



SR 4/US 1 Widening and Reconstruction

Jefferson County, Georgia

EDS-545(29, 30, 31, 32) and BRST-043-1(58)
P.I. Nos. 222120, 222150, 222160, 222170 and 232265

Value Engineering Study Report

Preliminary Phase

October 2007

Design Consultants



Kimley-Horn and Associates, Inc. and
Washington Group International



Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

6110 Executive Boulevard, Suite 512
Rockville, Maryland 20852-3903
301-984-9590 • Fax: 301-984-1369
info@lza.com • www.lza.com

November 8, 2007

Ms. Lisa L. Myers
Design Review Engineering Manager
Georgia Department of Transportation
No. 2 Capitol Square, SW, Room 266
Atlanta, Georgia 30334-1002

re: SR 4/US 1 Widening and Reconstruction
Project Numbers EDS-545(29, 30, 31, 32), P. I. Nos. 222120, 222150, 222160, 222170 and
BRST-043-1(58), P. I. No. 232265, Jefferson County
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to submit four hard copies and one electronic copy of the referenced VE report. The objective of the VE study was to identify opportunities to improve the value of the project by fulfilling the basic functions of increasing capacity and improving safety, and where logically possible and warranted, reducing capital cost.

The project involves the widening of SR/US 1 from two lanes to four lanes as part of the Governor's Road Improvement Program to promote economic development through an improved transportation network. Project BRST-043-1(58), the bridge replacement over Big Creek, is embedded within EDS-545(32) but identified as a separate project due to a different funding source.

Although the majority of the corridor follows the existing alignment, two areas depart from the current alignment. While these departures are in and of themselves not a problem, the VE team was concerned with the resulting increase in cost. This cost increase, as well as potentially using common intersections, closing off drives that can pose traffic conflicts, and reducing the amount of sidewalk, were the main focus of the VE team.

We appreciate the excellent participation of GDOT staff and Kimley-Horn and Associates, Inc. design team members throughout the study. Please call us if you have any questions as you review this report and determine implementation.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.


Luis M. Venegas, PE, CVS, FSAVE, LEED® AP
Vice President

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report summarizes the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the widening and reconstruction of SR 4/US 1 composed of Project Nos. EDS-545(29, 30, 31, 32), P. I. Nos. 222120, 222150, 222160, 222170 and BRST-043-1(58), P. I. No. 232265, in Jefferson County. The project is being designed by Kimley-Horn and Associates, Inc. (KHA) and Washington Group International (WGI). The project was at the preliminary design phase at the time of the study.

The VE workshop was conducted October 22-26, 2007 in the Atlanta offices of GDOT using a multidisciplinary team comprised of highway design, structures and construction professionals. The team followed the six-phase VE Job Plan to guide its deliberations:

- Information Gathering
- Function Identification and Analysis
- Speculation/Creative Idea Generation
- Evaluation of Creative Ideas
- Development of Alternatives
- Presentation of Results

PROJECT DESCRIPTION

All the projects, EDS-545(29, 30, 31, and 32) and BRST-043-1(58), are in Jefferson County and have the primary objective of widening State Route 4 (SR 4)/United States Route 1 (US 1) from two lanes to four lanes as part of the Governor's Road Improvement Program (G.R.I.P.) to promote economic development through an improved transportation network. Project BRST-043-1(58), the bridge replacement over Big Creek, is embedded within EDS-545(32) but identified as a separate project due to a different funding source.

The probable cost of construction for the project is based on the Estimate Report for file "222120," Estimate Report for file "222160," Estimate Report for file "222170," and Estimate Report for file "232265," construction cost estimates prepared by KHA, dated October 2007 and Estimate Report for file "EDS-545(30)," construction cost estimate prepared by WGI, dated November 2006. These documents list the following:

• construction costs	\$101,247,042
• right-of-way costs	10,560,000
• reimbursable utilities	<u>2,485,222</u>
total	\$ 114,238,264

These figures are broken down as follows:

- EDS 545(29) at \$34,456,040
- EDS-545(30) at \$20,209,765
- EDS-545(31) at \$29,789,280
- EDS-545(32) at \$27,954,999
- BSRT-043-1(58) at \$1,829,172

CONCERNS AND OBJECTIVES

The projects are relatively straightforward widenings and reconstructions of a combination of urban/rural/urban roadways using depressed grass and flush medians and completion of one of the G.R.I.P. corridors for this region of southern Georgia.

Although the majority of the corridor follows the existing alignment, two areas depart from the current alignment: (1) between Station (STA) 585+00 to STA 245+00 on EDS-545(31), and (2) from STA 142+27 to STA 240+00 on EDS-545(32). Although these departures are in and of themselves not a problem, they do increase the cost of the facility and should be reconsidered.

As with all new widening and reconstruction projects, safety improvements are a big component of the process. In this project, areas that could lend themselves to improvement include using common intersections and closing off drives that can pose traffic conflicts.

Finally, the issue of providing sidewalks beyond logical destinations within the town of Louisville may not be reasonable and should also be revisited.

As such, the objective of the VE effort was to identify opportunities that would improve the value of the project in terms of fulfilling the basic functions of increasing capacity and improving safety, and where logically possible and warranted, reducing capital cost.

HIGHLIGHTS OF THE STUDY

Highlighted below are some of the ideas developed by the VE team.

The combined projects have one of three types of medians: (1) a 44-ft.-wide depressed grass median, (2) a 32-ft.-wide depressed grass median, and (3) a 14-ft.-wide flush median; each at specific locations throughout the corridor. In an attempt to reduce right-of-way costs and provide a more "constant" cross section, VE Alternative Numbers (Alt. Nos.) 29-1, 31-2, and 32-2 reduce a portion of the 44-ft.-wide depressed grass median to a 32-ft.-wide depressed grass median. In so doing, initial savings of about \$92,000, \$153,000, and \$208,000 (a total of nearly \$453,000), respectively, are possible, and a more uniform median width is provided throughout the corridor.

In a similar manner, the projects call for the use of 6.5-ft. shoulders throughout. Alt. Nos. 29-2, 31-4, and 32-3 reduce the shoulders to six feet and overall save a foot of pavement and corresponding right-of-way. This would result in approximate initial savings of \$143,000, \$89,000, 143,000 (totaling \$375,000), respectively.

In keeping with Department standards, the design teams have called for the use of 12-ft.-wide travel and turning lanes throughout the corridor. Considering that 11-ft.-wide travel lanes are an acceptable substitute, especially within the town of Louisville where right-of-way is a serious consideration, as is keeping 12-ft.-wide turning lanes, Alt. Nos. 29-3, 30-6, 31-1, and 32-1 use 11-ft. travel lanes. Initial savings are possibly \$1,136,000, \$548,000, \$1,000,000, and \$1,151,000 (a sum of \$3,835,000), respectively.

Although sidewalks can be a safe means for pedestrians to travel parallel to the roadway to specific destinations or for leisurely strolls, they should have purpose and destinations. The mere fact that someday the population of the corridor would grow to sustain such pedestrian movement does not imply the addition of capital/first cost funds for that purpose. As such, Alt. Nos. 30-1 and 31-3 prepare the sidewalk shoulder like the as-designed condition but eliminate the concrete paving until such time as a definite pedestrian movement is noticed. Initial savings for these alternatives are noted to be close to \$150,000 and \$451,000, respectively, for a total of \$601,000. In a similar manner, Alt. No. 30-2 eliminates the entire sidewalk shoulder from the beginning of the project to Old SR 17 and reduces the shoulder width to 12 ft., saving an additional \$165,000.

As noted above, two areas of the corridor are sited on new locations. These new locations are the result of avoiding environmentally-sensitive historic areas. Neither alignment shift can be circumvented, and the one on EDS-545(31) has no alternative solutions. However, on EDS-545(32), two possible alternative solutions to the new location can be entertained:

1. Alt. No. 32-6 retains the existing alignment between Station (STA) 150+00 and STA 230+00 and does not abandon the existing roadway by using the retained roadway as the southbound traffic and widening the existing route to the east side away from the historic property and use for northbound traffic. Initial savings are close to \$3,400,000. Some additional work and tweaking would be necessary to ensure the historic properties and cemetery are circumnavigated.
2. Alt. No. 32-7 accepts the new location, and while it does not abandon the existing roadway from STA 150+00 to STA 230+00, it also retains that portion for the northbound traffic and uses the new location for southbound traffic, i.e., it employs a one-way pair around the historic properties. Initial savings are demonstrated to be about \$3,100,000.

As previously stated, safety is always at the forefront of all new reconstruction projects, and these projects are no different. One method of improving safety along a widened corridor is to align the intersection to minimize numerous, closely spaced, side-by-side, unconnected intersections or to close minor drives and/or streets where alternate routing is available. Of the former, Alt. Nos. 29-4, 29-5, 30-3, and 31-6, provide for common intersections at: US 1/River Road, Walden Brett Road/Mole Road, Bob Culvern Road/US 1 Business South, and Bridges Road/Wilchers Road with approximate respective initial savings of (\$43,000), (\$456,000), (\$164,000) and \$324,000. Although summing to an increase of nearly \$340,000, the added value and safety could very well overcome the additional funding needed. Of the latter, Alt. Nos. 30-4 and 30-7 close Compton Drive and Old SR 17 West as they intersect the mainline. Alt. No. 30-7 also provides for a new connector between Old SR 17 and Midville Road. Once again, the resultant negative savings of nearly \$5,000 and \$133,000 (adding to \$138,000), respectively, are outweighed by ensuing improved, safer conditions.

The Summary of Potential Cost Savings worksheet following this narrative outlines all of the alternatives and design suggests developed by the VE team. Some of the alternatives are mutually exclusive or interrelated so that addition of all project cost savings does not equal total savings for the project. A full listing of all of the ideas considered by the VE team can be found on the Creative Idea Listing worksheets in the Value Analysis and Conclusions section of this report.



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: WIDENING AND RECONSTRUCTION SR 4/US 1 <i>Jefferson County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EDS-545(29)						
29-1	Use 32-ft. median versus 44-ft. median from TS-2 to TS-5	\$ 92,092	\$ -	\$ 92,092		\$ 92,092
29-2	Use 6-ft. shoulders throughout from TS-1 to TS-5	\$ 142,710	\$ -	\$ 142,710		\$ 142,710
29-3	Use 11-ft. travel lanes throughout the project	\$ 1,136,306	\$ -	\$ 1,136,306		\$ 1,136,306
29-4	Use a common intersection for CR 327/Old US 1 and CR 274/River Road	\$ -	\$ 43,003	\$ (43,003)		\$ (43,003)
29-5	Use a common intersection for CR 248/Walden Brett Road and CR 248/Mole Road	\$ -	\$ 455,787	\$ (455,787)		\$ (455,787)
29-7	Use a concrete overlay in lieu of asphalt overlay on the Ogeechee River and Overflow Bridges	\$ 80,174	\$ 904,877	\$ (824,703)	\$ 890,834	\$ 66,131
EDS-545(30)						
30-1	Eliminate sidewalk paving from beginning of the project to Old SR 17	\$ 155,157	\$ 1,135	\$ 154,022		\$ 154,022
30-2	Eliminate sidewalk shoulder from the beginning of the project to Old SR 17 and reduce shoulder width to 12 feet	\$ 166,517	\$ 1,712	\$ 164,805		\$ 164,805
30-3	Use a common intersection for Bob Culvern Road and SR 4/US 1 Business South	\$ -	\$ 164,024	\$ (164,024)		\$ (164,024)
30-4	Close Compton Drive access to mainline	\$ -	\$ 4,932	\$ (4,932)		\$ (4,932)
30-5	Use 12-ft. urban shoulders	\$ 67,419	\$ -	\$ 67,419		\$ 67,419
30-6	Use 11-ft. travel lanes throughout the project	\$ 548,386	\$ -	\$ 548,386		\$ 548,386
30-7	Close Old SR 17 West and build a connector to SR 17/Midville Road	\$ -	\$ 132,881	\$ (132,881)		\$ (132,881)
30-8	Provide dedicated left turns at School Street	\$ -	\$ 30,924	\$ (30,924)		\$ (30,924)
30-9	Eliminate north access drive to the Ingles Market parking lot from the mainline	DESIGN SUGGESTION				
30-10	Eliminate both access drives to the Ingles Market parking lot from the mainline	DESIGN SUGGESTION				



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: WIDENING AND RECONSTRUCTION SR 4/US 1 <i>Jefferson County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EDS-545(31)						
31-1	Use 11-ft. travel lanes throughout the project	\$ 999,582	\$ -	\$ 999,582		\$ 999,582
31-2	Use 32-ft. median versus 44-ft. median	\$ 152,623	\$ -	\$ 152,623		\$ 152,623
31-3	Eliminate sidewalk paving from the beginning of the project to STA 581+97.45	\$ 455,061	\$ 4,048	\$ 451,013		\$ 451,013
31-4	Use 6-ft. paved shoulder in rural section	\$ 89,239	\$ -	\$ 89,239		\$ 89,239
31-5	Eliminate improvements for the parcel at the intersection with CR 325/Clarks Mill Road	\$ 188,353	\$ -	\$ 188,353		\$ 188,353
31-6	Use common intersection for CR 142/Bridges Road and CR 142/Wilchers Road, and tie CR 141/Pineneedle Road into CR 142/Wilchers Road and maintain existing alignment on the mainline	\$ 323,655	\$ -	\$ 323,655		\$ 323,655
31-7	Access mainline from SR 296/Harvey Street south of the cemetery instead of from the north side of the cemetery	\$ 309,678	\$ -	\$ 309,678		\$ 309,678
EDS-545(32)						
32-1	Use 11-ft. travel lanes throughout the project	\$ 1,151,060	\$ -	\$ 1,151,060		\$ 1,151,060
32-2	Use 32-ft. median versus 44-ft. median	\$ 207,848	\$ -	\$ 207,848		\$ 207,848
32-3	Use 6-ft. shoulders in rural section	\$ 142,803	\$ -	\$ 142,803		\$ 142,803
32-6	Retain existing alignment/roadway from STA 150+00 to STA 230+00	\$ 3,353,534	\$ -	\$ 3,353,534		\$ 3,353,534
32-7	Use one way pairs between STA 150+00 to STA 230+00	\$ 3,129,070	\$ -	\$ 3,129,070		\$ 3,129,070
32-8	Make northbound bridge over Big Creek 38-ft.-wide gutter-to-gutter	\$ 31,441	\$ -	\$ 31,441		\$ 31,441
32-9	Begin right-turn lane to Sand Valley Road south of the bridge over Big Creek	\$ 135,730	\$ -	\$ 135,730		\$ 135,730
32-10	Begin left- turn lane to Sand Valley Road south of the bridge over Big Creek	\$ 218,289	\$ -	\$ 218,289		\$ 218,289

STUDY RESULTS

INTRODUCTION

The results are the major feature of a VE study since they represent the benefits that can be realized on the project by the owner, users and designer. The results will directly affect the project design and will require coordination among the designer, the user and the owner to determine the ultimate acceptance of each alternative.

The creative ideas are organized according to the order in which they were originally generated by the VE team during their function analysis creative sessions.

RESULTS OF THE STUDY

The VE team generated 35 ideas for change during the Function Analysis and Creative Ideas phases of the VE Job Plan. The evaluation of these ideas was based upon their potential for capital cost savings, probability of acceptance, availability of information to properly develop an idea, compliance with perceived quality, adherence to universally accepted standards and procedures, life cycle cost efficiency, safety, maintainability, constructibility and soundness of the idea.

Of the 35 ideas generated, 33 of them were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 30 alternatives for change with an impact on project costs and 32 design suggestions. These alternatives and design suggestions are presented in detail following this narrative and on the Summary of Potential Cost Savings worksheets.

The creative ideas are organized according to the order in which they were originally generated by the VE team during their function analysis and creative sessions. The following prefixes in the alternative numbers are used to designate the project element being addressed:

- 29-x = 545(29), P. I. No. 222120
- 30-x = 545(30), P. I. No. 222150
- 29-x = 545(31), P. I. No. 222160
- 29-x = 545(32), P. I. No. 222170 (this also includes BRST-043-1(58), P. I. No. 232265)

EVALUATION OF ALTERNATIVES

It is important to consider each part of an individual alternative on its own merit. There may be a tendency to disregard an alternative because of concern about one portion of it. Separate consideration should be given to each of the areas within an alternative that are acceptable and those parts should be considered in the final design, even if the entire alternative is not implemented.

Cost is the primary basis of comparison for alternative designs. To ensure that costs are comparable within the alternatives proposed by the VE team, the designer's cost estimates, where possible, are to be used as the pricing basis. Where appropriate, the impact of energy costs, replacement costs, and effect on operations and maintenance should be shown within each alternative.

Some of the alternatives are interrelated, so acceptance of one may preclude the acceptance of another. The reader should evaluate those alternatives carefully to select the ideas with the greatest beneficial impact to the project.



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: WIDENING AND RECONSTRUCTION SR 4/US 1 <i>Jefferson County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EDS-545(29)						
29-1	Use 32-ft. median versus 44-ft. median from TS-2 to TS-5	\$ 92,092	\$ -	\$ 92,092		\$ 92,092
29-2	Use 6-ft. shoulders throughout from TS-1 to TS-5	\$ 142,710	\$ -	\$ 142,710		\$ 142,710
29-3	Use 11-ft. travel lanes throughout the project	\$ 1,136,306	\$ -	\$ 1,136,306		\$ 1,136,306
29-4	Use a common intersection for CR 327/Old US 1 and CR 274/River Road	\$ -	\$ 43,003	\$ (43,003)		\$ (43,003)
29-5	Use a common intersection for CR 248/Walden Brett Road and CR 248/Mole Road	\$ -	\$ 455,787	\$ (455,787)		\$ (455,787)
29-7	Use a concrete overlay in lieu of asphalt overlay on the Ogeechee River and Overflow Bridges	\$ 80,174	\$ 904,877	\$ (824,703)	\$ 890,834	\$ 66,131
EDS-545(30)						
30-1	Eliminate sidewalk paving from beginning of the project to Old SR 17	\$ 155,157	\$ 1,135	\$ 154,022		\$ 154,022
30-2	Eliminate sidewalk shoulder from the beginning of the project to Old SR 17 and reduce shoulder width to 12 feet	\$ 166,517	\$ 1,712	\$ 164,805		\$ 164,805
30-3	Use a common intersection for Bob Culvern Road and SR 4/US 1 Business South	\$ -	\$ 164,024	\$ (164,024)		\$ (164,024)
30-4	Close Compton Drive access to mainline	\$ -	\$ 4,932	\$ (4,932)		\$ (4,932)
30-5	Use 12-ft. urban shoulders	\$ 67,419	\$ -	\$ 67,419		\$ 67,419
30-6	Use 11-ft. travel lanes throughout the project	\$ 548,386	\$ -	\$ 548,386		\$ 548,386
30-7	Close Old SR 17 West and build a connector to SR 17/Midville Road	\$ -	\$ 132,881	\$ (132,881)		\$ (132,881)
30-8	Provide dedicated left turns at School Street	\$ -	\$ 30,924	\$ (30,924)		\$ (30,924)
30-9	Eliminate north access drive to the Ingles Market parking lot from the mainline	DESIGN SUGGESTION				
30-10	Eliminate both access drives to the Ingles Market parking lot from the mainline	DESIGN SUGGESTION				

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **29-1**

DESCRIPTION: **USE 32-FT. MEDIAN VERSUS 44-FT. MEDIAN
 FROM TS-2 TO TS -5**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A 44-ft. grass median is used between the northbound (NB) and southbound (SB) lanes of SR 4/US 1 (the mainline) from Wadley Bypass to the Louisville Bypass.

ALTERNATIVE: (Sketch attached)

Use a 32-ft. grass median between the NB and SB lanes of the mainline between Typical Section 2 (TS-2) and TS-5.

ADVANTAGES:

- Reduces right-of-way costs
- Reduces construction time
- Incorporates common practice

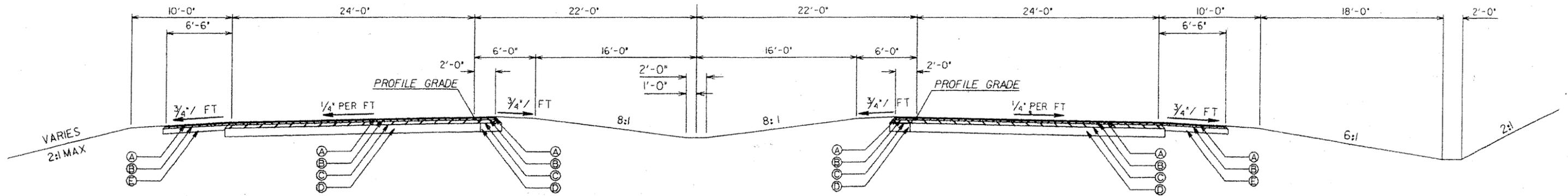
DISADVANTAGES:

- Perceived loss of safety

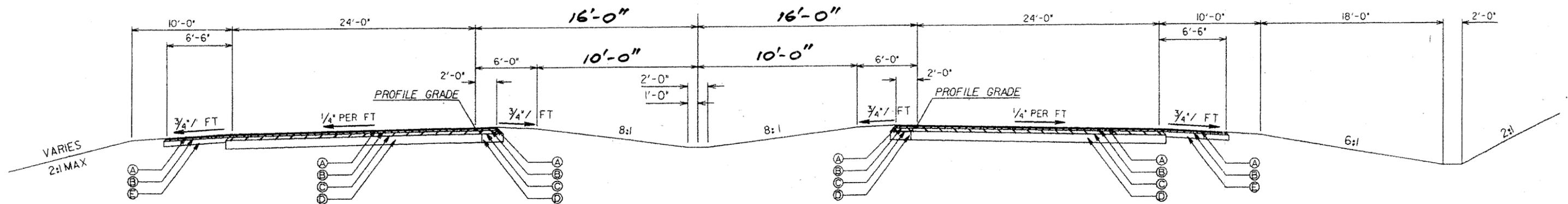
DISCUSSION:

A reduction in the width of the median from 44 ft. to 32 ft. will have no impact on traffic operations and provides for right-of-way savings. The use of 32-ft. grass medians is common in areas where a narrower median is desired, such as for environmental impact reductions.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 92,092	—	\$ 92,092
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 92,092	—	\$ 92,092



ORIGINAL DESIGN



ALTERNATIVE



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

29-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

RIGHT-OF-WAY:

Length = sta 410+40 - sta 132+75
 " = 27,765 FT.

Width = 44' - 32'
 " = 12 FT.

TOTAL AREA = 27,765' * 12'
 " = 333,180 SQ. FT ÷ 43,560 SQ. FT/AC.
 " = 7.65 AC.

RESIDENTIAL LAND:

= 6 * [750' + 1229.5' +
 442.04' + 250' + 1700']
 = 26,229.24 SQ. FT
 = 0.6 AC.

AGRICULTURAL LAND:

= 7.65 AC - 0.6 AC
 = 7.05 AC

GRASS MEDIAN:

- PERMANENT GRASSING:

TOTAL AREA = 7.65 AC.

- AGRICULTURAL LIME:

TOTAL QUAN. = $\frac{98 \text{ TN}}{98 \text{ AC}} * 7.65 \text{ AC}$
 " = 7.65 TN

- LIQUID LIME:

TOTAL QUAN. = $\frac{245 \text{ GL}}{98 \text{ AC}} * 7.65 \text{ AC} = 19.13 \text{ GL}$

- FERTILIZER MIXED GRADE:

TOTAL QUAN. = $\frac{69 \text{ TN}}{98 \text{ AC}} * 7.65 \text{ AC} = 5.39 \text{ TN}$

- FERTILIZER NITROGEN CONTENT:

TOTAL QUAN. = $\frac{4900 \text{ LB}}{98 \text{ AC}} * 7.65 \text{ AC} = 382.5 \text{ LB}$

- EROSION CONTROL MATS, SLOPES:

TOTAL QUAN. = $\frac{89127 \text{ SY}}{98 \text{ AC}} * 7.65 \text{ AC} = 6957.36 \text{ SY}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **29-2**

DESCRIPTION: **USE 6- FT. SHOULDERS THROUGHOUT FROM TS-1 TO TS-5**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

6.5-ft. paved shoulders are used throughout the project along the mainline from Wadley Bypass to the Louisville Bypass.

ALTERNATIVE: (Sketch attached)

Use 6-ft. shoulders along the mainline throughout the project area from Typical Section 1 (TS-1), to TS-5.

ADVANTAGES:

- Reduces right-of-way costs
- Reduces construction time
- Incorporates common practice

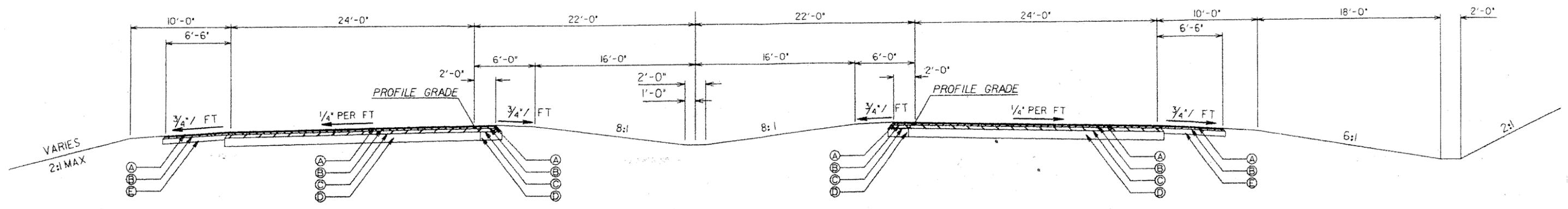
DISADVANTAGES:

- Perceived loss of safety

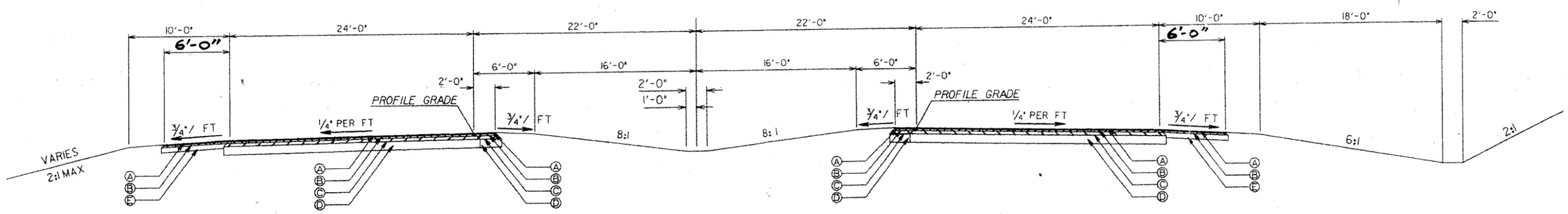
DISCUSSION:

A reduction in shoulder widths from 6.5 ft. to 6 ft. will have no impact on traffic operations and provides for right-of-way savings. This reduction will still allow for an appropriate clear zone.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 142,710	—	\$ 142,710
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 142,710	—	\$ 142,710



ORIGINAL DESIGN



ALTERNATIVE



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

29-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

Right-of-Way:

$$\text{Length} = \text{Sta } 445+00 - \text{Sta } 100+00$$

$$= 34,500 \text{ ft.}$$

$$\text{Width} = 2 \times 6''$$

$$= 1.0'$$

$$\text{Total Area} = 34,500' \times 1.0' \div 43560 \text{ sq. ft./Ac.}$$

$$= 0.79 \text{ Ac.}$$

-Residential Land:

$$\text{Total Area} = 8\% \text{ of } 0.79 \text{ Ac.} = 0.06 \text{ Ac.}$$

-Agricultural Land:

$$\text{Total Area} = 92\% \text{ of } 0.79 \text{ Ac.} = 0.73 \text{ Ac.}$$

Paved Shoulder:

$$\text{Length} = 34,500 \text{ ft.}$$

$$\text{Width} = 1.0'$$

$$\text{Total Area} = 34,500' \times 1.0' \div 9 \text{ sq. ft./sq. yd.}$$

$$= 3833.33 \text{ sq. yard}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **29-3**

DESCRIPTION: **USE 11-FT. TRAVEL LANES THROUGHOUT THE PROJECT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 12-ft.-wide travel lanes throughout the project.

