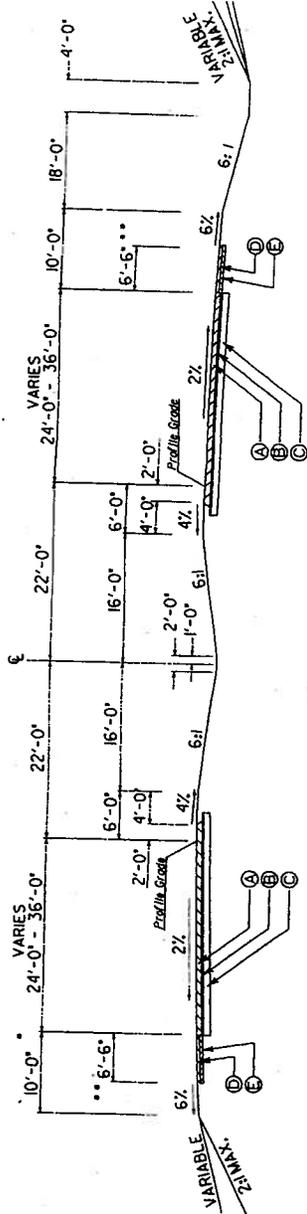
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 28,306,162	\$ 1,193,830	\$ 26,926,705
ALTERNATIVE	\$ 13,319,606	\$ 2,325,941	\$ 14,434,401
SAVINGS	\$ 14,986,556	\$ (1,132,111)	\$ 12,492,304

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.: **20-1**

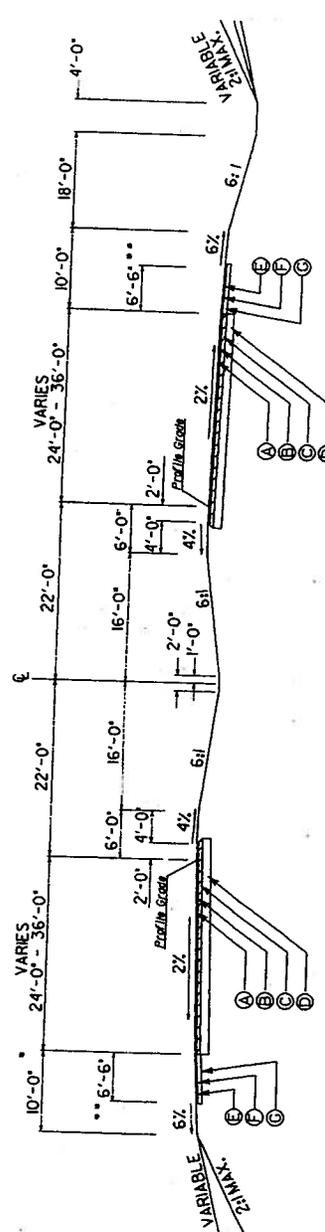
DESCRIPTION: **USE ASPHALT PAVING IN LIEU OF CONCRETE PAVING**

SHEET NO.: **2** of **6**



ORIGINAL DESIGN

- REQUIRED PAVEMENT**
- (A) 10" JOINTED PLAIN CONCRETE PAVEMENT
 - (B) 330 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE.
 - (C) 12" GRADED AGGREGATE BASE
 - (D) 6" ROLLER COMPACTED CONCRETE
 - (E) 6" GRADED AGGREGATE BASE



ALTERNATE DESIGN

- REQUIRED PAVEMENT**
- (A) 165 LB/SY RECYCLED ASPH. CONC. 12.5mm SUPERPAVE INCLUDING POLYMER MODIFIED BITUM MATL.
 - (B) 320 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
 - (C) 114 LB/SY RECYCLED ASPH. CONC. 25mm SUPERPAVE
 - (D) 12" GRADED AGGREGATE BASE
 - (E) 165 LB/SY RECYCLED ASPH. CONC. 12.5mm SUPERPAVE
 - (F) 220 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
 - (G) 6" GRADED AGGREGATE BASE

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 1222260
SR-17

ALTERNATIVE NO.:
20-1

DESCRIPTION: **USE ASPHALT PAVING IN LIEU OF CONCRETE
PAVING**

SHEET NO.: **3** of **6**

AREA OF CONCRETE PAVEMENT

STA 81+92 - STA 371+00 - 28908 LF

TURN LANES - 22 LANES TOTAL

LENGTH - 500' LF (AVERAGE FROM PLANS)

TAPERS - 420 LF (CONSTRUCTION DETAIL)

$$\text{M } 28908' \times 52' = 1503216 \text{ SF} = 16702454$$

TURN LANES

$$22 \times 500' \times 28' = 308000 \text{ SF} = 3422254$$

$$22 \times 420' \times \frac{28+0}{2} = 129360 \text{ SF} = 1437354$$

TOTAL	1940576 SF	21561954
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QUANTITY CHANGE - CHANGE FROM CONCRETE
TO ASPHALT

12.5 mm SURCREAVE ADD 1 1/2"

$$165 \# / yd^2 \times 215619 yd^2 \div 2000 = 17789 \text{ TN}$$

19 mm SURCREAVE DECREASE 1"

$$110 \# / yd^2 \times 215619 yd^2 \div 2000 = 11859 \text{ TN}$$

25 mm SURCREAVE ADD 7"

$$770 \# / yd^2 \times 215619 yd^2 \div 2000 = 83013 \text{ TN}$$

GRAB - NO CHANGE

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR-17

ALTERNATIVE NO.:
20-1

DESCRIPTION: **USE ASPHALT PAVING IN LIEU OF CONCRETE PAVING**

SHEET NO.: 4 of 6

CONSTRUCTION COST PER MILE FOR 4-12'
LANES FROM STA 81+92 - STA 371+00 PLUS
RESIDUALS

PC CONCRETE SECTION PER LINEAR FOOT

$$\begin{aligned} \text{GAB} & 1 \text{ LF} \times 52 \text{ LF} \times 1 \text{ LF} \times 145 \text{ lb/ft}^3 \div 2000 = 3.77 \text{ TN} \\ 19 \text{ mm} & 1 \text{ LF} \times 52 \text{ LF} \div 9 \times 330 \text{ \#/ft}^2 \div 2000 = 0.95 \text{ TN} \\ \text{PC CONC} & 1 \text{ LF} \times 52 \text{ LF} \div 9 = 5.77 \text{ yd}^2 \end{aligned}$$

$$\begin{aligned} 3.77 \text{ TN} \times 24.34 & = \$91.76 \\ 0.95 \text{ TN} \times 65.00 & = \$61.75 \\ 5.77 \text{ yd}^2 \times 90.00 & = \underline{\$519.30} \end{aligned}$$

\$ 672.81 PER LF

HOT MIX ASPHALT SECTION PER LINEAR FOOT

$$\begin{aligned} \text{GAB} & 1 \text{ LF} \times 52 \text{ LF} \times 1 \text{ LF} \times 145 \text{ \#/ft}^3 \div 2000 = 3.77 \text{ TN} \\ 25 \text{ mm} & 1 \text{ LF} \times 52 \text{ LF} \div 9 \times 770 \text{ \#/ft}^2 \div 2000 = 2.22 \text{ TN} \\ 19 \text{ mm} & 1 \text{ LF} \times 52 \text{ LF} \div 9 \times 220 \text{ \#/ft}^2 \div 2000 = 0.63 \text{ TN} \\ 12.5 \text{ mm} & 1 \text{ LF} \times 52 \text{ LF} \div 9 \times 165 \text{ \#/ft}^2 \div 2000 = 0.48 \text{ TN} \end{aligned}$$

$$\begin{aligned} 3.77 \text{ TN} \times 24.34 & = \$91.76 \\ 2.22 \text{ TN} \times 65.00 & = \$144.30 \\ 0.63 \text{ TN} \times 65.00 & = \$40.95 \\ 0.48 \text{ TN} \times 65.00 & = \underline{\$31.20} \end{aligned}$$

\$ 308.21 PER LF

CONCRETE PER MILE = \$ 672.81 x 5280 = \$ 3,552,436

ASPHALT PER MILE \$ 308.21 x 5280 = \$ 1,627,348

LIFE CYCLE COST WORKSHEET

PROJECT: SR 17, Franklin Stephens Counties, EDS-545(20)(37) ALTERNATIVE NO. 20-1
 SHEET NO. 6 of 6
Comparison of Concrete vs Asphalt Paving

LIFE CYCLE PERIOD: 20 years	Concrete	Asphalt
INTEREST RATE: 3.00% ESCALATION RATE: 0.00%	ORIGINAL	PROPOSED
A. INITIAL COST	25,732,875	12,108,460
Useful Life (Years)	20	10
INITIAL COST SAVINGS		13,624,415

B. RECURRENT COSTS (Annual Expenditures)			
1. Maintenance		-	
2. Maintenance			-
3. Energy			
4.			
5.			
6.			
Total Annual Costs		-	-
Present Worth Factor		14.8775	14.8775
Present Worth of RECURRENT COSTS		-	-

C. SINGLE EXPENDITURES			Year	Amount	PW factor	Present Worth	Present Worth
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)					
x		1. Concrete Pavement	10	\$0	0.7441	\$0.0	\$0.0
	x	2. Asphalt Resurfacing	10	\$1,153,561	0.7441	\$0.0	\$858,358.0
	x	3. Asphalt Resurfacing	20	\$1,153,561	0.5537	\$0.0	\$638,699.0
x		4. Concrete Repairs	20	\$2,156,190	0.5537	\$1,193,830.0	
	x	4. Asphalt Resurfacing	30	\$1,153,561	0.4120	\$0.0	\$475,252.0
	x	5. Asphalt Resurfacing	40	\$1,153,561	0.3066	\$0.0	\$353,632.0
		6.			1.0000	\$0.0	\$0.0
		7.			1.0000	\$0.0	\$0.0
		8.			1.0000	\$0.0	\$0.0

D. SALVAGE VALUE			Year	Amount	PW factor	Present Worth	Present Worth
	x	1.			1.0000	-	-
		2.			1.0000	-	-

Present Worth of SINGLE EXPENDITURES						\$1,193,830	\$2,325,941
E. Total Recurrent Costs & Single Expenditures (B + C + D)						\$1,193,830	\$2,325,941
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS							(\$1,132,111)
TOTAL PRESENT WORTH COST (A + E)						\$26,926,705	\$14,434,401
TOTAL LIFE CYCLE SAVINGS							\$12,492,304

Note - escalation shown as 0.0% since using constant dollar LCC analysis

	SY	Unit Cost	cost
AC Mill & Inlay	215,619	\$5.35	\$1,153,561.65
Concrete Mill and joint repair	215,619	\$10.00	\$2,156,190.00

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-6

DESCRIPTION: **USE WALLED ABUTMENTS IN-LIEU OF END SPANS**

SHEET NO.: 1 of 6

Original Design:

The original design calls for the construction of twin 5 span curved bridges, 537' long over Old SR-17 and Norfolk Southern RR. For both bridges, Spans 1 and 5 measure 100' and 78' respectively while the intermediate Spans 2, 3 & 4 measure 119'. The out-to-out width of the both bridges is 41'-3". The bridges are comprised of five Bulb Tee PSC beams evenly spaced. Span 1 consists of BT 63 beams, Spans 2, 3 & 4 consist of BT 72 beams and Span 5 consists of BT 54 beams. The bridges accommodate a 10' shoulder on the outside, two 12' travel lanes and a 4' shoulder on the inside. The end bents for both bridges are made up of concrete caps supported on Steel "H" Piles while the intermediate bents are made up of concrete cap and columns founded on Steel "H" Piles with pile caps. The barrier rails are standard.

Alternative Design:

The proposed alternative eliminates the 100' and 78' end spans and reduces the bridge length to 357'. This can be accomplished by providing walled abutments at the current Bent 2 and Bent 5 locations.

The alternative maintains the 23' minimum vertical clearance to Norfolk Southern RR and other current geometry.

Opportunities:

- Cost savings by reducing bridge length
- Cost savings on slope paving
- Reduced construction time
- May provide an opportunity for reduced Right-of-way requirements

Risks:

- This configuration is typically used in Urban areas where availability of Right-Of-Way is limited.
- Re-design effort will require additional time

Technical Discussion:

Special design for MSE walls will be required. The horizontal clearance requirements for future Rail Road expansion, if any, may be maintained. The same beam depth and configuration as in the original design can be used for the alternate.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,466,062	\$ 0	\$ 4,466,062
ALTERNATIVE	\$ 3,611,880	\$ 0	\$ 3,611,880
SAVINGS	\$ 854,183	\$ 0	\$ 854,183

Illustrations

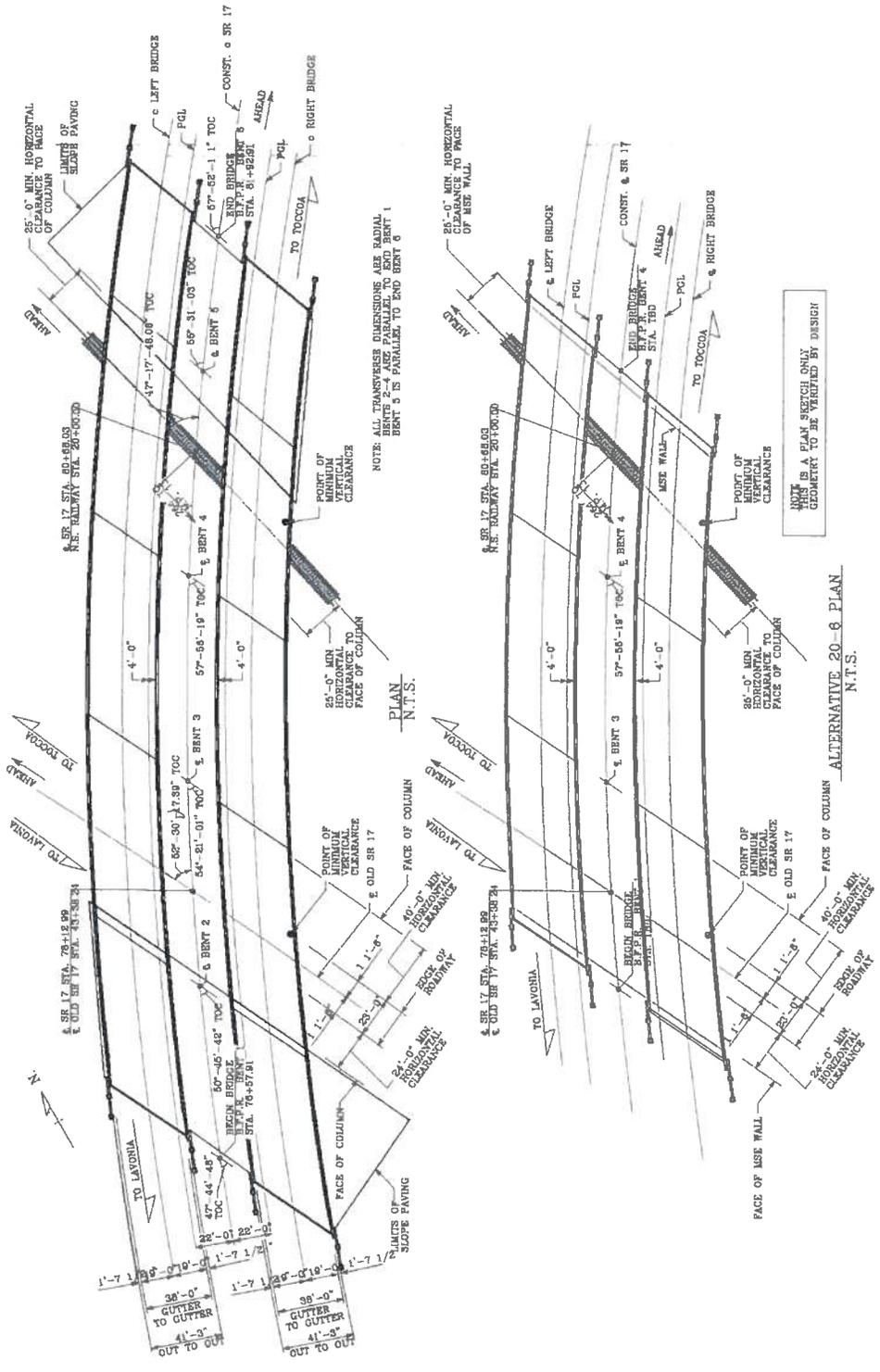


PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-6

DESCRIPTION: **USE WALLED ABUTMENTS IN-LIEU OF END SPANS**

SHEET NO.: **2** of **6**



Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-6

DESCRIPTION: **USE WALLED ABUTMENTS IN-LIEU OF END SPANS**

SHEET NO.: **4** of **6**

Current Design (Twin Bridges, 5 Spans – 535' Long)

Superstructure:

Deck Area = $2 * [535' * 41.25' \text{ (avg.)}] = 44,137.5 \text{ SF}$

Volume of 8 1/4" thick Class AA Superstructure Deck concrete = $[44137.5 * (8.25"/12)]/27 = 1123.87 \text{ CY}$

Area of Grooved concrete (approx.) = $2 * 535' * 34'/9 = 4,042.22 \text{ SY}$

Total length of BT-54 PPC Girders (approx.) = $2 * (78' * 3) = 468 \text{ LF}$

Total length of BT-63 PPC Girders (approx.) = $2 * (100' * 3) = 600 \text{ LF}$

Total length of BT-72 PPC Girders (approx.) = $2 * [(100' * 2) + (78' * 2) + (3 * 119' * 5)] = 4,282 \text{ LF}$

Total length of Barrier Rail (Standard) = $2 * 2 * 535 = 2,140 \text{ LF}$

Area of 4" Sloped Paving (approx.) = 3395 SY

Substructure:

Volume of Class AA concrete (average dimensions of Caps, Columns & Pile Caps, Columns @ 28'):

Intermediate Bents: $2 * \{[(2 * 53' * 5' * 6') + (2 * 49.5' * 5' * 6') + (4 * 2 * 5' * 5.5' * 28')] + [4 * 2 * (8.75' * 8.75' * 3.5')]\} / 27 = 1,070.65 \text{ CY}$

End Bents (approx.): $2 * \{[2 * 58' * 3' * 3'] + [2 * 56.25' * 3' * 3'] + [2 * 49.75' * 3' * 3'] + [2 * 50.5' * 3' * 3'] + [2 * 24.75' * 1' * 10.75'] + [2 * 22' * 1' * 8.25']\} / 27 = 352.31 \text{ CY}$

Total Volume of Class AA concrete = 1,422.96 CY

Length of Steel HP 14X89 Piles (End Bents – 30 ft piles) = $2 * 2 * [11 * 30' + 4 * 15'] = 1,560 \text{ LF}$

Length of Steel HP 14X73 Piles (Intermediate Bents – 30 ft piles) = $4 * (2 * 9 * 30) = 2,160 \text{ LF}$

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-6

DESCRIPTION: **USE WALLED ABUTMENTS IN-LIEU OF END SPANS**

SHEET NO.: **5** of **6**

Alternative (Twin Bridges, 3 Spans – 357' Long)

Superstructure:

Deck Area = $2 * [357' * 41.25' \text{ (avg.)}] = 29,452.5 \text{ SF}$

Volume of 8 1/4" thick Class AA Superstructure Deck concrete = $[29452.5 * (8.25"/12)] / 27 = 750 \text{ CY}$

Area of Grooved concrete (approx.) = $2 * 357' * 34' / 9 = 2,697.33 \text{ SY}$

Total length of BT-72 PPC Girders (approx.) = $2 * [(3 * 119' * 5)] = 3,570 \text{ LF}$

Total length of Barrier Rail (Standard) = $2 * 2 * 357 = 1,428 \text{ LF}$

Area of 4" Sloped Paving (approx.) = NONE

Substructure:

Volume of Class AA concrete (average dimensions of Caps, Columns & Pile Caps, Columns @ 28'):

Intermediate Bents: $2 * \{ [(53' * 5' * 6') + (49.5' * 5' * 6') + (2 * 2 * 5' * 5.5' * 28')] + [2 * 2 * (8.75' * 8.75' * 3.5')] \} / 27 = 535.32 \text{ CY}$

End Bents (approx.): $2 * \{ [2 * 58' * 3' * 3'] + [2 * 56.25' * 3' * 3'] + [2 * 49.75' * 3' * 3'] + [2 * 50.5' * 3' * 3'] + [2 * 24.75' * 1' * 10.75'] + [2 * 22' * 1' * 8.25'] \} / 27 = 352.31 \text{ CY}$

Total Volume of Class AA concrete = 887.65 CY

Length of Steel HP 14X89 Piles (End Bents – 30 ft piles) = $2 * 2 * [11 * 30' + 4 * 15'] = 1,560 \text{ LF}$

Length of Steel HP 14X73 Piles (Intermediate Bents – 30 ft piles) = $2 * (2 * 9 * 30) = 1,080 \text{ LF}$

Area of MSE Walls (assume 30' high, continuous in front of abutments and 15' wrap around on each side of abutment at an average height of 15') = $2 * [(30' * 150') + (30' * 140) + (2 * 15' * 15')] = 18,300 \text{ SF}$

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-8

DESCRIPTION: **SHORTEN THE LEFT AND RIGHT TURN STORAGE LENGTHS**

SHEET NO.: **1 of 1**

Original Design: The original design calls for 400' to 500' of storage in addition to the deceleration lanes.

Alternative: Reduce the left and right turn storage lengths to be more appropriate with the planned traffic loads.

Opportunities:

- Decrease construction cost

Risks

- Requires LOS re-evaluation
- May require redesign effort

Technical Discussion:

Detailed intersection traffic for was not available for analysis/evaluation however, an inspection of the project reveals that some of the storage lengths appeared excessive. A re-evaluation of the LOS of the turn lanes may be warranted.

Value Analysis Design Suggestion

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-9

DESCRIPTION: **SHORTEN THE U- TURN LANE STORAGE LENGTHS**

SHEET NO.: 1 of 1

Original Design: The original design calls for 400' to 500' of storage in addition to the deceleration lanes.

Alternative: Reduce the "U" storage lengths to be more appropriate with the planned traffic loads.