ALTERNATIVE: (Sketch attached)

Use 11-ft.-wide travel lanes throughout the project. Retain 12-ft.-wide turning lanes.

ADVANTAGES:

- Reduces overall cost
- Reduces right-of-way costs

DISADVANTAGES:

- Deviates from department standards
- Allows less room for traffic to maneuver

DISCUSSION:

A reduction in the width of the travel lanes from 12 ft. to 11 ft. will have little or no impact on traffic operations. This cost reduction effort is gaining wide acceptance throughout the Department where its application is warranted – in situations like this facility.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,136,306	—	\$ 1,136,306
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 1,136,306	—	\$ 1,136,306

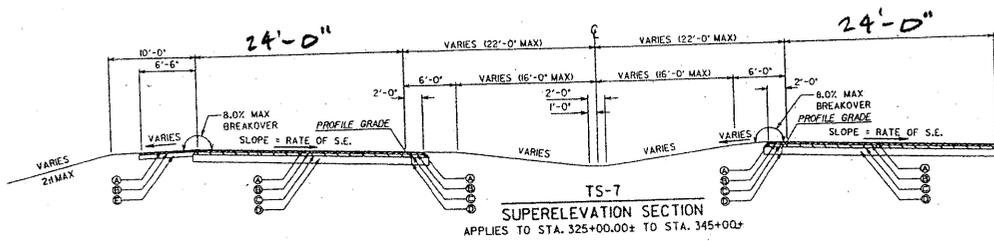
PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
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 Jefferson County, Georgia Department of Transportation, District 2
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ALTERNATIVE NO.:

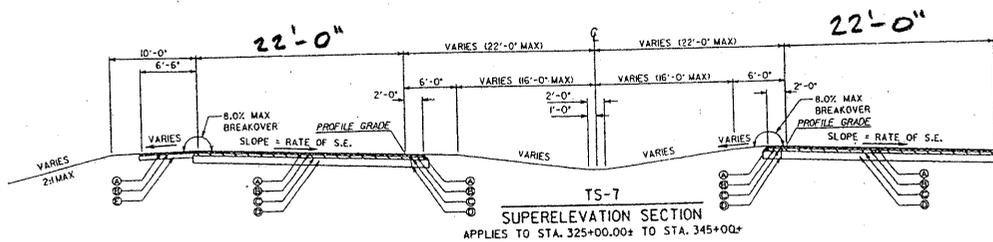
29-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
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ALTERNATIVE NO.:

29-3

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 6.59 \text{ MILES} = 34,795 \text{ FT}$$

$$\text{PAVEMENT AREA REDUCTION} = 4(34,795) / 9 = 15,464 \text{ SY}$$

$$\text{RIGHT-OF-WAY REDUCTION} = 4(34,795) / 43,560 = 3.20 \text{ AC.}$$

RIGHT-OF-WAY DISTRIBUTION

3 ACRES RESIDENTIAL @ \$6,650/ACRE

77 ACRES AGRICULTURAL @ \$2,200/ACRE

0 ACRES COMMERCIAL @ \$44,000/ACRE

AVG. RIGHT-OF-WAY COST

$$= [3(6650) + 77(2200) + 0(44000)] / 80$$

$$= \$2,367 / \text{ACRE}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **29-4**

DESCRIPTION: **USE A COMMON INTERSECTION FOR CR 327/OLD US1
AND CR 274/RIVER ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The present design slightly realigns CR 327/Old US 1 and CR 274/River Road at different intersections with the mainline. CR 274/River Road does not have a median opening under this design.

ALTERNATIVE: (Sketch attached)

Realign CR 327/Old US 1 and CR 247/River Road to a common intersection with a median opening.

ADVANTAGES:

- Improves safety
- Locates both roads at a median opening
- Improves traffic operations for CR 274/River Road and access to the mainline

DISADVANTAGES:

- Slight increase in initial construction cost
- Slight increase in right-of-way cost

DISCUSSION:

This alternative ties CR 327/Old US 1 and CR 247/River Road to a common intersection with a median opening on the mainline. This will eliminate any u-turns for the users of CR 274/River Road under the current design. Furthermore, safety is greatly improved for both side roads entering the mainline.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 43,003	—	\$ 43,003
SAVINGS	\$ (43,003)	—	\$ (43,003)

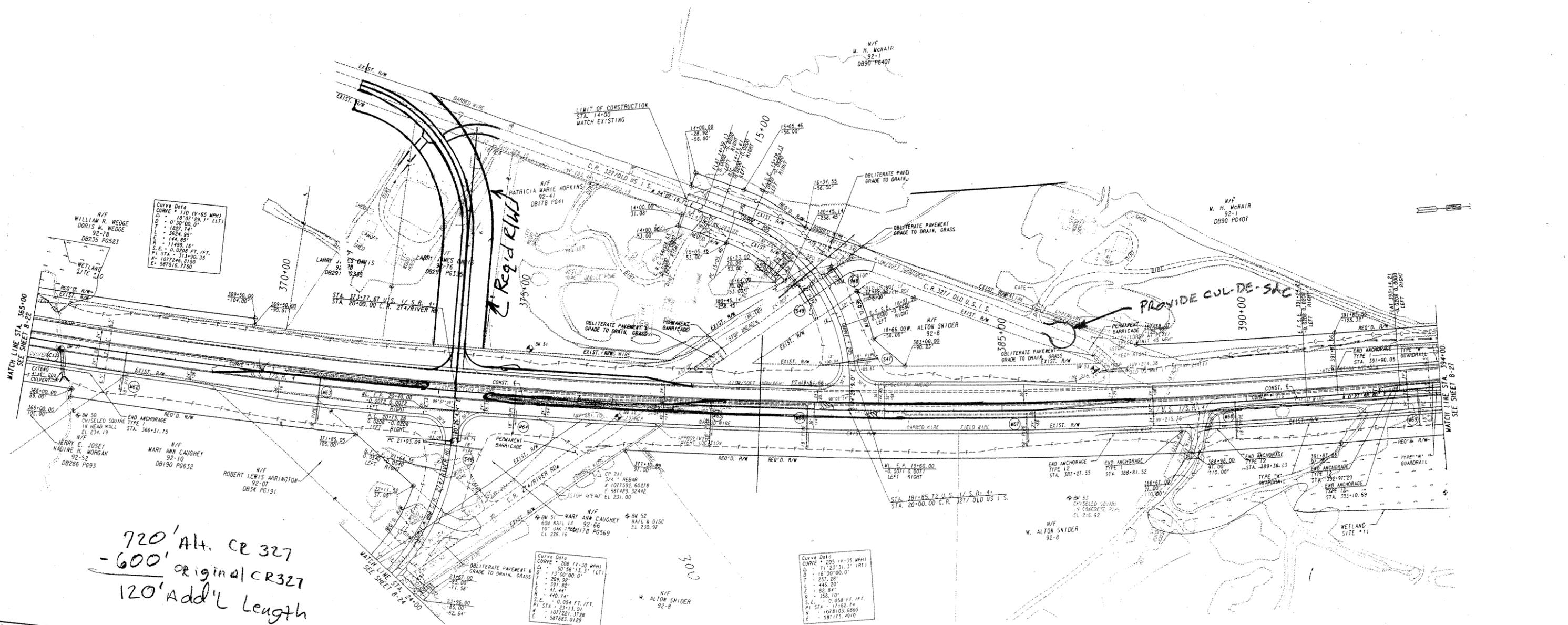
SKETCHES

PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage**

ALTERNATIVE NO.:
29-4

SHEET NO.: **2 of 4**

AS DESIGNED ALTERNATIVE



720' Alt. CR 327
- 600' original CR 327
120' Add'l Length

EXISTING R/W LINE
PROPOSED R/W LINE
CONSTRUCTION LIMITS
NOT FOR CONSTRUCTION

Kimley-Horn and Associates, Inc.

SCALE IN FEET

DATE	REVISIONS	DATE	REVISIONS	LAND LOT NO.	LAND DISTRICT

GEORGIA DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

294

SHEET NO.:

3 of 4

Difference in Length between Original
 CR 327 Realignment and the Alternate
 Realignment of CR 327 = 120' = 0.0227 mi.

$$S.Y. = \left(\frac{120' \times 24'}{9} \right) = 320 \text{ s.y.}$$

$$C.Y. = \frac{80' \times 3' \times 120'}{27} = 1,070 \text{ C.Y.}$$

$$\text{Clear. \& grubbing} = \frac{120' \times 100'}{43,560 \frac{\text{SF}}{\text{AC}}} = 0.275 \text{ AC}$$

see 29-5

$$\text{Eros. Control} = \$9,400 / \text{Ln-mi.}$$

$$\text{Sign \& marking} = \$4,300 / \text{Ln-mi.}$$

$$\text{CR 327} = 2 \text{ Lanes} \times \frac{120'}{5,280' / \text{mi}} = 0.0455 \text{ Ln-miles}$$

$$\text{Add'l R/W} = 0.275 \text{ AC}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **29-5**

DESCRIPTION: **USE A COMMON INTERSECTION FOR CR 248/WALDEN
BRETT ROAD AND CR 248/MOLE ROAD**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The present design slightly realigns CR 248/Walden Brett Road and CR 248/Mole Road at separate intersections with the mainline.

ALTERNATIVE: (Sketch attached)

Realign CR 248/Walden Brett Road with CR 248/Mole Road to create a common intersection with the mainline.

ADVANTAGES:

- Improves safety – one less point of conflict along the mainline
- Reduces median opening along the mainline
- Improves traffic operations for CR 248/Walden Brett Road/Mole Road and access to the mainline

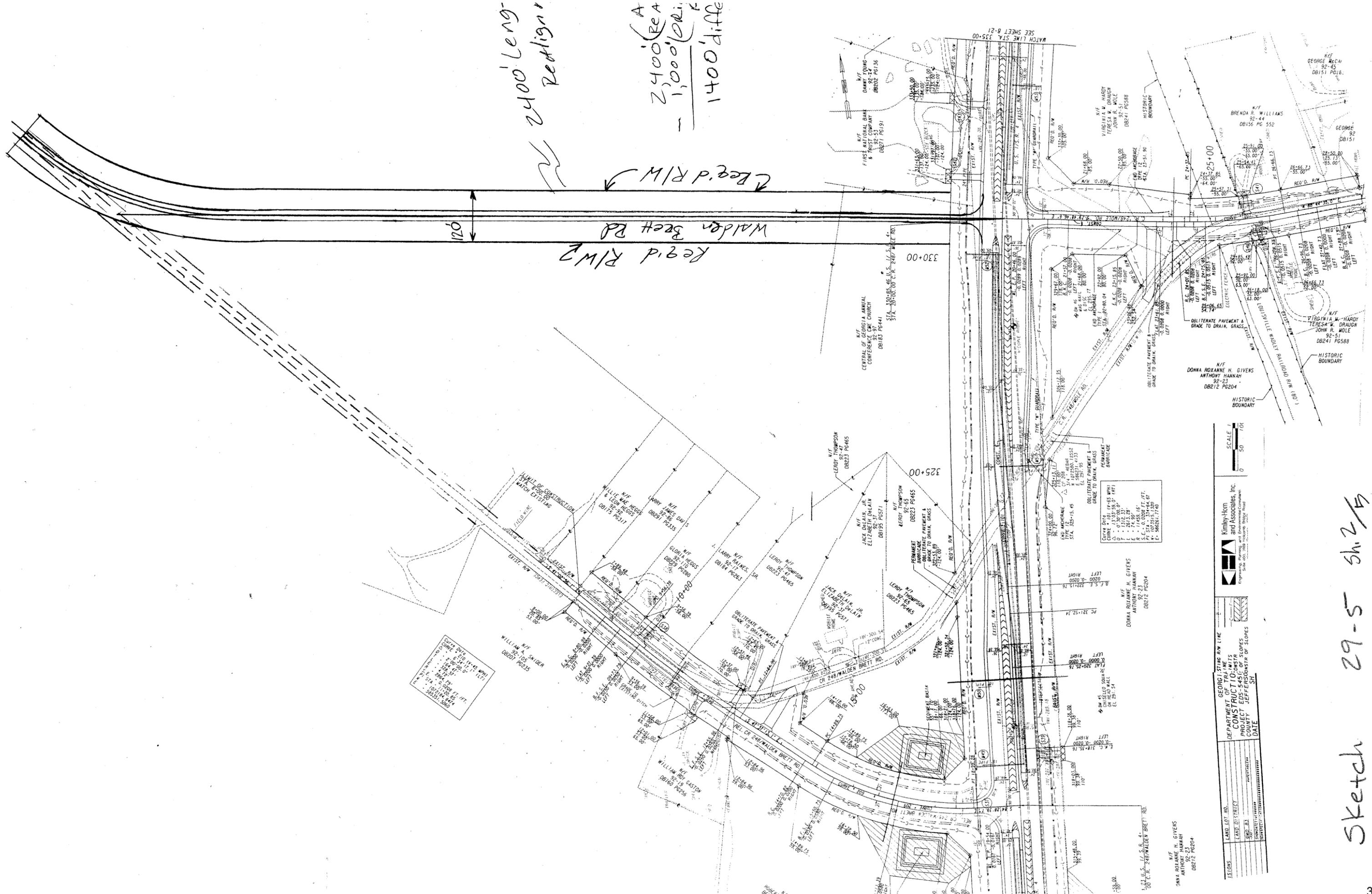
DISADVANTAGES:

- Increases initial construction cost
- Increases right-of-way cost

DISCUSSION:

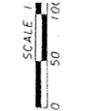
This alternative ties CR 248/Walden Brett Road to CR 248/Mole Road at 90° at a common intersection with the mainline. Furthermore, safety is greatly improved for both side roads entering the mainline.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 455,787	—	\$ 455,787
SAVINGS	\$ (455,787)	—	\$ (455,787)



CURVE DATA
 CHORD BEARING 114° 45' 45" W
 CHORD DIST. 100.00 FT.
 DELTA ANGLE 114° 45' 45"
 POINT OF BEGINNING STA. 325+00.00
 POINT OF TANGENCY STA. 325+100.00
 POINT OF CURVATURE STA. 325+50.00
 POINT OF ENDING STA. 326+00.00
 RADIUS 100.00 FT.
 CHORD BEARING 101° 14' 15" W
 CHORD DIST. 100.00 FT.
 DELTA ANGLE 101° 14' 15"
 POINT OF BEGINNING STA. 326+00.00
 POINT OF TANGENCY STA. 326+100.00
 POINT OF CURVATURE STA. 326+50.00
 POINT OF ENDING STA. 327+00.00
 RADIUS 100.00 FT.

CURVE DATA
 CHORD BEARING 131° 03' 59.01" RT
 CHORD DIST. 131.00 FT.
 DELTA ANGLE 131° 03' 59.01"
 POINT OF BEGINNING STA. 325+00.00
 POINT OF TANGENCY STA. 325+131.00
 POINT OF CURVATURE STA. 325+65.50
 POINT OF ENDING STA. 326+00.00
 RADIUS 131.00 FT.



Kimley-Horn
 and Associates, Inc.
 ENGINEERS
 400 N. 28th Street, Suite 400
 Raleigh, NC 27601
 PHONE: 919.977.1100
 FAX: 919.977.1101
 WWW: KIMLEY-HORN.COM

LAND LOT NO.	SECTION	DATE
LAND DISTRICT	PROJECT NO.	
CONTRACT NO.	CONTRACTOR	
OWNER	COUNTY	JEFFERSON
DESIGNED BY	CONTRACT NO.	
CHECKED BY	DATE	

DONNA ROUANNE H. GIVENS
 ANTHONY HANNAH
 DB212 P6204

Sketch
 29-5 sk. 2/4

CALCULATIONS



ALTERNATIVE NO.:

29-5

PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4/ US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

SHEET NO.: 3 of 5

(29) (31) (32)

PAVING/GAB costs

nb
section

$$(12.5 \text{ mm}): 165 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$85/\text{T} = \$7.01/\text{sy}$$

$$(19 \text{ mm}): 220 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$90/\text{T} = \$9.90/\text{sy}$$

$$(25 \text{ mm}): 440 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$80/\text{T} = \$17.60/\text{sy}$$

$$(GAB) 1' \times 9 \text{ S.F.} \times \frac{.076 \text{ T}}{\text{CF}} \times \$24.32 = \$16.63$$

$$\$51.14/\text{sy}$$

nb

$$(30) (12.5 \text{ mm}): 165 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$74.56 =$$

$$\$6.15$$

$$(19 \text{ mm}): 330 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$64.12 =$$

$$\$10.58$$

$$(25 \text{ mm}): 440 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$85.00 =$$

$$\$18.70$$

$$\$10.95$$

$$(GAB) 1' \times 9 \text{ S.F.} \times \frac{.076 \text{ T}}{\text{CF}} \times \$16.01 =$$

$$\$46.38/\text{sy}$$

Shoulder: (29) (31) (32)

$$(12.5 \text{ mm}): 165 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$85 = \$7.01/\text{sy}$$

$$(19 \text{ mm}): 220 \frac{\#}{\text{sy}} \times \frac{1}{2000} \times \$90 = \$9.90/\text{sy}$$

$$(GAB): .5' \times 9 \text{ S.F.} \times \frac{.076 \text{ T}}{\text{CF}} \times \$24.32 = \$8.32/\text{sy}$$

$$\$25.23/\text{sy}$$

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

29-5

SHEET NO.: 4 of 5

Difference in length of Original Realignment
 of Walden Brett Rd and Alternate Realignment of
 Walden Brett Rd. = 1,400 ft. = 0.265 mi

$$S.Y. = \frac{(1400') \times (24')}{9 \text{ SF/SY}} = 3,734 \text{ S.Y.}$$

$$\text{Earthwork estimate: } \frac{(80' \text{ Avg width} \times 3' \text{ Avg Ht.} \times 1400')}{27} = 12,440 \text{ C.Y.}$$

$$\text{Clearing \& Grubbing: } \frac{100' \text{ Avg} \times 1400'}{43,560 \text{ SF/AC}} = 3.214 \text{ AC.}$$

Project Cost

↑ Erosion Control: $\$ 306,073 / (6.5 \text{ mi} \times 5 \text{ Lanes}) = \$ 9,400 / \text{Ln-mi}$

signing & marking: $\$ 141,533 / (6.5 \text{ mi} \times 5 \text{ Lanes}) = \$ 4,300 / \text{Ln-mi}$

$$\text{Walden Brett Rd} = 2 \text{ Lanes} \times 0.265 \text{ mi} = 0.53 \text{ Ln-miles}$$

Add'l RIW for alternate over original

$$\frac{(1400' \times 120')}{43,560} = 3.857 \text{ AC}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **29-7**

DESCRIPTION: **USE A CONCRETE OVERLAY IN LIEU OF THE ASPHALT OVERLAY ON THE OGEECHEE RIVER AND OVERFLOW BRIDGES**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

In order to provide the correct cross-slope, an asphalt overlay is proposed for the bridges over the Ogeechee River and the Ogeechee River Overflow.

ALTERNATIVE: (Sketch attached)

Use a Portland cement concrete overlay in lieu of the proposed asphalt overlay on the aforementioned bridges over the Ogeechee River and the Ogeechee River Overflow.

ADVANTAGES:

- Eliminates long-term maintenance problems
- Reduces life-cycle cost
- Increases longevity
- Implements common practice

DISADVANTAGES:

- Increases initial capital cost
- Increases construction time

DISCUSSION:

Asphalt overlays tend to trap salts below the overlay at the top of the concrete deck resulting in deterioration of the concrete. This does not occur with Portland cement overlays. Although the initial cost is higher, future deck replacement is avoided thus circumventing traffic disruptions associated with such replacements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 80,174	\$ 946,852	\$ 1,027,026
ALTERNATIVE	\$ 904,877	\$ 56,018	\$ 960,895
SAVINGS	\$ (824,703)	\$ 890,834	\$ 66,131

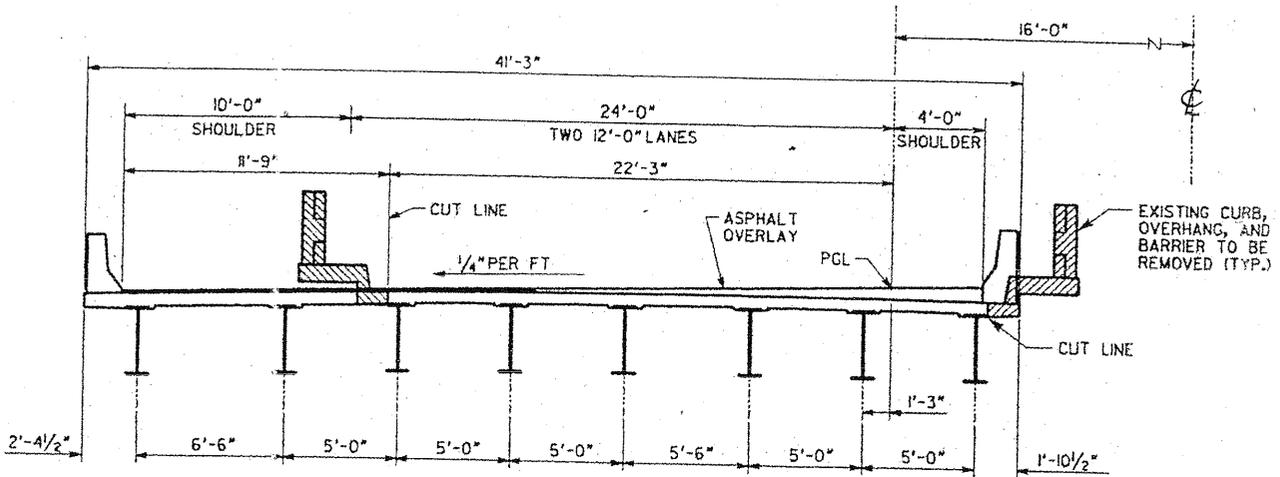
PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

29-7

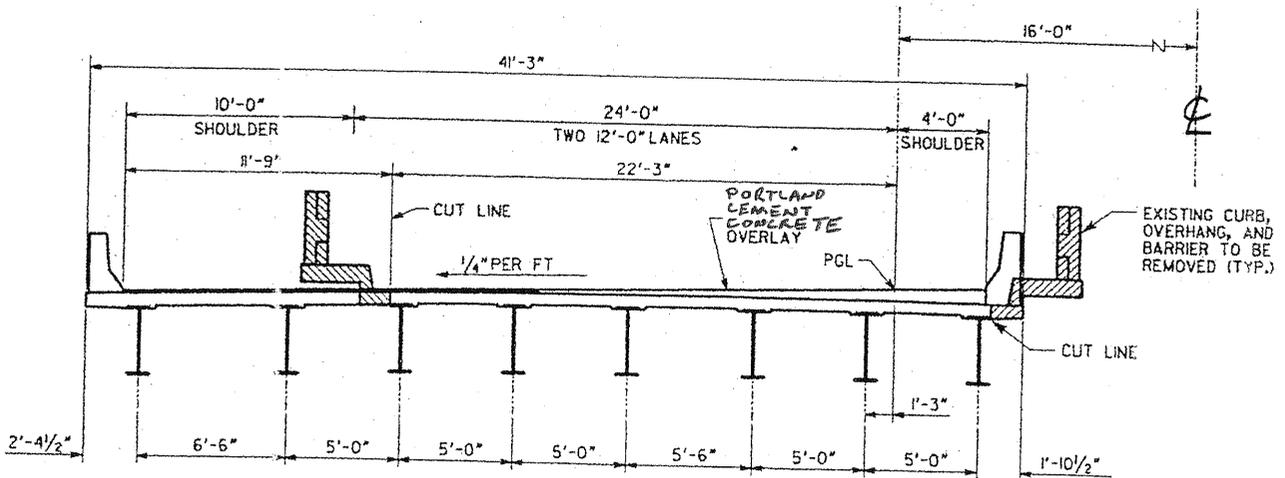
AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5



DECK SECTION - WIDENED RIGHT BRIDGE
TYPICAL SECTION @ 60'-0" SPAN

AS DESIGNED ALTERNATIVE



DECK SECTION - WIDENED RIGHT BRIDGE
TYPICAL SECTION @ 60'-0" SPAN

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
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 Jefferson County, Georgia Department of Transportation, District 2
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ALTERNATIVE NO.:

29-7

SHEET NO.: 3 of 5

BRIDGE LENGTHS BR. No. 1 L=580' BR. No. 2 L=440'

$$\text{OVERLAY WIDTH} = 22.25 + 4 = 26.25$$

THICKNESS: 2" @ LT CUT LINE & EXIST BRIDGE

$$\text{AT RT GUTTER, } t = 2 + .25(26.25) + .25(2.75 + 5 + 5 + .375) \\ = 11.85"$$

$$\text{Avg } t = [2(13.125) + \left(\frac{2+11.85}{2}\right)(13.125)] / 26.25 = 4.46"$$

$$\text{ASPHALT VOLUME} = (580 + 440)(26.25) \left(\frac{4.46}{12}\right) = 9951 \text{ ft}^3$$

$$\text{DENSITY} = 135 \text{ #/ft}^3$$

$$\text{WT} = 135(9951) / 2000 = 672 \text{ TONS}$$

QUANTITIES FOR FUTURE DECK REPLACEMENT:

WIDTH = 25'-6", ASSUME 7/8" THICK

$$\text{CONC VOLUME} = (580 + 440)(25.5) \left(\frac{7.25}{12}\right) / 27 = 582 \text{ CY}$$

$$\text{REINF @ } 175 \text{ #/CY, WT} = 175(582) = 101,850 \text{ #}$$

$$\text{LIN FT BARRIER} = 580 + 440 = 1,020 \text{ LF}$$

PORTLAND CEMENT CONCRETE OVERLAY

$$\text{AREA} = (580 + 440)(26.25)$$

$$= 26,775 / 9 = 2,975 \text{ SY}$$

LIFE CYCLE COST WORKSHEET



PROJECT: WIDENING AND RECONSTRUCTION SR 4/US 1 <i>Jefferson County, Georgia</i>		ALTERNATIVE NO: 29-7						
		SHEET NO.: 5 of 5						
LIFE CYCLE PERIOD: <u>15</u> years								
INTEREST RATE: <u>2.50%</u> ESCALATION RATE:		ORIGINAL	PROPOSED					
A. INITIAL COST		80,174	904,877					
Useful Life (Years)		<15	>25					
INITIAL COST SAVINGS			(824,703)					
B. RECURRENT COSTS (Annual Expenditures)								
1. Maintenance: Assume 10.00% of initial cost per year for asphalt overlay		8,017						
2. Maintenance: Assume 1/2% of initial cost per year for concrete overlay			4,524					
3. <i>(Note: Maintenance for 15 years only)</i>								
4.								
5.								
6.								
Total Annual Costs		8,017	4,524					
<i>(An effective rate of 2.50% with 0.00% Interest and 2.50% Escal.)</i>								
Present Worth Factor		12.3814	12.3814					
Present Worth of RECURRENT COSTS		99,266	56,018					
C. SINGLE EXPENDITURES								
		Year	Amount	PW factor	Present Worth	Present Worth		
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)						
x		15	876,529	0.6905	605,213	-		
x		15	138,669	0.6905	95,746	-		
x		15	71,999	0.6905	49,713	-		
x		15	140,360	0.6905	96,914	-		
				1.0000	-	-		
				1.0000	-	-		
				1.0000	-	-		
				1.0000	-	-		
D. SALVAGE VALUE				Year	Amount	PW factor	Present Worth	Present Worth
				1.0000	-	-		
				1.0000	-	-		
Present Worth of SINGLE EXPENDITURES					847,586	-		
E. Total Recurrent Costs & Single Expenditures (B + C)				946,852	56,018			
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS						890,834		
TOTAL PRESENT WORTH COST (A + D)					1,027,026	960,895		
TOTAL LIFE CYCLE SAVINGS						66,131		

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-1**

DESCRIPTION: **ELIMINATE SIDEWALK PAVING FROM THE BEGINNING OF THE PROJECT TO OLD SR 17**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The present design would construct 5-ft.-wide by 4-in. thick concrete sidewalks from SR 4/US 1 Business South (Station (STA) 141+86.58) to Old SR 17 (STA 172+13.13) on the west side of the mainline. On the east side of the mainline, the sidewalk would be constructed from the access road (STA 146+66.23) to the entrance south of the proposed cul-de-sac (STA 170+00.00).

ALTERNATIVE:

Eliminate the concrete paving only and retain the corresponding shoulders for potential future paving if needed.

ADVANTAGES:

- Reduces construction time
- Simplifies construction
- Reduces initial cost
- Eliminates unnecessary construction
- Still provides for a “finished” shoulder

DISADVANTAGES:

- Reduces amenities
- Slightly reduces pedestrian safety (no appreciable foot traffic in this area)

DISCUSSION:

There is very little development and few residents live on either side of the mainline from the beginning of the project to the intersection with Old SR 17. As such, the need for paved sidewalks at this time is not warranted as there are no destinations to walk to or from.

Should future development warrant the use of sidewalks, the shoulders would already be in place thereby facilitating the paving of the sidewalks.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 155,157	—	\$ 155,157
ALTERNATIVE	\$ 1,135	—	\$ 1,135
SAVINGS	\$ 154,022	—	\$ 154,022

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-2**

DESCRIPTION: **ELIMINATE SIDEWALK SHOULDER FROM THE BEGINNING OF THE PROJECT TO OLD SR 17 AND REDUCE SHOULDER WIDTH TO 12 FT.**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The present design would construct 5-ft.-wide by 4-in. thick concrete sidewalks from SR 3/US 1 Business South (STA 141+86.58) to Old SR 17 (STA 172+13.13) on the west side of the mainline. On the east side of the mainline, the sidewalk would be constructed from the access road (STA 146+66.23) to the entrance south of the proposed cul-de-sac (STA 170+00.00).

ALTERNATIVE: (Sketch attached)

Eliminate the sidewalk shoulder in its entirety creating 12-ft. shoulders on both sides of the mainline along the aforementioned section of the mainline.

ADVANTAGES:

- Reduces construction time
- Simplifies construction
- Reduces initial cost
- Still provides for a clear zone on both sides of the mainline
- Reduces required right-of-way

DISADVANTAGES:

- Loss of amenity
- Could increase cost if future right-of-way were ever needed

DISCUSSION:

There is very little development and few residents live on either side of the mainline from the beginning of the project to the intersection with Old SR 17. As such, the need for sidewalk shoulders is not warranted as there are no destinations to walk to or from.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 166,517	—	\$ 166,517
ALTERNATIVE	\$ 1,712	—	\$ 1,712
SAVINGS	\$ 164,805	—	\$ 164,805

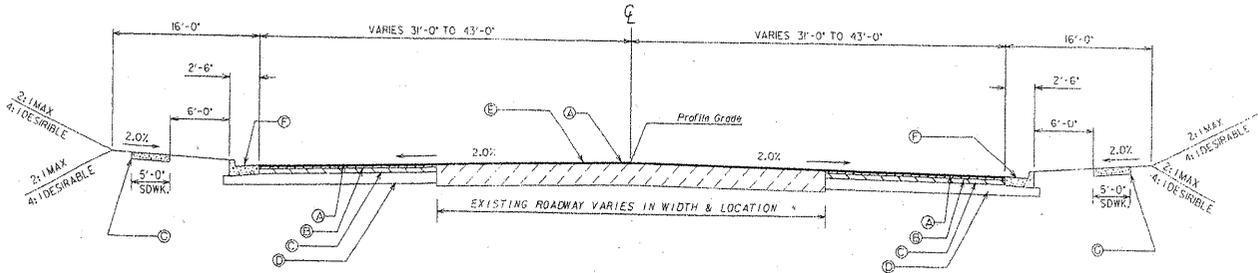
PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage**

ALTERNATIVE NO.:

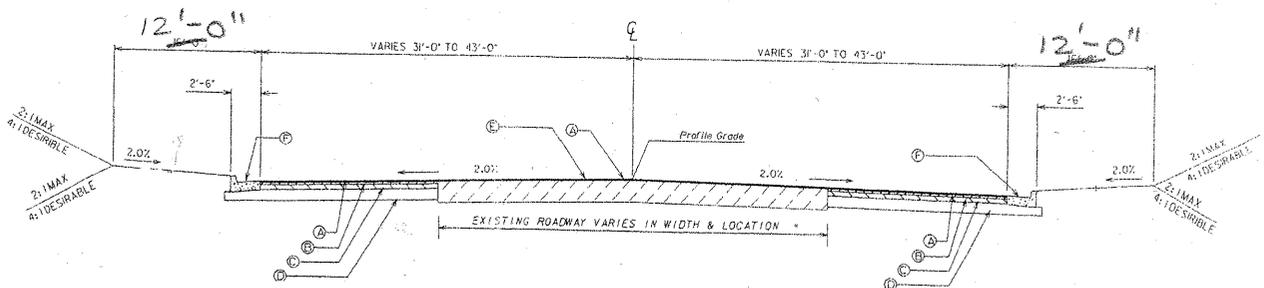
30-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 3



ORIGINAL DESIGN



ALTERNATIVE

COST WORKSHEET



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO: **30-2**

SHEET NO.: **3 of 3**

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Concrete Sidewalk (Westside)	SY	1,681.42	37.12	62,414			
((17,213.13 LF - 14,186.58 LF)*5 LF ÷ 9 SF / SY)							
Concrete Sidewalk (Eastside)	SY	1,296.54	37.12	48,128			
((17,000 LF - 14,666.23 LF)*5 LF ÷ 9 SF / SY)							
Permanent grassing	AC				0.615	906.91	558
Agricultural Lime	TN				0.103	59.69	6
Liquid Lime	GL				25.60	19.30	494
Fertilizer Mixed Grade	TN				0.371	294.10	109
Fertilizer Nitrogen Content	LB				30.750	1.71	53
Construction Subtotal				110,542			1,220
Construction Markup at 40.36%				44,615			492
Construction Total				155,157			1,712
Right-of-Way (Westside)	AC	0.278	6,650.00	1,849			
((17,213.13 LF - 14,186.58 LF)*4 LF ÷ 43,560 SF / AC)							
Right-of-Way (Eastside)	AC	0.214	6,650.00	1,423			
((17,000 LF - 14,666.23 LF)*4 LF ÷ 43,560 SF / AC)							
ROW Subtotal				3,272			
ROW Markup at 247.20%				8,088			
ROW Total				11,360			
Sub-total				166,517			1,712
Mark-up at 40.36%				Included			Included
TOTAL				166,517			1,712

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-3**

DESCRIPTION: **USE A COMMON INTERSECTION FOR BOB CULVERN ROAD AND SR 4/US 1 BUSINESS SOUTH**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The present design realigns SR 4/US 1 Business (South) at a separate intersection from Bob Culvern Road on the mainline.

ALTERNATIVE: (Sketch attached)

Realign SR 4/US 1 Business (South) to a common intersection with Bob Culvern Road and improve the existing angle of the intersection.

ADVANTAGES:

- Improves safety
- Improves mainline traffic operations
- Eliminates an additional side road intersection

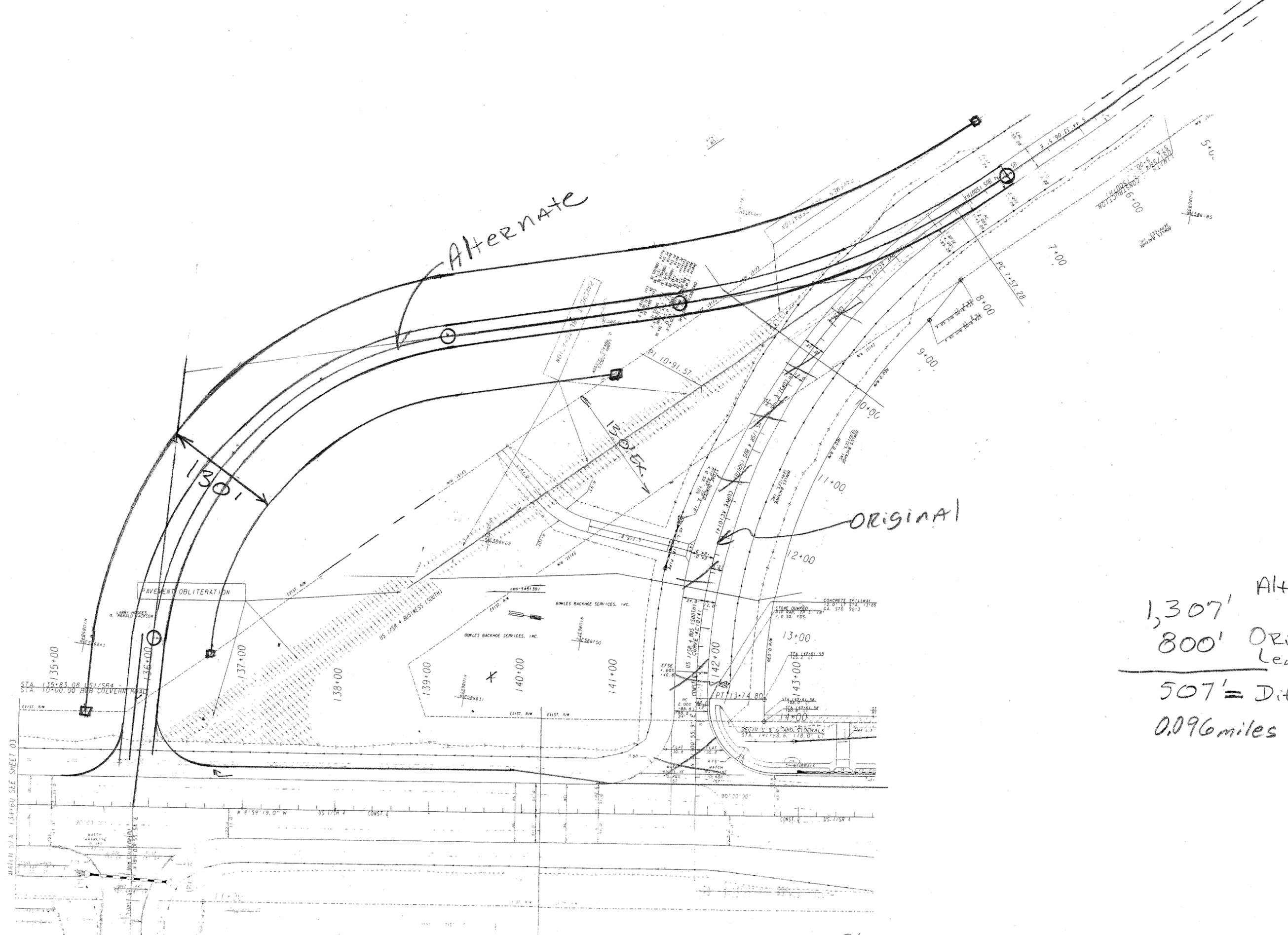
DISADVANTAGES:

- Increases initial construction cost
- Increases right-of-way cost

DISCUSSION:

The present design aligns SR 4/US 1 Business (South) with a better angle of intersection. However, it separates the intersections of SR 4/US 1 Business (South) and Bob Culvern Road creating an additional intersection on the mainline. This alternative realigns SR 4/US 1 Business (South) to have an even better angle of intersection and also a common intersection with Bob Culvern Road to improve traffic operations.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 164,024	—	\$ 164,024
SAVINGS	\$ (164,024)	—	\$ (164,024)



1,307' Alt. Realigned Length
 800' Original Realigned Length

 507' = Difference in Length
 0.096 miles

342

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

30-3

SHEET NO.: 3 of 4

Difference in length between "Original" Realigned US 1/SR4 Bus and "Alternative" Realigned US 1/SR4 Bus (see sketch) = 507' = .096 miles

S.Y. = $\frac{507' \times 24'}{9 \text{ SF/24'}} = 1,352 \text{ S.Y.}$ (use \$46.38/sy. for Pavement see 30-5)

Earthwork (unclassified Exc.) $\frac{(80' \times 3' \text{ avg Ht.} \times 507')}{27} = 4,550 \text{ C.Y.}$

Cleaning & Grubbing $\frac{120' \times 507'}{43,560 \text{ SF/AC}} = 1.397 \text{ AC}$

Proj Cost Eros Control $\frac{\$ 340,800}{(3.0 \text{ mi} \times 5.5 \text{ Lanes}) \text{ Avg.}} = \$ 20,600/\text{Ln-mi}$

Proj cost signing & marking $\frac{\$ 156,880}{(3.0 \times 5.5 \text{ Lanes})} = \$ 9,500/\text{Ln-mi}$

US 1/SR4 Bus: 2 Lanes $\times .096 \text{ mi} = .192 \text{ Ln-mi}$

Add'l R/W $\frac{(507' \times 130')}{43,560 \text{ SF/AC}} = 1.513 \text{ AC}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-4**

DESCRIPTION: **CLOSE COMPTON DRIVE ACCESS TO MAINLINE**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The present design provides an entrance to Compton Drive at STA 146+66.23 from the mainline.

ALTERNATIVE: (Sketch attached)

Close Compton Drive access to the mainline by providing a cul-de-sac at Compton Drive.

ADVANTAGES:

- Reduces construction time
- Simplifies construction
- Reduces costs
- Improves safety

DISADVANTAGES:

- Loss of amenity
- Slightly increases initial cost
- Adds 1,100 ft. to access the mainline

DISCUSSION:

By closing Compton Drive, vehicular ingress/egress to SR 4/US 1 – the mainline – is denied thereby improving safety. Users along Compton Drive will have to travel approximately 1,100 additional ft. to access the mainline via Wright Drive and Bob Culvern Road.

The cost for asphaltic concrete pavement for the cul-de-sac, curb and gutter and sidewalk is offset by similar savings of closing the Compton Drive access. The only additional cost is extending the proposed 42-in. storm sewer an additional 40 ft.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 4,932	—	\$ 4,932
SAVINGS	\$ (4,932)	—	\$ (4,932)



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

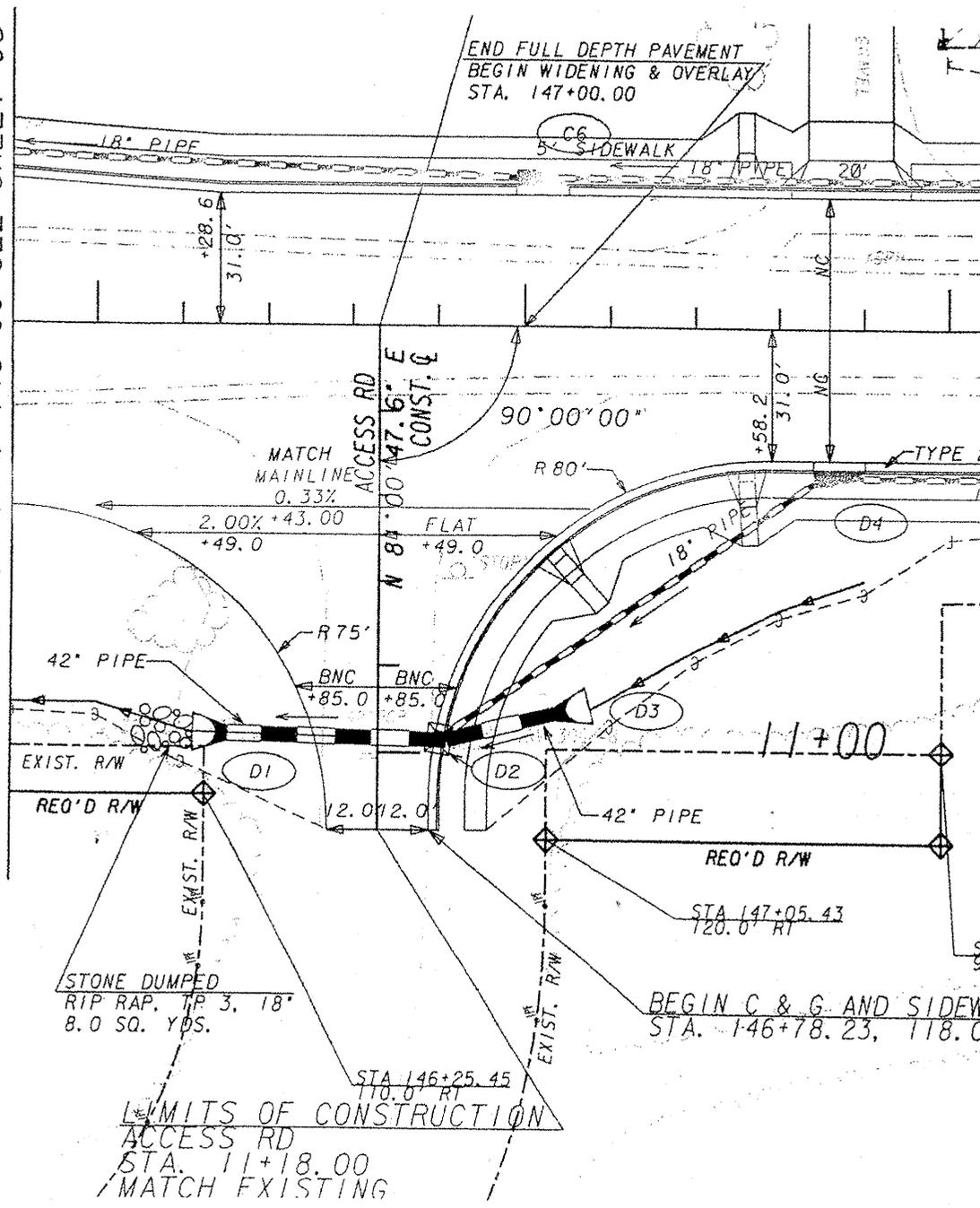
ALTERNATIVE NO.:

30-4

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4

MATCH STA. 145+80 SEE SHEET 05





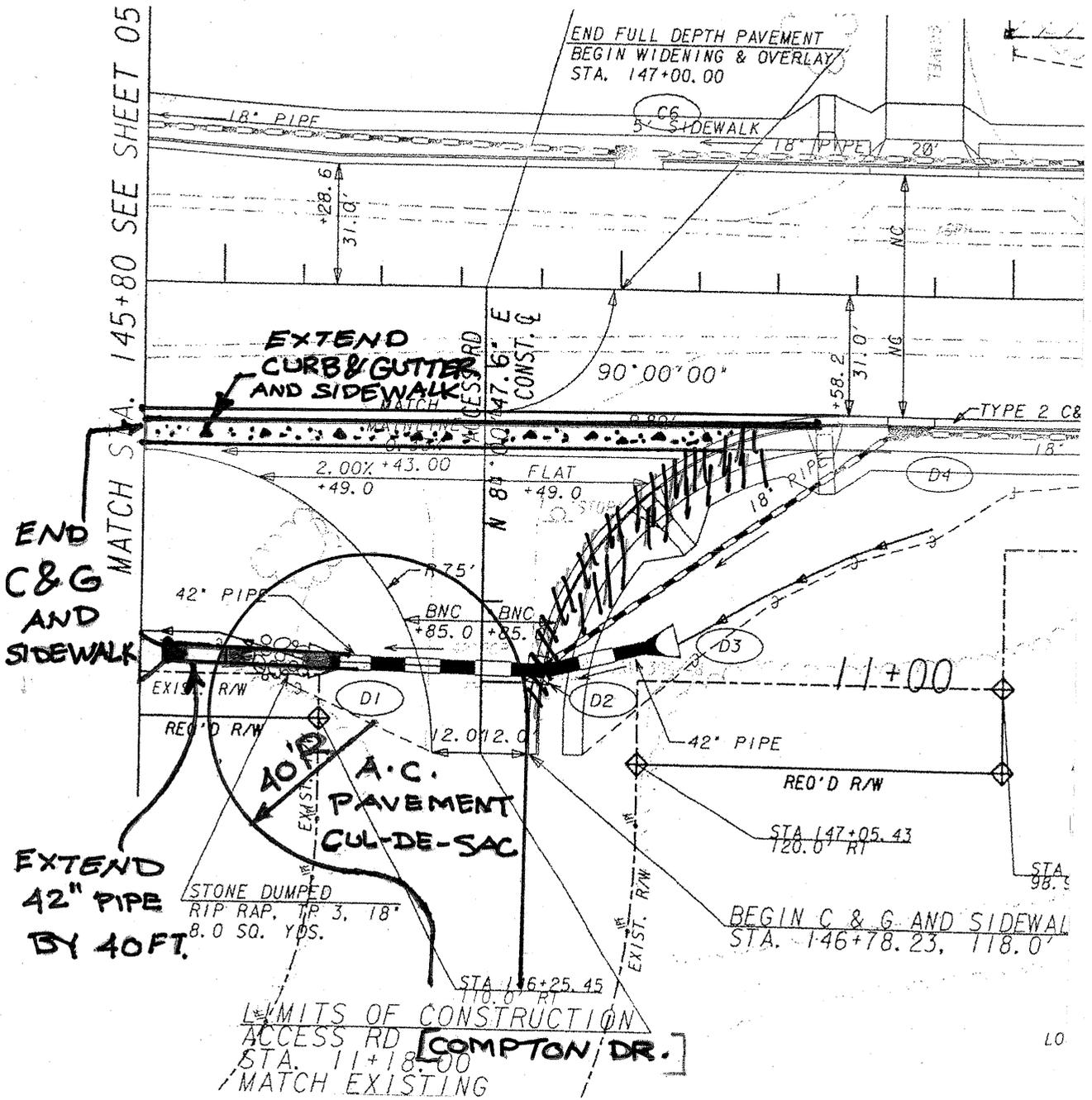
PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

30-4

AS DESIGNED ALTERNATIVE

SHEET NO. **3** of 4



VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-5**

DESCRIPTION: **USE 12-FT. URBAN SHOULDERS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

16-ft.-wide shoulders are used throughout the project with 5-ft. concrete sidewalks on the mainline.

ALTERNATIVE: (Sketch attached)

Use 12-ft. shoulders with 5-ft. sidewalks along the mainline throughout the project area.

ADVANTAGES:

- Reduces right-of-way costs
- Reduces construction time
- Implements common practice

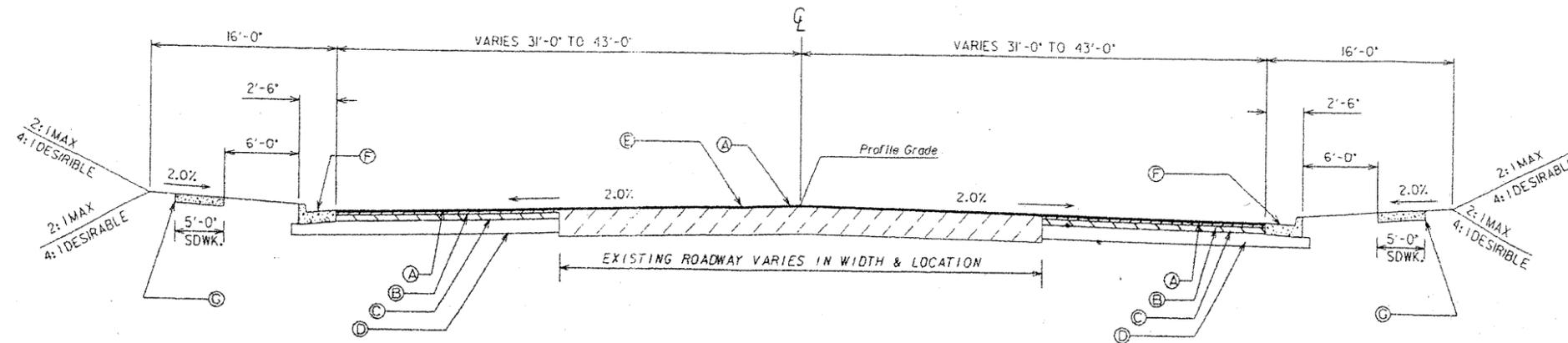
DISADVANTAGES:

- Perceived loss of safety for pedestrians as the sidewalks are closer to the street

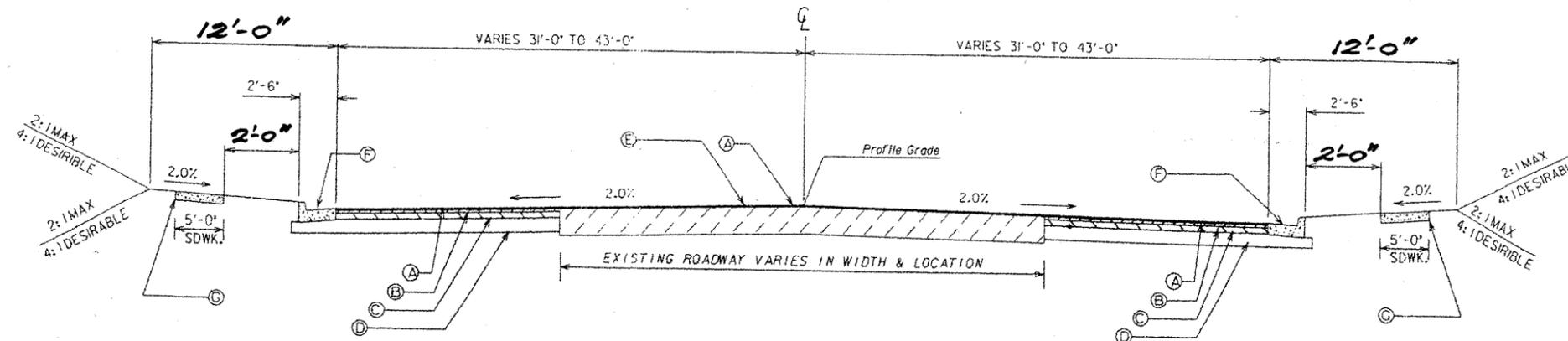
DISCUSSION:

A reduction in shoulder widths from 16 ft. to 12 ft. will have no impact on traffic operations and provides for right-of-way savings. This reduction will still allow for an appropriate clear zone.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 67,419	—	\$ 67,419
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 67,419	—	\$ 67,419



ORIGINAL DESIGN



ALTERNATIVE



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage**

ALTERNATIVE NO.:
30-5

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

Right-of-Way:

$$\text{Length} = \text{Sta. } 241+15.50 - \text{Sta. } 147+00.00$$

$$" = 9,415.5 \text{ ft.}$$

$$\text{Width} = 2 \times 4' = 8 \text{ ft.}$$

$$\text{Length} = (\text{Sta. } 147+00 - \text{Sta. } 141+60.0) + (\text{Sta. } 270+29.78 - \text{Sta. } 266+87.97)$$

$$" = 540' + 341.81'$$

$$" = 881.81 \text{ ft.}$$

$$\text{Width} = 4 \text{ ft}$$

$$\text{Length} = (\text{Sta. } 243+80.0 - \text{Sta. } 206+51.84)$$

$$= 3,728.16 \text{ ft.}$$

$$\text{Width} = 2 \times 4' = 8 \text{ ft.}$$

$$\text{Length} = \text{Sta. } 266+87.97 - \text{Sta. } 243+80.0$$

$$= 2,307.97 \text{ ft}$$

$$\text{Width} = 2 \times 4' = 8 \text{ ft.}$$

$$\text{Total Area} = (9415.5 \times 8') + (881.81 \times 4') + (3728.16 \times 8') + (2307.97 \times 8')$$

$$= 75,324 \text{ sf} + 3,527.24 \text{ sf} + 29,825.28 \text{ sf} + 18,463.76 \text{ sf}$$

$$= 127,140.28 \text{ sf.} \div 43,560 \text{ sf/Ac.}$$

$$= 2.92 \text{ Ac.}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-6**

DESCRIPTION: **USE 11-FT. TRAVEL LANES THROUGHOUT THE PROJECT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The design calls for the use of 12-ft.-wide travel lanes throughout the project.