Opportunities:

- Decrease construction cost

Risks

- Requires LOS re-evaluation
- May require a redesign effort

Technical Discussion:

Detailed intersection traffic for was not available for analysis/evaluation however, an inspection of the project reveals that some of the storage lengths appeared excessive. A re-evaluation of the LOS of the u-turn lanes may be warranted.

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-10

DESCRIPTION: **DELETE "CHANNELIZED" TURN FEATURE, USE TYPE A
MEDIAN CROSSOVERS IF TRAFFIC VOLUME PERMITS**

SHEET NO.: 1 of 4

Original Design:

The original design calls for the use of Type B median crossovers on the project.

Alternative Design:

This alternative design suggests using Type A median crossovers.

Opportunities:

- Reduce paving cost
- Provide additional median width to more easily accommodate u-turns by large design vehicles
- Improve drainage.

Risks:

- Potential to reduce safety

Technical Discussion:

The subject roadway has a relatively high volume which would normally dictate the use of a Type B crossing to improve safety and operations. Due to the large number of median crossovers, the increase in paving cost is significant.

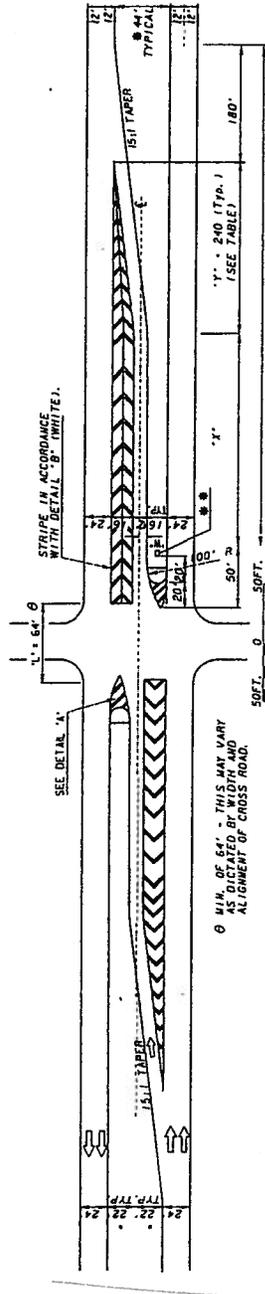
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,938,629		\$ 1,938,629
ALTERNATIVE	\$ 652,355		\$ 652,355
SAVINGS	\$ 1,286,174		\$ 1,286,174

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.: **20-10**

DESCRIPTION: **DELETE "CHANNELIZED" TURN FEATURE, USE TYPE A**
MEDIAN CROSSOVERS IF TRAFFIC VOLUME PERMITS

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



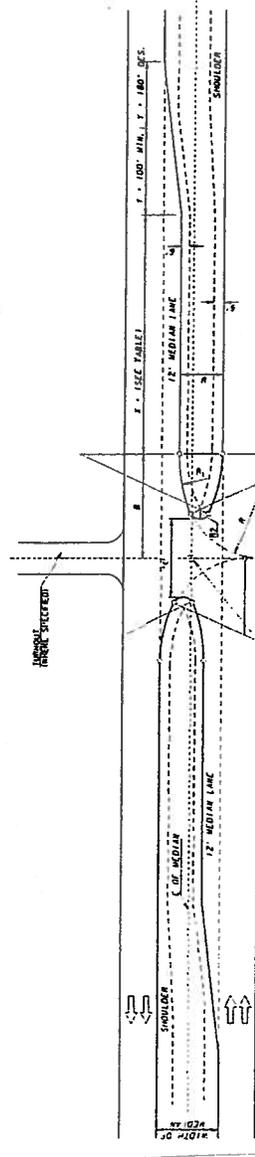
SEE SEPARATE SHEETS: TYPICAL SECTION GUIDE FOR TYPE "B" MEDIAN CROSSOVER.

- NOTE: PAVEMENT OF MEDIAN CROSSOVERS (ALL TYPES) SHALL BE SLOPED FOR SURFACE DRAINAGE AS SPECIFIED.
- * MEDIAN DROP INLET (80315) MUST BE PLACED CLOSER THAN 20 FEET BACK FROM END OF ROSE OF THE MEDIAN.
 - MEDIAN DROP INLET (80315) IS NOT RECOMMENDED FOR TYPE B MEDIAN CROSSOVERS WHERE GRADES ARE GREATER THAN 3%.

TYPE B MEDIAN CROSSOVER

- * DIMENSIONS MAY VARY WHERE SPECIFIED IN THE PLANS.
- * DIMENSIONS IN FEET (TYP)

ORIGINAL DESIGN
 NTS



NOTE: FOR TYPE "A" AND TYPE "B" MEDIAN CROSSOVERS SHALL BE SLOPED WITH A MINIMUM ACCEPTABLE SLOPE OF ONE INCH PER FOOT.

TYPE A MEDIAN CROSSOVER

- * DIMENSIONS MAY VARY WHERE SPECIFIED IN THE PLANS.
- * DIMENSIONS IN FEET (TYP)

ALTERNATIVE DESIGN
 NTS

Calculations



PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-10

DESCRIPTION: **USE ASPHALT PAVING IN LIEU OF CONCRETE PAVING**

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

Typical Type A crossover-

Taper- $[(0'+12')/2] 180LF = 1080 SF$

Storage- $(12' \times 350LF) = 4200 SF$

Total- $[(5280 SF)/(9 SF/SY)] \times 26 \text{ locations} \sim 15255 SY$

12.5 mm ACP- $(165\#/SY) \times 15255SY / (2000\#/TN) \sim 1260 TN$

19.0 mm ACP- $(330\#/SY) \times 15255SY / (2000\#/TN) \sim 2520 TN$

25.0 mm ACP- $(660\#/SY) \times 15255SY / (2000\#/TN) \sim 5035 TN$

12" GAB- $(5280SF \times 1.0 FT) \times (145\#/CF) / (2000\#/TN) \sim 385 TN$

Typical Type B crossover

Taper- $[(0'+28')/2] 420LF = 5880 SF$

Storage- $(28' \times 350LF) = 9800 SF$

Total- $[(15680 SF)/(9 SF/SY)] \times 26 \text{ locations} \sim 45300 SY$

12.5 mm ACP- $(165\#/SY) \times 45300SY / (2000\#/TN) \sim 3740 TN$

19.0 mm ACP- $(330\#/SY) \times 45300SY / (2000\#/TN) \sim 7475 TN$

25.0 mm ACP- $(660\#/SY) \times 45300SY / (2000\#/TN) \sim 14950 TN$

12" GAB- $(15680SF \times 1.0 FT) \times (145\#/CF) / (2000\#/TN) \sim 1140 TN$

COST WORKSHEET



PROJECT: EDS-545(20)(37) PI Nos. 122110, 122260 SR -17	ALTERNATIVE NO: SHEET NO:	20-10 4 OF 4
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DESCRIPTION:	DELETE "CHANNELIZED" TURN FEATURE, USE TYPE A MEDIAN CROSSOVERS IF TRAFFIC VOLUME PERMITS
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
REC ASPH CONC 12.5MM SUPERPAVE	TN	3,740	78.00	291,720	1,260	78.00	98,280
REC ASPH CONC 19.0MM SUPERPAVE	TN	7,475	66.00	493,350	2,520	66.00	1,66320
REC ASPH CONC 25.0MM SUPERPAVE	TN	14,950	64.00	956,800	5,035	64.00	3,22240
GR AGGR BASE	TN	1,140	18.00	20,520	385	18.00	6,210
SUB-TOTAL				1,762,390			593,050
MARK-UP AT 10%				176,239			5,9305
TOTAL				1,938,629			652,355

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 EDS-545(20)(37) PI Nos. 122110, 122260
 SR -17

ALTERNATIVE NO.:
20-11

DESCRIPTION: **USE CON-SPAN™ IN-LIEU OF CONCRETE BOX CULVERTS**

SHEET NO.: 1 of 3

Original Design:

The original design calls for the construction of Cast-In-Place Concrete Box Culverts (CBC) based on GDOT STD 2318, 2329, 2331 & 2332, as listed below:

<u>LOCATION</u>	<u>LENGTH</u>	<u>SIZE</u>	<u>SKEW</u>	<u>FILL HEIGHT</u>
STA 188+43.09	350'	DBL 7'X6' CBC	47°46'38.98"	25'
STA 268+97.52	270'	DBL 9'X6' CBC	19°13'10.38"	30'
STA 285+87.44	212'	SGL 10'X7' CBC	18°17'34.14"	20'
STA 311+54.56	365'	DBL 9'X6' CBC	13°05'38.56"	55'
STA 324+67.29	336'	SGL 8'X7' CBC	28°43'51.57"	40'
STA 375+84.57	205'	SGL 8'X8' CBC	25°26'05.90"	15'

Alternative Design:

The proposed alternatives replace the Cast-In-Place structures with pre-cast structures such as CON-SPAN™ providing an equivalent hydraulic area to that of the original design. The use of a segmental pre-cast structure significantly accelerates the construction time.

Opportunities:

- Reduce construction time and cost
- Eliminate or ease construction staging
- Enhanced aesthetics
- Pre-cast culverts are durable and being used by many agencies

Risks:

- Sufficiency of Hydraulic opening
- Re-design effort will require additional time

Technical Discussion:

Channel flows may have to be investigated and, if required, portions of the channel may have to lined.

For cost comparison, only barrel quantities have been computed. End treatments are assumed to be the same in both designs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,718,270	\$ 0	\$ 2,718,270
ALTERNATIVE	\$ 2,256,164	\$ 0	\$ 2,256,164
SAVINGS	\$ 462,105	\$ 0	\$ 462,105

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-11

DESCRIPTION: **USE CON-SPAN™ IN-LIEU OF CONCRETE BOX CULVERTS**

SHEET NO.: **2** of **3**

Current Design (Cast-In-Place Concrete Box Culverts)

Note:

GA DOT STD's 2318 through 2332 referenced for quantities.

Assumed fill height to be 20' high. (Results in a conservative estimate of quantities).

<u>LOCATION</u>	<u>LENGTH</u>	<u>SIZE</u>	<u>COCONRETE QTY</u>
STA 188+43.09	350'	DBL 7'X6' CBC	$1.791 * 350' = 626.85$ CY
STA 268+97.52	270'	DBL 9'X6' CBC	$2.384 * 270' = 643.68$ CY
STA 285+87.44	212'	SGL 10'X7' CBC	$1.639 * 212' = 347.47$ CY
STA 311+54.56	365'	DBL 9'X6' CBC	$2.384 * 365' = 870.16$ CY
STA 324+67.29	336'	SGL 8'X7' CBC	$1.299 * 336' = 436.46$ CY
STA 375+84.57	205'	SGL 8'X8' CBC	$1.404 * 205' = 643.68$ CY

Alternative (Pre-Cast (CON-SPAN™) Culverts)

Use GA STD 2530 and Quotes from CONTECH BRIDGE SOLUTIONS for basis of cost comparison.

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-12

DESCRIPTION: **ELIMINATE CROSS SLOPE BREAK FOR 2' SHOULDERS**
(CONCRETE PAVEMENT)

SHEET NO.: 1 of 1

Original Design:

The typical sections for the concrete paving section provides for full depth (10") concrete for 2 – 12' lanes and a 2' inside shoulder. The SE pivot point is located on the left edge of the pavement at the shoulder point. The slope of the shoulder differs from the roadway and is in the opposite direction.

Alternative:

The new section would have the 2' inside shoulder slope the same as the mainline roadway pavement. The SE pivot point would be the edge of the paved shoulder.

Opportunities:

- Better construction techniques

Risks

- Non standard roadway section

Technical Discussion:

Normal construction practice would result in a 24' wide slip form paver. Typical construction would not allow a break in the paver screed for a different cross slope. Additionally, grading of the subgrade and underlying asphalt would be difficult.

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-14

DESCRIPTION: **REVIEW PROFILE/CROSS SLOPES TO ELIMINATE**
PONDING POTENTIAL

SHEET NO.: **1 of 1**

Original Design: The plans show four areas with K values in excess of the drainage maximum of $K=157$ and cross slopes ranging from 0.00 to 0.50.

Alternative: Modify profile and or cross slope a various locations to improve sheet flow across the pavement.

Opportunities:

- Decrease sheet flow depth on the pavement

Risks

- None
- May require redesign

Technical Discussion:

A review of the plans reveals several areas of concern that should be reviewed. Four areas in particular would be 161+50, 185+50, 229+80 and 381+25. These are three intersections and one median crossovers that are in Type III sag vertical curves with K values in excess of the drainage maximum of $K=157$ and cross slopes ranging from 0.00 to 0.50. In high type pavements these conditions pose the potential to create a sheet flow depths that could pose a potential hazard.

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-15

DESCRIPTION: **COMPLETE THE CONSTRUCTION OF ALL SIDE ROADS**
PRIOR TO STAGING SR 328

SHEET NO.: **1 of 1**

Original Design:

The MOT plan calls for alternating the construction of the side streets in order to lessen the impact to the traveling public.

Alternative:

Construct all the minor side streets in an alternating fashion first and then construct SR 328 last.

Opportunities:

- Reduce traffic disruption.

Risks

- None

Technical Discussion:

By constructing all of the minor side streets first it will allow the maximum utilization of alternative routes when traffic on the primary intersecting roadway is disrupted.

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-17

DESCRIPTION: **CONSIDER HAVING APPROACH ROADWAY TYPICAL**
SECTION IDENTICAL TO THE BRIDGE SECTION

SHEET NO.: 1 of 1

Original Design:

The roadway typical section is 2-12' lanes with a 10' improved (8' paved) outside shoulder and a 6' improved (2' paved) inside shoulder. The bridge typical section is 2-12' lanes with a 10' outside shoulder and a 4' inside shoulder

Alternative:

Make the bridge typical and the roadway typical match by building a 6' inside shoulder on the bridge.

Opportunities:

- Improved safety.

Risks

- Increased cost.

Technical Discussion:

By constructing a typical of a consistent width throughout the project should improve safety. This is particularly true when you can avoid transition sections in the areas around bridges or that require guardrail.

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
20-18

DESCRIPTION: **CONSTRUCT A LEFT TURN LANE ON ARROWHEAD ROAD**

SHEET NO.: **1 of 1**

Original Design:

Two lane intersection at SR 17 and Arrowhead Road.

Alternative:

Modify the intersection to provide two thru lanes and a channelized left turn lane at the intersection with SR 17.

Opportunities:

- Improve traffic operations

Risks

- Increased construction cost

Technical Discussion:

Detailed intersection traffic was not available for analysis/evaluation, however, an inspection of the project area reveals that Arrowhead Road provides access for a small college and portions of the Stephens County Industrial Park (Caterpillar Tractor). A re-evaluation of the LOS of this intersection may be warranted.

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-2

DESCRIPTION: **REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD.
CUL-DE-SAC**

SHEET NO.: 1 of 9

Original Design:

Roadway:

The original design calls for the reconstruction of Davis Road with a Right In / Right Out movement. To provide access to Westbound SR-17 traffic, Type B median opening is specified at STA 435+92.68. A Type B median opening results in a left turn lane across the new bridge at Eastanollee Creek. A right turn lane into the proposed Davis Road also crosses the bridge in the Westbound direction.

Bridge:

The original design calls for the construction of twin single-span bridges, 127' long over Eastanollee Creek. The bridges are skewed to the normal at 18°42'-18". The out-to-out width of the Eastbound bridge is 81'-3" and the Westbound bridge is 53'-3". The Eastbound bridge is comprised of ten BT-72 PSC beams evenly spaced and the Westbound bridge is comprised of seven BT-72 PSC beams evenly spaced. The Eastbound bridge accommodates a 10' shoulder on the outside, a 12' Right Turn lane, two 12' travel lanes and a 4' shoulder on the inside. The Westbound bridge accommodates a 10' shoulder on the outside, a 12' Right Turn lane, two 12' travel lanes, a 16' Painted Island, a 12' Left Turn lane and a 4' shoulder on the inside. The end bents for both bridges are made up of concrete caps supported on Steel "H" Piles. The barrier rails are standard. The cross slope on the Eastbound bridge transitions from 1.18% to 5.18% at the PGL.

Alternative Design:

The proposed Roadway alternative design suggests a Cul-de-sac on Davis Road and eliminate the left U-turn movement at STA 435+92.68 in the Westbound direction, and the right turn lane into Davis Road from the Westbound direction. Access to Davis Road would be via Old Mill Bridge Road at the proposed median opening at STA 413+23.42.

The proposed alternative reduces the width of the Eastbound bridge by removing the 12' Left Turn lane and 16' Painted Island and reduces the width of the Westbound bridge by removing the 12' Right Turn lane, both made possible by providing a cul-de-sac on Davis Rd.. The alternative Eastbound bridge width would be 53'-3". The alternative Westbound bridge width would be 41'-3".

The alternative maintains all other current geometry.

Opportunities:

- Roadway & Bridge Cost savings by reducing total bridge and roadway width
- Reduced construction time
- Eliminate Right In / Right Out movement for Davis Road
- May provide an opportunity for reduced Right-of-way requirements

Risks:

- Phased construction (staging) may be required
- Re-design effort will require minimal additional time
- Roadway alignments may require minor modifications including possible improvements to Old Mill Bridge Road
- Longer access to Davis Road from SR-17

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-2

DESCRIPTION: **REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD. CUL-
DE-SAC**

SHEET NO.: 2 of 9

Technical Discussion:

Roadway:

The relocation of the access should provide better operational access along SR-17 by eliminating U turns and the Right In / Right Out movement.

Bridge:

The 53'-3" out-to-out width of the alternative Eastbound bridge will accommodate standard barriers, a 10' shoulder on the outside, a 12' Right Turn lane, two 12' travel lanes in and a 4' inside shoulder. The Eastbound bridge may be comprised of seven BT-72 PSC beams evenly spaced. The 41'-3" out-to-out width of the alternative Westbound bridge will accommodate standard barriers, a 10' shoulder on the outside, two 12' travel lanes in and a 4' inside shoulder. The Westbound bridge may be comprised of six BT-72 PSC beams evenly spaced. The composition of the Bents will be similar to the current design except, cap lengths and foundation (piling) requirements will be reduced.

See the next sheet for the calculation of the savings noted below.

COST SUMMARY (Roadway)	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 9,757,220	\$ 0	\$ 9,757,220
ALTERNATIVE	\$ 9,601,924	\$ 0	\$ 9,601,924
SAVINGS	\$ 155,296	\$ 0	\$ 155,296

COST SUMMARY (Bridge)	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,373,601	\$ 0	\$ 1,373,601
ALTERNATIVE	\$ 1,067,266	\$ 0	\$ 1,067,266
SAVINGS	\$ 306,336	\$ 0	\$ 306,336

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 11,130,821	\$ 0	\$ 11,130,821
ALTERNATIVE	\$ 10,669,190	\$ 0	\$ 10,669,190
SAVINGS	\$ 461,632	\$ 0	\$ 461,632

Illustrations

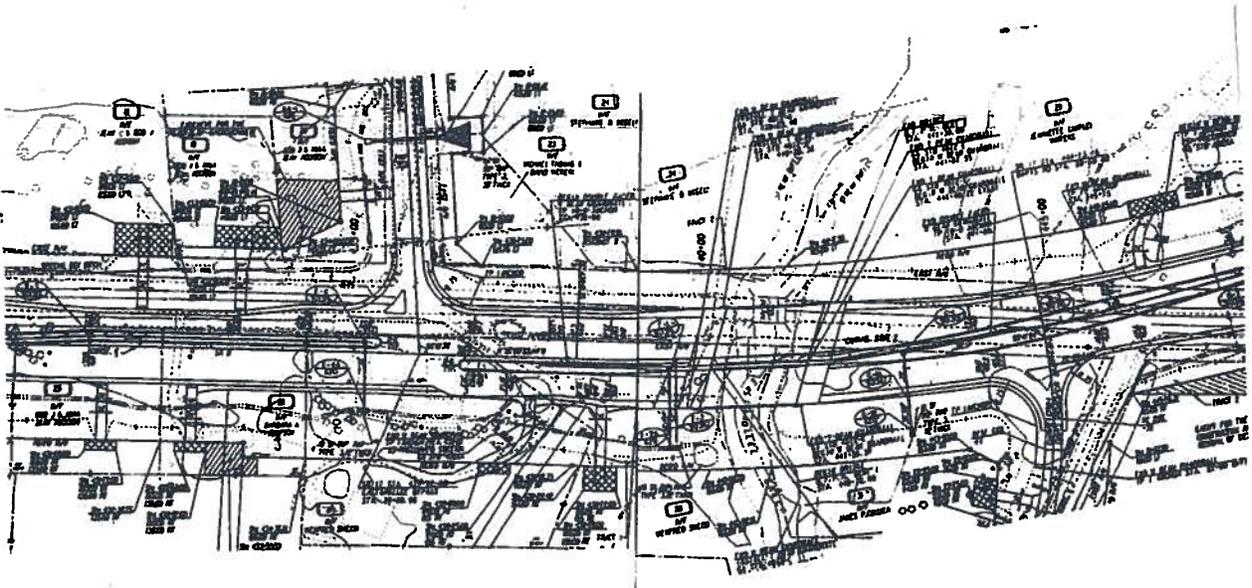
PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
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SR -17

ALTERNATIVE NO.:

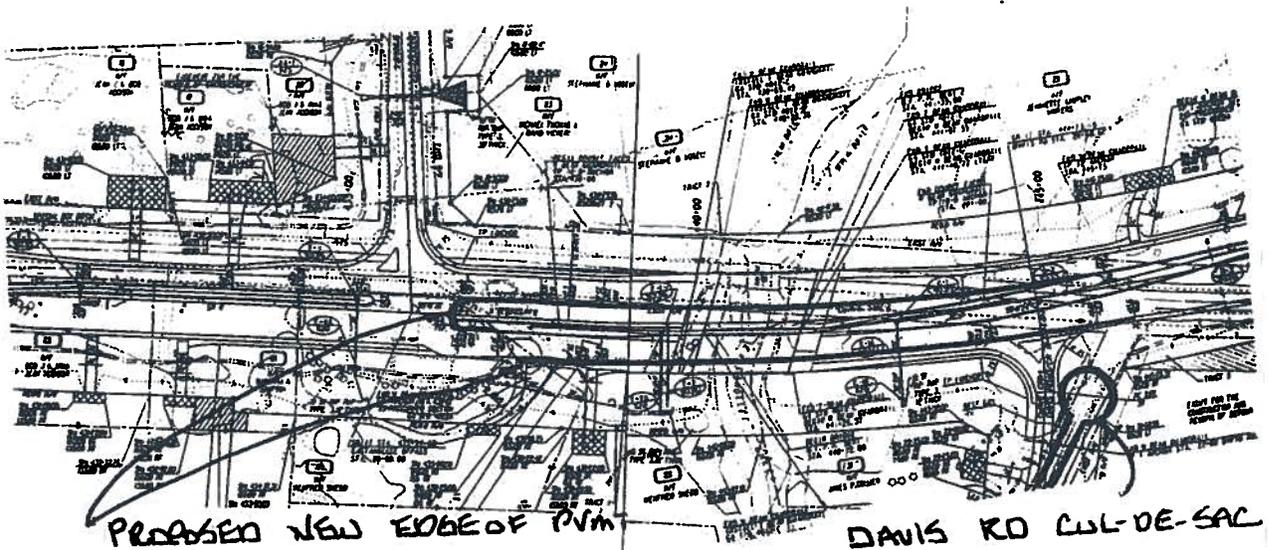
37-2

DESCRIPTION: **REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD.
CUL-DE-SAC**

SHEET NO.: 3 of 9



ORIGINAL DESIGN



PROPOSED NEW EDGE OF PAV

DAVIS RD CUL-DE-SAC

ALTERNATE DESIGN

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-2

DESCRIPTION: **REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD. CUL-
DE-SAC**

SHEET NO.: 5 of 9

SR 17 SOUTH BOUND
STA 436+54 - STA 441+69 505 LF 28' WIDE
STA 441+69 - STA 445+74 405 LF 28'-0" WIDE

SR 17 NORTH BOUND
STA 438+62 - STA 439+82 120' 0-12' WIDE
STA 439+82 - STA 447+58 776 LF 12' WIDE
STA 447+58 - STA 452+58 500 LF 0-12' WIDE

QUANTITIES

$$\begin{array}{rcl}
 505 \text{ LF} - 187 \text{ LF (BRIDGE)} \times 28 \text{ LF} & = & 8904 \text{ SF} = 989 \text{ SY} \\
 405 \text{ LF} \times \frac{28+0}{2} & = & 5628 \text{ SF} = 625 \text{ SY} \\
 120 \text{ LF} \times \frac{0+12}{0} & = & 720 \text{ SF} = 80 \text{ SY} \\
 776 \text{ LF} - 187 \text{ LF (BRIDGE)} \times 12 \text{ LF} & = & 7068 \text{ SF} = 785 \text{ SY} \\
 500 \text{ LF} \times \frac{0+12}{2} & = & 3000 \text{ SF} = 333 \text{ SY} \\
 \hline & & 25320 \qquad 2812 \text{ SY}
 \end{array}$$

$$\begin{array}{rcl}
 \text{GAB} \quad 25320 \text{ SF} \times 1 \text{ FT} \times 145 \#/\text{FT}^3 \div 2000 & = & 1835 \text{ TN} \\
 25 \text{ mm} \quad 2812 \text{ SY} \times 660 \#/\text{yd}^2 \div 2000 & = & 927 \text{ TN} \\
 19 \text{ mm} \quad 2812 \text{ SY} \times 330 \#/\text{yd}^2 \div 2000 & = & 464 \text{ TN} \\
 12.5 \text{ mm} \quad 2812 \text{ SY} \times 165 \#/\text{yd}^2 \div 2000 & = & 232 \text{ TN}
 \end{array}$$

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-2

DESCRIPTION: **REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD.
CUL-DE-SAC**

SHEET NO.: 6 of 9

Current Design (Twin, Single Span – 127' Long, Eastbound 81'-3", Westbound 53'-3" Out-to-Out)

Superstructure:

Eastbound - Deck Area = $127' * 81.25'$ (avg.) = 9,049 SF

Westbound - Deck Area = $127' * 53.25'$ (avg.) = 6,763 SF

Eastbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =
 $[(9049)*(7.75"/12)]/27 = 216.43$ CY

Westbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =
 $[(6763)*(7.75"/12)]/27 = 161.77$ CY

Eastbound - Area of Grooved concrete (approx.) = $127'*74'/9 = 1,044.22$ SY

Westbound - Area of Grooved concrete (approx.) = $127'*46'/9 = 649.11$ SY

Eastbound - Length of BT-72 PPC Girders (approx.) = $127'*10 = 1,270$ LF

Westbound - Length of BT-72 PPC Girders (approx.) = $127'*7 = 889$ LF

Eastbound - Total length of Barrier Rail (Standard) = $2*127 = 254$ LF

Westbound - Total length of Barrier Rail (Standard) = $2*127 = 254$ LF

Substructure:

Volume of Class AA concrete (average dimensions of Caps, Piles, Drilled Caissons):

Eastbound & Westbound (Combined Cap)

End Bents (approx.): $2*{\{[146.5*3'*3'] + [2*18'*1'*7.5']\}}/27 = 117.67$ CY

End Walls (approx.): $2*[146.5*1.5*6.25']/27 = 101.74$ CY

Total Volume of Class AA concrete = 219.41 CY

Length of Steel HP 14X89 Piles (End Bents – 32 ft piles) = $2*[17*32' + 4*15'] = 1208$ LF

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-2

DESCRIPTION: **REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD.
CUL-DE-SAC**

SHEET NO.: 7 of 9

Alternative Design (Twin, Single Span – 127' Long, Eastbound 53'-3", Westbound 41'-3" Out-to-Out)

Superstructure:

Eastbound - Deck Area = $127' * 53.25' \text{ (avg.)} = 6,763 \text{ SF}$

Westbound - Deck Area = $127' * 41.25' \text{ (avg.)} = 5,239 \text{ SF}$

Eastbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =

$[(6763)*(7.75"/12)]/27 = 161.77 \text{ CY}$

Westbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =

$[(5239)*(7.75"/12)]/27 = 125.31 \text{ CY}$

Eastbound - Area of Grooved concrete (approx.) = $127'*46'/9 = 649.11 \text{ SY}$

Westbound - Area of Grooved concrete (approx.) = $127'*34'/9 = 479.78 \text{ SY}$

Eastbound - Length of BT-72 PPC Girders (approx.) = $127'*7 = 889 \text{ LF}$

Westbound - Length of BT-72 PPC Girders (approx.) = $127'*6 = 762 \text{ LF}$

Eastbound - Total length of Barrier Rail (Standard) = $2*127 = 254 \text{ LF}$

Westbound - Total length of Barrier Rail (Standard) = $2*127 = 254 \text{ LF}$

Substructure:

Volume of Class AA concrete (average dimensions of Caps, Piles, Drilled Caissons):

Eastbound & Westbound (Combined Cap)

End Bents (approx.): $2* \{ [104.75*3'*3'] + [2*18'*1'*7.5'] \} / 27 = 89.83 \text{ CY}$

End Walls (approx.): $2*[104.75*1.5*6.25'] / 27 = 72.74 \text{ CY}$

Total Volume of Class AA concrete = 162.58 CY

Length of Steel HP 14X89 Piles (End Bents – 32 ft piles) = $2*[13*32' + 4*15'] = 952 \text{ LF}$

COST WORKSHEET



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION EDS-545(20)(37) PI Nos. 122110, 122260 SR -17					ALTERNATIVE NO:		37-2	
					SHEET NO:		8 of 9	
DESCRIPTION:			REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD. CUL-DE-SAC					
CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE			
ROADWAY ITEMS	UNIT S	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL	
310-110 GA AGGR BASE CRS	TN	133100	\$ 18.00	\$ 2,395,800	131265	\$ 18.00	\$ 2,362,700	
402-3113 RECYCLED ASPH CONC 12.5 MM	TN	13800	\$ 78.00	\$ 1,076,400	13568	\$ 78.00	\$ 1,058,304	
402-3121 RECYCLED ASPH CONC 25 MM	TN	53200	\$ 64.00	\$ 3,404,800	52273	\$ 64.00	\$ 3,345,472	
402-3190 RECYCLED ASPH CONC 19 MM	TN	30200	\$ 66.00	\$ 1,993,200	29736	\$ 66.00	\$ 1,962,576	
SUB-TOTAL				\$ 8,870,200			\$ 8,729,022	
MARK-UP AT 10%				\$ 887,020			\$ 872,902	
TOTAL				\$ 9,757,220			\$ 9,601,924	

COST WORKSHEET



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION EDS-545(20)(37) PI Nos. 122110, 122260 SR -17					ALTERNATIVE NO:	37-2	
					SHEET NO:	9 OF 9	
DESCRIPTION:			REDUCE BRIDGE WIDTH BY PROVIDING A DAVIS RD. CUL-DE-SAC				
CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
BRIDGE ITEMS	UNIT S	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
East - BT-72 PSC Beams	LF	1270	\$ 227.53	\$288,963.10	889	\$ 227.53	\$202,274.17
West - BT-72 PSC Beams	LF	889	\$ 227.53	\$202,274.17	762	\$ 227.53	\$173,377.86
East - Class "AA" Conc (Sup)	CY	216.43	\$1,122.40	\$242,921.03	161.77	\$1,122.40	\$181,570.65
West - Class "AA" Conc (Sup)	CY	161.77	\$1,122.40	\$181,570.65	125.31	\$1,122.40	\$140,647.94
Class "AA" Concrete (Sub)	CY	219.41	\$ 692.53	\$151,948.01	162.58	\$ 692.53	\$112,591.53
East - Concrete Deck Grooving	SY	1044.22	\$ 4.17	\$4,354.40	649.11	\$ 4.17	\$2,706.79
West - Concrete Deck Grooving	SY	649.11	\$ 4.17	\$2,706.79	479.78	\$ 4.17	\$2,000.68
Concrete Side Barrier	LF	508	\$ 166.77	\$84,719.16	508	\$ 166.77	\$84,719.16
Steel H Piles: HP 14X89	LF	1208	\$ 73.90	\$89,271	952	\$ 73.90	\$70,352.80
SUB-TOTAL				\$1,248,729			\$970,242
MARK-UP AT 10%				\$124,873			\$97,024
TOTAL				\$1,373,601			\$1,067,266

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-3

DESCRIPTION: **REDUCE BRIDGE WIDTH BY USING A TYPE A IN-LIEU OF
TYPE B INTERSECTION AT EASTANOLLEE BYPASS.**

SHEET NO.: 1 of 6

Original Design:

Roadway:

The original design calls for a Type B median crossover at STA . 435+92.68

Bridge:

The original design calls for the construction of twin single-span bridges, 127' long over Eastanollee Creek. The bridges are skewed to the normal at 18°42'-18". The out-to-out width of the Eastbound bridge is 81'-3" and the Westbound bridge is 53'-3". The Eastbound bridge is comprised of ten BT-72 PSC beams evenly spaced and the Westbound bridge is comprised of seven BT-72 PSC beams evenly spaced. The Eastbound bridge accommodates a 10' shoulder on the outside, a 12' Right Turn lane, two 12' travel lanes and a 4' shoulder on the inside. The Westbound bridge accommodates a 10' shoulder on the outside, a 12' Right Turn lane, two 12' travel lanes, a 16' Painted Island, a 12' Left Turn lane and a 4' shoulder on the inside. The end bents for both bridges are made up of concrete caps supported on Steel "H" Piles. The barrier rails are standard. The cross slope on the Eastbound bridge transitions from 1.18% to 5.18% at the PGL.

Alternative Design:

The proposed Roadway alternative design suggests a Type A median crossover at STA . 435+92.68 in-lieu of the Type B median cross over.

The proposed Bridge alternative reduces the width of the Eastbound bridge by removing the 16' Painted Island made possible by intersection modifications at Eastanollee Bypass to a Type A. The alternative Eastbound bridge width would be 65'-3". The Westbound bridge remains the same as in the original design.

The alternative maintains all other current geometry.

Opportunities:

- Cost savings by reducing bridge and roadway width
- Reduced construction time
- Wider median for guardrail installations
- May provide an opportunity for reduced Right-of-way requirements

Risks:

- Re-design effort will require minimal additional time
- Roadway alignments may require minor modifications

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-3

DESCRIPTION: **REDUCE BRIDGE WIDTH BY USING A TYPE A IN-LIEU OF
TYPE B INTERSECTION AT EASTANOLLEE BYPASS.**

SHEET NO.: **2** of **6**

Technical Discussion:

Roadway:

GDOT construction detail M-3 indicates the Type A median crossover can be used under low traffic volume conditions.

Bridge:

The Westbound bridge remains as in the original design. The 65'-3" out-to-out width of the alternative Eastbound bridge will accommodate standard barriers, a 10' shoulder on the outside, a 12' Right Turn lane, two 12' travel lanes in, a 12' Left Turn Lane, and a 4' inside shoulder. The Eastbound bridge may be comprised of eight BT-72 PSC beams evenly spaced. The composition of the Bents will be similar to the current design except, cap lengths and foundation (piling) requirements will be reduced.

See the next sheet for the calculation of the savings noted below.

COST SUMMARY (Roadway)	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 9,757,220	\$ 0	\$ 9,757,220
ALTERNATIVE	\$ 9,641,995	\$ 0	\$ 9,641,995
SAVINGS	\$ 115,225	\$ 0	\$ 115,225

COST SUMMARY (Bridge)	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,373,601	\$ 0	\$ 1,373,601
ALTERNATIVE	\$ 1,258,737	\$ 0	\$ 1,258,737
SAVINGS	\$ 114,864	\$ 0	\$ 114,864

TOTAL SAVINGS	\$ 230,089	\$ 0	\$ 230,089
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Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-3

DESCRIPTION: **REDUCE BRIDGE WIDTH BY USING A TYPE A IN-LIEU OF
TYPE B INTERSECTION AT EASTANOLLEE BYPASS.**

SHEET NO.: **3** of **6**

Current Design (Twin, Single Span – 127' Long, Eastbound 81'-3", Westbound 53'-3" Out-to-Out)

Superstructure:

Eastbound - Deck Area = $127' * 81.25' \text{ (avg.)} = 9,049 \text{ SF}$

Westbound - Deck Area = $127' * 53.25' \text{ (avg.)} = 6,763 \text{ SF}$

Eastbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =
 $[(9049)*(7.75"/12)]/27 = 216.43 \text{ CY}$

Westbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =
 $[(6763)*(7.75"/12)]/27 = 161.77 \text{ CY}$

Eastbound - Area of Grooved concrete (approx.) = $127'*74'/9 = 1,044.22 \text{ SY}$

Westbound - Area of Grooved concrete (approx.) = $127'*46'/9 = 649.11 \text{ SY}$

Eastbound - Length of BT-72 PPC Girders (approx.) = $127'*10 = 1,270 \text{ LF}$

Westbound - Length of BT-72 PPC Girders (approx.) = $127'*7 = 889 \text{ LF}$

Eastbound - Total length of Barrier Rail (Standard) = $2*127 = 254 \text{ LF}$

Westbound - Total length of Barrier Rail (Standard) = $2*127 = 254 \text{ LF}$

Substructure:

Volume of Class AA concrete (average dimensions of Caps, Piles, Drilled Caissons):

Eastbound & Westbound (Combined Cap)

End Bents (approx.): $2* \{ [146.5*3'*3'] + [2*18'*1'*7.5'] \} / 27 = 117.67 \text{ CY}$

End Walls (approx.): $2*[146.5*1.5*6.25'] / 27 = 101.74 \text{ CY}$

Total Volume of Class AA concrete = 219.41 CY

Length of Steel HP 14X89 Piles (End Bents – 32 ft piles) = $2*[17*32' + 4*15'] = 1208 \text{ LF}$

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-3

DESCRIPTION: **REDUCE BRIDGE WIDTH BY USING A TYPE A IN-LIEU OF
TYPE B INTERSECTION AT EASTANOLLEE BYPASS.**

SHEET NO.: 4 of 6

Alternative Design (Twin, Single Span – 127' Long, Eastbound 65'-3", Westbound 53'-3" Out-to-Out)

Superstructure:

Eastbound - Deck Area = $127' * 65.25' \text{ (avg.)} = 8,287 \text{ SF}$

Westbound - Deck Area = $127' * 53.25' \text{ (avg.)} = 6,763 \text{ SF}$

Eastbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =
 $[(8287)*(7.75"/12)]/27 = 198.22 \text{ CY}$

Westbound - Volume of 7 3/4" thick Class AA Superstructure Deck concrete =
 $[(6763)*(7.75"/12)]/27 = 161.77 \text{ CY}$

Eastbound - Area of Grooved concrete (approx.) = $127'*58'/9 = 818.44 \text{ SY}$

Westbound - Area of Grooved concrete (approx.) = $127'*46'/9 = 649.11 \text{ SY}$

Eastbound - Length of BT-72 PPC Girders (approx.) = $127'*8 = 1,016 \text{ LF}$

Westbound - Length of BT-72 PPC Girders (approx.) = $127'*7 = 889 \text{ LF}$

Eastbound - Total length of Barrier Rail (Standard) = $2*127 = 254 \text{ LF}$

Westbound - Total length of Barrier Rail (Standard) = $2*127 = 254 \text{ LF}$

Substructure:

Volume of Class AA concrete (average dimensions of Caps, Piles, Drilled Caissons):

Eastbound & Westbound (Combined Cap)

End Bents (approx.): $2* \{ [129.75*3'*3'] + [2*18'*1'*7.5'] \} / 27 = 106.5 \text{ CY}$

End Walls (approx.): $2*[129.75*1.5*6.25'] / 27 = 90.11 \text{ CY}$

Total Volume of Class AA concrete = 196.61 CY

Length of Steel HP 14X89 Piles (End Bents – 32 ft piles) = $2*[15*32' + 4*15'] = 1080 \text{ LF}$

COST WORKSHEET



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION EDS-545(20)(37) PI Nos. 122110, 122260 SR -17	ALTERNATIVE NO: SHEET NO:	37-3 5 OF 6
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DESCRIPTION:	REDUCE BRIDGE WIDTH BY USING A TYPE A IN-LIEU OF TYPE B INTERSECTION AT EASTANOLLEE BYPASS.
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNIT S	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
East - BT-72 PSC Beams	LF	1270	\$ 227.53	\$288,963.10	1016	\$ 227.53	\$231,170.48
West - BT-72 PSC Beams	LF	889	\$ 227.53	\$202,274.17	889	\$ 227.53	\$202,274.17
East - Class "AA" Conc (Sup)	CY	216.43	\$1,122.40	\$242,921.03	198.22	\$1,122.40	\$222,482.13
West - Class "AA" Conc (Sup)	CY	161.77	\$1,122.40	\$181,570.65	161.77	\$1,122.40	\$181,570.65
Class "AA" Concrete (Sub)	CY	219.41	\$ 692.53	\$151,948.01	196.61	\$ 692.53	\$136,158.32
East - Concrete Deck Grooving	SY	1044.22	\$ 4.17	\$4,354.40	818.44	\$ 4.17	\$3,412.89
West - Concrete Deck Grooving	SY	649.11	\$ 4.17	\$2,706.79	649.11	\$ 4.17	\$2,706.79
Concrete Side Barrier	LF	508	\$ 166.77	\$84,719.16	508	\$ 166.77	\$84,719.16
Steel H Piles: HP 14X89	LF	1208	\$ 73.90	\$89,271	1080	\$ 73.90	\$79,812.00
SUB-TOTAL				\$1,248,729			\$1,144,307
MARK-UP AT 10%				\$124,873			\$114,431
TOTAL				\$1,373,601			\$1,258,737

COST WORKSHEET



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION EDS-545(20)(37) PI Nos. 122110, 122260 SR -17	ALTERNATIVE NO: SHEET NO:	37-3 6 OF 6
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DESCRIPTION:	REDUCE BRIDGE WIDTH BY USING A TYPE A IN-LIEU OF TYPE B INTERSECTION AT EASTANOLLEE BYPASS.
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ROADWAY ITEMS	UNIT S	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
310-110 GA AGGR BASE CRS	TN	133100	\$ 18.00	\$ 2,395,800	131737	\$ 18.00	\$ 2,371,266
402-3113 RECYCLED ASPH CONC 12.5 MM	TN	13800	\$ 78.00	\$ 1,076,400	13628	\$ 78.00	\$ 1,062,984
402-3121 RECYCLED ASPH CONC 25 MM	TN	53200	\$ 64.00	\$ 3,404,800	52511	\$ 64.00	\$ 3,360,704
402-3190 RECYCLED ASPH CONC 19 MM	TN	30200	\$ 66.00	\$ 1,993,200	29856	\$ 66.00	\$ 1,970,496
SUB-TOTAL				\$ 8,870,200			\$ 8,765,450
MARK-UP AT 10%				\$ 887,020			\$ 876,545
TOTAL				\$ 9,757,220			\$ 9,641,995

Value Analysis Design Alternative



PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-4

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION** SHEET NO.: **1** of **5**
485+00 TO STATION 526+00

Original Design:

The original design calls for a complete reconstruction of the roadway from station 485+00 to 526+00 utilizing a 65mph design speed and a typical section with two 12 foot lanes each direction, 2' paved inside shoulders in a 44' median and 6'-6" paved outside shoulders

Alternative Design:

This alternative design suggests extending the lower design speed "transition" section from station 485+00 to station 526+00. The proposed typical section would maintain the same cross sectional elements but utilize a reduced design speed to accommodate the existing profile and provide for retaining and overlaying the existing roadway.

Opportunities:

- Reduced pavement cost
- Reduce right-of-way taking
- Improvements to construction sequencing due to less total reconstruction.

Risks:

- Reduction in design speed of this section of roadway

Technical Discussion:

The existing roadway is all in a tangent section and the existing profile appears adequate to meet a 55mph-60 mph design speed. This section could be signed for 55 mph and provide a longer area for the transition from 65mph to 45mph. An existing pavement of 36' would provide more than sufficient width in order to provide two 12' lanes, a 2' paved inside shoulder and a 6'-6" paved outside shoulder by simply overlaying and re-striping the existing pavement. The proposed project alignment can be maintained and curve SR17-4 would provide the transition of the median from 20' to 44'.

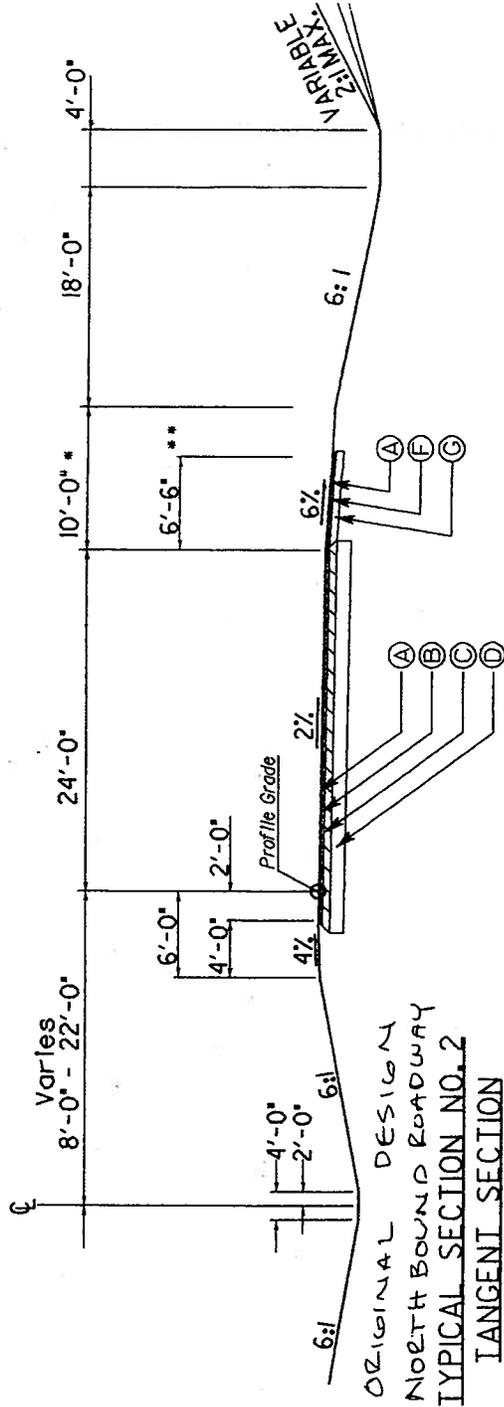
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 701,855	\$ 0	\$ 701,855
ALTERNATIVE	\$ 392,568	\$ 0	\$ 392,568
SAVINGS	\$ 309,287	\$ 0	\$ 309,287

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.: **37-4**

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION**
485+00 TO STATION 526+00

SHEET NO.: **2 of 5**



REQUIRED PAVEMENT

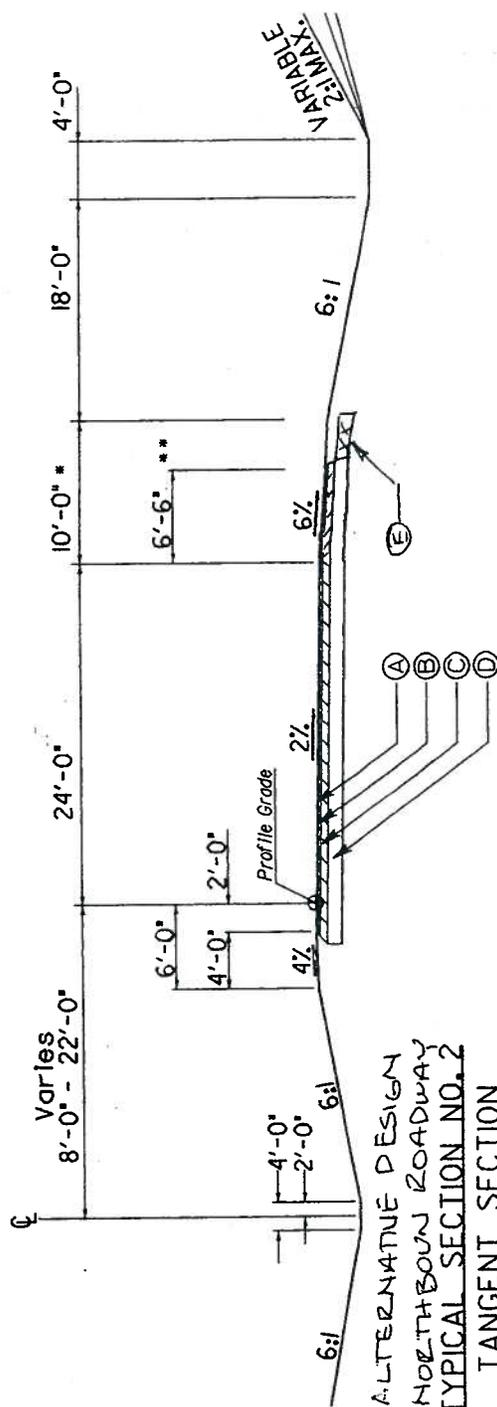
- (A) 165 LB/SY RECYCLED ASPH. CONC. 12.5mm SUPERPAVE
- (B) 330 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
- (C) 660 LB/SY RECYCLED ASPH. CONC. 25mm SUPERPAVE
- (D) 12" GRADED AGGREGATE BASE
- (F) 220 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
- (G) 6" GRADED AGGREGATE BASE

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 EDS-545(20)(37) PI Nos. 122110, 122260
 SR -17

ALTERNATIVE NO.: 37-4

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION 485+00 TO STATION 526+00**

SHEET NO.: 3 of 5



REQUIRED PAVEMENT

- (A) 165 LB/SY RECYCLED ASPH. CONC. 12.5mm SUPERPAVE
- (B) LEVELING RECYCLED ASPH CONC 50TONS/STA
- (C) 220 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
- (D) EXISTING PAVEMENT TO REMAIN
- (E) EXISTING PAVEMENT TO BE REMOVED

Calculations



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-4

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM
STATION 485+00 TO STATION 526+00**

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

Total length- $526+00 - 485+00 = 4100\text{LF}$

New Pavement-

12.5 mm ACP $[(32.5' \times 4100') / (9\text{sf/sy})] \times [(165\#/\text{sy}) / (2000\#/\text{ton})] \sim 1225$ tons

19.0 mm ACP $[(26.0' \times 4100') / (9\text{sf/sy})] \times [(330\#/\text{sy}) / 2000\#/\text{ton}] \sim 1960$ tons

19.0 mm ACP $[(6.5' \times 4100') / (9\text{sf/sy})] \times [(220\#/\text{sy}) / 2000\#/\text{ton}] \sim 325$ tons

25.0 mm ACP $[(26.5' \times 4100') / 9\text{sf/sy}] \times [(660\#/\text{sy}) / 2000\#/\text{ton}] \sim 3985$ tons

12" GAB $[(27.0' \times 4100' \times 1.0') \times (145\#/\text{cf}) / 2000\#/\text{ton}] \sim 8025$ tons

Rehabilitated Pavement-

Leveling ACP (50 tons/Station) $\times (41$ Stations) ~ 2050 tons

12.5 mm ACP $[(32.5' \times 4100') / (9\text{sf/sy})] \times [(165\#/\text{sy}) / (2000\#/\text{ton})] \sim 1225$ tons

19.0 mm ACP $[(32.5' \times 4100') / (9\text{sf/sy})] \times [(220\#/\text{sy}) / 2000\#/\text{ton}] \sim 1630$ tons

COST WORKSHEET



PROJECT: EDS-545(20)(37) PI Nos. 122110, 122260 SR -17	ALTERNATIVE NO:	37-4
	SHEET NO:	5 OF 5

DESCRIPTION:	RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION 485+00 TO STATION 526+00
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
REC ASPH CONC LEVELING	TN	0	75.00	0	2,050	75.00	153,750
REC ASPH CONC 12.5MM SUPERPAVE	TN	1,225	78.00	87,750	1,225	78.00	95,550
REC ASPH CONC 19.0MM SUPERPAVE	TN	2,285	66.00	150,810	1,630	66.00	107,580
REC ASPH CONC 25.0MM SUPERPAVE	TN	3,985	64.00	255,040	0	64.00	0
GR AGGR BASE	TN	8,025	18.00	144,450	0	18.00	0
SUB-TOTAL				638,050			356,880
MARK-UP AT 10%				63,805			35,688
TOTAL				701,855			392,568

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-5

DESCRIPTION: **USE KEYSTONE™ IN LIEU OF MSE WALLS AT STA 546+50 ±**

SHEET NO.: 1 of 4

Original Design:

The original design calls for a MSE Wall and Type V Traffic Barrier on the left side of the roadway from approximate Station 546+49.31 (87.96' Left Offset) to approximate Station 548+90 (72.50' Left Offset). Total length of the wall is 243.75' varying in height 5' to 23'.

Alternative Design:

The alternative proposes the use of Modular Block walls such as Keystone in lieu of the cast-in-place concrete barrier walls.

The alternative maintains the original design geometry.

Opportunities:

- Cost savings
- Reduced construction time
- Suitable for urbanized areas
- Improved aesthetics

Risks:

- Minimal design and coordination effort with manufacturer
- Agency (local & state) approval required

Technical Discussion:

Modular Block walls are easy to construct and have demonstrated acceptable performance and durability. It is not uncommon to use these types of walls in an Urban Commercial environment. The system is typically designed and supervised during installation by the manufacturer. These systems also carry a warranty by the manufacturer.

See the next sheet for the calculation of the savings noted below. Note: Calculations & Cost Analysis for Wall systems only are shown. Appurtenances (Barriers, etc.) are similar costs for both alternatives.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 197,250	\$ 0	\$ 197,250
ALTERNATIVE	\$ 56,899	\$ 0	\$ 56,899
SAVINGS	\$ 140,351	\$ 0	\$ 140,351

Illustrations

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-5

DESCRIPTION: **USE KEYSTONE™ IN LIEU OF MSE WALLS AT STA 546+50 ±**

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

KEY FEATURES

All of the features of the Keystone Compac units plus:

Inextensible Steel Reinforcement

- ▶ Significantly reduced deflection or movement within the reinforced mass. Deflections with steel reinforcement are reduced by over 66% compared to geosynthetic reinforcement.
- ▶ Performance is not time dependent such as polymer creep effects with extensible reinforcing (geogrids).
- ▶ Backfill of up to 4" to 6" maximum size can be used. With geosynthetics, the maximum size is generally limited to approximately 3/4" due to erratic resistance and installation damage with larger particle sizes.

Designed to More Rigorous AASHTO Standards

- ▶ Increased factors of safety and confidence in wall system performance.

Intended for the Most Demanding Applications

- ▶ Deflection sensitive applications such as:
 - Bridge abutments
 - Tall walls
 - Walls with heavy surcharges
 - Walls where loads or structures bear on or immediately behind the reinforced mass
- ▶ Transportation or other projects requiring AASHTO compliance.
- ▶ HITEC Evaluation #40478.



Note: Literature and Illustrations obtained from KEYSTONE's (A CONTECH Company) website, www.keystonewalls.com.



GOVERNMENTAL

The rigorous standards for government projects are routinely met by Keystone products and services. Government agencies that use Keystone include:

- ▶ U.S. Federal Highway Administration
- ▶ State Department of Transportation Roadway and Freeway Projects
- ▶ Army Corps of Engineers
- ▶ Department of Transportation for individual U.S. states



Calculations



PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-5

DESCRIPTION: **USE KEYSTONE™ IN LIEU OF MSE WALLS AT STA 546+50 ±**

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

Current Design (MSE Walls with Traffic Barrier)

Note:

Assumed height between top of wall and top of parapet is 4'-0".
Assumed all wall segments to be between 10' to 20' high.

From Station 546+49.31 to Station 546+99.44 = 50.13 LF
Height of wall varies from 5.33' to 13.81'
Area of wall = $0.5 * (5.33 + 13.81) * 50.13 = 479.75$ SF

From Station 546+99.44 to Station 547+50.00 = 50.56 LF
Height of wall varies from 13.81' to 18.98'
Area of wall = $0.5 * (13.81 + 18.98) * 50.56 = 828.93$ SF

From Station 547+50.00 to Station 548+50.00 = 50.00 LF
Height of wall varies from 18.98' to 18.50'
Area of wall = $0.5 * (18.98 + 18.50) * 50 = 937.00$ SF

From Station 548+00.00 to Station 548+50.00 = 50.00 LF
Height of wall varies from 18.50' to 15.89'
Area of wall = $0.5 * (18.50 + 15.89) * 50 = 859.75$ SF

From Station 548+50.00 to Station 548+90.00 = 40.00 LF
Height of wall varies from 15.89' to 1.26'
Area of wall = $0.5 * (15.89 + 1.26) * 40 = 343.00$ SF

Total area of MSE wall = 3448.43 SF

Alternative (Modular Block Walls with Traffic Barrier same as for MSE Wall)

Total area of Modular Block Wall = 3448.43 SF

Value Analysis Design Alternative



PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-6

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION**
400+00 TO STATION 485+00

SHEET NO.: **1** of **5**

Original Design:

The original design calls for a complete reconstruction of the roadway from station 400+00 to 485+00 utilizing a 65mph design speed and a typical section with two 12 foot lanes each direction, 2' paved inside shoulders in a 44' median and 6'-6" paved outside shoulders

Alternative Design:

This alternative design suggests extending the lower design speed "transition" section from station 485+00 to station 526+00. The proposed typical section would maintain the same cross sectional elements but utilize a reduced design speed to accommodate the existing profile and provide for retaining and overlaying the existing roadway.

Opportunities:

- Reduced pavement cost
- Reduce right-of-way taking
- Improvements to construction sequencing due to less total reconstruction.

Risks:

- Reduction in design speed and posted speed of this section of roadway
- Significant effort required for redesign of this section of roadway
-

Technical Discussion:

The existing roadway is all in a tangent section and the existing profile appears adequate to meet a 55mph-60 mph design speed. This section could be signed for 55 mph and provide a longer area for the transition from 65mph to 45mph. An existing pavement of 36' would provide more than sufficient width in order to provide two 12' lanes, a 2' paved inside shoulder and a 6'-6" paved outside shoulder by simply overlaying and re-striping the existing pavement. A significant design effort would be required to change the original design in this area.

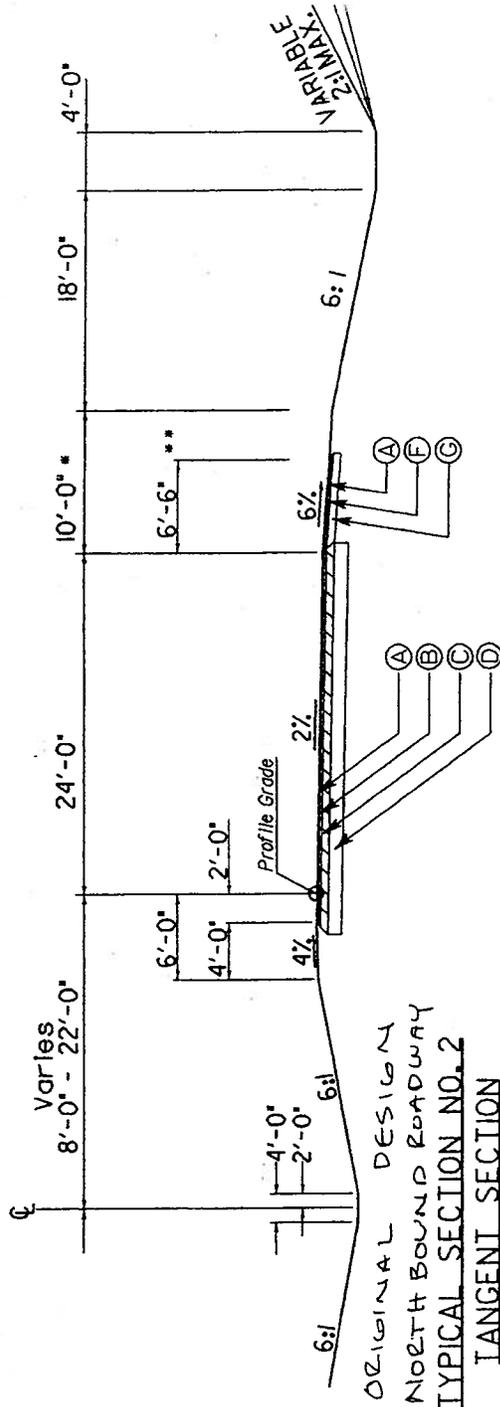
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,471,877	\$ 0	\$ 1,471,877
ALTERNATIVE	\$ 813,516	\$ 0	\$ 813,516
SAVINGS	\$ 658,361	\$ 0	\$ 658,361

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.: **37-6**

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION**
400+00 TO STATION 485+00

SHEET NO.: **2 of 5**



REQUIRED PAVEMENT

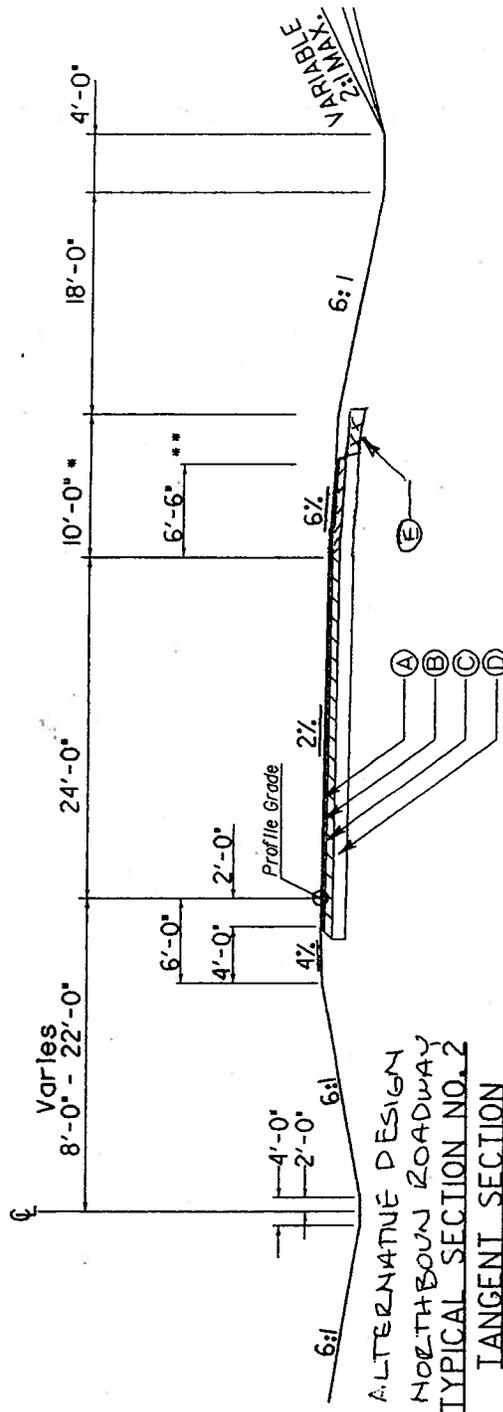
- (A) 165 LB/SY RECYCLED ASPH. CONC. 12.5mm SUPERPAVE
- (B) 330 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
- (C) 660 LB/SY RECYCLED ASPH. CONC. 25mm SUPERPAVE
- (D) 12" GRADED AGGREGATE BASE
- (E) 220 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
- (F) 6" GRADED AGGREGATE BASE

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.: **37-6**

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION**
400+00 TO STATION 485+00

SHEET NO.: **3 of 5**



ALTERNATIVE DESIGN
 NORTHBOUND ROADWAY
 TYPICAL SECTION NO. 2
 TANGENT SECTION
 N.T.S.

REQUIRED PAVEMENT

- (A) 165 LB/SY RECYCLED ASPH. CONC. 12.5mm SUPERPAVE
- (B) LEVELING RECYCLED ASPH CONC. 50TONS/STA
- (C) 220 LB/SY RECYCLED ASPH. CONC. 19mm SUPERPAVE
- (D) EXISTING PAVEMENT TO REMAIN
- (E) EXISTING PAVEMENT TO BE REMOVED

Calculations



PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-6

DESCRIPTION: **RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION**
400+00 TO STATION 485+00

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

Total length- $485+00 - 400+00 = 8500\text{LF}$

New Pavement-

12.5 mm ACP $[(32.5' \times 8500')/(9\text{sf/sy})] \times [(165\#/sy)/(2000\#/ton)] \sim 2535$ tons

19.0 mm ACP $[(26.0' \times 8500')/(9\text{sf/sy})] \times [(330\#/sy)/2000\#/ton] \sim 4055$ tons

19.0 mm ACP $[(6.5' \times 8500')/(9\text{sf/sy})] \times [(220\#/sy)/2000\#/ton] \sim 675$ tons

25.0 mm ACP $[(26.5' \times 8500')/9\text{sf/sy}] \times [(660\#/sy)/2000\#/ton] \sim 8260$ tons

12" GAB $[(27.0' \times 8500' \times 1.0') \times (145\#/cf)/2000\#/ton] \sim 16640$ tons

Rehabilitated Pavement-

Leveling ACP (50 tons/Station) $\times (85$ Stations) ~ 4250 tons

12.5 mm ACP $[(32.5' \times 8500')/(9\text{sf/sy})] \times [(165\#/sy)/(2000\#/ton)] \sim 2535$ tons

19.0 mm ACP $[(32.5' \times 8500')/(9\text{sf/sy})] \times [(220\#/sy)/2000\#/ton] \sim 3380$ tons

COST WORKSHEET



PROJECT: EDS-545(20)(37) PI Nos. 122110, 122260 SR -17	ALTERNATIVE NO:	37-6
	SHEET NO:	5 OF 5

DESCRIPTION:	RETAIN AND OVERLAY EXISTING PAVEMENT FROM STATION 400+00 TO STATION 485+00
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
REC ASPH CONC LEVELING	TN	0	75.00	0	4,250	75.00	318,750
REC ASPH CONC 12.5MM SUPERPAVE	TN	2,535	78.00	197,730	2,535	78.00	197,730
REC ASPH CONC 19.0MM SUPERPAVE	TN	4,730	66.00	312,180	3,380	66.00	223,080
REC ASPH CONC 25.0MM SUPERPAVE	TN	8,260	64.00	528,640	0	64.00	0
GR AGGR BASE	TN	16,640	18.00	299,520	0	18.00	0
SUB-TOTAL				1,338,070			739,560
MARK-UP AT 10%				138,807			73,956
TOTAL				1,471,877			813,516

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-7

DESCRIPTION: **RELOCATE BIKE LANES FROM ROADWAY TO A**
MULTI-USE TRAIL

SHEET NO.: **1 of 1**

Original Design:

The typical section specifies a 4' bike lane in each direction between Sta 526+00 and Sta 571+82.90. This Section involves the unit 37 contract, PI No. 122260.