ALTERNATIVE: (Sketch attached)

Use 11-ft. travel lanes throughout the project. Retain 12-ft.-wide turning lanes.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way costs

DISADVANTAGES:

- Deviates from Department standards
- Reduces room for traffic to maneuver

DISCUSSION:

A reduction in the width of the travel lanes from 12 ft. to 11 ft. will have little or no impact on traffic operations. This cost reduction effort is gaining wide acceptance throughout the Department where its application is warranted – in situations like this facility.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 548,386	—	\$ 548,386
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 548,386	—	\$ 548,386



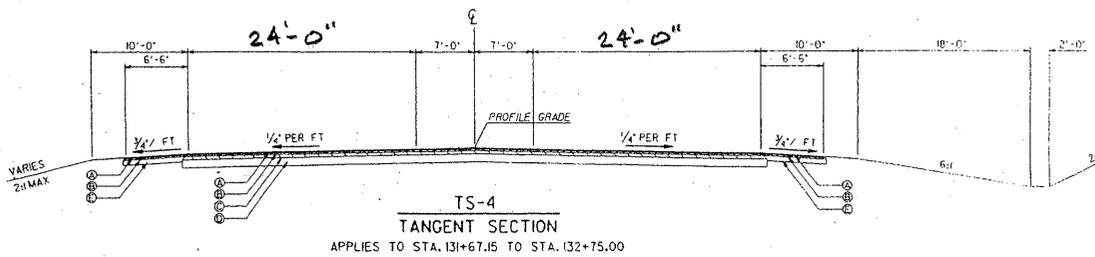
PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

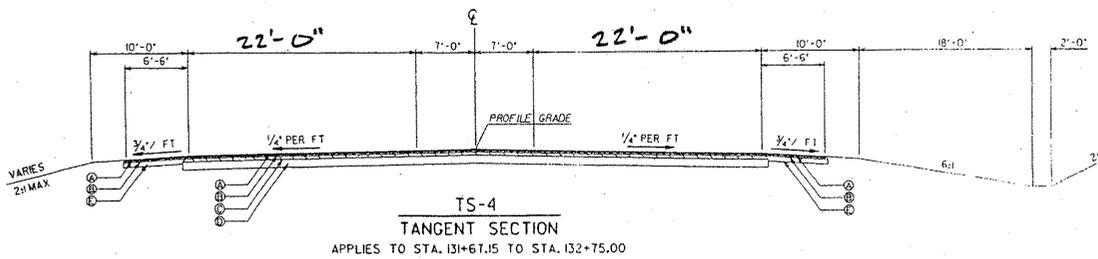
30-6

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

30-6

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 2.56 \text{ MILES} = 13,517 \text{ FT}$$

$$\text{PAVEMENT AREA REDUCTION} = 4(13,517)(9) = 6,008 \text{ SY}$$

$$\text{RIGHT-OF-WAY REDUCTION} = 4(13,517) / 43,560 = 1.24 \text{ AC.}$$

RIGHT-OF-WAY DISTRIBUTION

1.35 ACRES RESIDENTIAL @ \$6,650/ACRE

0 ACRES AGRICULTURAL @ \$2,200/ACRE

5.4 ACRES COMMERCIAL @ \$44,000/ACRE

AVG. RIGHT-OF-WAY COST

$$= [1.35(6650) + 0(2200) + 5.4(44000)] / 6.75$$

$$= \$36,530/\text{ACRE}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-7**

DESCRIPTION: **CLOSE OLD SR 17 WEST AND BUILD A CONNECTOR TO
 SR 17/MIDVILLE ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The present design provides an intersection between the mainline and Old SR 17 West close to the mainline intersection with SR 17/Midville Road.

ALTERNATIVE: (Sketch attached)

Close Old SR 17 using a cul-de-sac and construct a new connector street to SR 17/Midville Road for access to the mainline.

ADVANTAGES:

- Simplifies construction
- Improves safety
- Improves traffic operations
- Provides a common intersection

DISADVANTAGES:

- Increases initial cost
- Increases right-of-way costs
- Adds a "new" connector street

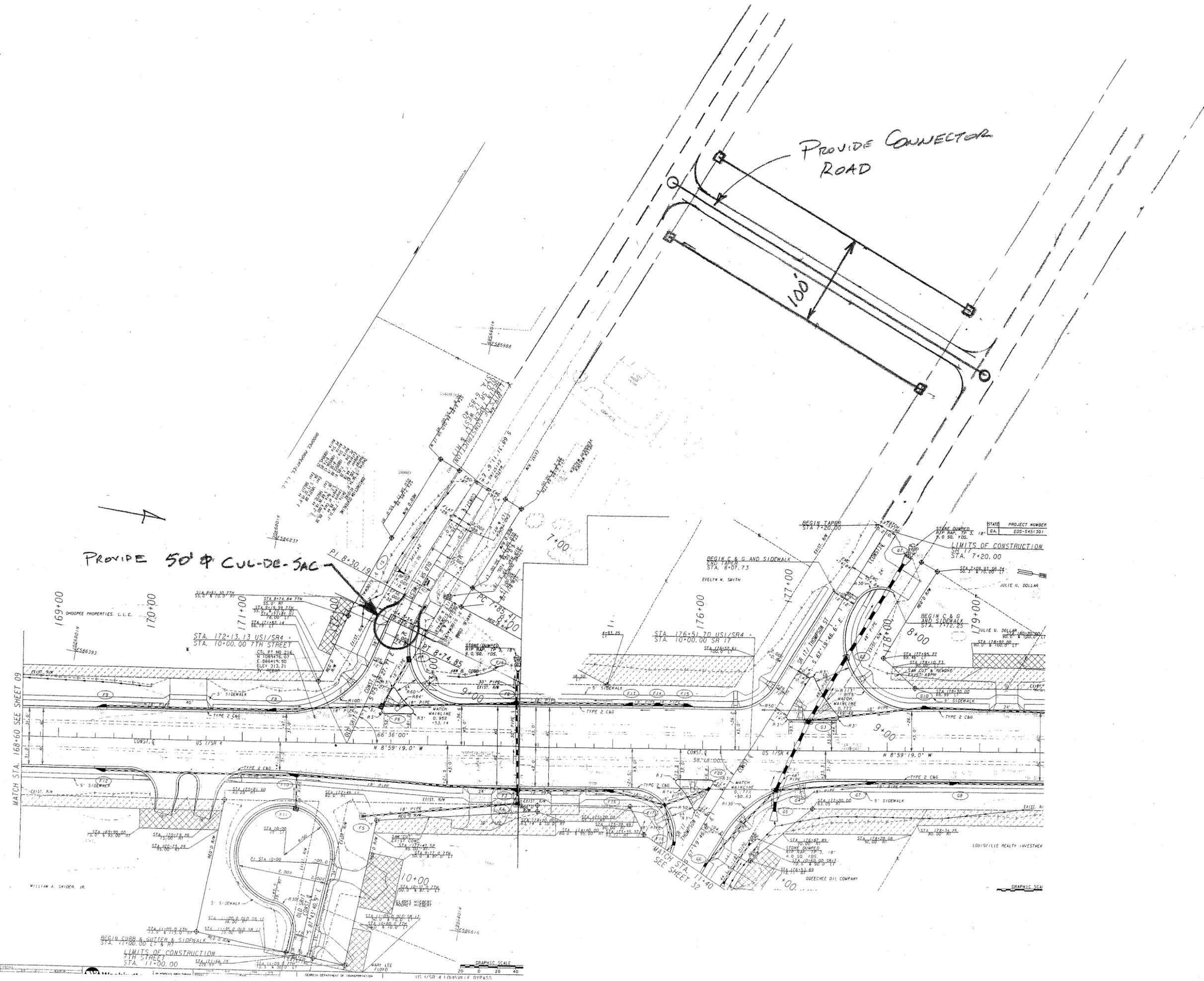
DISCUSSION:

The current design ties Old SR 17 West to the mainline only 450 ft. from the major intersection of SR 17/Midville Road. This alternative closes Old SR 17 West at the mainline and adds a "new" connector street to SR 17/Midville Road for access to the mainline using an existing major intersection.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 132,881	—	\$ 132,881
SAVINGS	\$ (132,881)	—	\$ (132,881)

PROVIDE CONNECTOR ROAD

PROVIDE 50' Ø CUL-DE-SAC



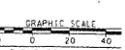
MATCH STA. 168+60 SEE SHEET 09

MATCH STA. 11+40 SEE SHEET 32

STATE PROJECT NUMBER
EDS-5451301

LIMITS OF CONSTRUCTION
STA. 7+20.00

LIMITS OF CONSTRUCTION
7TH STREET
STA. 11+00.00



GRAPHIC SCALE

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

30-7

SHEET NO.: 3 of 4

475' for connector Street from Old SR17 west to Midville Rd.

380' = 0.072 miles = Length of Connector

$$S.Y. = \frac{(380' \times 24')}{9 SF/sy} = 1,014 S.Y.$$

$$EARTHWORK (unclass EXCAV) = \frac{(80' \times 3 AUG. Ht. \times 380')}{27} = 3,400 C.Y.$$

$$CLEARING \& GRUBBING = \frac{(100' \times 380')}{43,560 SF/AC} = 0.872 AC$$

Project Cost Eros Control EDS-545(30) (see 30-3)
 \$20,600/Ln-mi.

Proj. Cost Sign & Marking (see 30-3)
 \$9,500/Ln-mi.

US 1 / SR 4 Bus: 2 Lanes x 0.072 mi = 0.144 Ln-mi.

$$Add'l R/W \frac{(380' \times 100')}{43,560 SF/AC} = 0.872 AC$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-8**

DESCRIPTION: **PROVIDE DEDICATED LEFT TURNS AT SCHOOL STREET**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The existing facility has a 14-ft. two-way, left-turn lane on the mainline for the median-turn lane in the vicinity of School Street.

ALTERNATIVE: (Sketch attached)

Provide dedicated left turns at School Street and CR 332/Walnut Street by widening the median-turn lanes to 18 ft. for a 2-ft. concrete island.

ADVANTAGES:

- Improves safety
- Eliminates opposing left turns
- Improves traffic operations – especially for school buses

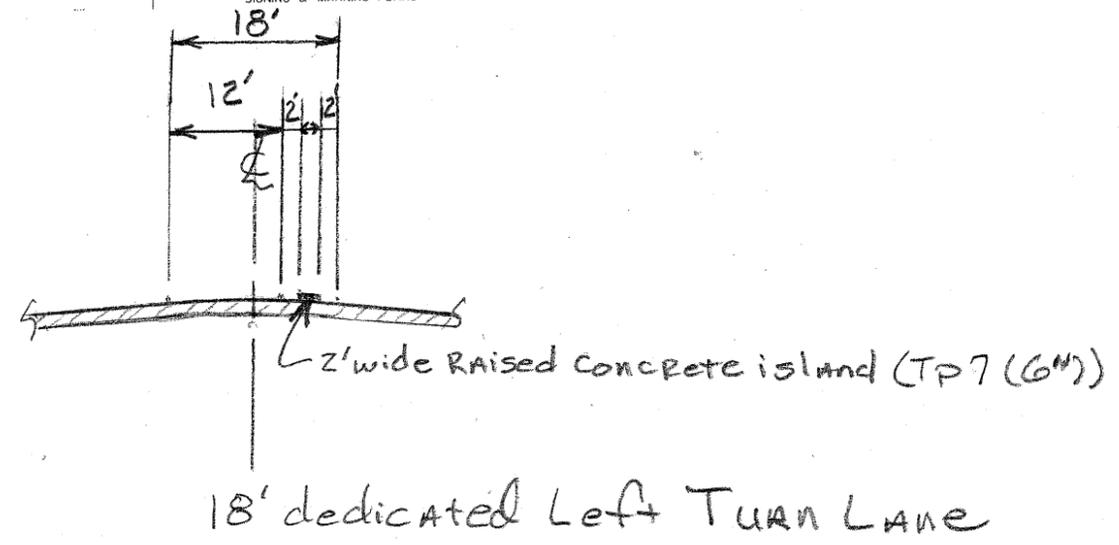
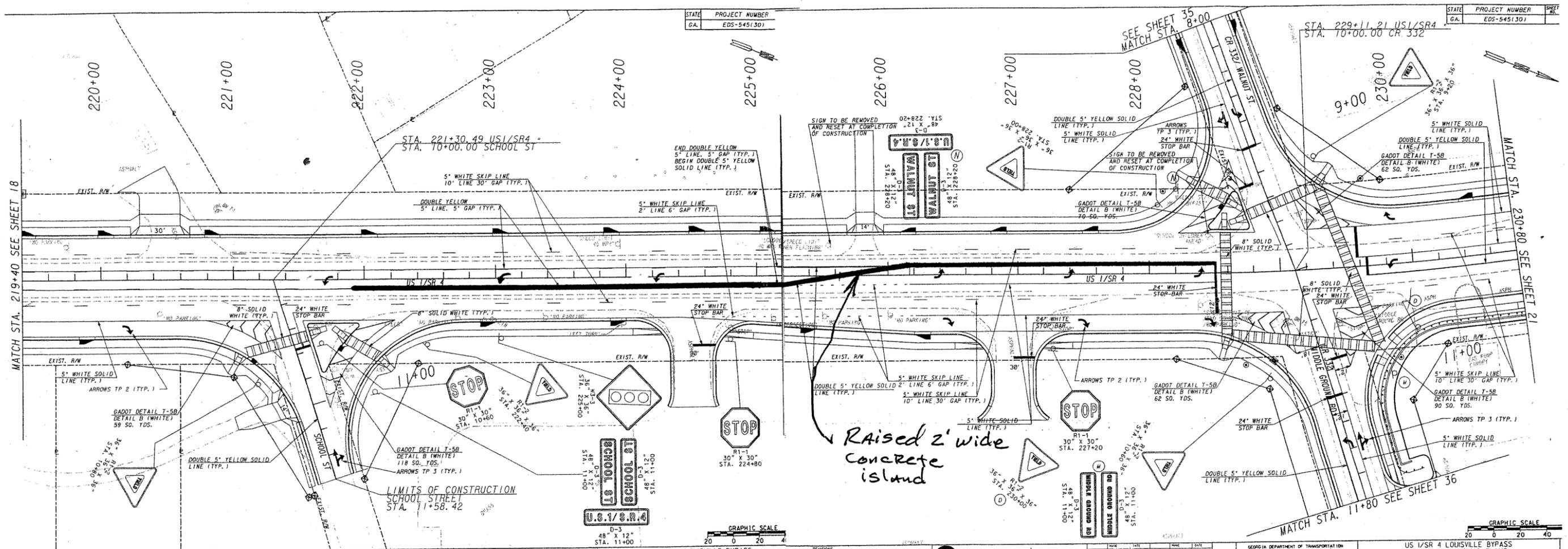
DISADVANTAGES:

- Precludes left turns from School Street onto SB mainline
- Increases construction cost
- Increases right-of-way costs
- Requires additional travel distance to access mainline for SB traffic from School Street

DISCUSSION:

Although SB traffic from School Street would be precluded, the logical routes to access the SB lanes from School Street are either Middleground Road via Roosevelt Street (approximately 2,600 ft. or 0.49 miles) or Mulberry Street via Sinquefield Street (about 2,500 ft. or 0.47 miles).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 30,924	—	\$ 30,924
SAVINGS	\$ (30,924)	—	\$ (30,924)



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

30-8

SHEET NO.: 3 of 4

14' width
 700' Length increased by 4' to 18' for
 L_t turn lane and 2' offsets to 2' concrete
 island

$$S.Y. = \frac{4' \times 700'}{9} = 311 S.Y. \quad \text{Add'l (Pavement) (for Alt.)}$$

2' Raised concrete median island

$$\frac{2' \times 650'}{9} = 144 S.Y. \quad \text{(for Alt.)}$$

$$\frac{4' \times 700'}{43,560} = .064 AC \quad \text{(Add'l R/W for Alt.)}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-9**

DESCRIPTION: **ELIMINATE NORTH ACCESS DRIVE TO THE INGLES
MARKET PARKING LOT FROM THE MAINLINE**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The existing facility has two curb cuts and accesses into the Ingles Market parking lot between School Street and CR 332/Middle Ground Road. The project undertakes minor improvements to these accesses.

ALTERNATIVE: (Sketch attached)

Eliminate the northern access drive to the Ingles Market by continuing the curb and gutter and sidewalk on the mainline.

ADVANTAGES:

- Reduces construction time
- Simplifies construction
- Improves safety
- Still retains three accesses: on the mainline, on School Street and on Middle Ground Road

DISADVANTAGES:

- Loss of amenities – an existing direct access onto the mainline
- Inconveniences shoppers

DISCUSSION:

The northern access to the Ingles Market parking lot is only 150 ft. away from the mainline intersection with CR 332/Middle Ground Road. This closure improves safety to both pedestrians and vehicles along the mainline, i.e., no conflicts between pedestrians and vehicles and no vehicle-to-vehicle conflicts of ingress/egress from the parking lot. While shoppers may experience a minor inconvenience, they still have access on three different sides.

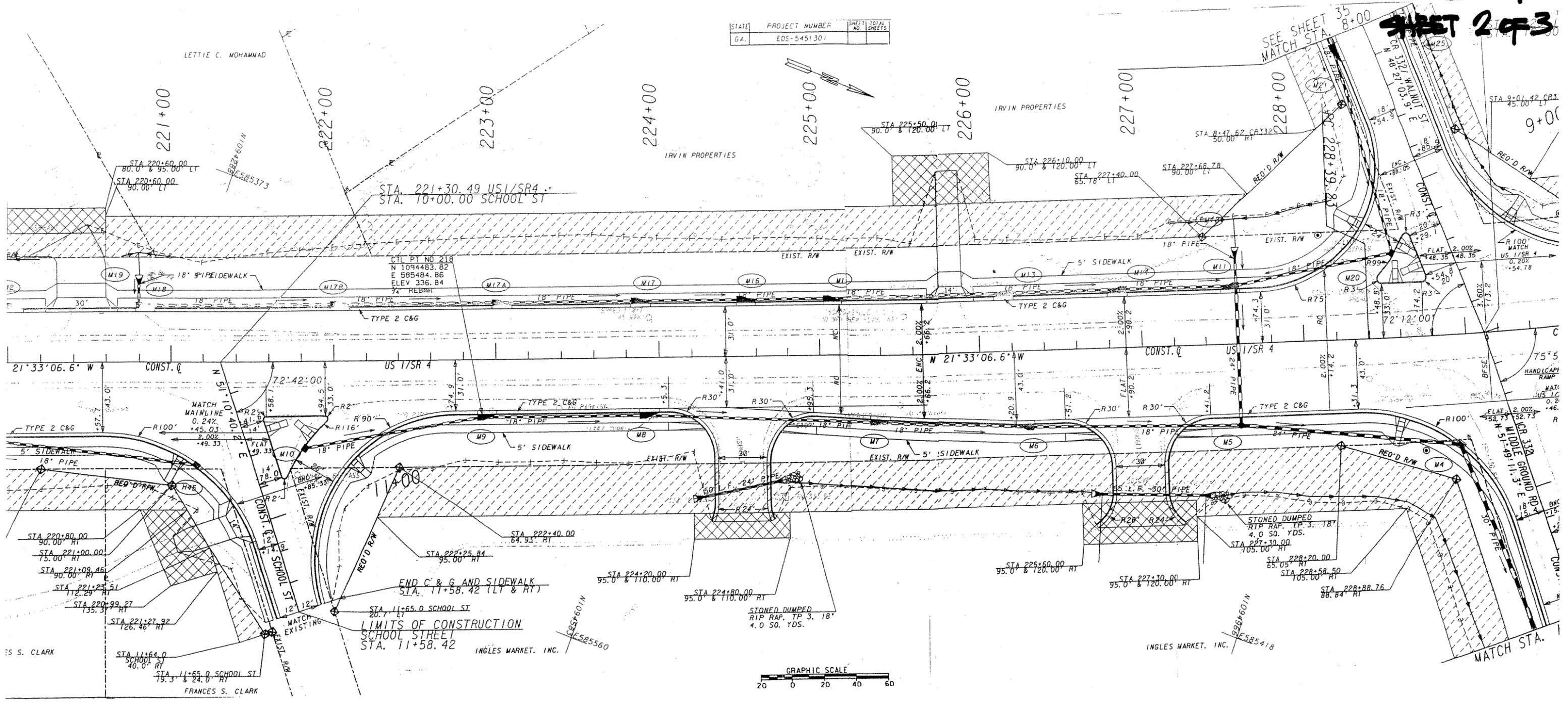
Cost differential is minimal as the continuation of the sidewalk and curb and gutter is considered a trade-off to the proposed minor entrance improvements.

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

30-9

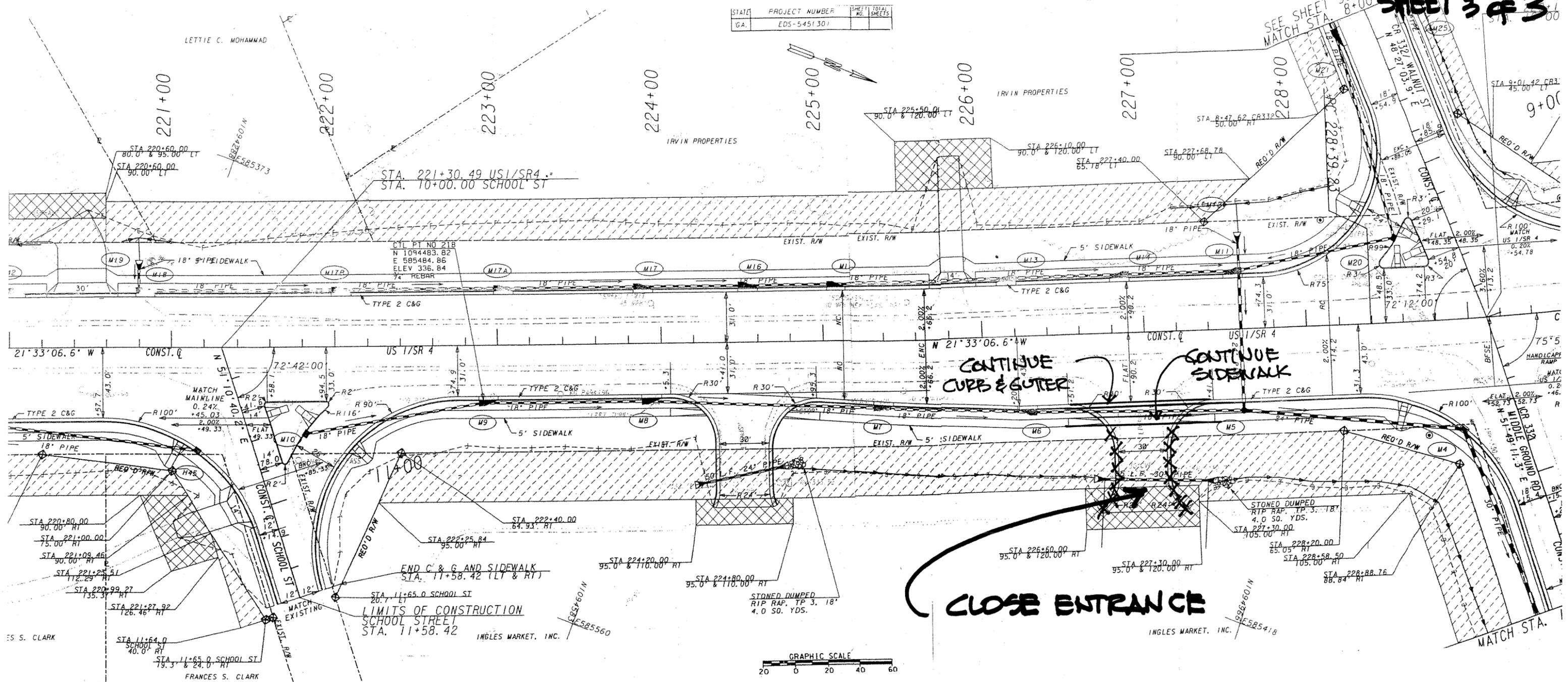
SHEET 2 OF 3

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	EDS-545130		



AS DESIGNED

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	EDS-545130		

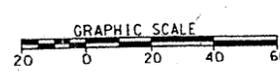


CONTINUE CURB & GUTTER

CONTINUE SIDEWALK

CLOSE ENTRANCE

END C & G AND SIDEWALK
 STA. 11+58.42 (LT & RT)
 LIMITS OF CONSTRUCTION
 SCHOOL STREET
 STA. 11+58.42



ALTERNATIVE

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **30-10**

DESCRIPTION: **ELIMINATE BOTH ACCESS DRIVES TO THE INGLES
MARKET PARKING LOT FROM THE MAINLINE**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The existing facility has two curb cuts and accesses into the Ingles Market parking lot between School Street and CR 332/Middle Ground Road. The project undertakes minor improvements to these accesses.

ALTERNATIVE: (Sketch attached)

Eliminate both access drives to the Ingles Market by continuing the curb and gutter and sidewalk on the mainline.

ADVANTAGES:

- Reduces construction time
- Simplifies construction
- Improves safety
- Still retains two accesses: on School Street and on Middle Ground Road

DISADVANTAGES:

- Loss of amenities – an existing direct access drives onto the mainline
- Inconveniences shoppers

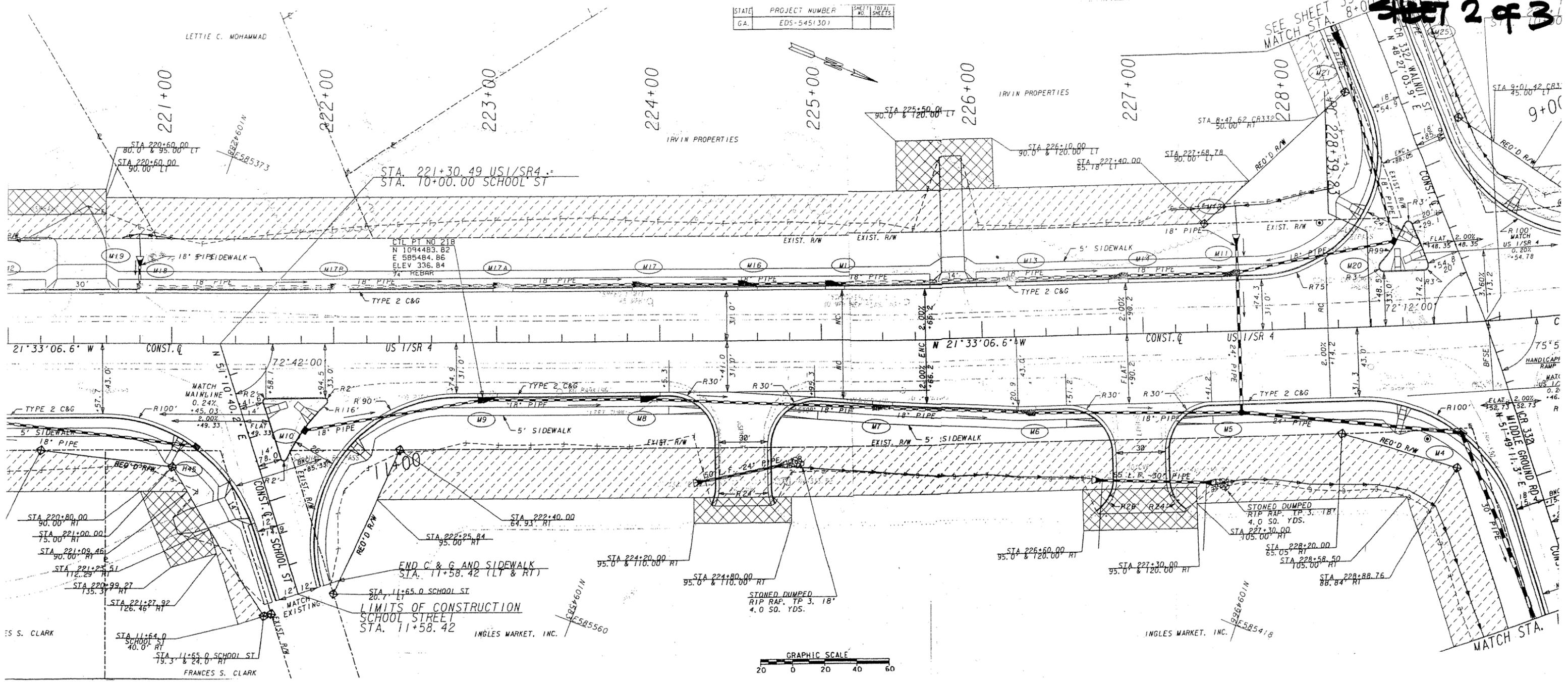
DISCUSSION:

The two access drives along the mainline to the Ingles Market parking lot are about 150 ft. away from the intersections with School Street and CR 332/Middle Ground Road. These closures improve safety to both pedestrians and vehicles along the mainline, i.e., no conflicts between pedestrians and vehicles and no vehicle-to-vehicle conflicts of ingress/egress from the parking lot. While shoppers may experience an inconvenience, they still have access on two different sides.