Alternative:

The typical section change would remove the bike lanes from the roadway and create provisions for bikes on a multi-use trail on the roadway shoulder.

Opportunities:

- Reduced construction costs
- Enhanced safety for bicyclists
- Easier provisions for adding bike provisions when changing from rural to urban section

Risks

- Change in standard bike lane location

Technical Discussion:

The 4' width removed from the roadway would be added to the shoulder. This would increase the shoulder to a 16' width which would accommodate an 8' multi-use trail with a 5' buffer behind the curb and gutter. The "Guide for Development of Bicycle Facilities" allows sidewalk bikeways in select situations.

Value Analysis Design Alternative



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-8

DESCRIPTION: **USE CON-SPAN™ IN-LIEU OF CONCRETE BOX CULVERTS**

SHEET NO.: 1 of 3

Original Design:

The original design calls for the construction of Cast-In-Place Concrete Box Culverts (CBC) based on GDOT STD 2318, 2329, 2331 & 2332, as listed below:

<u>LOCATION</u>	<u>LENGTH</u>	<u>SIZE</u>	<u>SKEW</u>	<u>FILL HEIGHT</u>
STA 408+85.00	195'	SGL 5'X6' CBC	60°00'00.00"	10'
STA 467+60.00	226'	TPL 10'X10' CBC	45°00'00.00"	10'

Alternative Design:

The proposed alternatives replace the Cast-In-Place structures with pre-cast structures such as CON-SPAN™ providing an equivalent hydraulic area to that of the original design. The use of a segmental pre-cast structure significantly accelerates the construction time.

Opportunities:

- Reduce construction time and cost
- Eliminate or ease construction staging
- Enhanced aesthetics
- Pre-cast culverts are durable and being used by many agencies

Risks:

- Sufficiency of Hydraulic opening
- Re-design effort will require additional time

Technical Discussion:

Channel flows may have to be investigated and, if required, portions of the channel may have to lined.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 994,751	\$ 0	\$ 994,751
ALTERNATIVE	\$ 825,643	\$ 0	\$ 825,643
SAVINGS	\$ 169,108	\$ 0	\$ 169,108

Calculations



PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:

37-8

DESCRIPTION: **USE CON-SPAN™ IN-LIEU OF CONCRETE BOX CULVERTS**

SHEET NO.: **2** of **3**

Current Design (Cast-In-Place Concrete Box Culverts)

Note:

GA DOT STD's 2318 through 2332 referenced for quantities.

Assumed fill height to be 20' high. (Results in a conservative estimate of quantities).

<u>LOCATION</u>	<u>LENGTH</u>	<u>SIZE</u>	<u>CONCRETE QTY</u>
STA 408+85.00	195'	SGL 5'X6' CBC	$0.817 * 195' = 159.32$ CY
STA 467+60.00	226'	TPL 10'X10' CBC	$5.073 * 226' = 1146.5$ CY

Alternative (Pre-Cast (CON-SPAN™) Culverts)

Use GA STD 2530 and Quotes from CONTECH BRIDGE SOLUTIONS for basis of cost comparison.

Value Analysis Design Suggestion

PROJECT: **GEORGIA DEPARTMENT OF TRANSPORTATION**
EDS-545(20)(37) PI Nos. 122110, 122260
SR -17

ALTERNATIVE NO.:
37-10

DESCRIPTION: **REVIEW PROFILE/CROSS SLOPES TO ELIMINATE**
PONDING POTENTIAL

SHEET NO.: **1 of 1**

Original Design: The plans show areas with K values in excess of the drainage maximum of K=157 and cross slopes ranging from 0.00 to 0.50.

Alternative: Modify profile and or cross slope at various locations to improve the sheet flow across the pavement, thereby lessening the potential for ponding.

Opportunities:

- Decrease sheet flow depth on the pavement

Risks

- None
- May require redesign efforts

Technical Discussion:

One area in particular where ponding could occur would be from station 547+50 to station 555+25. This area is a Type III sag vertical curve with K values of K= 253 and K=696, both in excess of the drainage maximum of K=157 and a typical cross slopes of 2.00. In high type pavements, these conditions pose the potential to create a sheet flow depth resulting in ponding that could pose a potential hazard.

Project Description

PROJECT DESCRIPTION

The project is for the widening and reconstruction of SR 17 which is part of the GRIP program. The project consist of two projects: EDS-545 (20)(37); P.I.s 122110 and 122260 in Franklin/Stephens Counties. The two projects are being designed by Arcadis and by G&M,Inc.

The purpose of Project EDS-545(20) is to widen the existing roadway from two lanes to a rural four lane facility on a new alignment. The project begins in Franklin County approximately 0.75 miles south of the Franklin County/Stephens County line and extends to Rumsey Road/CR 1. New parallel bridges over existing SR17, Norfolk-Southern Railroad and Eastanollee Creek will also be constructed. The length of the project is 6.86 miles.

The purpose of Project ESDS-545(37) is the widening and reconstruction of SR 17 from CR24/Scott Road to CR538/Brookhaven Circle in Stephens County along the existing alignment. The existing two and three lane road will be widened to a four-lane roadway. The project length is 3.04 miles.

The expected cost of this construction including right of way purchase is approximately \$111,249,757 dollars. This cost estimate is included in the first document noted below as part of the enclosures in this report section.

Please see the following enclosed documents:

- Georgia Department of Transportation
 - The Concept Plans of Proposed EDS-545 (20)(37) Franklin/Stephens Counties, Georgia; PI No.: P.I.s 122110 and 122260
 - Construction Cost Estimates

The VE Team utilized the supplied project materials noted above, along with the design documents prepared by Arcadis and by G&M,Inc. The Team was also provided with the current GDOT standard drawings, details and specifications.

PRELIMINARY COST ESTIMATE
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(20)
 FRANKLIN/STEPHENS COUNTIES
 P.I. No. 122110

ITEM DESCRIPTION	UNITS	UNIT COST	QUANTITY	COST
RIGHT-OF-WAY				
PROPERTY (LAND & Easement)	LS	\$1,755,785.00	1	\$1,755,785.00
IMPROVEMENTS, RELOCATION, DAMAGES	LS	\$278,320.00	1	\$278,320.00
OTHER COST (SCHEDULING, ADMIN. COST, INFLATION)	LS	\$8,915,895.00	1	\$8,915,895.00
TOTAL RIGHT-OF-WAY COST				\$10,950,000.00
REIMBURSABLE UTILITIES				
TRANSMISSION LINES	LS	\$178,000.00	1	\$178,000.00
ROADWAY				
TRAFFIC CONTROL	LS	\$350,000.00	1.00	\$350,000.00
FIELD ENGINEERING OFFICE, TP 3	EACH	\$75,833.00	1.00	\$75,833.00
CLEARING & GRUBBING	LS	\$1,600,000.00	1.00	\$1,600,000.00
UNCLASSIFIED EXCAVATION	CY	\$4.00	2,703,210.00	\$10,812,840.00
GR AGGR BASE CRS, INCL MATL	TON	\$24.34	270,788.00	\$6,590,979.92
RECY ASPH CONC 9.5mm SUPERPAVE, GP2 ONLY, INCL BITUM MAT	TON	\$65.00	2,301.00	\$149,565.00
RECY ASPH CONC 12.5mm SUPERPAVE, GP1 OR 2, INCL POLYMER MODIF BITUM	TON	\$75.00	4,653.40	\$349,005.00
RECY ASPH CONC 12.5mm SUPERPAVE, GP1 OR 2,	TON	\$65.00	6,025.00	\$391,625.00
RECY ASPH CONC 19mm SUPERPAVE, GP1 OR 2, INCL BITUM MAT	TON	\$65.00	57,634.00	\$3,746,210.00
RECY ASPH CONC 25mm SUPERPAVE, GP1 OR 2, INCL BITUM MAT	TON	\$65.00	19,840.00	\$1,289,600.00
ASPHALTIC CONCRETE LEVELING	TON	\$75.00	274.38	\$20,578.13
BITUM TACK COAT	GAL	\$2.05	58,355.00	\$119,627.75
PLAIN PC CONC PMT, CL 1 CONC, 10 INCH THK	SY	\$90.00	225,616.80	\$20,305,512.00
CONCRETE R/W MARKERS	EACH	\$111.30	250.00	\$27,825.00
REINF CONC APPROACH SLAB	SY	\$175.00	587.00	\$102,725.00
GUARDRAIL, TP T	LF	\$56.49	125.00	\$7,061.25
GUARDRAIL, TP W	LF	\$24.39	22,500.00	\$548,775.00
GUARDRAIL ANCHORAGE, TP 1	EACH	\$613.61	39.00	\$23,930.79
GUARDRAIL ANCHORAGE, TP 12	EACH	\$1,753.33	39.00	\$68,379.87
RUMBLE STRIP - GROUND IN PLACE	GLM	\$1,200.00	14.00	\$16,800.00
DRAINAGE				
STORM DRAIN PIPE, 18 IN, H 1-10	LF	\$46.90	19,998.00	\$937,906.20
STORM DRAIN PIPE, 24 IN, H 1-10	LF	\$50.15	3,142.00	\$157,571.30
STORM DRAIN PIPE, 30 IN, H 1-10	LF	\$62.56	782.00	\$48,921.92
STORM DRAIN PIPE, 36 IN, H 1-10	LF	\$77.29	1,909.00	\$147,546.61
STORM DRAIN PIPE, 42 IN, H 1-10	LF	\$102.39	127.00	\$13,003.53
STORM DRAIN PIPE, 48 IN, H 1-10	LF	\$116.00	893.00	\$103,588.00
STORM DRAIN PIPE, 54 IN, H 1-10	LF	\$116.96	224.00	\$26,199.04
STORM DRAIN PIPE, 72 IN, H 1-10	LF	\$265.00	1,080.00	\$286,200.00
SAFETY END SECTION, 18 IN, SIDE DRAIN, 6:1 SLOPE	EACH	\$615.24	62.00	\$38,144.88
FLARED END SECTION, 18 IN, STORM DRAIN	EACH	\$554.70	5.00	\$2,773.50
FLARED END SECTION, 24 IN, STORM DRAIN	EACH	\$844.88	6.00	\$5,069.28
FLARED END SECTION, 24 IN, SIDE DRAIN 6:1	EACH	\$628.96	10.00	\$6,289.60
FLARED END SECTION, 30 IN, SIDE DRAIN 6:1	EACH	\$2,795.00	6.00	\$16,770.00
FLARED END SECTION, 36 IN, STORM DRAIN	EACH	\$1,164.48	14.00	\$16,302.72
FLARED END SECTION, 42 IN, STORM DRAIN	EACH	\$1,555.75	1.00	\$1,555.75
SLOPE DRAIN PIPE, 18 IN	LF	\$32.53	230.00	\$7,481.90
SLOPE DRAIN PIPE, 24 IN	LF	\$47.98	250.00	\$11,995.00
STN DUMPED RIP RAP TP3, 24 IN	SY	\$51.48	2,700.00	\$138,996.00
CLASS A CONCRETE	CY	\$701.17	117.10	\$82,107.01
DROP INLET, GP 1	EA	\$3,528.14	98.00	\$345,757.72
DROP INLET, GP 2	EA	\$2,379.82	2.00	\$4,759.64
DROP INLET, GP 1, SPECIAL DESIGN	EA	\$4,394.00	3.00	\$13,182.00
DROP INLET, GP 2, SPECIAL DESIGN	EA	\$4,702.00	1.00	\$4,702.00
DROP INLET, GP 1, ADD DEPTH	LF	\$294.93	25.00	\$7,373.25
CONCRETE SPILLWAY TP. 1	EA	\$1,763.49	2.00	\$3,526.98
CONCRETE SPILLWAY TP. 3	EA	\$2,063.49	2.00	\$4,126.98
CONCRETE BOX CULVERT BARREL	EACH	\$150,000.00	10.00	\$1,500,000.00
UNDERDRAIN PIPE INCLUDING DRAINAGE AGGREGATE, 6 IN	LF	\$16.46	450.00	\$7,407.00
FILTER FABRIC FOR EMBANKMENT STABILIZATOIN	SY	\$4.75	33,780.00	\$160,455.00

PRELIMINARY COST ESTIMATE
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(20)
 FRANKLIN/STEPHENS COUNTIES
 P.I. No. 122110

ITEM DESCRIPTION	UNITS	UNIT COST	QUANTITY	COST
EROSION CONTROL - PERMANENT				
PERMANENT GRASSING	AC	\$1,021.00	248.90	\$254,126.90
MULCH	TN	\$206.32	3,323.70	\$685,745.78
AGRICULTURE LIME	TON	\$61.12	248.90	\$15,212.77
FERTILIZER MIXED GRADE	TON	\$324.04	149.34	\$48,392.13
FERTILIZER NITROGEN CONTENT	LBS	\$1.98	12,445.00	\$24,641.10
LIQUID LIME	GAL	\$23.17	622.25	\$14,417.53
PLAIN CONCRETE DITCH PAVIN, 4 IN	SY	\$33.82	2,810.00	\$95,034.20
PERMANENT SOIL REINFORCING MATTING	SY	\$4.95	9,057.56	\$44,834.90
CLASS A CONCRETE FOR CONCRETE FLUMES	CY	\$850.00	203.53	\$172,996.25
EROSION CONTROL - TEMPORARY				
CONSTRUCT AND REMOVE TEMPORARY DITCH CHECKS	EACH	\$229.01	5,686.00	\$1,302,150.86
MAINTENANCE OF TEMPORARY DITCH CHECKS	EACH	\$98.01	2,843.00	\$278,642.43
CONSTRUCT AND REMOVE BALED STRAW EROSION CHECKS	LF	\$3.48	1,000.00	\$3,480.00
TEMPORARY GRASSING	AC	\$525.52	124.45	\$65,400.96
MULCH	TN	\$206.32	2,950.35	\$608,716.21
AGRICULTURE LIME	TN	\$61.12	124.45	\$7,606.38
FERTILIZER MIXED GRADE	TN	\$324.04	24.89	\$8,065.36
FERTILIZER NITROGEN CONTENT	LBS	\$1.98	6,222.50	\$12,320.55
LIQUID LIME	GAL	\$23.17	311.13	\$7,208.77
MAINT BALED STRAW EROSION CHECKS	LF	\$2.20	500.00	\$1,100.00
MAINT TEMP SILT FENCE TYPE A	LF	\$1.40	4,867.00	\$6,813.80
MAINT TEMP SILT FENCE TYPE C	LF	\$1.45	27,800.00	\$40,310.00
CONSTR. & REM. SILT CONTROL GATE, TYPE 3	EACH	\$558.89	106.00	\$59,242.34
MAINT. SILT CONTROL GATE, TYPE 3	EACH	\$225.17	106.00	\$23,868.02
TEMPORARY SILT FENCE, TYPE A	LF	-\$2.03	9,734.00	\$19,760.02
TEMPORARY SILT FENCE, TYPE C	LF	\$3.77	55,600.00	\$209,612.00
CONSTR. & REM TEMPORARY SEDIMENT BAIN	EACH	\$8,652.13	6.00	\$51,912.78
MAINT. TEMPORARY SEDIMENT BASIN	EACH	\$1,358.81	6.00	\$8,152.86
CONSTR. & REM INLET SEDIMENT TRAP	EACH	\$354.30	219.00	\$77,591.70
CONSTRUCTION EXIT	EACH	\$2,570.00	26.00	\$66,820.00
MAINT. CONSTRUCTION EXIT	EACH	\$604.61	26.00	\$15,719.86
WATER QUALITY MONITORING	MO	\$968.42	24.00	\$23,242.08
WATER QUALITY SAMPLING	EACH	\$1,262.78	2.00	\$2,525.56
TEMPORARY SLOPE PROTECTION MATTING	SY	\$2.25	308,300.00	\$693,675.00
CONSTR. & REM TEMPORARY SLOPE DRAIN	LF	\$16.09	10,240.00	\$164,761.60
SIGNING & MARKING				
HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	SF	\$18.61	1,200.00	\$22,332.00
HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING, TP 3	SF	\$31.00	250.00	\$7,750.00
HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 6	SF	\$35.00	1,400.00	\$49,000.00
GALV STEEL POSTS, TP 7	LF	\$8.18	3,400.00	\$27,812.00
GALV STEEL POSTS, TP 8	LF	\$9.73	400.00	\$3,892.00
STEEL WIRE STRAND CABLE, 3/8 IN	LF	\$3.06	680.00	\$2,080.80
STRAIN POLE, TP IV	EA	\$5,274.92	4.00	\$21,099.68
TRAFFIC SIGNAL INSTALLATION NO-1	LS	\$55,000.00	1.00	\$55,000.00
PULL BOX, PB-5	EA	\$2,299.00	1.00	\$2,299.00
SIGNAL ASSEMBLY, FLASHING SCHOOL, COMPLETE	EA	\$6,566.00	2.00	\$13,132.00
THERMOPLASTIC PVMT MARKING, ARROW, TP 2	EA	\$70.00	300.00	\$21,000.00
THERMOPLASTIC PVMT MARKING, ARROW, TP 3	EA	\$103.57	15.00	\$1,553.55
THERMOPLASTIC PVMT MARKING, ARROW, TP 7	EA	\$82.76	115.00	\$9,517.40
THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	LF	\$0.38	131,000.00	\$49,780.00
THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	LF	\$0.43	106,600.00	\$45,838.00
THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	LF	\$4.08	800.00	\$3,264.00
THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	LF	\$0.30	106,500.00	\$31,950.00
THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, YELLOW	LF	\$0.30	400.00	\$120.00
THERMOPLASTIC TRAF STRIPING, WHITE	SY	\$2.86	45,100.00	\$128,986.00
RAISED PVMT MARKERS TP 1	EA	\$4.02	2,000.00	\$8,040.00
RAISED PVMT MARKERS TP 3	EA	\$4.43	500.00	\$2,215.00
CONDUIT, NONMETL, TP 2, 2 IN	LF	\$6.00	950.00	\$5,700.00

PRELIMINARY COST ESTIMATE
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(20)
 FRANKLIN/STEPHENS COUNTIES
 P.I. No. 122110

ITEM DESCRIPTION	UNITS	UNIT COST	QUANTITY	COST
MAJOR STRUCTURES				
2 BRIDGES	SF	\$90.00	23,637.00	\$2,127,330
SUBTOTAL CONSTRUCTION COST				\$58,739,095.33
INFLATION (0%)				
E&C (10%)				\$5,873,910
TOTAL CONSTRUCTION COST				\$64,613,005
GRAND TOTAL PROJECT COST				\$75,741,005

PRELIMINARY EARTHWORK SUMMARY
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(20)
 FRANKLIN/STEPHENS COUNTIES
 P.I. No. 122110

SR 17				
Excavation		2,479,160.00		
Embankment		1,909,333.00		
Usable Excavation		1,983,328.00		
Balance		73,995.00	WASTE	
OLD SR17 S				
Excavation		5,695.00		
Embankment		410.00		
Usable Excavation		4,556.00		
Balance		4,146.00	WASTE	
PRICE RD S				
Excavation		3,350.00		
Embankment		290.00		
Usable Excavation		2,680.00		
Balance		2,390.00	WASTE	
PRICE RD N				
Excavation		46,530.00		
Embankment		20.00		
Usable Excavation		37,224.00		
Balance		37,204.00	WASTE	

PRELIMINARY EARTHWORK SUMMARY
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(20)
 FRANKLIN/STEPHENS COUNTIES
 P.I. No. 122110

OLD PRICE RD				
Excavation		4,070.00		
Embankment		5.00		
Usuable Excavation		3,256.00		
Balance		3,251.00	WASTE	
ANDERSON THOMAS RD				
Excavation		7,800.00		
Embankment		3,775.00		
Usuable Excavation		6,240.00		
Balance		2,465.00	WASTE	
MARTIN DRIVE				
Excavation		31,795.00		
Embankment		5,735.00		
Usuable Excavation		25,436.00		
Balance		19,701.00	WASTE	
POPLAR SPRINGS RD				
Excavation		11,175.00		
Embankment		770.00		
Usuable Excavation		8,940.00		
Balance		8,170.00	WASTE	
POPLAR SPRINGS DETOUR STAGE 1				

PRELIMINARY EARTHWORK SUMMARY
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(20)
 FRANKLIN/STEPHENS COUNTIES
 P.I. No. 122110

Excavation				
Embankment			16,105.00	
Usable Excavation			125.00	
Balance			12,884.00	
			12,759.00	WASTE
POPLAR SPRINGS DETOUR STAGE 2				
Excavation				
Embankment			9,475.00	
Usable Excavation			250.00	
Balance			7,580.00	
			7,330.00	WASTE
NEW RD				
Excavation				
Embankment			6,875.00	
Usable Excavation			33,035.00	
Balance			5,500.00	
			-27,535.00	BORROW
YOW MILL RD				
Excavation				
Embankment			12,235.00	
Usable Excavation			240.00	
Balance			9,788.00	
			9,548.00	WASTE
SISK RD				
Excavation				
			6,785.00	

REVISED PROJECT CONCEPT REPORT

EDS-545 (20), Stephens County

P. I. No.122110

Need and Purpose:

This project is identified as a part of the Governor's Road Improvement Program (GRIP). As part of this program, the existing two-lane SR 17 will be improved to multilane from 0.75 miles south of the Franklin / Stephens county line to Scott Road. GRIP was initiated in the 1980's to address the importance of stimulating growth via an improved transportation network. The GRIP has identified a system of economic development highways that consist of approximately 2,627 miles of existing primary routes, and an additional 113 miles of truck connector routes. The system would place 98% of the State's population within 20 miles of a multilane highway. It would provide access for oversized trucks to cities having populations of 5,000 or more, and to most cities having populations between 2,000 and 5,000.

Among the many benefits of such a system is that areas lagging in growth would be enhanced. In addition, tourism industries would benefit as would accessibility to recreation and historic sites. Georgia is to remain a growth state in the near future. The demands created by population and economic growth will spill over onto the non-Interstate systems that form a critical link for both large and small communities in the state. This essentially makes highway access a prime requisite for community growth in the future.

Currently limitations on trucks prevent access for many Georgia communities and affect economic potential. The Governor's Road Improvement Program would provide access to communities denied service by larger trucks. This is beneficial, because based on the experiences of the Georgia Department of Industry and Trade, if two cities are competing for an industry, the city closest to a four-lane roadway will usually attract the industry.

The proposed multilane of SR 17 will serve as a catalyst for the development of the region, connecting the Atlanta area with the more sparsely developed areas along the corridor. Traffic carrying capacity will be increased and safety and operational characteristics along these segments will be improved.

Project location:

Project EDS-545(20) in Stephen/Franklin Counties is the proposed project that will widen existing SR 17 from two lanes to a rural divided four lane roadway. The project begins 0.75 miles south of the Franklin County/Stephens County line, connecting to project EDS 545 (19) using a rural 44-foot depressed grass median roadway section and extends to Rumsey Road/CR 13, maintaining the same typical section throughout the project.

Description of the approved concept:

The purpose of this project is to widen the existing roadway from two lanes to a rural four lane facility. Project EDS-545(20) begins in Franklin County approximately 0.75 miles south of the

Franklin County/Stephens County line utilizing a rural 44-foot grassed median and extends to Rumsey Road /CR 13, maintaining the 44-foot grassed median to the end of the project. From its beginning at the end of project EDS-545(19), the alignment continues along its original course for approximately 0.25 miles. The alignment then diverges from the existing SR 17 and comes back to cross over both existing SR 17 and Norfolk Southern Railroad in a long 1900' radius right curve. Parallel bridges will be used for the grade separation. The proposed alignment then runs northeast in along the county line for approximately 1/3 of a mile before taking a 1-mile, 2500' radius curve to the left just beyond Price Road. The proposed realignment then continues approximately 0.5 miles northeast of exiting SR 17 to the end of the project at Rumsey Road/CR 13.

PDP Classification: Major/Existing

Full Oversight () ; Exempt (X); SF () ; Other ()

Functional Classification: Rural Arterial

U. S. Route Number: N/A

State Route Number: 17

Traffic (AADT) as shown in the approved concept:

Current Year: 1997 12,850 vpd Design Year: 2017 21,150 vpd

Proposed features to be revised:

Project termini: The approved concept for this project is being revised to change the "ending" limits of this project.

- The ending point is being moved forward (increase of 1.16 miles) from the intersection of SR 17 at Rumsey Road/CR 13 to begin at the intersection with Scott Road/CR 24. The proposed typical shall remain a rural four-lane divided roadway with a 44-foot depressed grass median. The purpose of this change in project limits is to provide logical termini and better maintenance of traffic for this project and the adjacent project (EDS 545 (37)).

Describe the revised feature to be approved:

The revised feature that approval is being requested for is the change in *project terminus* at the end of the project. The reasons to revise the project limits are stated above.

The present approved project concept length is 5.70 miles. This change in project terminus will increase the project length to 6.86 miles.

Updated traffic data (AADT): Current Year: 2007 22,500 vpd Design Year: 2027 36,000 vpd

Programmed/Schedule:

P.E.: 1994/2002

R/W: Long Range

Construction: Long Range

Revised cost estimates:

1. Construction cost (including inflation and E&C): \$23,661,097
2. Right-of-way: \$1,095,000

3. Utilities (reimbursable): \$178,000

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

Recommendation: It is recommended that the proposed revision (project termini) to the concept be approved for implementation.

Attachments:

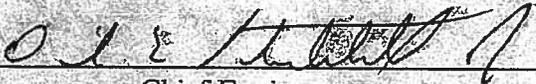
1. Sketch Map,
2. Cost Estimate,

• Exempt projects

Concur: _____


Director of Preconstruction

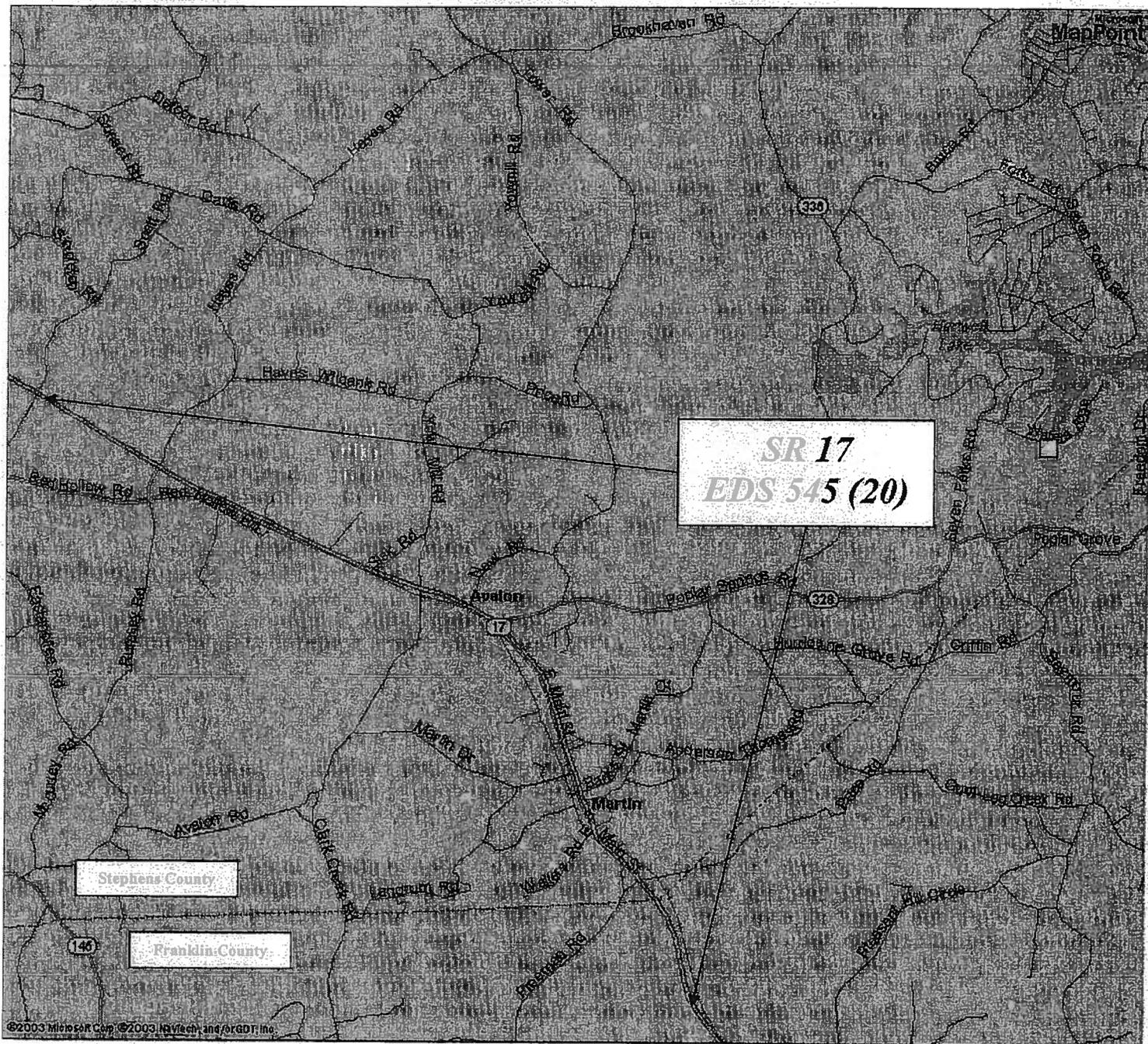
Approve: _____


Chief Engineer



SR 17 – EDS 545(20), P.I.No. 122110
Stephens/Franklin Counties

(Project Location Map)



PRELIMINARY PROJECT COST ESTIMATE
EDS-545 (20)

page 1 of 3
P.I. NO. 122110
Stephens Co

DATE: 15-Jan-05 EDS-545 (20) Stephens Co PROJECT LETTING DATE: Long Range

PREPARED BY: Joe Leoni, P.E. PROJECT LENGTH (MILES): 6.86
ARCADIS

() PROGRAMMING PROCESS () CONCEPTUAL DEVELOPMENT (X) DURING PROJ DEV.

PROJECT COSTS

A. RIGHT OF WAY:

1. PROPERTY (Land & Easement)

a. Acquisition	(from GDOT)	AC	\$1,755,785	(from GDOT)
b. Easements	(included in above)	AC	\$0	

2. DISPLACEMENTS:

a. Mobile Homes	EA	\$0	
b. Residences	EA	\$0	
c. Businesses	EA	\$0	
		\$320,000	(from GDOT)

3. IMPROVEMENTS

\$0
\$888,000 (from GDOT)

4. DAMAGES

a. Proximity	\$0
b. Consequential	\$0
c. Cost to Cure	\$0
	\$190,000 (from GDOT)

5. NET COSTS

Net Cost	\$3,153,785	(from GDOT)
Scheduling Contingency	55%	\$1,734,582
Adm/Court/Cost	60%	\$2,933,020
Inflation Factor	40%	\$3,128,555

Subtotal \$10,949,942
SUBTOTAL A \$ 10,950,000.00

B. REIMBURSABLE UTILITIES:

1. TELEPHONE
2. ELECTRIC TRANSMISSION LINES
3. FIBER OPTIC LINE
4. GAS LINES
5. SERVICES

\$178,000 (from GDOT)
SUBTOTAL B \$ 178,000.00

C. CONSTRUCTION:

1 GRADING AND DRAINAGE (MAINLINE):

a. SITEWORK				
1)	Unclass. Excav.	1250000	CY	\$ 4.00 \$5,000,000

b. DRAINAGE:

PRELIMINARY PROJECT COST ESTIMATE
EDS-545 (20)

page 2 of 3
P.I.NO. 122110
Stephens Co

1)	Cross Drain Pipes	47 SITES	\$10,000.00	\$470,000
2)	Cross Drain End Treatm	94 EA	\$800.00	\$75,200
3)	Side Drain Pipe	1880 LF	\$25.00	\$47,000
4)	Side Drain End Treatme	92 EA	\$550.00	\$50,600
5)	Drop Inlets (Incl. Add de	80 EA	\$2,000.00	\$160,000
			SUBTOTAL:C-1	\$5,802,800
2 BASE AND PAVING (MAINLINE):				
a.	12-in G.A.B.	193000 TON	\$14.00	\$2,702,000
b.	ASPHALT PAVING:			
1)	1.5" Asph. Conc. 12.5 m	22900 TON	\$39.00	\$893,100
2)	2" Asph. Conc. 19 mm S	30530 TON	\$41.00	\$1,251,730
3)	4" Asph. Conc. 25 mm S	61060 TON	\$37.00	\$2,259,220
4)	Leveling	700 TON	\$42.00	\$29,400
5)	Bitum. Tack	60500 GAL	\$1.00	\$60,500
c.	CONCRETE ITEMS			
1)	Curb and Gutter, Type II	0		\$0
2)	Conc. Med Islands	2140 SY	\$36.00	\$77,040
3)	5' Sidewalk	0		\$0
d.	OTHER			
			SUBTOTAL:C-2	\$7,272,990
3 LUMP ITEMS:				
a.	TRAFFIC CONTROL	6.9 MI	\$50,000	\$345,000
b.	CLEARING AND GRUBBING	240 AC	\$6,000	\$1,440,000
c.	LANDSCAPING			
d.	EROSION CONTROL	6.9 MI	\$80,000	\$552,000
			SUBTOTAL:C-3	\$2,337,000
4 MISCELLANEOUS:				
a.	FIELD ENGINEERS OFFICE	1 EA	\$52,500	\$52,500
b.	GUARDRAIL	13000 LF	\$14	\$182,000
	Guardrail Anchor	50 EA	\$1,500	\$75,000
c.	SIGNING - STRIPING - SIGNAL			
	Signing/Striping	6.9 MI	\$25,000	\$172,500
	Traffic Signal	EA	\$125,000	\$0
			SUBTOTAL:C-4	\$482,000
5 MAJOR STRUCTURES:				
a.	BRIDGES: 2 Bridges 450' x 40'	36000 SF	\$65	\$2,340,000
b.	BOX CULVERTS			
	Single 10' x 10' - 2 SITE	400 LF	\$800	\$320,000
	Double 10' x 10' - 1 SITE	LF	\$0	\$0
	Triple 10' x 10' - 1 SITE	LF	\$0	\$0
			SUBTOTAL:C-5	\$2,660,000

ESTIMATE SUMMARY

A.	RIGHT OF WAY	\$10,950,000
B.	REIMBURSABLE UTILITIES	\$178,000

PRELIMINARY PROJECT COST ESTIMATE
EDS-545(20)

page 3 of 3
P. I. NO. 122110
Stephens Co

C. CONSTRUCTION			
1 GRADING AND DRAINAGE			\$5,802,800
2 BASE AND PAVING			\$7,272,990
3 LUMP ITEMS			\$2,337,000
4 MISCELLANBOUS			\$482,000
5 MAJOR STRUCTURES			\$2,660,000
SUBTOTAL CONSTRUCTION COST			\$18,554,790
INFLATION	5 YEARS @	3%	\$2,955,298
E. & C. (10 %)			\$2,151,009
TOTAL CONSTRUCTION COST			\$ 23,661,097
GRAND TOTAL PROJECT COST			\$34,789,097

CONSTRUCTION COST ESTIMATE

Project: SR 17 ROADWAY IMPROVEMENTS
 Project No.: EDS-545(37)
 County: STEPHENS

Prepared by: 
 Last Modified: December 13, 2006

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	COST		
1	RIGHT OF WAY:	LS	LUMP	\$12,609,000.00	\$12,609,000.00		
2	DISPLACEMENTS:	LS	LUMP	\$555,000.00	\$555,000.00		
TOTAL RIGHT OF WAY COST					\$13,164,000.00		
REIMBURSABLE UTILITIES:				LS	LUMP	\$ 60,000.00	\$60,000.00
CONSTRUCTION COSTS							
ROADWAY ITEMS							
150-1000	TRAFFIC CONTROL (PROJECT NO. EDS 545(37))	LS	LUMP	\$150,000.00	\$150,000.00		
201-1500	CLEARING & GRUBBING	LS	LUMP	\$570,000.00	\$570,000.00		
205-0001	UNCLASSIFIED EXCAVATION	CY	383906	\$6.00	\$2,303,436.00		
207-0203	FOUND BK/FILL MATL, TP II	CY	996	\$60.00	\$59,760.00		
310-1101	GR AGGR BASE NCL MATL	TN	133100	\$18.00	\$2,395,800.00		
318-3000	AGGR SURFACE CRS	TN	1000	\$18.00	\$18,000.00		
402-1812	REC ASPH CONC LEVELING, INCLUDE BIT MATL & H LIME	TN	300	\$75.00	\$22,500.00		
402-3110	REC ASPH CONC 9.5mm SUPERPAVE, GP 1 OR 2, INCLUDE BIT MATL & H LIME	TN	3400	\$61.00	\$207,400.00		
402-3113	REC ASPH CONC 12.5mm SUPERPAVE, GP 1 & GP2, INCL BIT MATL & H LIME	TN	13800	\$78.00	\$1,076,400.00		
402-3121	REC ASPH CONC 25mm SUPERPAVE, GP 1 OR 2, INCLUDE BIT MATL & H LIME	TN	53200	\$64.00	\$3,404,800.00		
402-3190	REC ASPH CONC 19mm SUPERPAVE, GP 1 OR 2, INCLUDE BIT MATL & H LIME	TN	30200	\$66.00	\$1,993,200.00		
402-4510	REC ASPH CONC 12.5mm SUPERPAVE, GP2 ONLY, INCL POLYMER-MODIFIED BIT MATL	TN	12600	\$65.00	\$819,000.00		
418-1000	BITUM TACK COAT	GL	29400	\$2.00	\$58,800.00		
433-1000	REINF CONC APPROACH SLAB	SY	930	\$133.00	\$123,690.00		
441-0014	DRIVEWAY CONCRETE, 4 IN TK	SY	100	\$36.00	\$3,600.00		
441-0016	DRIVEWAY CONCRETE, 6 IN TK	SY	100	\$41.00	\$4,100.00		
441-0050	CONC SLOPE DRAIN	SY	100	\$45.00	\$4,500.00		
441-0104	CONC SIDEWALK, 4 IN	SY	4800	\$38.00	\$182,400.00		
441-0303	CONC SPILLWAY, TP 3	EA	1	\$2,300.00	\$2,300.00		
441-0740	CONCRETE MEDIAN, 4 IN	SY	2000	\$35.00	\$70,000.00		
441-3999	CONCRETE V GUTTER	LF	803	\$16.00	\$12,848.00		
441-4030	CONC VALLEY GUTTER, 8 IN	SY	1100	\$46.00	\$50,600.00		
441-6222	CONC CURB & GUTTER, 8" X 30", TYPE 2	LF	9600	\$18.00	\$172,800.00		
441-6740	CONC CURB & GUTTER, 8" X 30", TYPE 7	LF	9500	\$16.00	\$152,000.00		
446-1100	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	LF	500	\$6.00	\$3,000.00		
449-0000	BRIDGE OVER EASTANOLLEE CREEK	SF	17081	\$90.00	\$1,537,290.00		
500-3101	CLASS A CONCRETE	CY	1515	\$590.00	\$893,992.19		
500-3800	CLASS A CONCRETE, INCL REINF STEEL	CY	35	\$890.00	\$31,150.00		
511-1000	BAR REINF STEEL	LB	165001	\$1.00	\$165,000.50		
622-1033	PRECAST CONCRETE MEDIAN BARRIER, METHOD 3	LF	6250	\$42.00	\$262,500.00		
634-1200	RIGHT OF WAY MARKER	EA	300	\$111.00	\$33,300.00		
627-1000	MSE WALL FACE	SF	5000	\$46.00	\$230,000.00		
627-1160	TRAFFIC BARRIER	LF	250	\$222.00	\$55,500.00		
641-1100	GUARDRAIL, TP T	LF	153	\$53.00	\$8,109.00		
641-1200	GUARDRAIL, TP W	LF	5861	\$19.00	\$111,368.31		
641-2100	DBL FACED GUARDRAIL, TP W	LF	494	\$35.00	\$17,290.00		
641-5001	GUARDRAIL ANCHORAGE, TP 1	EA	21	\$632.00	\$13,272.00		
641-5012	GUARDRAIL ANCHORAGE, TP 12	EA	10	\$2,000.00	\$20,000.00		
641-6000	GUARDRAIL ANCHORAGE TP 10D, SPCL DES	EA	2	\$4,000.00	\$8,000.00		
643-4000	WOVEN WIRE FENCE	LF	1250	\$6.00	\$7,500.00		
643-8040	GATE, WOVEN WIRE	EA	2	\$678.00	\$1,356.00		
643-8200	BARRIER FENCE (ORANGE) 4 FT	LF	1000	\$3.00	\$3,000.00		
DRAINAGE ITEMS							
550-1180	STORM DRAIN PIPE, 18 IN., H 1-10	LF	12600	\$42.00	\$529,200.00		
550-1240	STORM DRAIN PIPE, 24 IN., H 1-10	LF	2500	\$54.00	\$135,000.00		
550-1300	STORM DRAIN PIPE, 30 IN., H 1-10	LF	1400	\$68.00	\$95,200.00		