Cost differential is minimal as the continuation of the sidewalk and curb and gutter is considered a trade-off to the proposed minor entrance improvements.

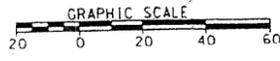
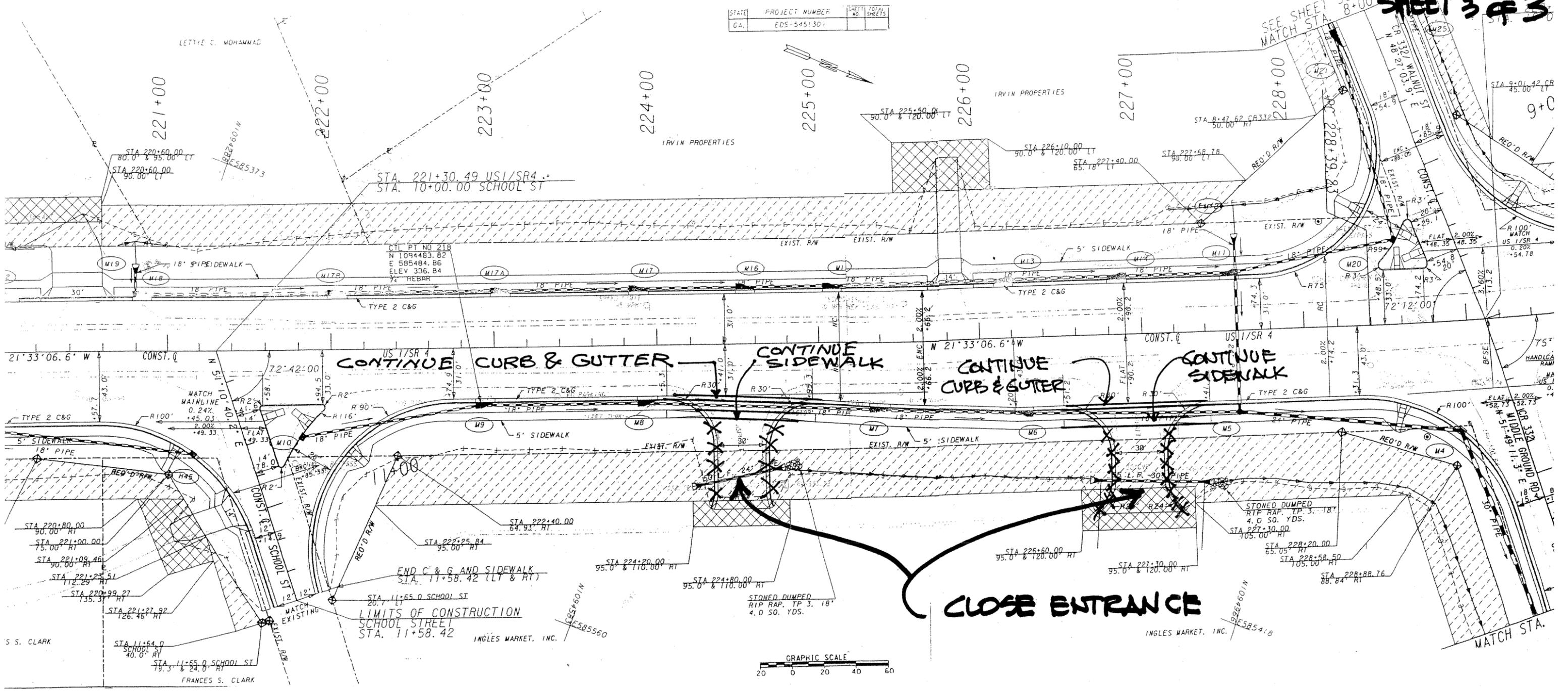
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS			

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	EDS-5451301		



AS DESIGNED

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	EDS-5451301		



ALTERNATIVE



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: WIDENING AND RECONSTRUCTION SR 4/US 1 <i>Jefferson County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EDS-545(31)						
31-1	Use 11-ft. travel lanes throughout the project	\$ 999,582	\$ -	\$ 999,582		\$ 999,582
31-2	Use 32-ft. median versus 44-ft. median	\$ 152,623	\$ -	\$ 152,623		\$ 152,623
31-3	Eliminate sidewalk paving from the beginning of the project to STA 581+97.45	\$ 455,061	\$ 4,048	\$ 451,013		\$ 451,013
31-4	Use 6-ft. paved shoulder in rural section	\$ 89,239	\$ -	\$ 89,239		\$ 89,239
31-5	Eliminate improvements for the parcel at the intersection with CR 325/Clarks Mill Road	\$ 188,353	\$ -	\$ 188,353		\$ 188,353
31-6	Use common intersection for CR 142/Bridges Road and CR 142/Wilchers Road, and tie CR 141/Pineneedle Road into CR 142/Wilchers Road and maintain existing alignment on the mainline	\$ 323,655	\$ -	\$ 323,655		\$ 323,655
31-7	Access mainline from SR 296/Harvey Street south of the cemetery instead of from the north side of the cemetery	\$ 309,678	\$ -	\$ 309,678		\$ 309,678
EDS-545(32)						
32-1	Use 11-ft. travel lanes throughout the project	\$ 1,151,060	\$ -	\$ 1,151,060		\$ 1,151,060
32-2	Use 32-ft. median versus 44-ft. median	\$ 207,848	\$ -	\$ 207,848		\$ 207,848
32-3	Use 6-ft. shoulders in rural section	\$ 142,803	\$ -	\$ 142,803		\$ 142,803
32-6	Retain existing alignment/roadway from STA 150+00 to STA 230+00	\$ 3,353,534	\$ -	\$ 3,353,534		\$ 3,353,534
32-7	Use one way pairs between STA 150+00 to STA 230+00	\$ 3,129,070	\$ -	\$ 3,129,070		\$ 3,129,070
32-8	Make northbound bridge over Big Creek 38-ft.-wide gutter-to-gutter	\$ 31,441	\$ -	\$ 31,441		\$ 31,441
32-9	Begin right-turn lane to Sand Valley Road south of the bridge over Big Creek	\$ 135,730	\$ -	\$ 135,730		\$ 135,730
32-10	Begin left- turn lane to Sand Valley Road south of the bridge over Big Creek	\$ 218,289	\$ -	\$ 218,289		\$ 218,289

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **31-1**

DESCRIPTION: **USE 11 FT. TRAVEL LANES THROUGHOUT THE PROJECT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 12-ft.-wide travel lanes throughout the project.

ALTERNATIVE: (Sketch attached)

Use 11-ft. travel lanes throughout the project. Retain 12-ft.-wide turning lanes.

ADVANTAGES:

- Reduces costs
- Reduces right-of-way costs

DISADVANTAGES:

- Deviates from Department standards
- Reduces room for traffic to maneuver

DISCUSSION:

A reduction in the width of the travel lanes from 12 ft. to 11 ft. will have little or no impact on traffic operations. This cost reduction effort is gaining wide acceptance throughout the Department where its application is warranted – in situations like this facility.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 999,582	—	\$ 999,582
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 999,582	—	\$ 999,582

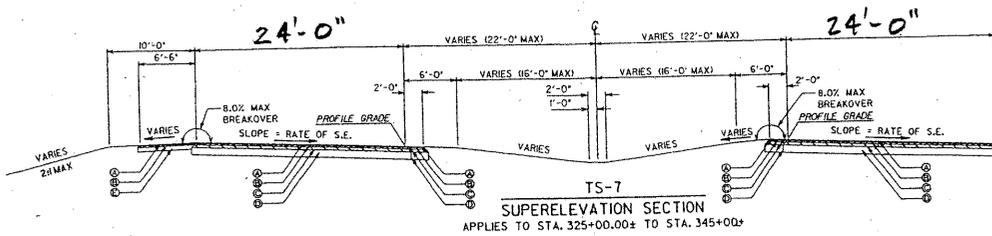
PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265.
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

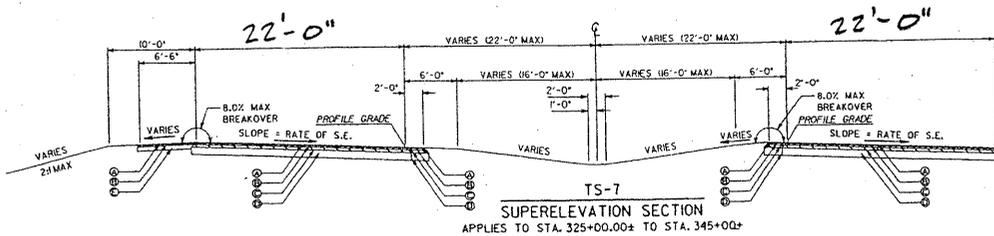
31-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

31-1

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 5.78 \text{ MILES} = 30,518 \text{ FT}$$

$$\text{PAVEMENT AREA REDUCTION} = 4(30,518) / 9 = 13,564 \text{ SY}$$

$$\text{RIGHT-OF-WAY REDUCTION} = 4(30,518) / 43,560 = 2.80 \text{ AC.}$$

RIGHT-OF-WAY DISTRIBUTION

1.93 ACRES RESIDENTIAL @ \$6,650/ACRE

64.76 ACRES AGRICULTURAL @ \$2,200/ACRE

0.55 ACRES COMMERCIAL @ \$44,000/ACRE

AVG. RIGHT-OF-WAY COST

$$= [1.93(6650) + 64.76(2200) + 0.55(44000)] / 67.24$$

$$= \$2,670 / \text{ACRE}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **31-2**

DESCRIPTION: **USE 32 FT. MEDIAN VERSUS 44 FT. MEDIAN**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A 44-ft. grass median is used between the NB and SB lanes of the mainline from CR 325/Clark Mill Road to CR 138/Mennonite Church Road.

ALTERNATIVE: (Sketch attached)

Use a 32-ft. grass median between the NB and SB lanes of the mainline between CR 325/Clark Mill Road to CR 138/Mennonite Church Road.

ADVANTAGES:

- Reduces right-of-way costs
- Reduces construction time
- Implements common practice

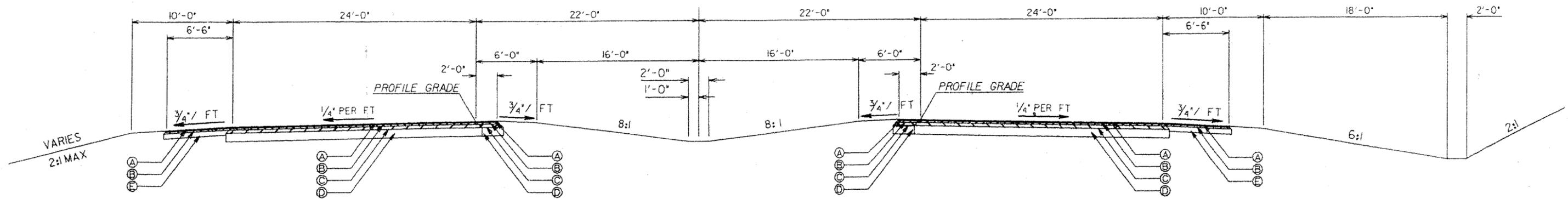
DISADVANTAGES:

- Perceived loss of safety

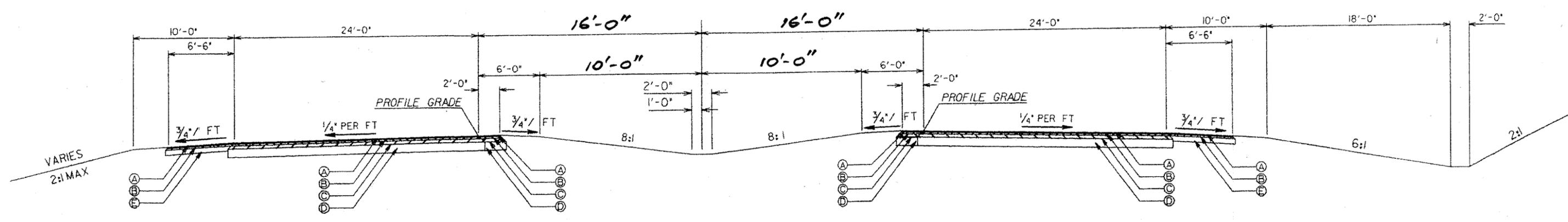
DISCUSSION:

A reduction in the width of the median from 44 ft. to 32 ft. will have no impact on traffic operations and provides for right-of-way savings. The use of 32-ft. grass medians is common in areas where a narrower median is desired, such as environmental impact reductions.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 152,623	—	\$ 152,623
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 152,623	—	\$ 152,623



ORIGINAL DESIGN



ALTERNATIVE



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:
 31-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

Right-of-Way:

$$\begin{aligned} \text{Length} &= (\text{Sta. } 591+76.87 - \text{Sta. } 581+97.45) + (\text{Sta. } 428+50 - \text{Sta. } 224+54.11) \\ &= 979.42' + 20,395.89 \\ &= 21,375.31 \end{aligned}$$

$$\text{Width} = 44' - 32' = 12 \text{ ft.}$$

$$\begin{aligned} \text{Total Area} &= 21,375.31' \times 12' \div 43,560 \\ &= 5.89 \text{ AC} \end{aligned}$$

Residential Land:

$$\begin{aligned} \text{Length} &= (\text{Sta. } 368+00 - \text{Sta. } 353+00) + (\text{Sta. } 428+50 - \text{Sta. } 406+00) \\ &= 1,500' + 2250' \\ &= 3750' \end{aligned}$$

$$\text{Width} = 12'$$

$$\text{Area} = 3750' \times 12' \div 43560 = 1.03 \text{ AC}$$

Agricultural Land:

$$\text{Area} = 5.89 \text{ AC} - 1.03 \text{ AC} = 4.86 \text{ AC}$$

Grass Median:

- Permanent Grassing:

$$\text{Area} = 82 \text{ AC}$$

- Agricultural Lime:

$$\text{Quan.} = \frac{82 \text{ TN}}{82 \text{ AC}} \times 5.89 \text{ AC} = 5.89 \text{ TN}$$

- Liquid Lime:

$$\text{Quan.} = \frac{205 \text{ GL}}{82 \text{ AC}} \times 5.89 \text{ AC} = 14.73 \text{ GL}$$

- Fertilizer Mixed Grade:

$$\text{Quan.} = \frac{58 \text{ TN}}{82 \text{ AC}} \times 5.89 \text{ AC} = 4.17 \text{ TN}$$

- Fertilizer Nitrogen Content:

$$\text{Quan.} = \frac{4100 \text{ LB}}{82 \text{ AC}} \times 5.89 \text{ AC} = 294.5 \text{ LB}$$

- Erosion Control Mats, Slopes:

$$\text{Quan.} = \frac{720074 \text{ SY}}{82 \text{ AC}} \times 5.89 \text{ AC} = 51,722.39$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **31-3**

DESCRIPTION: **ELIMINATE SIDEWALK PAVING FROM THE BEGINNING
OF THE PROJECT TO STA 581+97.45**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The present design would construct 5-ft. wide by 4-in. thick concrete sidewalks from the beginning of the project to STA 581+97.45 on both sides of the mainline.

ALTERNATIVE:

Eliminate the concrete paving only and retain the corresponding shoulders for potential future paving if needed.

ADVANTAGES:

- Reduces construction time
- Simplifies construction
- Reduces initial cost
- Eliminates unnecessary construction
- Still provides for a “finished” shoulder

DISADVANTAGES:

- Loss of amenity
- Slightly reduces in pedestrian safety (no appreciable foot traffic in this area)

DISCUSSION:

There is very little development and few residents live on either side of the mainline from the beginning of the project to STA 581+97.45. As such, the need for paved sidewalks at this time is not warranted as there are no destinations to walk to or from.

Should future development warrant the use of sidewalks, the shoulders would already be in place thereby facilitating the paving of sidewalks.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 455,061	—	\$ 455,061
ALTERNATIVE	\$ 4,048	—	\$ 4,048
SAVINGS	\$ 451,013	—	\$ 451,013

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **31-4**

DESCRIPTION: **USE 6-FT. PAVED SHOULDERS IN RURAL SECTION**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

6.5-ft. paved shoulders are used throughout the rural section of the project along the mainline from CR 325/Clarks Mill Road to CR 138/Mennonite Church Road.

ALTERNATIVE: (Sketch attached)

Use 6-ft. shoulders along the mainline throughout the rural section of the project between CR 325/Clarks Mill Road to CR 138/Mennonite Church Road.

ADVANTAGES:

- Reduces right-of-way costs
- Slightly reduces construction time
- Implements common practice

DISADVANTAGES:

- Perceived loss of safety

DISCUSSION:

A reduction in shoulder widths from 6.5 ft. to 6.0 ft. will have no impact on traffic operations and provides for right-of-way savings. This reduction will still allow for an appropriate clear zone.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 89,239	—	\$ 89,239
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 89,239	—	\$ 89,239



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage**

ALTERNATIVE NO.:
31-4

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

Right-of-Way:

$$\begin{aligned} \text{Length} &= (\text{Sta. } 591+76.87 - 581+97.45) + (\text{Sta. } 428+50 - \text{Sta. } 224+54.11) \\ &= 979.42' + 20,395.89' \\ &= 21,375.31 \end{aligned}$$

$$\begin{aligned} \text{Width} &= 2 \times 6'' \\ &= 1.0' \end{aligned}$$

$$\begin{aligned} \text{Total Area} &= 21,375.31' \times 1.0' \div 43,560 \text{ ss/Ac} \\ &= 0.49 \text{ Ac} \end{aligned}$$

Residential Land:

$$\begin{aligned} \text{Length} &= (\text{Sta. } 368+00 - \text{Sta. } 353+00) + (\text{Sta. } 428+50 - \text{Sta. } 406+00) \\ &= 1,500' + 2250' \\ &= 3750' \end{aligned}$$

$$\text{Width} = 1.0'$$

$$\begin{aligned} \text{Total Area} &= 3750' \times 1.0' \div 43,560 \text{ ss/Ac} \\ &= 0.09 \text{ Ac} \end{aligned}$$

Agricultural Land:

$$\begin{aligned} \text{Total Area} &= 0.49 \text{ Ac} - 0.09 \text{ Ac} \\ &= 0.40 \text{ Ac} \end{aligned}$$

Paved Shoulder:

$$\text{Length} = 21,375.31$$

$$\text{Width} = 1.0'$$

$$\begin{aligned} \text{Total Area} &= 21,375.31' \times 1.0' \div 9 \text{ ss/SY} \\ &= 2375 \text{ SY} \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **31-5**

DESCRIPTION: **ELIMINATE IMPROVEMENTS FOR THE PARCEL AT THE INTERSECTION WITH CR 325/CLARKS MILL ROAD**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The present design provides for curb and gutter and sidewalk for the parcel at the northwest corner of the intersection of the mainline with CR 325/Clarks Mill Road.

ALTERNATIVE: (Sketch attached)

Eliminate all improvements to the aforementioned parcel at the intersection of the mainline with CR 325/Clarks Mill Road.

ADVANTAGES:

- Reduces construction time
- Simplifies construction
- Reduces initial cost

DISADVANTAGES:

- Loss of amenity

DISCUSSION:

The aforementioned improvements do not appear to be warranted as they do not benefit the project. Access to this parcel is not impacted by the proposed mainline work and parcel betterment is not required.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 188,353	—	\$ 188,353
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 188,353	—	\$ 188,353



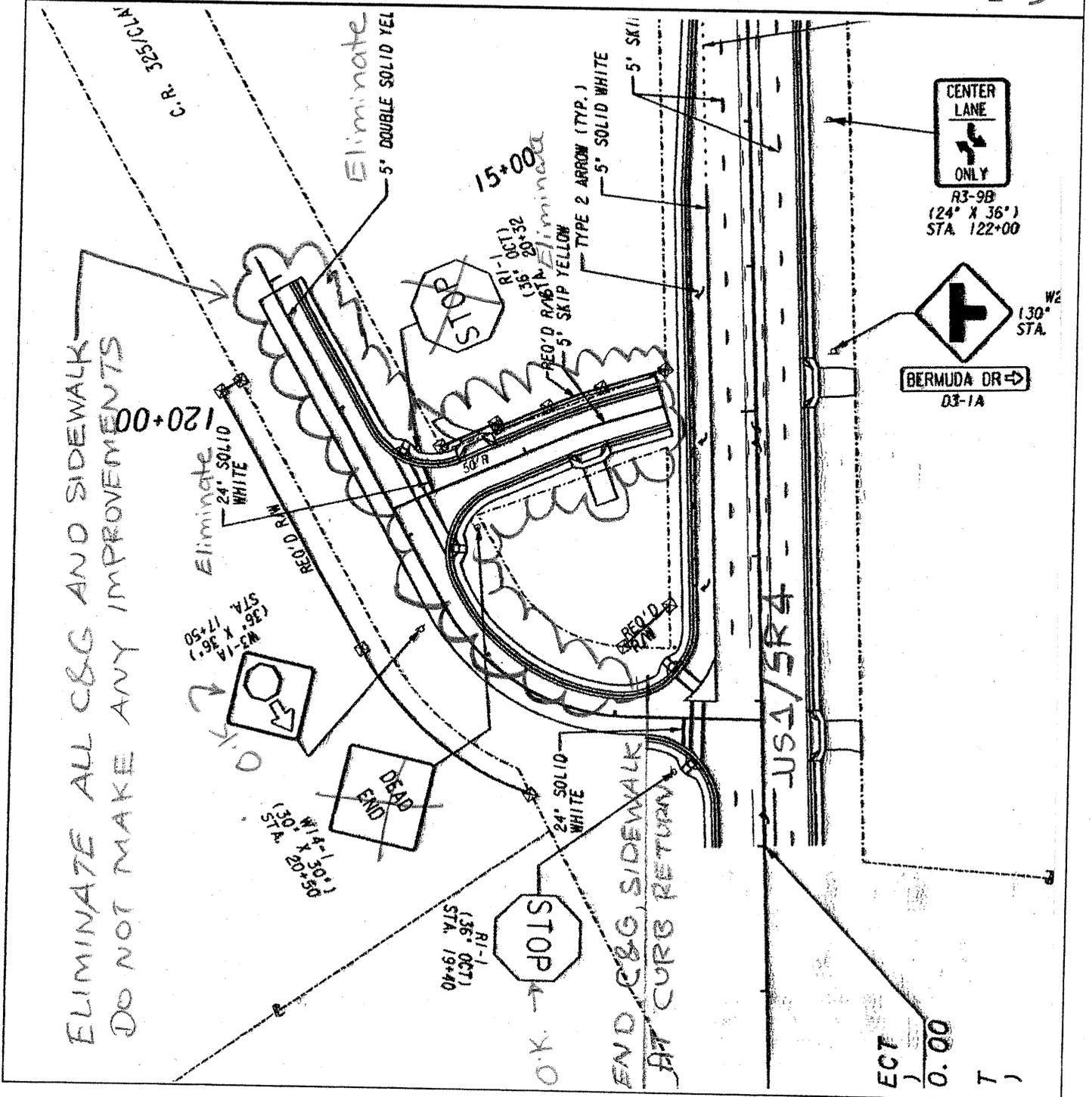
PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

31-5

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 3



ELIMINATE ALL C&G AND SIDEWALK
 DO NOT MAKE ANY IMPROVEMENTS

C.R. 325/CLN

Eliminate
 5' DOUBLE SOLID YEL

15+00
 RI-1 (OCT)
 (36' x 30')
 REQ'D R/W STA. 15+00
 5' SOLID WHITE
 TYPE 2 ARROW (TYP.)
 5' SKIP YELLOW

Eliminate
 24' SOLID
 WHITE

DEAD
 END
 (30' W x 30' L)
 STA. 20+50

O.K.
 STOP
 RI-1 (OCT)
 (36' x 30')
 STA. 19+40

END C&G, SIDEWALK
 AT CURB RETURN

US1/SR4

CENTER
 LANE
 ONLY
 R3-9B
 (24' x 36')
 STA. 122+00

BERMUDA DR
 D3-1A
 130+
 STA.

ECT
 0.00
 T

COST WORKSHEET



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO: **31-5**

SHEET NO.: **3 of 3**

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Curb and Gutter	LF	700	31.57	22,099			
Sidewalk: (700 LF*5 LF ÷ 9 SF / SY)	SY	389	29.86	11,616			
Full Depth Pavement: (600 LF x 24 LF ÷ 9 SF / SY)	SY	1,600	51.14	81,824			
Catch Basins	EA	2	1,962.16	3,924			
18" Storm Sewer	LF	100	36.45	3,645			
18" Flared End	EA	1	558.86	559			
TP 3, 12" Rip Rap	SY	2	36.35	73			
6" Concrete Driveway (30 LF x 15 LF x 0.5 LF ÷ 27 CF / CY)	CY	8.33	701.17	5,841			
Highway Sign Posts	EA	2	250.00	500			
5" Solid Double Yellow Stripe	LF	900	0.30	270			
5" Skip Single Yellow Stripe	LF	200	0.20	40			
24" White Stop Bar	LF	15	3.86	58			
Construction Subtotal				130,448			
Construction Markup at 40.36%				52,649			
Construction Total				183,097			
Right-of-Way: (150 LF x 10 LF ÷ 43,569 SF / AC)				1,514			
ROW Subtotal				1,514			
ROW Markup at 247.20%				3,742			
ROW Total				5,256			
Sub-total				188,353			
Mark-up at 40.36%				Included			
TOTAL				188,353			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **31-6**

DESCRIPTION: **USE A COMMON INTERSECTION FOR CR 142/BRIDGES ROAD AND CR 142/WILCHERS ROAD AND TIE CR 141/PINENEEDLE ROAD INTO CR 142/WILCHERS ROAD AND MAINTAIN EXISTING ALIGNMENT ON THE MAINLINE**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The present design realigns the mainline on “new location” to avoid an historic property and to realign CR 142/Wilchers Road with CR 142/Bridges Road at 90° to SR 4/US 1.

ALTERNATIVE: (Sketch attached)

Retain the current alignment of SR 4/US 1 and widen to the east away from the historic property. Realign CR 142/Wilchers Road with CR 142/Bridges Road to tie to the mainline at 70°. Tie CR 141/Pineneedle Road to CR 142/Wilchers Road at 90°.