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
550-1300	STORM DRAIN PIPE, 30 IN., H 10-15	LF	320	\$68.00	\$21,760.00
550-1360	STORM DRAIN PIPE, 36 IN., H 1-10	LF	290	\$80.00	\$23,200.00
550-1420	STORM DRAIN PIPE, 42 IN., H 1-10	LF	450	\$119.00	\$53,550.00
550-1480	STORM DRAIN PIPE, 48 IN., H 1-10	LF	51	\$131.00	\$6,681.00
550-1540	STORM DRAIN PIPE, 54 IN., H 1-10	LF	110	\$119.00	\$13,090.00
550-3418	SAFETY END SECTION 18 IN, SIDE DRAIN, 4:1 SLOPE	EA	11	\$830.00	\$9,130.00
550-3424	SAFETY END SECTION 24 IN, SIDE DRAIN, 4:1 SLOPE	EA	10	\$850.00	\$8,500.00
550-3430	SAFETY END SECTION 30 IN, SIDE DRAIN, 4:1 SLOPE	EA	12	\$1,100.00	\$13,200.00
550-3436	SAFETY END SECTION 36 IN, SIDE DRAIN, 4:1 SLOPE	EA	2	\$1,600.00	\$3,200.00
550-3442	SAFETY END SECTION 42 IN, SIDE DRAIN, 4:1 SLOPE	EA	3	\$2,800.00	\$8,400.00
550-3518	SAFETY END SECTION 18 IN, SIDE DRAIN, 6:1 SLOPE	EA	9	\$630.00	\$5,670.00
550-3524	SAFETY END SECTION 24 IN, SIDE DRAIN, 6:1 SLOPE	EA	10	\$1,100.00	\$11,000.00
550-3530	SAFETY END SECTION 30 IN, SIDE DRAIN, 6:1 SLOPE	EA	12	\$1,700.00	\$20,400.00
550-3536	SAFETY END SECTION 36 IN, SIDE DRAIN, 6:1 SLOPE	EA	2	\$2,000.00	\$4,000.00
550-3542	SAFETY END SECTION 42 IN, SIDE DRAIN, 6:1 SLOPE	EA	3	\$1,800.00	\$5,400.00
550-4218	FLARED END SECTION 18 IN, STORM DRAIN	EA	9	\$678.00	\$6,102.00
550-4224	FLARED END SECTION 24 IN, STORM DRAIN	EA	8	\$868.00	\$6,944.00
550-4230	FLARED END SECTION 30 IN, STORM DRAIN	EA	6	\$889.00	\$5,600.70
550-4236	FLARED END SECTION 36 IN, STORM DRAIN	EA	3	\$1,300.00	\$3,900.00
573-2006	UNDDR PIPE INCL DRAINAGE AGGR, 6 IN	LF	650	\$16.46	\$10,699.00
603-2030	STN DUMPED RIP RAP, TP1, 30 IN	SY	2933	\$75.00	\$219,975.00
603-2180	STN DUMPED RIP RAP, TP3, 12 IN	SY	210	\$42.00	\$8,820.00
603-2181	STN DUMPED RIP RAP, TP3, 18 IN	SY	120	\$49.00	\$5,880.00
603-2182	STN DUMPED RIP RAP, TP3, 24 IN	SY	83	\$50.00	\$4,150.00
603-2184	STN DUMPED RIP RAP, TP3, 30 IN	SY	200	\$50.00	\$10,000.00
603-2186	STN DUMPED RIP RAP, TP3, 36 IN	SY	210	\$53.00	\$11,130.00
603-7000	PLASTIC FILTER FABRIC	SY	3756	\$5.00	\$18,780.00
668-1100	CATCH BASIN, GP 1	EA	45	\$2,300.00	\$103,500.00
668-1110	CATCH BASIN, GP 1, ADDL DEPTH	LF	36	\$235.00	\$8,460.00
668-2100	DROP INLET, GP 1	EA	31	\$4,390.00	\$136,090.00
668-2110	DROP INLET, GP 1, ADDL DEPTH	LF	48	\$279.00	\$13,392.00
668-2200	DROP INLET, GP 2	EA	3	\$4,110.00	\$12,330.00
668-2210	DROP INLET, GP 2, ADDL DEPTH	LF	7	\$311.00	\$2,177.00
668-4300	STORM SEWER MANHOLE, TP 1	EA	2	\$2,300.00	\$4,600.00
668-4311	STORM SEWER MANHOLE, TP 1, ADDL DEPTH, CL 1	LF	9	\$300.00	\$2,700.00
668-5000	JUNCTION BOX	EA	1	\$1,920.00	\$1,920.00
668-7000	DRIVEWAY GRATE INLET, SPECIAL DESIGN, 30 IN.	EA	2	\$8,000.00	\$16,000.00
668-8011	SAFETY GRATE, TP 1	SF	78	\$52.00	\$4,056.00
	EROSION CONTROL				
163-0232	TEMPORARY GRASSING	AC	25	\$562.00	\$14,050.00
163-0240	MULCH	TN	1168	\$195.00	\$227,760.00
163-0300	CONSTRUCTION EXIT	EA	7	\$2,900.00	\$20,300.00
163-0503	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP3	EA	50	\$570.00	\$28,500.00
163-0521	CONSTRUCT AND REMOVE TEMPORARY DITCH CHECKS	EA	670	\$220.00	\$147,400.00
163-0531	CONSTRUCT AND REMOVE TEMPORARY SEDIMENT BASIN TP 1	EA	2	\$8,500.00	\$17,000.00
163-0550	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	EA	170	\$300.00	\$51,000.00
165-0010	MAINTENANCE OF TEMPORARY SILT FENCE - TYPE A	LF	12900	\$1.00	\$12,900.00
165-0030	MAINTENANCE OF TEMPORARY SILT FENCE - TYPE C	LF	5000	\$2.00	\$10,000.00
165-0040	MAINTENANCE OF EROSION CONTROL CHECKDAMS / DITCH CHECKS	LF	670	\$87.00	\$58,290.00
165-0060	MAINTENANCE OF TEMPORARY SEDIMENT BASIN	EA	2	\$1,320.00	\$2,640.00
165-0087	MAINTENANCE OF SILT CONTROL GATE, TP 3	EA	50	\$205.00	\$10,250.00
165-0101	MAINTENANCE OF CONSTRUCTION EXIT	EA	7	\$677.00	\$4,739.00
165-0105	MAINTENANCE OF INLET SEDIMENT TRAP	EA	170	\$112.00	\$19,040.00
167-1000	WATER QUALITY MONITORING AND SAMPLING	EA	2	\$1,340.00	\$2,680.00
167-1500	WATER QUALITY INSPECTIONS	MO	24	\$1,070.00	\$25,680.00
171-0010	TEMPORARY SILT FENCE, TYPE A	LF	25700	\$2.00	\$51,400.00
171-0030	TEMPORARY SILT FENCE, TYPE C	LF	9900	\$4.00	\$39,600.00
700-6910	PERMANENT GRASSING	AC	50	\$895.00	\$44,750.00
700-7000	AGRICULTURAL LIME	TN	99	\$59.00	\$5,841.00
700-7010	LIQUID LIME	GL	124	\$20.00	\$2,480.00
700-8000	FERTILIZER MIXED GRADE	TN	50	\$348.00	\$17,400.00
700-8100	FERTILIZER NITROGEN CONTENT	LB	2471	\$3.00	\$7,413.00

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
715-2200	BITUMINOUS TREATED ROVING, WATERWAYS	SY	23100	\$3.00	\$69,300.00
716-2000	EROSION CONTROL MATS, SLOPES	SY	112400	\$2.00	\$224,800.00
	SIGNING AND MARKING				
636-1020	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	SF	882	\$16.00	\$14,112.00
	HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING, TP 3	SF	135	\$31.00	\$4,185.00
636-1031	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 6	SF	1419	\$28.00	\$39,732.00
636-1032	HIGHWAY SIGNS, TP 2 MATL, REFL SHEETING, TP 6	SF	38	\$20.00	\$760.00
636-2070	GALV STEEL POSTS, TP 7	LF	3456	\$9.00	\$31,104.00
639-2002	STEEL WIRE STRAND CABLE, 3/8 IN	EA	350	\$4.00	\$1,400.00
639-3004	STEEL STRAIN POLE, TP IV	EA	2	\$9,500.00	\$19,000.00
653-0120	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	EA	120	\$72.00	\$8,640.00
653-0170	THERMOPLASTIC PVMT MARKING, ARROW, TP 7	EA	44	\$82.00	\$3,608.00
653-1501	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	LF	50250	\$1.00	\$50,250.00
653-1502	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	LF	33500	\$1.00	\$33,500.00
653-1704	THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	LF	420	\$6.00	\$2,520.00
653-1804	THERMOPLASTIC SOLID TRAF STRIPE, 8 IN, WHITE	LF	2800	\$2.00	\$5,600.00
653-4501	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	LF	41875	\$0.30	\$12,562.50
653-6004	THERMOPLASTIC TRAF STRIPING, WHITE	SY	15813	\$3.00	\$47,439.00
653-6006	THERMOPLASTIC TRAF STRIPING, YELLOW	SY	429	\$4.00	\$1,716.00
654-1001	RAISED PVMT MARKERS TP 1	EA	1798	\$4.00	\$7,192.00
654-1003	RAISED PVMT MARKERS TP 3	EA	1000	\$4.00	\$4,000.00
654-1010	RAISED PVMT MARKERS TP 10	EA	56	\$39.00	\$2,184.00
657-1054	PREFORMED PLASTIC SOILD PVMT MKG, 5 IN, WHITE, TP PB	LF	1350	\$5.00	\$6,750.00
657-3054	PREFORMED PLASTIC SKIP PVMT MKG, 5 IN, WHITE, TP PB	GLF	450	\$4.00	\$1,800.00
657-6054	PREFORMED PLASTIC SOILD PVMT MKG, 5 IN, YELLOW, TP PB	LF	450	\$5.00	\$2,250.00

Subtotal Construction Cost \$ 20,258,866.20

Inflation Rate 0%

E&C Rate 10% \$ 2,025,886.62

Total Construction Cost \$ 22,284,752.82

EDS-545(37) Total Project Cost \$ 35,508,752.82

PRELIMINARY EARTHWORK SUMMARY
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(37)
 STEPHENS COUNTY
 P.I. No. 122260

SR 17			
Excavation	345,176.00		
Embankment	262,617.00		
Usable Excavation	276,140.80		
Balance	13,523.80	WASTE	
CR 371			
Excavation	2,644.00		
Embankment	38.00		
Usable Excavation	2,115.20		
Balance	2,077.20	WASTE	
CR 198			
Excavation	15,305.00		
Embankment	3.00		
Usable Excavation	12,244.00		
Balance	12,241.00	WASTE	
CR 195			
Excavation	2,069.00		
Embankment	5,273.00		
Usable Excavation	1,655.20		
Balance	-3,617.80	BORROW	
CR 13			
Excavation	833.00		
Embankment	8,416.00		
Usable Excavation	666.40		
Balance	-7,749.60	BORROW	
CR 6			
Excavation	9,869.00		
Embankment	9.00		
Usable Excavation	7,895.20		
Balance	7,886.20	WASTE	
CR 194			
Excavation	484.00		
Embankment	388.00		
Usable Excavation	387.20		
Balance	-0.80	BORROW	
CR 642			
Excavation	321.99		
Embankment	264.09		
Usable Excavation	271.37		
Balance	7.28	WASTE	

PRELIMINARY EARTHWORK SUMMARY
 SR 17 ROADWAY IMPROVEMENTS
 EDS-545(37)
 STEPHENS COUNTY
 P.I. No. 122260

CR 4			
Excavation	165.00		
Embankment	587.00		
Usable Excavation	134.00		
Balance	-453.00	BORROW	
CR 192			
Excavation	3,624.00		
Embankment	580.00		
Usable Excavation	2,899.20		
Balance	2,319.20	WASTE	
CR 191			
Excavation	445.00		
Embankment	1,970.00		
Usable Excavation	356.00		
Balance	-1,614.00	BORROW	
LOCAL SERVICE RD 1			
Excavation	2,950.00		
Embankment	582.00		
Usable Excavation	2,360.00		
Balance	1,778.00	WASTE	

REVISED PROJECT CONCEPT REPORT

EDS-545 (37), Stephens County

P. I. No. 122260

Need and Purpose:

This project is identified as a part of the Governor's Road Improvement Program (GRIP). As part of this program, the existing two-lane SR 17 will be improved to multilane from Scott Road to Brookhaven Circle. GRIP was initiated in the 1980's to address the importance of stimulating growth via an improved transportation network. The GRIP has identified a system of economic development highways that consist of approximately 2,627 miles of existing primary routes, and an additional 113 miles of truck connector routes. The system would place 98% of the State's population within 20 miles of a multilane highway. It would provide access for oversized trucks to cities having populations of 5,000 or more, and to most cities having populations between 2,000 and 5,000.

Among the many benefits of such a system is that areas lagging in growth would be enhanced. In addition, tourism industries would benefit as would accessibility to recreation and historic sites. Georgia is to remain a growth state in the near future. The demands created by population and economic growth will spill over onto the non-Interstate systems that form a critical link for both large and small communities in the state. This essentially makes highway access a prime requisite for community growth in the future.

Currently limitations on trucks prevent access for many Georgia communities and affect economic potential. The Governor's Road Improvement Program would provide access to communities denied service by larger trucks. This is beneficial, because based on the experiences of the Georgia Department of Industry and Trade, if two cities are competing for an industry, the city closest to a four-lane roadway will usually attract the industry.

The proposed multilane of SR 17 will serve as a catalyst for the development of the region, connecting the Atlanta area with the more sparsely developed areas along the corridor. Traffic carrying capacity will be increased and safety and operational characteristics along these segments will be improved.

Project location:

Project EDS-545(37) is the widening and reconstruction of SR 17 from CR 13/Rumsey Road to CR 190/Memorial Drive in Stephens County. As part of the project, the existing two- and three-lane roadway will be widened to a four-lane roadway with a 44-foot depressed median and will be transitioned to a four-lane roadway with a 20-foot raised median as the project approaches Toccoa.

Description of the approved concept:

The revised concept for project EDS-545(37), approved January 26, 1999, begins on new location at CR 13/Rumsey Road and traverses to CR 24/Scott Road, at which point it converges with the existing SR 17. At this location, the roadway will be widened on the east side, holding the existing right-of-way on the west side, to create a four-lane divided roadway with a 44-foot depressed median. The road widening to the east will continue until just north of CR 195/Eastanollee Bypass. The alignment will then shift to the west side of SR 17 to avoid impacting two historical properties and

continue to just south of CR 192/Meadowbrook Drive. This alignment will flatten the curve at CR 194/Moore Circle. The alignment will then transition to a rural-divided four-lane roadway with a 20-foot raised median, widening symmetrically about existing SR 17. The typical section then will change to an urban-divided four-lane (20-foot raised median) roadway 1,000 feet south of CR 191/Fieldcrest Road to avoid impacting a historical property on the east side and a church property on the west side. This alignment will flatten the curve at CR 191/Fieldcrest Road and continue to CR 190/Memorial Drive.

PDP Classification: Major/Existing

Full Oversight (), Exempt (X), SF (), Other ()

Functional Classification: Rural Arterial

U. S. Route Number: N/A

State Route Number: 17

Traffic (AADT) as shown in the approved concept:

Current Year: 1997 12,850 vpd Design Year: 2017 21,150 vpd

Proposed features to be revised:

Project termini- The approved concept for this project is being revised to change the "begin" and "end" limits for this project.

- The beginning point is being moved forward (reduction of 1.16 miles) from the intersection of SR 17 at Rumsey Road/CR 13 to begin at the intersection with Scott Road/CR 24. The proposed typical shall remain a rural four-lane divided roadway with a 44-foot depressed grass median. The purpose of this change in project limits is to provide logical termini and better maintenance of traffic for this project and the adjacent project EDS 545 (20).
- The ending point is being extended 0.90 miles from the intersection of SR 17 with Memorial Drive/CR 190 to the intersection with Brookhaven Circle. The present and future traffic volumes require a "retrofit" urban-divided four-lane roadway with a 14-foot flush median and 3 ft outside paved shoulders is proposed as the typical section (see attached typical section) for the extension of SR 17. The extension of this project was requested by the Gainesville District to close a 0.90 mile "gap" that would be left if this project ends at its presently proposed termini (Memorial Drive).

Describe the revised feature to be approved:

Approval is requested for a change in *project termini* on both ends of the project. The reasons to revise the project limits are stated above. In addition, a typical section is to be added that uses the "retrofit" urban-divided four-lane roadway with a 14-foot flush median and 3 ft outside paved shoulders. This section would apply to the 0.90-mile project extension and would allow smooth transition to the existing 5-lane section at the end of the project.

The present approved project concept length is 4.20 miles. These changes in project termini will change the project length to 3.94 miles.

Updated traffic data (AADT): Current Year: 2007 23,500 vpd Design Year: 2027 38,500 vpd

Programmed/Schedule:

P.E: 1994/2002

R/W: 2006

Construction: 2007

Revised cost estimates:

1. Construction cost (including inflation and E&C): \$11,885,513
2. Right-of-way: \$8,437,000
3. Utilities (reimbursable): \$60,000

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

Recommendation: It is recommended that the proposed revision (project termini) to the concept be approved for implementation.

Attachments:

1. Sketch Map
2. Typical Section
3. Cost Estimate

• **Exempt projects**

Concur:



Director of Preconstruction

Approve:

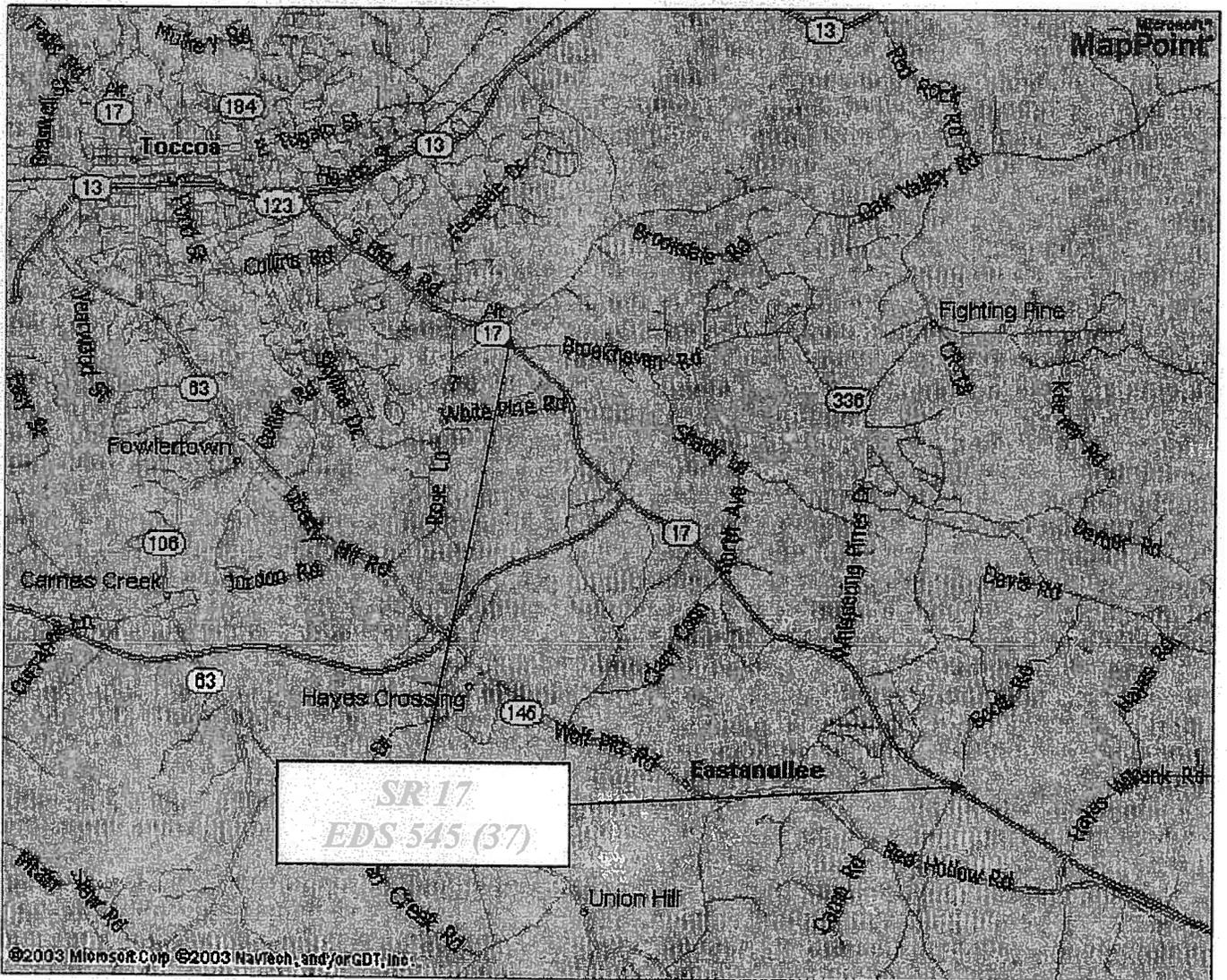


Chief Engineer

11 22
1994 05 18

SR 17 - EDS 545 (37)
Stephens County, P.I.No. 122260

(Project Location Map)



PRELIMINARY PROJECT COST ESTIMATE
EDS-545 (37)

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P.I.NO. 122260
Stephens Co

2)	Cross Drain End Treatments	40 EA	\$800.00	\$32,000
3)	Side Drain Pipe	800 LF	\$25.00	\$20,000
4)	Side Drain End Treatments	40 EA	\$550.00	\$22,000
5)	Drop Inlets/Catch Bas(Incl. Add d	40 EA	\$2,000.00	\$80,000
			SUBTOTAL:C-1	\$2,079,000
2	BASE AND PAVING (MAINLINE):			
a.	12 in G.A.B.	90100 TON	\$14.00	\$1,261,400
b.	ASPHALT PAVING:			
1)	1.5" Asph. Conc. 12.5 mm Sprpve	10800 TON	\$39.00	\$421,200
2)	2" Asph. Conc. 19 mm Sprpve	14400 TON	\$41.00	\$590,400
3)	4" Asph. Conc. 25 mm Sprpve	27000 TON	\$37.00	\$999,000
4)	Leveling	530 TON	\$42.00	\$22,260
5)	Bitum. Tack	25500 GAL	\$1.00	\$25,500
c.	CONCRETE ITEMS			
1)	Curb and Gutter, Type II	30000 LF	\$15	\$450,000
2)	Conc. Median	18800 SY	\$36.00	\$676,800
3)	5' Sidewalk	6000 SY	\$30.00	\$180,000
d.	OTHER			
			SUBTOTAL:C-2	\$4,626,560
3	LUMP ITEMS:			
a.	TRAFFIC CONTROL	3.94 MI	\$50,000	\$197,000
b.	CLEARING AND GRUBBING	64 AC	\$6,000	\$384,000
c.	LANDSCAPING			
d.	EROSION CONTROL	3.94 MI	\$80,000	\$315,200
			SUBTOTAL:C-3	\$896,200
4	MISCELLANEOUS:			
a.	FIELD ENGINEERS OFFICE	1 EA	\$52,500	\$52,500
b.	GUARDRAIL	5000 LF	\$14	\$70,000
	Guardrail Anchor.	20 EA	\$1,500	\$30,000
c.	SIGNING- STRIPING - SIGNAL			
	Signing/Striping	3.94 MI	\$23,000	\$98,500
	Traffic Signal	EA	\$125,000	\$0
			SUBTOTAL:C-4	\$251,000
5	MAJOR STRUCTURES:			
a.	BRIDGES: 4 Bridges 200'x40'	32000 SF	\$65	\$2,080,000
b.	BOX CULVERTS Single 10'x10' - 2 SITES	360 LF	\$700	\$252,000
		LF	\$1,200	\$0
		LF	\$1,200	\$0
			SUBTOTAL:C-5	\$2,332,000

ESTIMATE SUMMARY

A.	RIGHT OF WAY	\$13,164,000
B.	REIMBURSABLE UTILITIES	\$60,000
C.	CONSTRUCTION	

PRELIMINARY PROJECT COST ESTIMATE
EDS-545 (37)

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P.I.NO. 122260
Stephens Co

1	GRADING AND DRAINAGE				\$2,079,000
2	BASE AND PAVING				\$4,626,560
3	LUMP ITEMS				\$896,200
4	MISCELLANEOUS				\$251,000
5	MAJOR STRUCTURES				\$2,332,000
	SUBTOTAL CONSTRUCTION COST				\$10,184,760
	INFLATION	2 YEARS @	3 %		\$620,252
	E. & C. (10 %)				\$1,080,501
	TOTAL CONSTRUCTION COST				\$ 11,885,513
	GRAND TOTAL PROJECT COST				\$25,109,513

Value Engineering Process

VALUE ENGINEERING PROCESS

Introduction

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE Study during the period of June 25-28, 2007 in Atlanta, Georgia, for the Georgia Department of Transportation.