ADVANTAGES:

- Improves safety
- Improves traffic operations of the mainline and adjoining roads
- Eliminates relocation of the mainline
- Reduces initial costs
- Reduces right-of-way costs

DISADVANTAGES:

- The side roads angle of intersection would be less than 90°

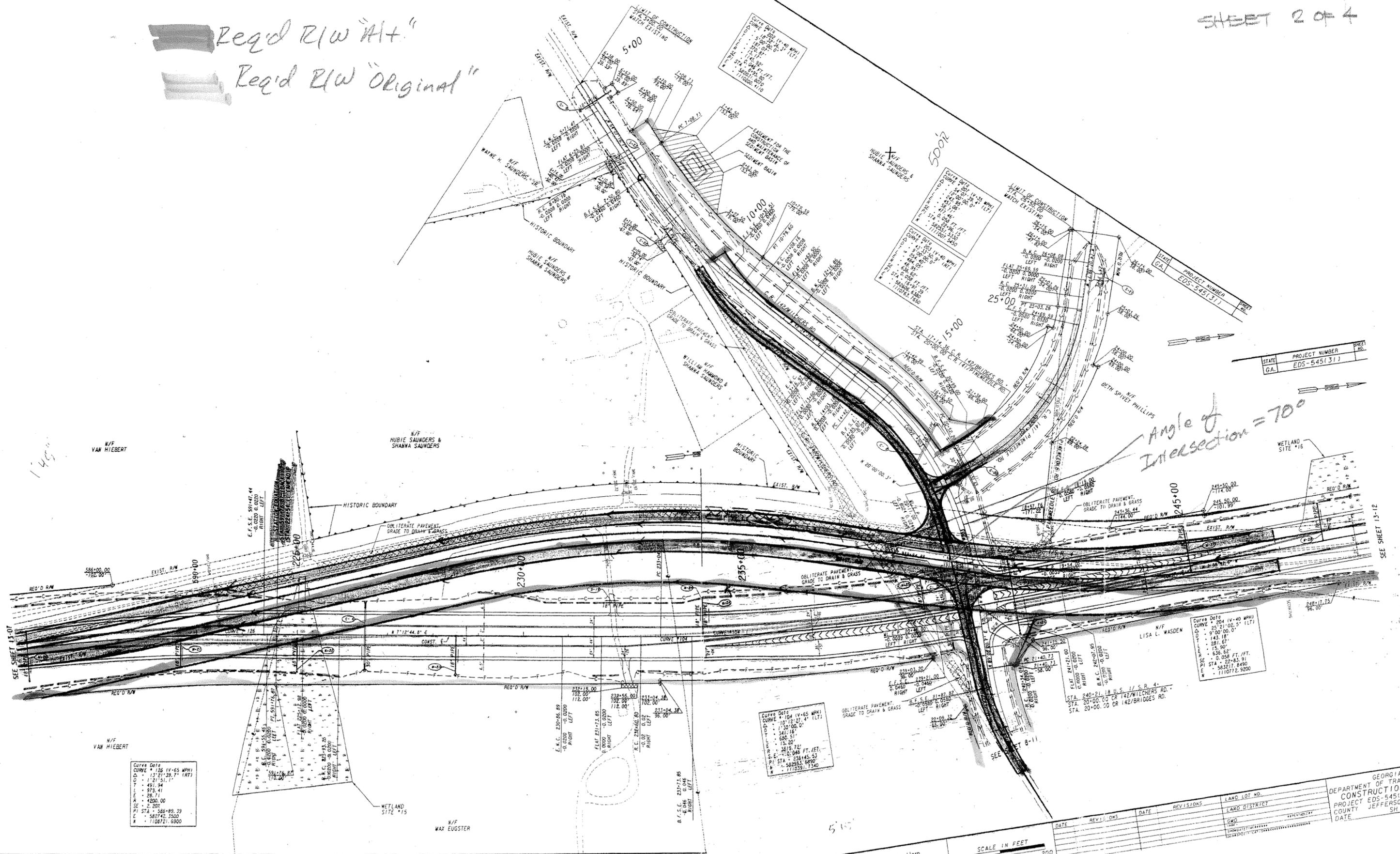
DISCUSSION:

This alternative “keeps” the mainline alignment in its current location and the CR 142/Wilchers Road and CR 142/Bridges Road alignments approximately at their present locations. All widening would be away from the historic property.

The alternative alignment would have a large right-of-way savings as it uses the existing SR 4/US 1 right-of-way. There would only be a small construction cost savings as the mainline length is approximately the same and CR 142/Wilchers Road would tie in to the mainline sooner, saving about 300 ft. It is noted the alternative’s design has a skew angle of 70° in lieu of 90° as the location of the mainline makes it difficult to align at 90°.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 323,655	—	\$ 323,655
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 323,655	—	\$ 323,655

Req'd R/W "H+"
Req'd R/W "Original"



STATE PROJECT NUMBER SHEET NO.
GA. EDS-545(31)

Angle of Intersection = 70°

Curve Data

CURVE #	126 (V-65 MPH)
D	13121.39, 71' (RT)
T	1815.51, 17'
L	491.94
E	975.41
R	28.71
P	4200.00
SE	2.200
PI STA	585+89.39
E	58742.3500
N	1108721.6900

Curve Data

CURVE #	104 (V-65 MPH)
D	10172.02, 41' (LT)
T	1417.15
L	686.51
E	153.20
R	3819.72
SE	130.946 FT. (RT)
PI STA	138145.53
E	582951.8990
N	1110339.1340

Curve Data

CURVE #	204 (V-40 MPH)
D	252102.51' (LT)
T	9700.00, 0'
L	143.18'
E	281.01'
R	15.90'
P	636.66'
SE	0.006 FT. (FT)
PI STA	22+83.91
E	583017.8490
N	1110712.9200

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
SEWAGE FOR CONSTR



SCALE IN FEET

DATE	REVISIONS	DATE	REVISIONS	LAND LOT NO.

GEORGIA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN
PROJECT EDS-545(31)



SCALE IN FEET
0 50 100 200

DATE	REVISIONS	DATE	REVISIONS	LAND LOT NO.	LAND DISTRICT	OWNER	PROPERTY	DATE

GEORGIA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN
PROJECT EDS-545(31)
COUNTY JEFFERSON
SH 13-09 OF

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

31-6

SHEET NO. 3 of 4

EXCAV/W req'd for ORIGINAL Design:

$$\begin{aligned} & (1,000' \times \frac{200'}{2}) + (500' \times 220') + (360' \times 180') + \\ & (140' \times 40') + (400' \times 30') + (70' \times 650') + (50' \times 350') \\ & = 355,400 \text{ SF} \end{aligned}$$

$$\frac{355,400 \text{ SF}}{43,560} = 8.16 \text{ AC}$$

Savings in Constr. of 300' of CR 142/Wilcher Rd.

$$\frac{300' \times 24'}{9} = 800 \text{ S.Y.}$$

unclass EXCAV. $\frac{300' \times 3' \times 24'}{27} = 800 \text{ C.Y.}$

Eros control: (see 29-5) \$9,400/Ln-mi

Sign & marking: (see 29-5) \$4,300/Ln-mi

$$2 \text{ Lanes} \times 0.057 \text{ mi} = .114 \text{ Lane-miles}$$

clearing & grubbing 8.16 AC.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **31-7**

DESCRIPTION: **ACCESS MAINLINE FROM SR 296/HARVEY STREET
 SOUTH OF THE CEMETERY INSTEAD OF FROM THE
 NORTH SIDE OF THE CEMETERY**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The present design realigns CR 296/Harvey Street to access the mainline on the north side of the Memorial Gardens.

ALTERNATIVE: (Sketch attached)

Shorten the proposed realignment of SR 296/Harvey Street by accessing the mainline south of the Memorial Gardens.

ADVANTAGES:

- Reduces costs
- Reduces right-of-way costs
- Less disruptive to funeral/burial operations

DISADVANTAGES:

- Slows design of CR 296/Harvey Street

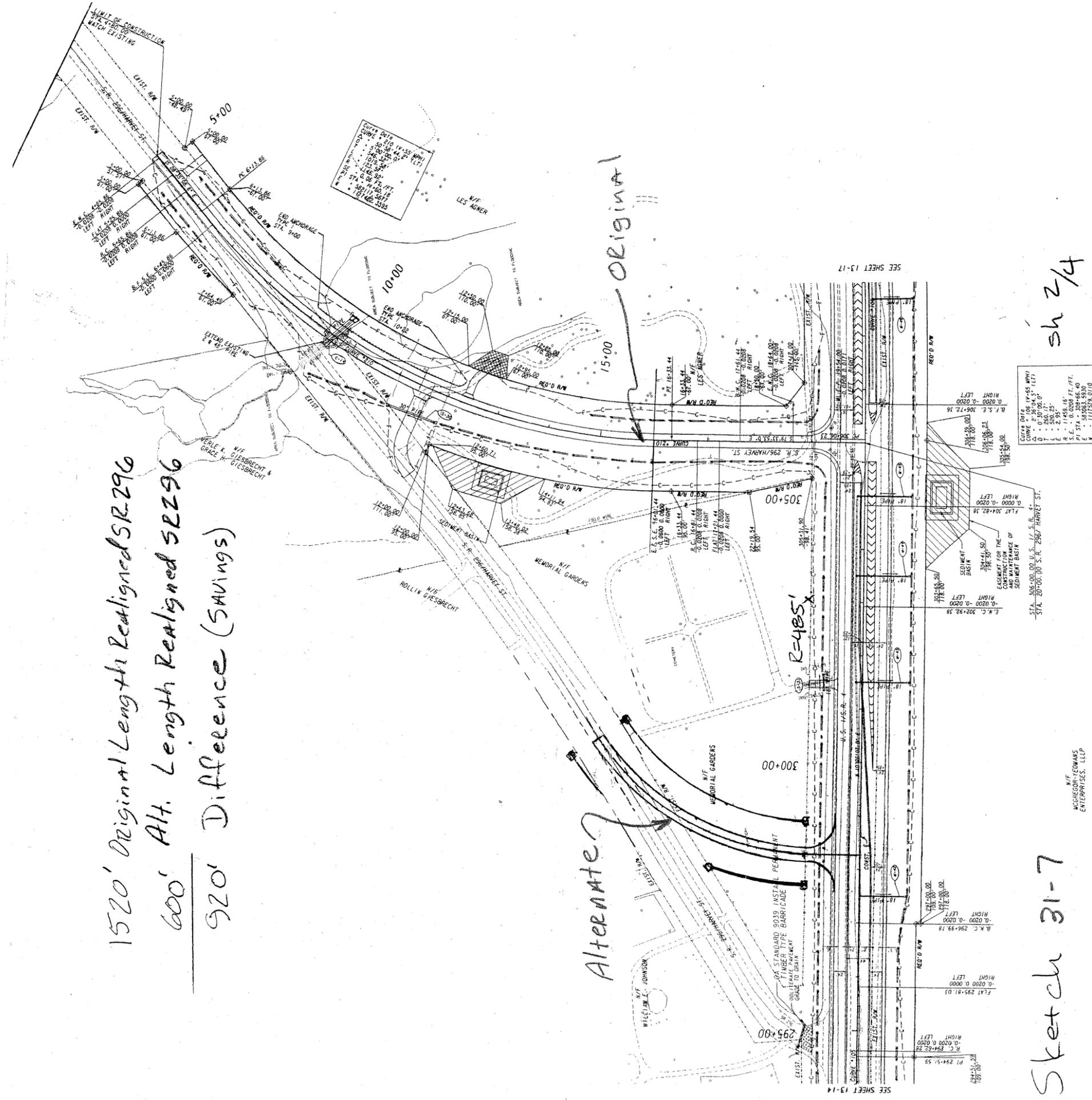
DISCUSSION:

This alternative revises the realignment of SR 296/Harvey Street to reduce the reconstruction length. The curved section will require a sharper curve, i.e., shorter radius. However, the intersection with the mainline is a "T" intersection requiring a stop condition.

A 485-ft. radius will work with an $e_{max} = 6\%$ for rural low speed road and a design speed of 40 miles per hour (mph) which is sufficient for stop conditions (45 mph – 10 mph = 35 mph). [Source: GDOT Design Policy Manual.]

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 309,678	—	\$ 309,678
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 309,678	—	\$ 309,678

1520' Original Length Realigned SR 296
600' Alt. Length Realigned SR 296
920' Difference (SAVINGS)



Curve Data

Curve No.	106
Curve Type	11.55 MPH
Stationing	110.00 to 117.00
Stationing	117.00 to 124.00
Stationing	124.00 to 131.00
Stationing	131.00 to 138.00
Stationing	138.00 to 145.00
Stationing	145.00 to 152.00
Stationing	152.00 to 159.00
Stationing	159.00 to 166.00
Stationing	166.00 to 173.00
Stationing	173.00 to 180.00
Stationing	180.00 to 187.00
Stationing	187.00 to 194.00
Stationing	194.00 to 201.00
Stationing	201.00 to 208.00
Stationing	208.00 to 215.00
Stationing	215.00 to 222.00
Stationing	222.00 to 229.00
Stationing	229.00 to 236.00
Stationing	236.00 to 243.00
Stationing	243.00 to 250.00
Stationing	250.00 to 257.00
Stationing	257.00 to 264.00
Stationing	264.00 to 271.00
Stationing	271.00 to 278.00
Stationing	278.00 to 285.00
Stationing	285.00 to 292.00
Stationing	292.00 to 299.00
Stationing	299.00 to 306.00
Stationing	306.00 to 313.00
Stationing	313.00 to 320.00
Stationing	320.00 to 327.00
Stationing	327.00 to 334.00
Stationing	334.00 to 341.00
Stationing	341.00 to 348.00
Stationing	348.00 to 355.00
Stationing	355.00 to 362.00
Stationing	362.00 to 369.00
Stationing	369.00 to 376.00
Stationing	376.00 to 383.00
Stationing	383.00 to 390.00
Stationing	390.00 to 397.00
Stationing	397.00 to 404.00
Stationing	404.00 to 411.00
Stationing	411.00 to 418.00
Stationing	418.00 to 425.00
Stationing	425.00 to 432.00
Stationing	432.00 to 439.00
Stationing	439.00 to 446.00
Stationing	446.00 to 453.00
Stationing	453.00 to 460.00
Stationing	460.00 to 467.00
Stationing	467.00 to 474.00
Stationing	474.00 to 481.00
Stationing	481.00 to 488.00
Stationing	488.00 to 495.00
Stationing	495.00 to 502.00
Stationing	502.00 to 509.00
Stationing	509.00 to 516.00
Stationing	516.00 to 523.00
Stationing	523.00 to 530.00
Stationing	530.00 to 537.00
Stationing	537.00 to 544.00
Stationing	544.00 to 551.00
Stationing	551.00 to 558.00
Stationing	558.00 to 565.00
Stationing	565.00 to 572.00
Stationing	572.00 to 579.00
Stationing	579.00 to 586.00
Stationing	586.00 to 593.00
Stationing	593.00 to 600.00
Stationing	600.00 to 607.00
Stationing	607.00 to 614.00
Stationing	614.00 to 621.00
Stationing	621.00 to 628.00
Stationing	628.00 to 635.00
Stationing	635.00 to 642.00
Stationing	642.00 to 649.00
Stationing	649.00 to 656.00
Stationing	656.00 to 663.00
Stationing	663.00 to 670.00
Stationing	670.00 to 677.00
Stationing	677.00 to 684.00
Stationing	684.00 to 691.00
Stationing	691.00 to 698.00
Stationing	698.00 to 705.00
Stationing	705.00 to 712.00
Stationing	712.00 to 719.00
Stationing	719.00 to 726.00
Stationing	726.00 to 733.00
Stationing	733.00 to 740.00
Stationing	740.00 to 747.00
Stationing	747.00 to 754.00
Stationing	754.00 to 761.00
Stationing	761.00 to 768.00
Stationing	768.00 to 775.00
Stationing	775.00 to 782.00
Stationing	782.00 to 789.00
Stationing	789.00 to 796.00
Stationing	796.00 to 803.00
Stationing	803.00 to 810.00
Stationing	810.00 to 817.00
Stationing	817.00 to 824.00
Stationing	824.00 to 831.00
Stationing	831.00 to 838.00
Stationing	838.00 to 845.00
Stationing	845.00 to 852.00
Stationing	852.00 to 859.00
Stationing	859.00 to 866.00
Stationing	866.00 to 873.00
Stationing	873.00 to 880.00
Stationing	880.00 to 887.00
Stationing	887.00 to 894.00
Stationing	894.00 to 901.00
Stationing	901.00 to 908.00
Stationing	908.00 to 915.00
Stationing	915.00 to 922.00
Stationing	922.00 to 929.00
Stationing	929.00 to 936.00
Stationing	936.00 to 943.00
Stationing	943.00 to 950.00
Stationing	950.00 to 957.00
Stationing	957.00 to 964.00
Stationing	964.00 to 971.00
Stationing	971.00 to 978.00
Stationing	978.00 to 985.00
Stationing	985.00 to 992.00
Stationing	992.00 to 999.00
Stationing	999.00 to 1006.00
Stationing	1006.00 to 1013.00
Stationing	1013.00 to 1020.00
Stationing	1020.00 to 1027.00
Stationing	1027.00 to 1034.00
Stationing	1034.00 to 1041.00
Stationing	1041.00 to 1048.00
Stationing	1048.00 to 1055.00
Stationing	1055.00 to 1062.00
Stationing	1062.00 to 1069.00
Stationing	1069.00 to 1076.00
Stationing	1076.00 to 1083.00
Stationing	1083.00 to 1090.00
Stationing	1090.00 to 1097.00
Stationing	1097.00 to 1104.00
Stationing	1104.00 to 1111.00
Stationing	1111.00 to 1118.00
Stationing	1118.00 to 1125.00
Stationing	1125.00 to 1132.00
Stationing	1132.00 to 1139.00
Stationing	1139.00 to 1146.00
Stationing	1146.00 to 1153.00
Stationing	1153.00 to 1160.00
Stationing	1160.00 to 1167.00
Stationing	1167.00 to 1174.00
Stationing	1174.00 to 1181.00
Stationing	1181.00 to 1188.00
Stationing	1188.00 to 1195.00
Stationing	1195.00 to 1202.00
Stationing	1202.00 to 1209.00
Stationing	1209.00 to 1216.00
Stationing	1216.00 to 1223.00
Stationing	1223.00 to 1230.00
Stationing	1230.00 to 1237.00
Stationing	1237.00 to 1244.00
Stationing	1244.00 to 1251.00
Stationing	1251.00 to 1258.00
Stationing	1258.00 to 1265.00
Stationing	1265.00 to 1272.00
Stationing	1272.00 to 1279.00
Stationing	1279.00 to 1286.00
Stationing	1286.00 to 1293.00
Stationing	1293.00 to 1300.00
Stationing	1300.00 to 1307.00
Stationing	1307.00 to 1314.00
Stationing	1314.00 to 1321.00
Stationing	1321.00 to 1328.00
Stationing	1328.00 to 1335.00
Stationing	1335.00 to 1342.00
Stationing	1342.00 to 1349.00
Stationing	1349.00 to 1356.00
Stationing	1356.00 to 1363.00
Stationing	1363.00 to 1370.00
Stationing	1370.00 to 1377.00
Stationing	1377.00 to 1384.00
Stationing	1384.00 to 1391.00
Stationing	1391.00 to 1398.00
Stationing	1398.00 to 1405.00
Stationing	1405.00 to 1412.00
Stationing	1412.00 to 1419.00
Stationing	1419.00 to 1426.00
Stationing	1426.00 to 1433.00
Stationing	1433.00 to 1440.00
Stationing	1440.00 to 1447.00
Stationing	1447.00 to 1454.00
Stationing	1454.00 to 1461.00
Stationing	1461.00 to 1468.00
Stationing	1468.00 to 1475.00
Stationing	1475.00 to 1482.00
Stationing	1482.00 to 1489.00
Stationing	1489.00 to 1496.00
Stationing	1496.00 to 1503.00
Stationing	1503.00 to 1510.00
Stationing	1510.00 to 1517.00
Stationing	1517.00 to 1524.00
Stationing	1524.00 to 1531.00
Stationing	1531.00 to 1538.00
Stationing	1538.00 to 1545.00
Stationing	1545.00 to 1552.00
Stationing	1552.00 to 1559.00
Stationing	1559.00 to 1566.00
Stationing	1566.00 to 1573.00
Stationing	1573.00 to 1580.00
Stationing	1580.00 to 1587.00
Stationing	1587.00 to 1594.00
Stationing	1594.00 to 1601.00
Stationing	1601.00 to 1608.00
Stationing	1608.00 to 1615.00
Stationing	1615.00 to 1622.00
Stationing	1622.00 to 1629.00
Stationing	1629.00 to 1636.00
Stationing	1636.00 to 1643.00
Stationing	1643.00 to 1650.00
Stationing	1650.00 to 1657.00
Stationing	1657.00 to 1664.00
Stationing	1664.00 to 1671.00
Stationing	1671.00 to 1678.00
Stationing	1678.00 to 1685.00
Stationing	1685.00 to 1692.00
Stationing	1692.00 to 1699.00
Stationing	1699.00 to 1706.00
Stationing	1706.00 to 1713.00
Stationing	1713.00 to 1720.00
Stationing	1720.00 to 1727.00
Stationing	1727.00 to 1734.00
Stationing	1734.00 to 1741.00
Stationing	1741.00 to 1748.00
Stationing	1748.00 to 1755.00
Stationing	1755.00 to 1762.00
Stationing	1762.00 to 1769.00
Stationing	1769.00 to 1776.00
Stationing	1776.00 to 1783.00
Stationing	1783.00 to 1790.00
Stationing	1790.00 to 1797.00
Stationing	1797.00 to 1804.00
Stationing	1804.00 to 1811.00
Stationing	1811.00 to 1818.00
Stationing	1818.00 to 1825.00
Stationing	1825.00 to 1832.00
Stationing	1832.00 to 1839.00
Stationing	1839.00 to 1846.00
Stationing	1846.00 to 1853.00
Stationing	1853.00 to 1860.00
Stationing	1860.00 to 1867.00
Stationing	1867.00 to 1874.00
Stationing	1874.00 to 1881.00
Stationing	1881.00 to 1888.00
Stationing	1888.00 to 1895.00
Stationing	1895.00 to 1902.00
Stationing	1902.00 to 1909.00
Stationing	1909.00 to 1916.00
Stationing	1916.00 to 1923.00
Stationing	1923.00 to 1930.00
Stationing	1930.00 to 1937.00
Stationing	1937.00 to 1944.00
Stationing	1944.00 to 1951.00
Stationing	1951.00 to 1958.00
Stationing	1958.00 to 1965.00
Stationing	1965.00 to 1972.00
Stationing	1972.00 to 1979.00
Stationing	1979.00 to 1986.00
Stationing	1986.00 to 1993.00
Stationing	1993.00 to 2000.00

Sketch 31-7

W.F. MCGREGOR-COMBES ENTERPRISES, L.L.P.

PROPERTY AND EXISTING RW LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTRUCTION
& MAINTENANCE OF SLOPES
EASEMENT FOR CONSTRUCTION OF SLOPES

Kimley-Horn and Associates, Inc.
1000 Peachtree Street, N.E.
Atlanta, Georgia 30309
Phone: 404.525.8800
Fax: 404.525.8801
www.kimley-horn.com

SCALE IN FEET
0 50 100 200

DATE	REVISIONS	DATE	REVISIONS

LAND LOT NO.
LAND DISTRICT
PROJECT EDS-545(31)
COUNTY JEFFERSON

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

31-7

SHEET NO.: 3 of 4

Difference (SAVINGS) in Length between
 Original (520') and Alt. (600') Length of
 SR 296 / HARVEY ST. = 920' = .174 miles

$$S.Y. = \frac{920' \times 24'}{9} = 2,453 \text{ S.Y.}$$

$$\text{unclass exca.} = \frac{920' \times 3' \text{ aught.} \times 80'}{27} = 8,200 \text{ C.Y.}$$

$$\text{Eros. Control} = \$ 9,600 \text{ Ln-mi}$$

$$\text{Sign \& marking} = \$ 4,300 \text{ Ln-mi}$$

$$\text{RLW for Original SR 296} = 3.658 \text{ AC}$$

$$\text{RLW for Alt. SR 296} = 0.758 \text{ AC} \quad 0.758$$

$$2.90 \text{ AC (SAVINGS)}$$

↑ Add'l for Original design

$$\text{Also Clearing \& Grubbing} = 2.9 \text{ AC}$$

$$2 \text{ Lanes} \times .174 \text{ miles} = 0.348 \text{ Ln-miles}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-1**

DESCRIPTION: **USE 11-FT. TRAVEL LANES THROUGHOUT THE PROJECT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 12-ft.-wide travel lanes throughout the project.

ALTERNATIVE: (Sketch attached)

Use 11-ft.-wide travel lanes throughout the project. Retain 12-ft.-wide turning lanes.

ADVANTAGES:

- Reduces costs
- Reduces right-of-way costs

DISADVANTAGES:

- Deviates from Department standards
- Less room for traffic to maneuver

DISCUSSION:

A reduction in the width of the travel lanes from 12 ft. to 11 ft. will have little or no impact on traffic operations. This cost reduction effort is gaining wide acceptance throughout the Department where its application is warranted – in situations like this facility.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,151,060	—	\$ 1,151,060
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 1,151,060	—	\$ 1,151,060



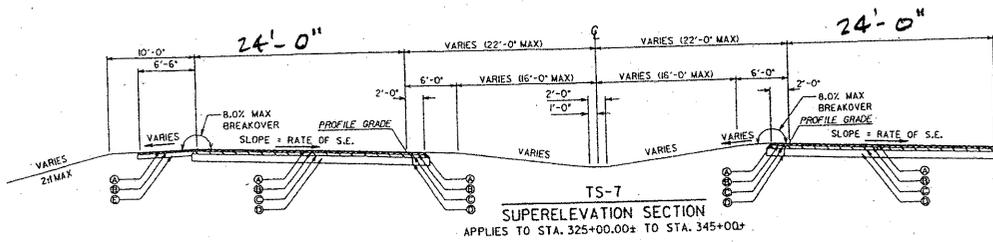
PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

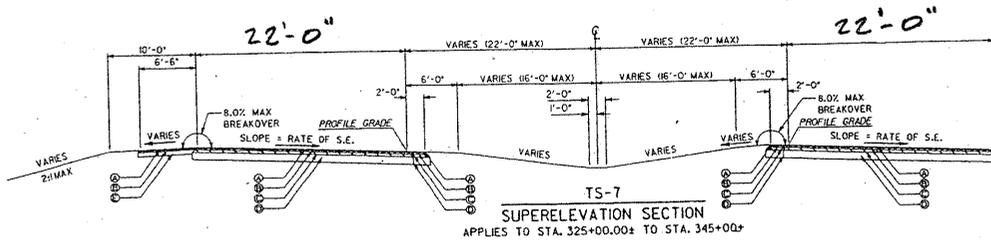
32-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

32-1

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 6.63 \text{ MILES} = 35,006 \text{ FT}$$

$$\text{PAVEMENT AREA REDUCTION} = 4(35,006) / 9 = 15,558 \text{ SY}$$

$$\text{RIGHT-OF-WAY REDUCTION} = 4(35,006) / 43,560 = 3.21 \text{ AC.}$$

RIGHT-OF-WAY DISTRIBUTION

1.96 ACRES RESIDENTIAL @ \$6,650 / ACRE

104.9 ACRES AGRICULTURAL @ \$2,200 / ACRE

2.08 ACRES COMMERCIAL @ \$44,000 / ACRE

AVG. RIGHT-OF-WAY COST

$$= [1.96(6650) + 104.9(2200) + 2.08(44000)] / 108.94$$

$$= \$3078 / \text{ACRE}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-2**

DESCRIPTION: **USE 32-FT. MEDIAN VERSUS 44-FT. MEDIAN**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A 44-ft. grass median is used between the NB and SB lanes of the mainline from CR 138/Mennonite Church Road to SR 88.

ALTERNATIVE: (Sketch attached)

Use a 32-ft. grass median between the NB and SB lanes of the mainline between CR 325/Clark Mill Road to CR 138/Mennonite Church Road and SR 88.

ADVANTAGES:

- Reduces right-of-way costs
- Reduces construction time
- Implements common practice

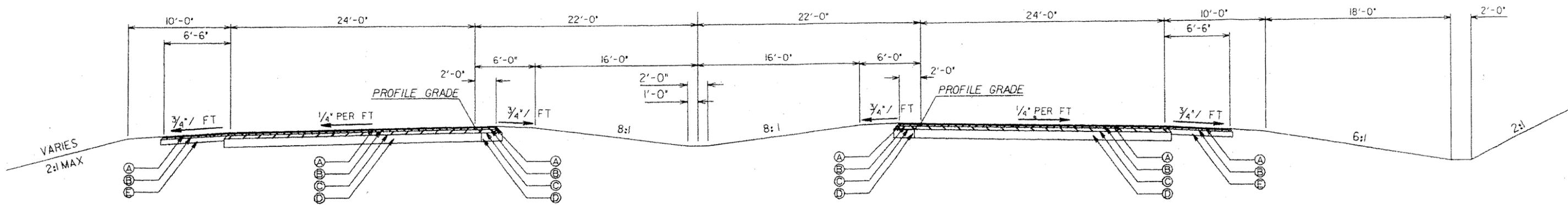
DISADVANTAGES:

- Perceived loss of safety

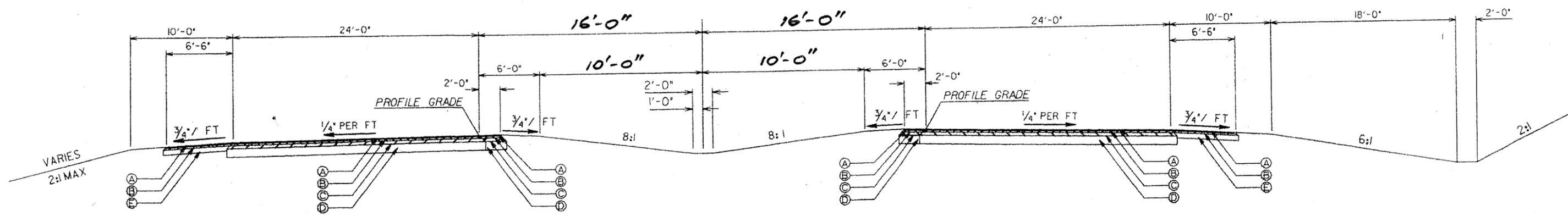
DISCUSSION:

A reduction in the width of the median from 44 ft. to 32 ft. will have no impact on traffic operations and provides for right-of-way savings. The use of 32-ft. grass medians is common in areas where a narrower median is desired such as for environmental impact reductions.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 207,848	—	\$ 207,848
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 207,848	—	\$ 207,848



ORIGINAL DESIGN



ALTERNATIVE



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:
32-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

Right-of-Way:

$$\text{Length} = \text{Sta. } 417+14.14 - \text{Sta. } 142+27.10$$

$$" = 27,487.04'$$

$$\text{Width} = 44' - 32' = 12'$$

$$\text{Total Area} = 27,487.04' \times 12' \div 43,560 \text{ sf/Ac}$$

$$" = 7.57 \text{ Ac.}$$

Residential Land:

$$\text{Length} = (\text{Sta. } 180+00 - \text{Sta. } 140+00) + (\text{Sta. } 354+00 - \text{Sta. } 290+00)$$

$$" = 4,000' + 6,400'$$

$$" = 10,400'$$

$$\text{Area} = (12' \times 4,000') + (6' \times 6,400')$$

$$" = 86,400 \text{ sf} \div 43,560$$

$$" = 1.98 \text{ Ac.}$$

Agricultural Land:

$$\text{Area} = 7.57 \text{ Ac} - 1.98 \text{ Ac}$$

$$" = 5.59 \text{ Ac}$$

Grass Median:

- Permanent Grassing:

$$\text{Area} = 89 \text{ Ac}$$

• Agricultural Lime:

$$\text{Quan.} = 89 \text{ TN}$$

• Liquid Lime:

$$\text{Quan.} = \frac{223 \text{ GL}}{89 \text{ Ac}} \times 7.57 \text{ Ac} = 18.97 \text{ GL}$$

• Fertilizer Mixed Grade:

$$\text{Quan.} = \frac{63 \text{ TN}}{89 \text{ Ac}} \times 7.57 \text{ Ac} = 5.36 \text{ TN}$$

• Fertilizer Nitrogen Content:

$$\text{Quan.} = \frac{4450}{89} \times 7.57 = 378.5 \text{ LB}$$

• Erosion Control Mats, Slopes:

$$\text{Quan.} = (793/67 + 89) \times 7.57 = 67,464 \text{ SY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-3**

DESCRIPTION: **USE 6-FT. PAVED SHOULDERS IN RURAL SECTION**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

6.5-ft. paved shoulders are used throughout the rural section of the project along the mainline from north of CR 138/Mennonite Church Road to SR 88.

ALTERNATIVE: (Sketch attached)

Use 6-ft. shoulders along the mainline throughout the rural section of the project between CR 138/Mennonite Church Road to SR 88.

ADVANTAGES:

- Reduces right-of-way costs
- Reduces construction time
- Implements common practice

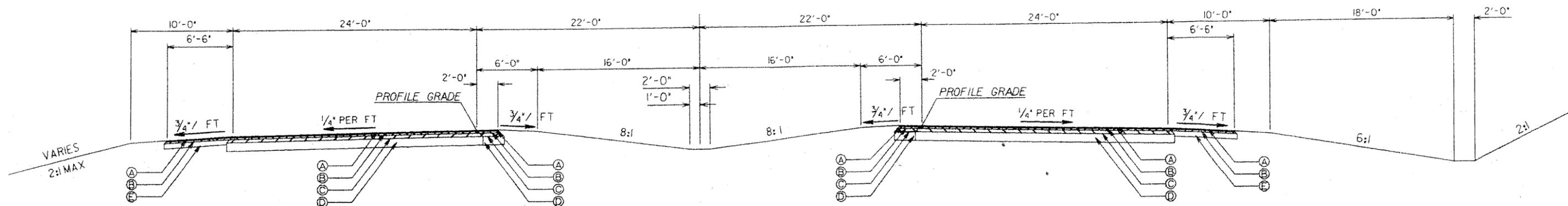
DISADVANTAGES:

- Perceived loss of safety

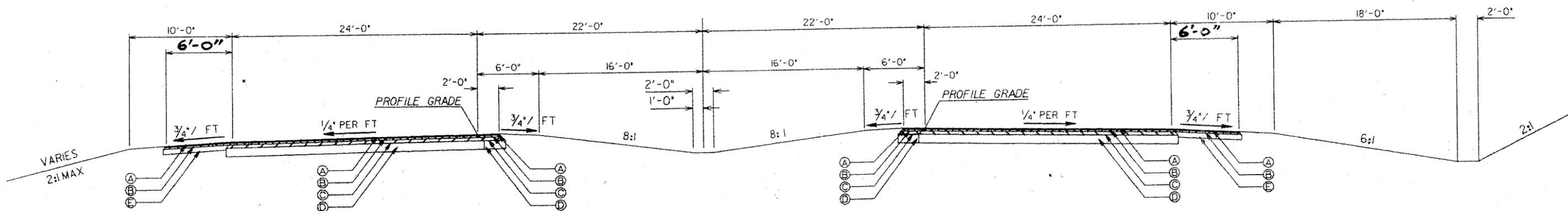
DISCUSSION:

A reduction in shoulder widths from 6.5 ft. to 6.0 ft. will have no impact on traffic operations and provides for right-of-way savings. This reduction will still allow for an appropriate clear zone.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 142,803	—	\$ 142,803
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 142,803	—	\$ 142,803



ORIGINAL DESIGN



ALTERNATIVE



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

32-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

Right-of-way:

$$\begin{aligned} \text{Length} &= \text{Sta. } 482+18.63 - \text{Sta. } 142+27.10 \\ &= 33,992 \text{ ft} \end{aligned}$$

$$\text{Width} = 1.0'$$

$$\begin{aligned} \text{Total Area} &= 33,992' * 1' \div 43,560 \text{ sf/Ac} \\ &= 0.78 \text{ Ac} \end{aligned}$$

• Residential Land:

$$\text{Area} = \frac{\textcircled{1} 1.9 \text{ BAc}}{\textcircled{2} 7.57 \text{ Ac}} * 0.78 \text{ BAc}$$

⊗ See Sheet 2 (32-2)

$$\text{Area} = 0.2 \text{ Ac}$$

• Agricultural Land:

$$\text{Area} = 0.78 \text{ BAc} - 0.2 \text{ BAc}$$

$$\text{Area} = 0.58 \text{ BAc}$$

Paved Shoulder:

$$\text{Length} = 33,992'$$

$$\text{Width} = 1.0'$$

$$\text{Area} = 33,992' * 1.0' \div 9 \text{ sf/sy}$$

$$\text{Area} = 3,777 \text{ sy}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-6**

DESCRIPTION: **RETAIN EXISTING ALIGNMENT/ROADWAY FROM STATION 150+00 TO STATION 230+100**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The present design realigns the mainline on new location and abandons the existing roadway from STA 150+00 to STA 230+00.

ALTERNATIVE: (Sketch attached)

Do not abandon the existing roadway from STA 150+00 to STA 230+00. The retained roadway would be used as the SB traffic. Widen the existing route to the east side away from the historic property and use for NB traffic.

ADVANTAGES:

- Reduces initial costs
- Reduces right-of-way costs
- Takes advantage of an existing asset

DISADVANTAGES:

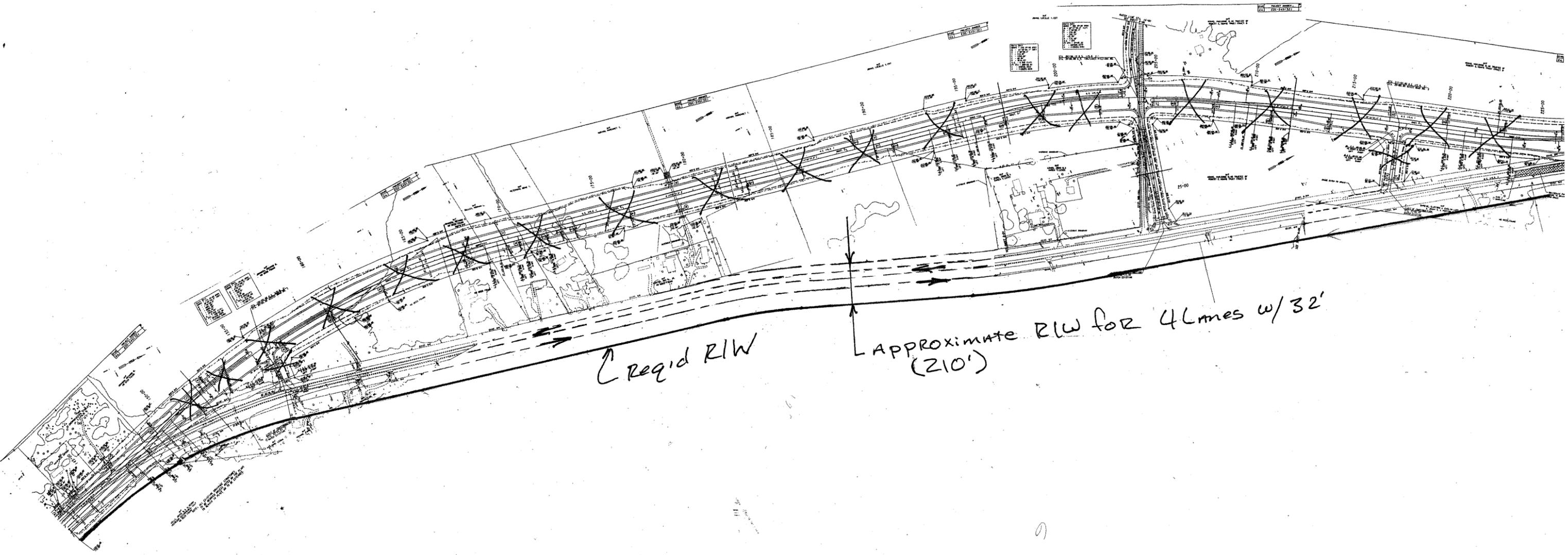
- May increase residential right-of-way impacts

DISCUSSION:

This alternative uses the existing route from STA 150+00 to STA 230+00 which is being abandoned because of an historic property on the west side of the mainline. The roadway could be widened to the east using a 32-ft. wide median instead of the proposed 44-ft. median, thus reducing impacts.

It is assumed the existing pavement would be overlaid since the project proposes to overlay existing pavement where it is retained.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,353,534	—	\$ 3,353,534
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 3,353,534	—	\$ 3,353,534



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

32-6

SHEET NO.: 3 of 5

STA 150+00 to STA 230+00 = 8,000' = 1.515 miles
 Use 32' median to reduce impacts.

Aug. ^{Regid} RLW on Original new Location Route = 220'

RLW for Alternate design 220' - 12' = 208'

↑ Savings in median

R/W Savings for Alternate:

$$\begin{matrix} 220' & - & (208' - 130') & = & 142' & \text{R/W saved} \\ \text{original} & & \begin{matrix} \uparrow \\ \text{Alt.} \\ \text{RLW} \end{matrix} & & \begin{matrix} \uparrow \\ \text{Exist RLW} \end{matrix} & \text{Along Alt. Route} \end{matrix}$$

$$\frac{142' \times 8,000'}{43,560} = 26.08 \text{ AC. RLW}$$

The existing pavement for the Northbound two lanes would be retained and overlaid. Thus the (19mm) & (25mm) & GAB would be "SAVED" versus the full depth pavement section on the present design

$$\frac{8,000' \times 26'}{9} = 23,110 \text{ s.y. (Full depth pavement Savings)}$$

Clearing & Grubbing (Savings) $\frac{80' \times 8,000'}{43,560} = 14.6 \text{ AC}$

Pavement Cost / sy for (19mm), (25mm) & GAB (w/o surface course (2.5mm))
 $\$51.14/sy - 7.01/sy = \$44.13/sy$
 (Full depth) (12.5mm)

Save earthwork over grading two lanes on new location:
 $\frac{80' \times 4 \text{ ht. Aug.} \times 8,000'}{27} \approx 95,000 \text{ c.y.}$

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

32-6

SHEET NO.: 4 of 5

SAVE Construction Cos of two Access Roads
 (No. 1 & No. 2) to New location

$$\text{Length of both Roads} = 330 + 200' = 330 + 200' = 530'$$

$$\text{SAVE cost of the median opening A Access Rd No. 1} = 25' = 1200'$$

$$\text{SAVE cost of Pt. Turn Lane onto Access No. 2} = 400'$$

$$\text{S.Y.} = \frac{(530' \times 24) + (1200' \times 28) + (400' \times 12)}{9} = 5,680 \text{ S.Y.}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-7**

DESCRIPTION: **USE ONE-WAY PAIRS BETWEEN STATION 150+00 TO STATION 230+100**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The present design realigns the mainline on new location and abandons the existing roadway from STA 150+00 to STA 230+00.

ALTERNATIVE: (Sketch attached)

Do not abandon the existing roadway from STA 150+00 to STA 230+00 and retain that portion for the NB traffic and use the new location for SB traffic.

ADVANTAGES:

- Reduces initial costs
- Reduces right-of-way costs
- Takes advantage of an existing asset

DISADVANTAGES:

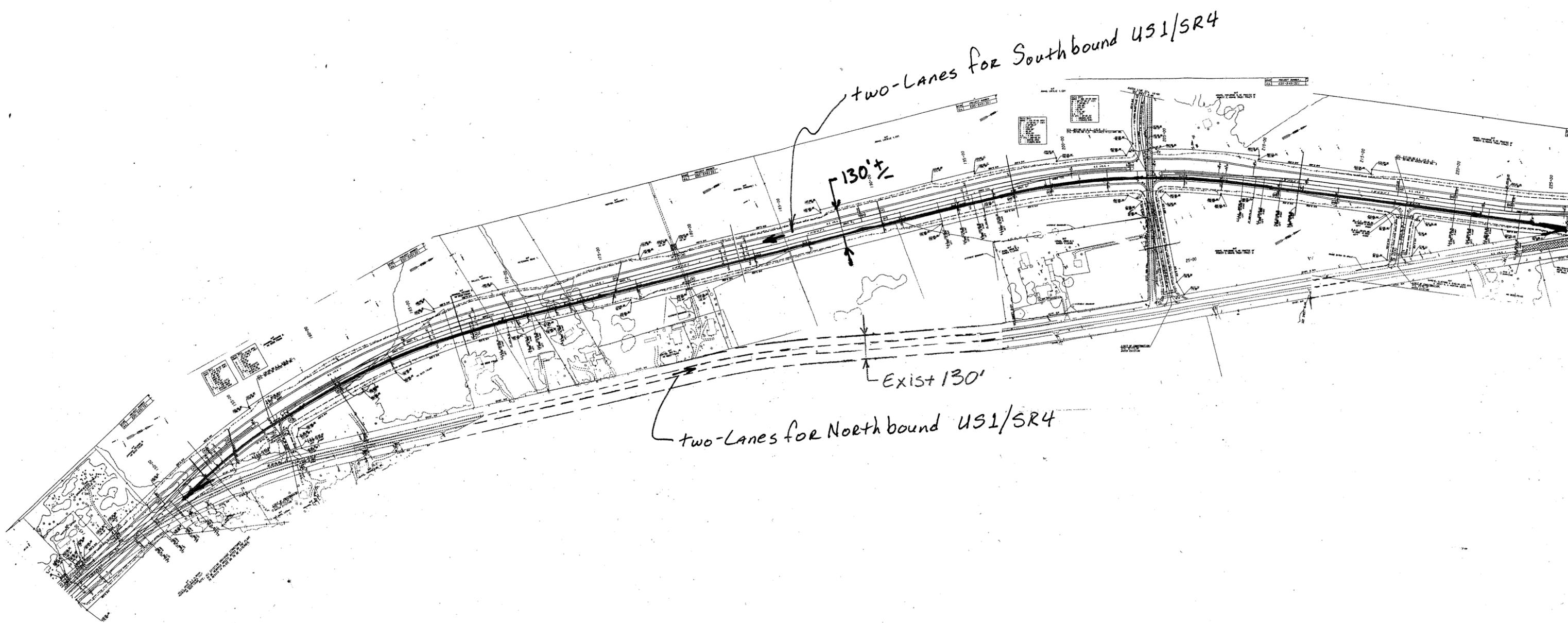
- None apparent

DISCUSSION:

The original design proposes the mainline on new location from STA 150+00 to STA 230+00 to avoid possible impacts to an historic property on the west side of the mainline and abandons the existing roadway.

Use the proposed abandoned SR 4/US 1 alignment for NB traffic. Reduce the widening of the new location to just two lanes and use for the SB traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,129,070	—	\$ 3,129,070
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 3,129,070	—	\$ 3,129,070



One-Way PAIR

32-7

2/4.

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

32-7

SHEET NO.: 3 of 4

Savings on R/W since "new" R/W will only
 require approximately 130' for two-lanes

Savings in R/W: 220' Avg. R/W for 4 lanes (4' incline)
 on new location.

$$\text{R/W Savings: } 220' - 130' = 90'$$

$$\frac{90' \times 8,000'}{43,560 \frac{\text{SF}}{\text{AC}}} \approx 17 \text{ AC}$$

Pavement Savings: Same as 32-6
 for pavement savings utilizing the
 existing pavement.

$$\text{unclass excav: } \frac{8,000' \times 80' \times 5' \text{ht.}}{27} \approx 118,600 \text{ C.Y.}$$

$$\text{(Full depth pavement savings) S.Y.} = \frac{8,000' \times 26'}{9} = 23,110 \text{ S.Y.}$$

$$\text{Pavement Section Cost: } \$44.13/\text{sy}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-8**

DESCRIPTION: **MAKE THE NORTHBOUND BRIDGE OVER BIG CREEK**
38-FT.-WIDE GUTTER-TO-GUTTER

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design indicates the NB bridge over the Big Creek to be 40 ft. wide gutter-to-gutter.

ALTERNATIVE: (Sketch attached)

Use a 38-ft.-wide gutter-to-gutter NB bridge over the Big Creek.

ADVANTAGES:

- Provides for a standard width bridge
- Reduces costs
- Implements common practice

DISADVANTAGES:

- None apparent

DISCUSSION:

For a four-lane rural divided highway, the standard bridge width per the Manual of Guidance Transportation Online Policy and Procedure System (TOPPS) is 38 ft. The original design provides a width of 40 ft.; this additional width provides no benefit but adds cost to the project.

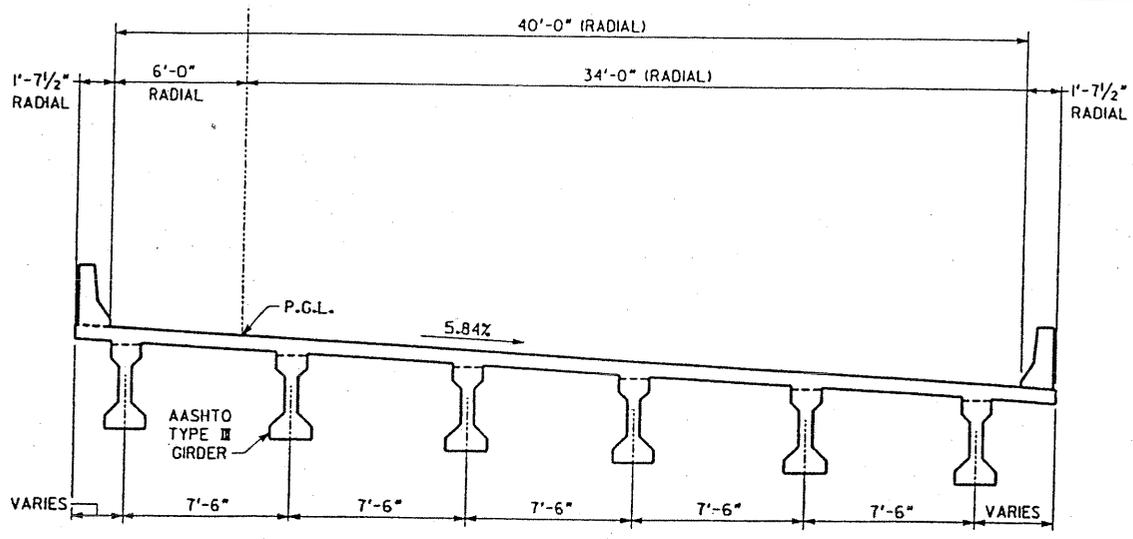
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 31,441	—	\$ 31,441
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 31,441	—	\$ 31,441

PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:
32-8

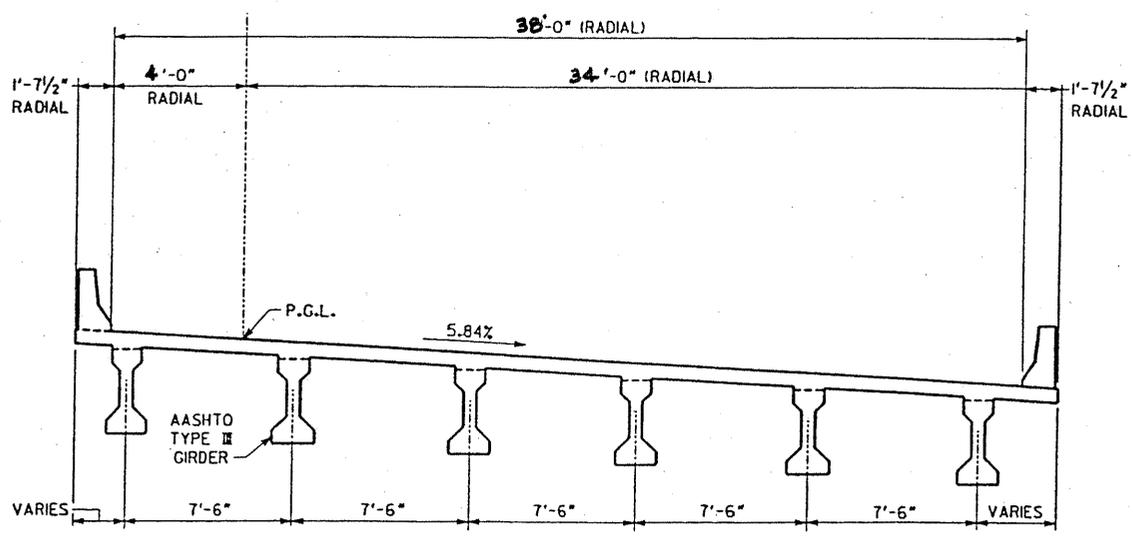
AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



DECK SECTION - RIGHT BRIDGE
TYPICAL SECTION @ SPAN 2

AS DESIGNED ALTERNATIVE



DECK SECTION - RIGHT BRIDGE
TYPICAL SECTION @ SPAN 2

CALCULATIONS



PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

32-8

SHEET NO.: 3 of 4

BRIDGE LENGTH = 140'

WIDTH REDUCTION = 2'

AREA REDUCTION = $140(2) = 280 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-9**

DESCRIPTION: **BEGIN RIGHT-TURN LANE TO SAND VALLEY ROAD
SOUTH OF THE BRIDGE OVER BIG CREEK**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

The SB right-turn lane to Sand Valley Road begins approximately 480 ft. north of the intersection necessitating a tapered bridge.

ALTERNATIVE: (Sketch attached)

Begin the right-turn lane taper at the south end of the bridge.