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

Les Thomas, P.E., CVS-Life	Certified Value Specialist
Luke Clarke, P.E.	Highway Design Engineer
Rameish Kalvakaalva, P.E.	Bridge Structural Engineer
Gary King	Highway Construction Specialist

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

- The important functions of the project were identified as follows:
 - **Project Objective/Goals**
 - **Improve Safety**
 - **Improve Line-of-Sight**
 - **Increase Capacity**
 - **Separate Traffic**
 - **Provide for near future growth**
 - **Project Basic Functions**
 - **Construct Additional Traffic Lanes**
 - **Construction Additional Turn Lanes**
 - **Widen Bridge**
 - **Provide Raised Median**
 - **Route Stormwater**
 - **Direct Traffic**
- **Speculation Phase** - The VE team performed a brainstorming session to identify ideas that might help meet the project objectives:
 - Improve Operations
 - Improve Safety
 - Increase Capacity
 - Reduce construction and life cycle costs
 - Reduce the time of construction

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

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

- Following that selection process, the VE Team used the following values as measures of whether or not an alternative had enough merit to be carried forward in the VE process:
 - Construction Cost Savings
 - Maintainability
 - Ability to Implement the Idea
 - General Acceptability of the Alternatives
 - Constructability

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

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

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



FUNCTION ANALYSIS AND COST-WORTH

SHEET NO.: 1 of 3

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 Proj. No. EDS - 545(20) Franklin Stephens Counties - P.I. Number: 122110

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	CONCRETE PAVEMENT (C)	Increase	Capacity Functions	B	20,850	14,000	C/W = 1.49
2	EARTHWORK (EW)	Match	Existing Roadway Elevation	B	12,412	10,000	C/W = 1.24
		Accommodate	New lanes & Shoulders	B			
3	DRAINAGE (DR)	Minimize	Accidents	G	4,389	4,000	C/W = 1.09
		Protect	Pavement Integrity	S			
		Convey	Storm Water	S			
4	RIGHT-OF-WAY (RW)	Accommodate	Widening	B	10,950	9,000	C/W = 1.21
		Facilitate	Utilities	RS			
		Accommodate	Amenities	S			

Function defined as: Action Verb Measurable Noun

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

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



FUNCTION ANALYSIS AND COST-WORTH

SHEET NO.: 2 of 3

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 Proj. No. EDS - 545(20) Franklin Stephens Counties - P.I. Number: 122110

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
5	BASE & ASPHALT PAVING (BP)	Increase	Traffic Capacity	B	26,596	25,000	C/W = 1.06
		Shed	Water	S			
		Channelize	Traffic	S			
		Provide	Bicycle Access	S			
6	BRIDGES (BR)	Increase	Capacity	B	2,127	1,900	C/W = 1.12
7	TRAFFIC CONTROL (TC)	Facilitate	Safe Construction	RS	350	350	C/W = 1.00
8	SIGNING & MARKING (SM)	Enhance	Wayfinding	S	512	512	C/W = 1.00
		Maintain	Safe Traffic Operations	RS			
		Channelize	Traffic	S			

Function defined as: Action Verb
 Measurable Noun

Kind: B = Basic
 S = Secondary
 RS = Required Secondary

HO = Higher Order
 LO = Lower Order

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



FUNCTION ANALYSIS AND COST-WORTH

SHEET NO.: 1 of 3

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 Proj. No. EDS - 545(37) Franklin Stephens Counties - P.I. Number: 122260

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	CONCRETE (C)	Increase	Capacity Functions	B	1,742	1,500	C/W = 1.16
2	EARTHWORK (EW)	Match	Existing Roadway Elevation	B	2,933	2,700	C/W = 1.08
		Accommodate	New lanes & Shoulders	B			
3	DRAINAGE (DR)	Minimize	Accidents	G	1,583	1,400	C/W = 1.13
		Protect	Pavement Integrity	S			
		Convey	Storm Water	S			
4	RIGHT-OF-WAY (RW)	Accommodate	Widening	B	13,160	13,160	C/W = 1.00
		Facilitate	Utilities	RS			
		Accommodate	Amenities	S			

Function defined as: Action Verb Measurable Noun

Kind: B = Basic
 S = Secondary
 RS = Required Secondary

HO = Higher Order
 LO = Lower Order

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



FUNCTION ANALYSIS AND COST-WORTH

SHEET NO.: 2 of 3

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 Proj. No. EDS - 545(37) Franklin Stephens Counties - P.I. Number: 122260

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
5	BASE & ASPHALT PAVING (BP)	Increase	Traffic Capacity	B	9,937	8,900	C/W = 1.11
		Shed	Water	S			
		Channelize	Traffic	S			
		Provide	Bicycle Access	S			
6	BRIDGES (BR)	Increase	Capacity	B	1,537	1,300	C/W = 1.18
7	TRAFFIC CONTROL (TC)	Facilitate	Safe Construction	RS	150	150	C/W = 1.00
8	SIGNING & MARKING (SM)	Enhance	Way finding	S	300	300	C/W = 1.00
		Maintain	Safe Traffic Operations	RS			
		Channelize	Traffic	S			

Function defined as: Action Verb Measurable Noun
 Kind: B = Basic HO = Higher Order
 S = Secondary LO = Lower Order
 RS = Required Secondary
 Cost/Worth Ratio = (Total Cost + Basic Worth)

PARETO CHART - COST HISTOGRAM

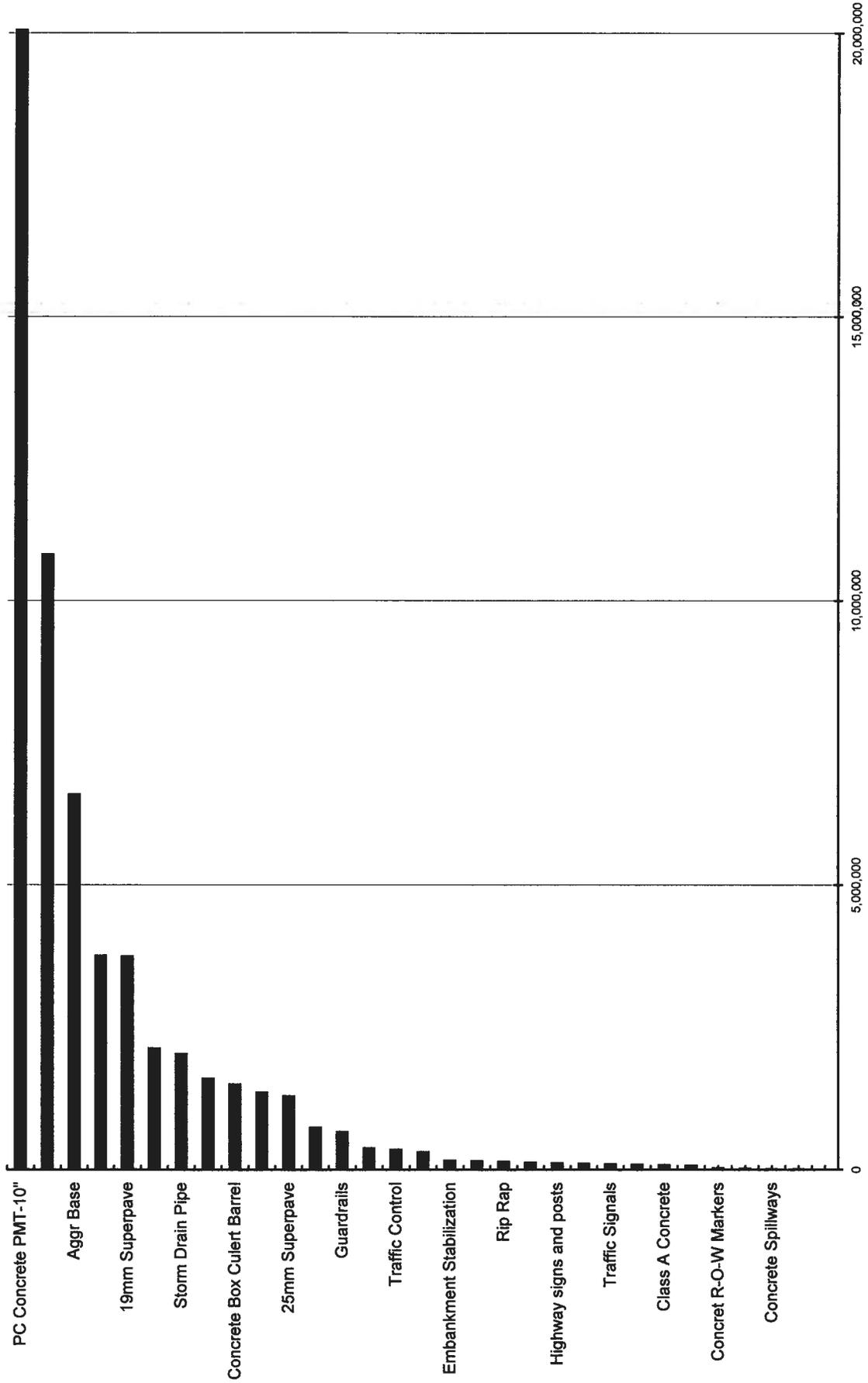
PROJECT: SR 17 Widening EDS 545(20) PI 122110

Franklin/Stephens Counties, Georgia

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
PC Concrete PMT-10"	20,305,512	34.57%	34.57%
Unclassified Excavation	10,812,840	18.41%	52.98%
Aggr Base	6,590,980	11.22%	64.20%
Erosion Control-Temporary	3,758,700	6.40%	70.60%
19mm Superpave	3,746,210	6.38%	76.98%
2-Bridges	2,127,330	3.62%	80.60%
Storm Drain Pipe	2,028,414	3.45%	84.05%
Clearing & Grubbing	1,600,000	2.72%	86.77%
Concrete Box Culert Barrel	1,500,000	2.55%	86.60%
Erosion Control-Permanent	1,355,402	2.31%	88.91%
25mm Superpave	1,289,600	2.20%	91.11%
12.5mm Superpave	740,630	1.26%	92.37%
Guardrails	664,947	1.13%	93.50%
Drop Inlets	375,775	0.64%	94.14%
Traffic Control	350,000	0.60%	94.74%
Pavement Markings	307,964	0.52%	95.26%
Embankment Stabilization	160,455	0.27%	95.53%
9.5mm Superpave	149,565	0.25%	95.79%
Rip Rap	138,996	0.24%	96.02%
Tack Coat	119,628	0.20%	96.23%
Highway signs and posts	110,786	0.19%	96.42%
Concrete Approach Slab	102,725	0.17%	96.59%
Traffic Signals	93,612	0.16%	95.95%
Storm Drains	86,907	0.15%	96.10%
Class A Concrete	82,107	0.14%	96.24%
Field Office	75,833	0.13%	96.36%
Concret R-O-W Markers	27,825	0.05%	96.41%
Asph Concrete Leveling	20,578	0.04%	96.45%
Concrete Spillways	7,654	0.01%	96.46%
Underdrain pipe	7,407	0.01%	96.38%
	Subtotal	\$ 58,738,382	100.00%
E & C Rate @ 10%	INCL	\$ 5,873,838	
Subtotal =		\$ 64,612,220	
Total Construction Cost =		\$ 64,612,220	
Right-of-Way =		10,950,000	
Reimb. Utilities =		178,000	
TOTAL		\$ 75,740,220	Comp Mark-up: 29%

Pareto Chart 2

EDS-545(20)



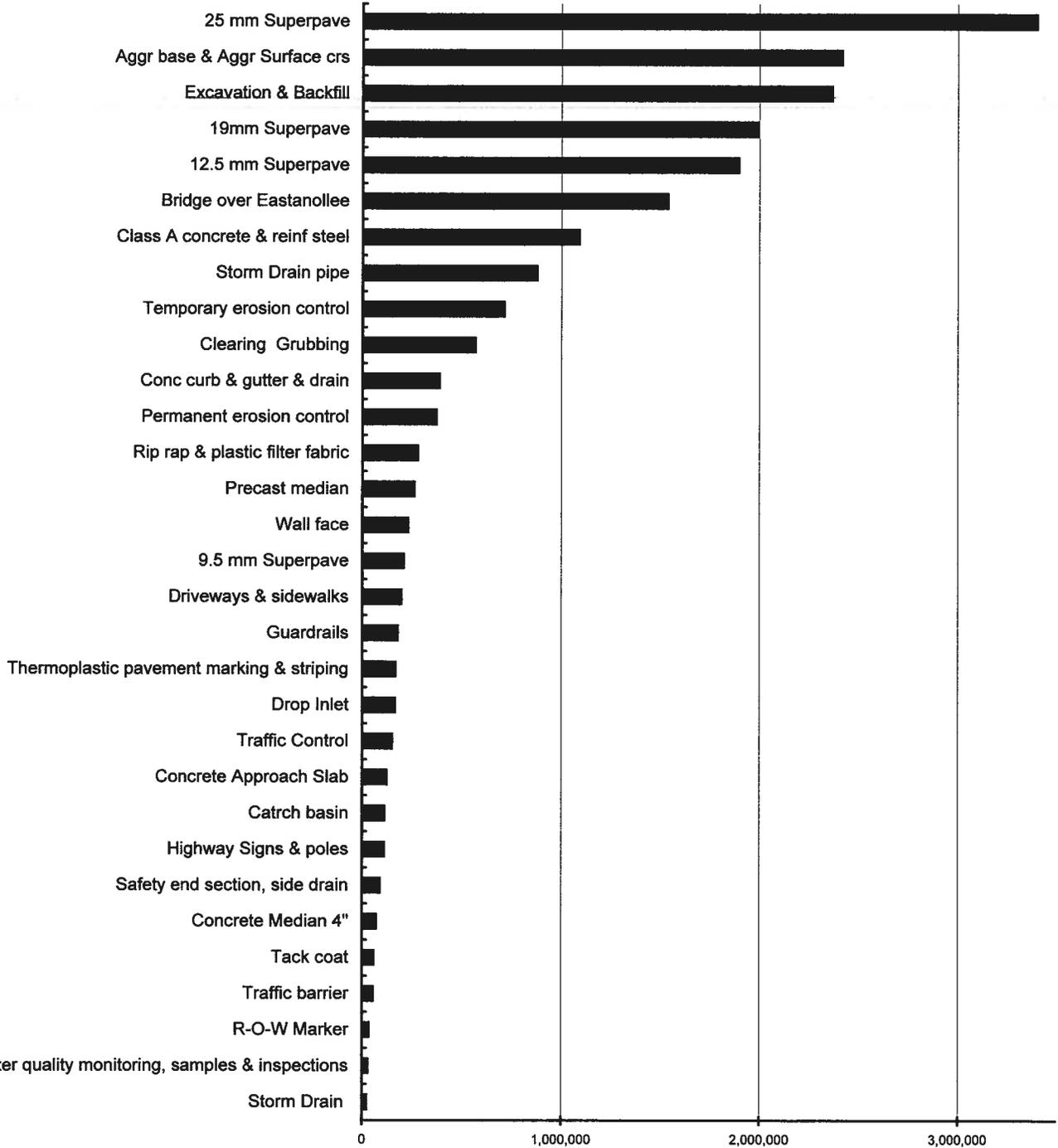
PARETO CHART - COST HISTOGRAM

PROJECT: SR 17 Widening EDS 545(37) PI 122260			
Franklin/Stephens Counties, Georgia			
PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
25 mm Superpave	3,404,800	16.81%	16.81%
Aggr base & Aggr Surface crs	2,413,800	11.91%	28.72%
Excavation & Backfill	2,363,196	11.66%	40.39%
19mm Superpave	1,993,200	9.84%	50.22%
12.5 mm Superpave	1,895,400	9.36%	59.58%
Bridge over Eastanollee	1,537,290	7.59%	67.17%
Class A concrete & reinf steel	1,090,142	5.38%	72.55%
Storm Drain pipe	877,681	4.33%	76.88%
Temporary erosion control	714,869	3.53%	76.08%
Clearing Grubbing	570,000	2.81%	78.89%
Conc curb & gutter & drain	388,249	1.92%	80.81%
Permanent erosion control	371,984	1.84%	82.64%
Rip rap & plastic filter fabric	278,735	1.38%	84.02%
Precast median	262,500	1.30%	85.32%
Wall face	230,000	1.14%	86.45%
9.5 mm Superpave	207,400	1.02%	87.48%
Driveways & sidewalks	196,900	0.97%	88.45%
Guardrails	178,039	0.88%	89.33%
Thermoplastic pavement marking & striping	165,835	0.82%	90.14%
Drop Inlet	163,989	0.81%	90.95%
Traffic Control	150,000	0.74%	91.69%
Concrete Approach Slab	123,690	0.61%	92.31%
Catrch basin	111,960	0.55%	89.88%
Highway Signs & poles	110,293	0.54%	90.42%
Safety end section, side drain	88,900	0.44%	90.86%
Concrete Median 4"	70,000	0.35%	91.21%
Tack coat	58,800	0.29%	91.50%
Traffic barrier	55,500	0.27%	91.77%
R-O-W Marker	33,300	0.16%	91.94%
Water quality monitoring, samples & inspections	28,360	0.14%	91.35%
Storm Drain	22,547	0.11%	91.46%
Rec Asphalt Leveling	22,500	0.11%	91.57%
Safety grates	20,056	0.10%	91.67%
Raised pavement markers	13,376	0.07%	91.74%
Wire fence & gate	11,856	0.06%	91.79%
Preformed plastic solid pavement marking	10,800	0.05%	91.85%
Undor pipe incl drainage aggr	10,699	0.05%	91.90%
Manholes	7,300	0.04%	91.94%
Pavement reinf fabric strips	3,000	0.01%	91.95%
Junction box	1,920	0.01%	91.96%
Subtotal	\$ 20,258,866	100.00%	
E & C Rate @ 10%	INCL \$ 2,025,887		
Subtotal =	\$ 22,284,753		
Total Construction Cost =	\$ 22,284,753		
Right-of-Way =	13,164,000		
Reimb. Utilities =	60,000		
TOTAL	\$ 35,508,753	Comp Mark-up:	75%

PARETO CHART - COST HISTOGRAM

PROJECT: SR 17 Widening EDS 545(37) PI 122260

EDS-545(37)



Costs in graph include mark-ups.



DESIGNER'S PRESENTATION MEETING PARTICIPANTS

Project: Georgia Department of Transportation		Date: 25 June 2007	
NAME	ORGANIZATION & TITLE	PI No: 122110 & 122260	PHONE
		E-MAIL	
Lisa Myers	GDOT - Engineering Services	lisa.myers@dot.state.ga.us	404-651-7468
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VE TEAM PRESENTATION

MEETING PARTICIPANTS



Project: Georgia Department of Transportation		Date: 28 June 2007	
NAME	ORGANIZATION & TITLE	PI No: 122110 & 122260	PHONE
		E-MAIL	
Lisa Myers	GDOT - Engineering Services	lisa.myers@dot.state.ga.us	404-651-7468
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CREATIVE IDEA LIST and EVALUATION



PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION EDS-545(20)(37) PI Nos. 122110, 122260 SR -17	SHEET NO.:	1 of 2
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NO.	IDEA DESCRIPTION	RATING
Project EDS-545(20) PI Nos. 122110		
20-1	Use Asphalt Paving in lieu of Concrete Paving	5
20-2	Reduce length of Bridge	20-3
20-3	Relocate Old SR 17, tie in near	2
20-4	Reduce the Right of Way to accommodate actual Construction	1
20-5	Consider use of a Temporary Easement for slopes in-lieu of permanent ROW	1
20-6	Use Walled Abutments in-lieu of End Spans	5
20-7	Utilize existing SR-17 for northerly direct access	1
20-8	Shorten the left and right turn lane storage lengths	DS
20-9	Shorten the U turn lane storage lengths	DS
20-10	Delete "channelized" turn feature, Use Type A if volume permits	4
20-11	Use "Conspan" in-lieu of CBS's	5
20-12	Eliminate Cross Slope Break for 2' shoulders (concrete pavement)	DS
20-13	Use bifurcated (up to 5') profiles for lanes to reduce earthwork	1
20-14	Review profile/cross slopes to eliminate ponding potential	DS
20-15	Complete construction of all side roads prior to staging SR 328	DS
20-16	Replace intermediate spans with boxed in earth fills	1
20-17	Consider having approaching roadway section identical bridge section	DS
20-18	Construct a left turn lane on Arrowhead Rd	DS
Project EDS-545(37) PI Nos. 122260		
37-1	Reduce Bridge Width	37-2,3
37-2	Reduce Bridge Width by providing a Davis Rd. Cul-De-Sac	5
37-3	Reduce Bridge Width by using a Type A in-lieu of Type B intersection at Eastanollee Rd.	5
37-4	Retain and Overlay the existing pavement from Sta 485+/- to Sta 526+/-	5
37-5	Use Keystone in-lieu of MSE walls at Sta 546+50 +/-	5
37-6	Retain and Overlay the existing pavement from Sta 400+/- to Sta 485+/-	5

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