ADVANTAGES:

- Reduces the bridge width
- Reduces pavement
- Reduces costs
- Simplifies design and construction

DISADVANTAGES:

- Shortens turn lane

DISCUSSION:

Traffic counts are not provided for Sand Valley Road but it is assumed there is not a large volume turning right from SR 4/US 1 onto Sand Valley Road. Shortening the turn lane reduces the bridge area and greatly simplifies the bridge construction since a tapered bridge is no longer necessary and a constant width bridge will be constructed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 135,730	—	\$ 135,730
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 135,730	—	\$ 135,730

SKETCHES



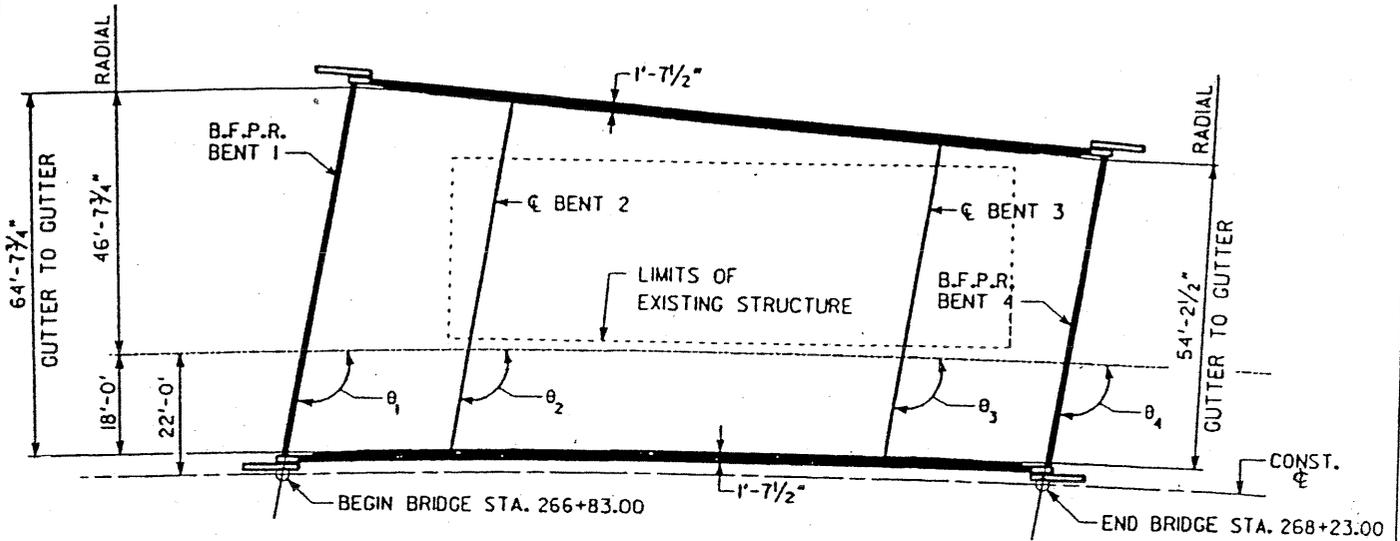
PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

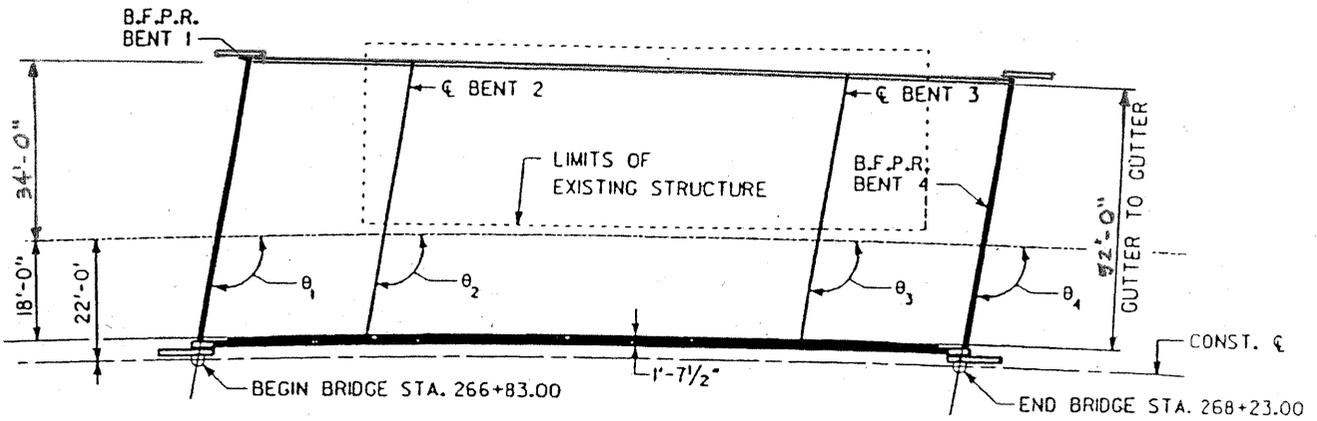
32-9

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 6



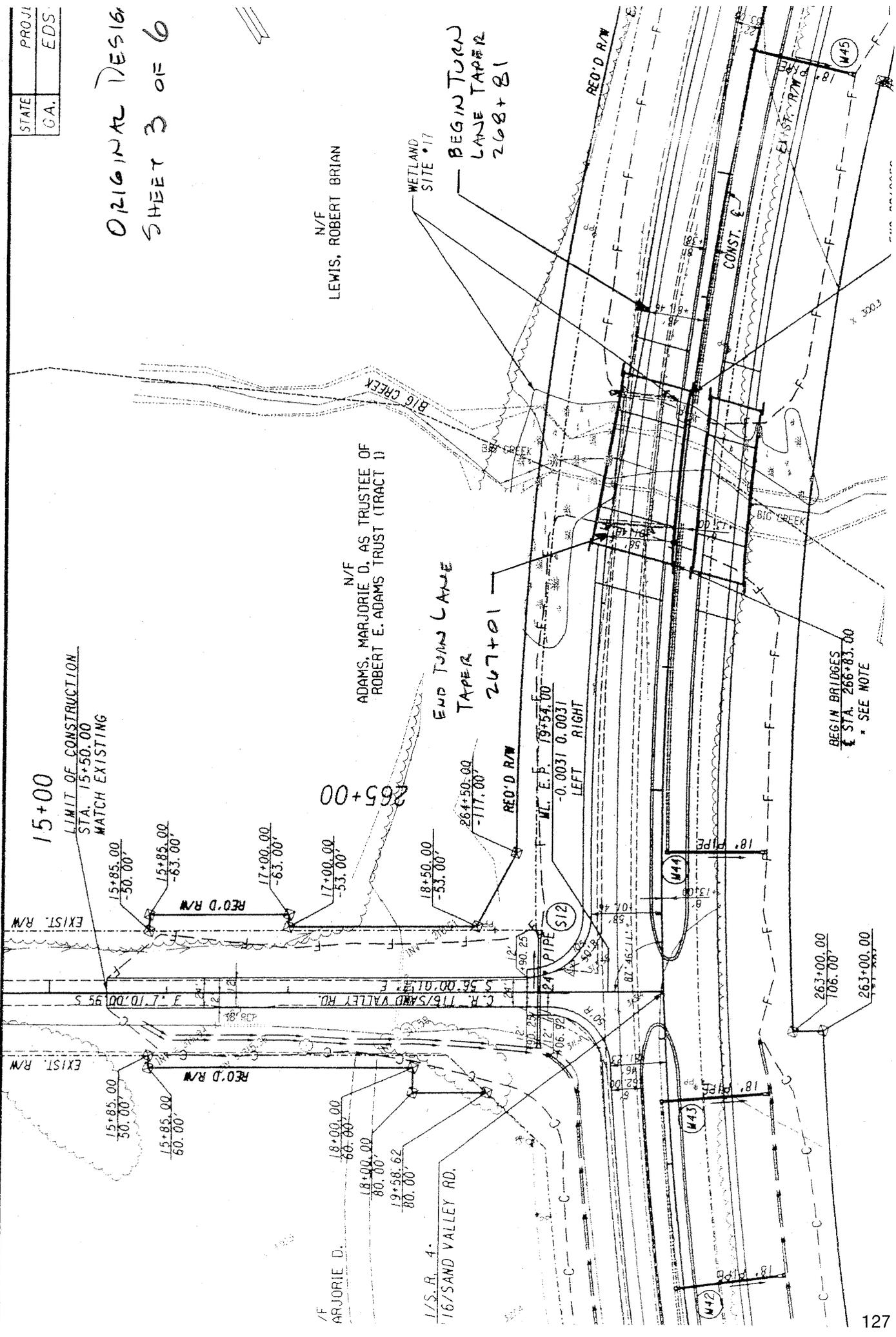
AS DESIGNED ALTERNATIVE



ALTERNATIVE NO.
32-9

STATE	PROJ
GA.	EDS.

ORIGINAL DESIGN
SHEET 3 OF 6

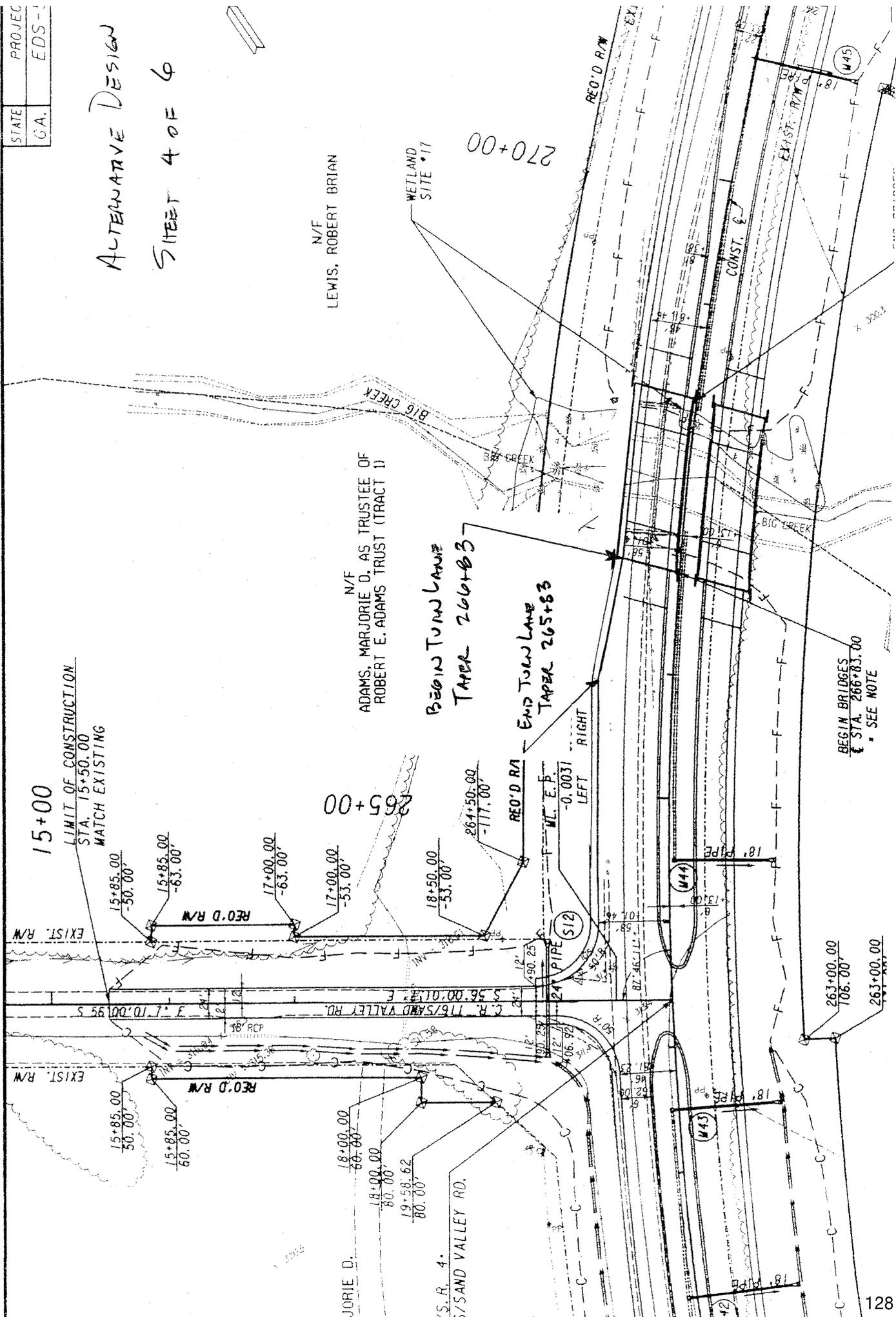


ALTERNATIVE No.
32-9

STATE	PROJECT
GA.	EDS-

ALTERNATIVE DESIGN

SHEET 4 OF 6



15+00
LIMIT OF CONSTRUCTION
STA. 15+50.00
MATCH EXISTING

ADAMS, MARJORIE D. AS TRUSTEE OF
ROBERT E. ADAMS TRUST (TRACT D)
N/F

LEWIS, ROBERT BRIAN
N/F

BEGIN TAPER
TAPER 266+83

END TAPER
TAPER 265+83

BEGIN BRIDGES
STA. 266+83.00
* SEE NOTE

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

32-9

SHEET NO.: 5 of 6

$$\text{BRIDGE WIDTH} = 140'$$

$$\begin{aligned} \text{ORIGINAL DESIGN AVG. WIDTH} \\ &= \frac{54.21 + 64.65}{2} \\ &= 59.43 \end{aligned}$$

$$\text{ALTERNATIVE DESIGN WIDTH} = 52'-0''$$

$$\begin{aligned} \text{BRIDGE AREA REDUCTION} &= 140(59.43 - 52) \\ &= 1,040 \text{ SF} \end{aligned}$$

$$\begin{aligned} \text{TURN LANE IS SHORTENED BY} \\ 26881 - 26683 &= 198' \end{aligned}$$

$$\begin{aligned} \text{PAVEMENT AREA REDUCTION} \\ &= 198(12)/4 = 264 \text{ SY} \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-10**

DESCRIPTION: **BEGIN LEFT-TURN LANE TO SAND VALLEY ROAD SOUTH
 OF THE BRIDGE OVER BIG CREEK**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

The SB left-turn lane to Sand Valley Road begins approximately 800 ft. north of the intersection necessitating a wider bridge.

ALTERNATIVE: (Sketch attached)

Begin the left-turn lane taper at the south end of the bridge.

ADVANTAGES:

- Reduces the bridge width
- Reduces pavement
- Reduces costs

DISADVANTAGES:

- Shortens turning lane

DISCUSSION:

The left-turn lane is used only for u-turns at Sand Valley Road and as such, the volume is very low. Shortening the left lane reduces the bridge and turn lane areas.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 218,289	—	\$ 218,289
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 218,289	—	\$ 218,289

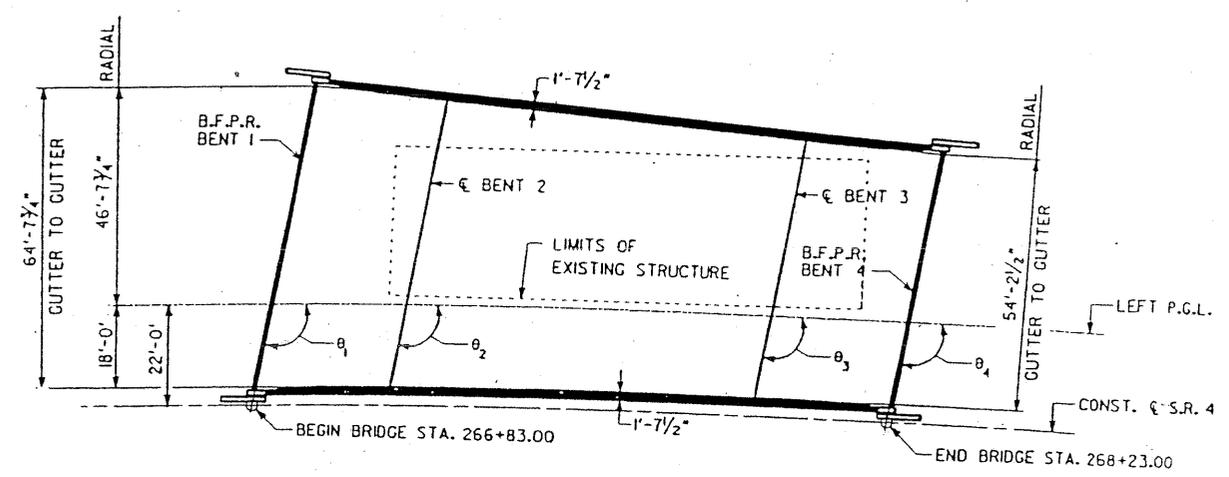
PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

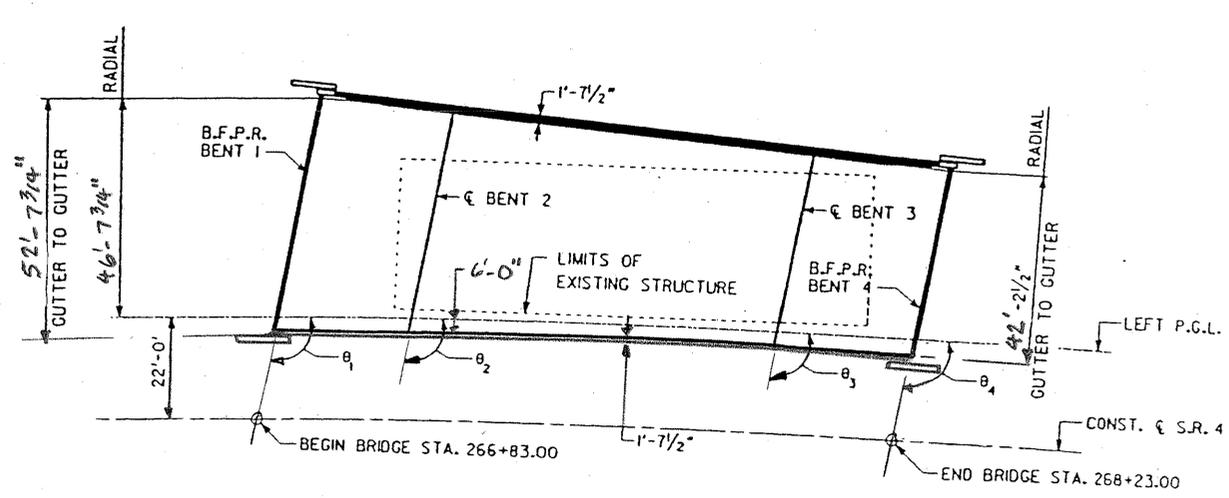
32-10

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 6



AS DESIGNED ALTERNATIVE



ALTERNATIVE No.

32-10

ORIGINAL DESIGN

SHEET 3 OF 6

N/F
LEWIS, ROBERT BRIAN

N/F
ADAMS, MARJORIE D. AS TRUSTEE OF
ROBERT E. ADAMS TRUST (TRACT 1)

WETLAND
SITE #17

270+00

265+00

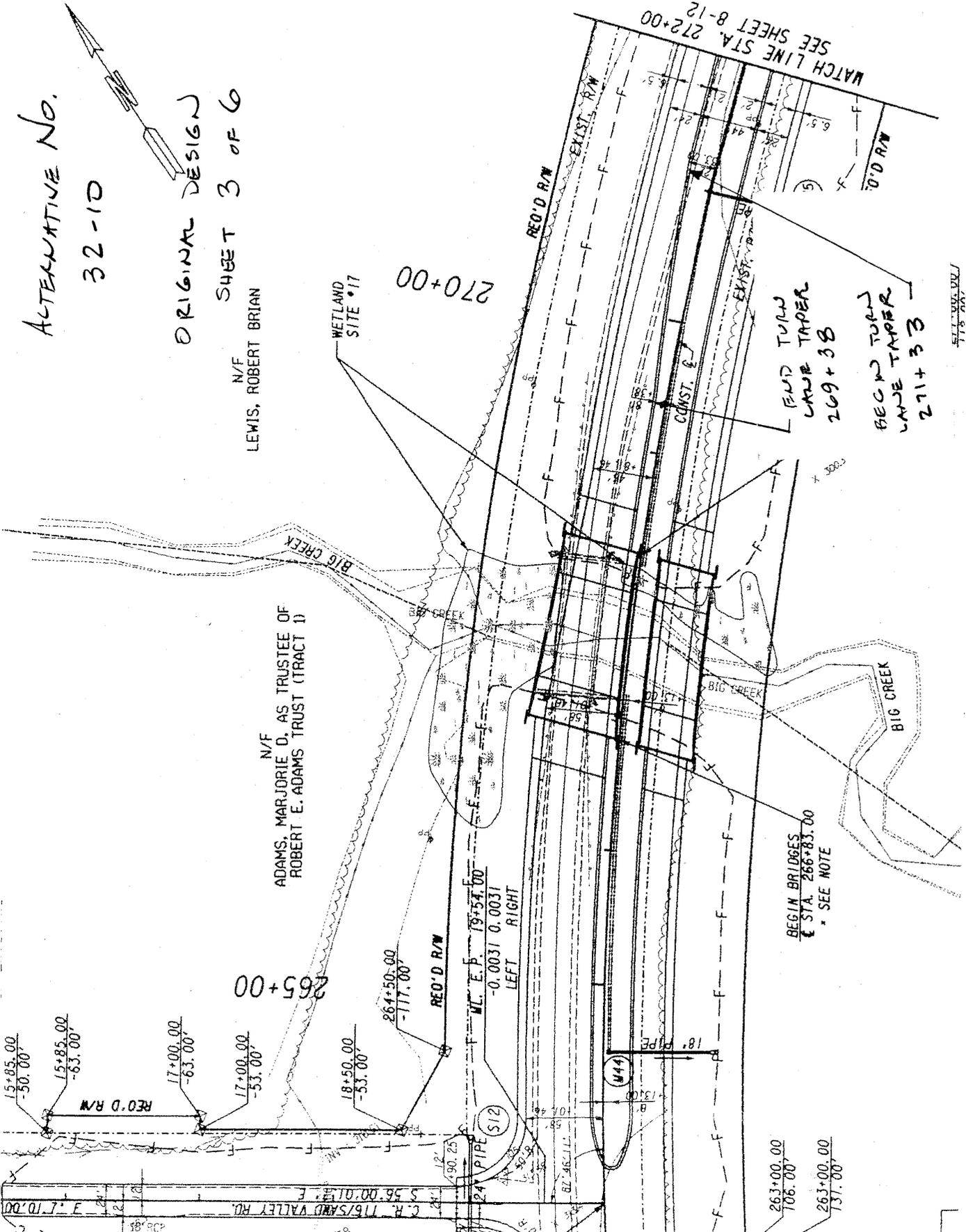
MATCH LINE STA. 272+00
SEE SHEET 8-12

END TURN
LARGE TAPER
269+38

BEGIN TURN
LARGE TAPER
271+33

511-114-001
115-001

BEGIN BRIDGES
E STA. 266+83.00
* SEE NOTE



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

32-10

SHEET NO.: 5 of 6

BRIDGE WIDTH IS REDUCED BY 12'

$$\text{BRIDGE AREA REDUCTION} = 140(12) = 1,680 \text{ SF}$$

TURN LANE IS SHORTENED BY $450' - 140' = 310'$

$$\text{TURN LANE AREA REDUCTION} = 310(12)(9) = 413 \text{ SY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

ALTERNATIVE NO.: **32-11**

DESCRIPTION: **AT THE BRIDGES OVER BIG CREEK, USE THREE SPANS
AT 47 FT., TYPE I MODIFIED PRE-STRESSED BEAMS AND
PILE BENTS**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

The current design indicates the bridges over Big Creek have two 30-ft. end spans with reinforced concrete deck girders; one 80 ft. span with Type III pre-stressed beams; two pile end bents; and two concrete intermediate bents.

ALTERNATIVE: (Sketch attached)

Change the bridges over Big Creek to have three 47-ft. spans with Type I modified prestressed beams, two pile end bents and two pile intermediate bents.

ADVANTAGES:

- Reduces construction time
- Reduces costs
- Eliminates possibility of cofferdams
- Simplifies design and construction

DISADVANTAGES:

- None apparent

DISCUSSION:

The original design uses an 80-ft. span with Type III pre-stressed concrete beams for the span over the creek. Using shorter spans of 47 ft. allows for smaller beams as well as pile intermediate bents. In addition to lighter beams and much simpler intermediate bents construction, this alternative precludes the possibility of requiring cofferdams.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,597,665	—	\$ 1,597,665
ALTERNATIVE	\$ 1,347,783	—	\$ 1,347,783
SAVINGS	\$ 249,882	—	\$ 249,882

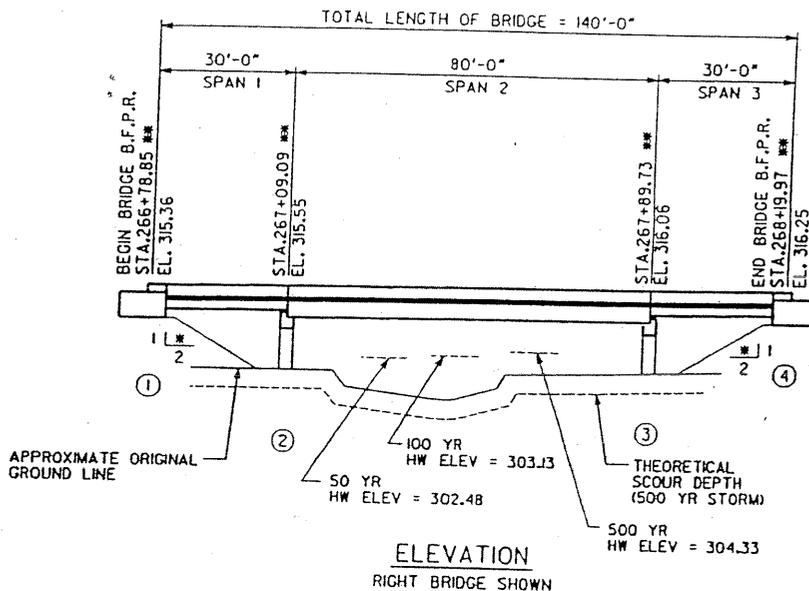
PROJECT: **EDS-545(29, 30, 31, 32) and BRST-043-1(58),**
P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
WIDENING AND RECONSTRUCTION SR 4 / US 1
Jefferson County, Georgia Department of Transportation, District 2
Design Development Stage

ALTERNATIVE NO.:

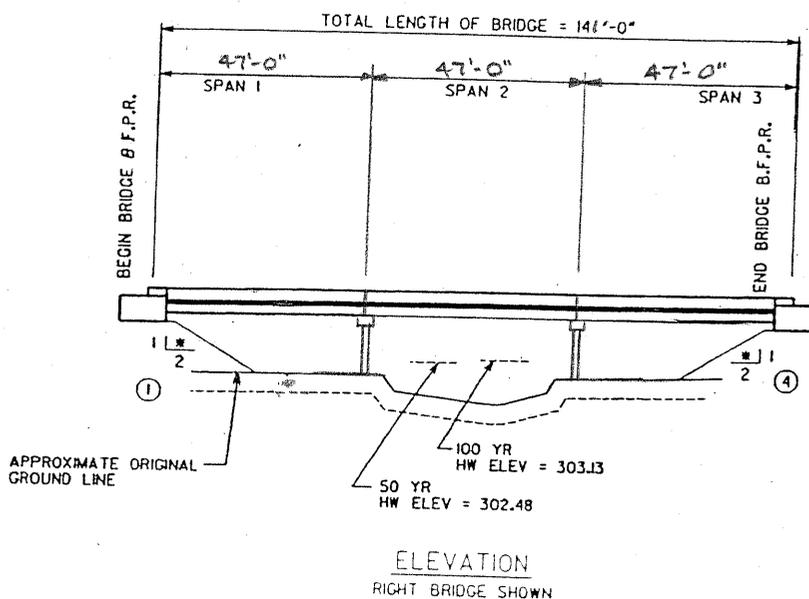
32-11

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 6



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

32-11

SHEET NO.: 3 of 6

CALCULATE RIGHT BRIDGE COSTS, PRORATE FOR BOTH BRIDGES

ORIGINAL DESIGN:

ASSUME 8 1/2" DECK

END SPANS:

$$\text{DECK } 43.25(8.5/12)(2)(30) = 1,838$$

$$\text{GIRDER STEMS } 6(1.5)(2.0417)(2)(30) = 1,103$$

$$\Sigma = 2,941 / 27 = 108.9$$

$$\text{INCREASE BY 15% FOR MISC.} = 125.3 \text{ CY}$$

$$\text{SUPERSTR REINF @ } 225\$/\text{CY} = 125.3(225) = 28,193$$

SPAN 2:

$$\text{DECK } 43.25(8.5/12)(80) = 2451$$

$$\text{COPING } 6(16/12)(1.5/12)(80) = 80$$

$$\Sigma = 2,531 / 27 = 93.7$$

$$\times 1.15 = 107.8$$

$$\text{SUPERSTR REINF @ } 185\$/\text{CY} = 107.8(185) = 19,943$$

$$\text{SUPERSTR CONC TOTAL} = 125.3 + 107.8 = 233.1$$

$$\text{SUPERSTR REINF TOTAL} = 19,943 + 28,193 = 48,136$$

$$\text{TYPE III BEAMS } 6(80 - .3333) = 478 \text{ LF}$$

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

32-11

SHEET NO.: 4 of 6

SUBSTRUCTURE 1 END BENTS SAME

INTERMEDIATE BENTS:

$$\text{CAP } 42 \times 3.5 \times 3.5 \times 2 = 1029$$

$$\text{COLUMNS } 3 \times 3 \times 14 \times 2 \times 2 = 504$$

$$\text{FOOTINGS } 6.5 \times 6.5 \times 3.5 \times 2 \times 2 = 592$$

$$\Sigma = 2125 / 27 = 78.7 \text{ CY}$$

$$\text{REINFORCING @ } 125 \#/\text{CY} = 78.7(125) = 9837$$

PILING: 5- HP12x53 PER FOOTING, EA. PILE 50' LONG

$$\text{PILE L} = 5(2)(2)(50) = 1000 \text{ LF}$$

ALTERNATIVE DESIGN

$$\text{DECK } 3(47)(43.25)(8.57/12) = 4320$$

$$\text{COPING } 3(47)(6)(14/12)(1.25/12) = 103$$

$$\Sigma = 4423 / 27 = 163.8$$

$$\times 1.15 = 188.4$$

$$\text{SUPERSTR REINF @ } 185 \#/\text{CF} = 185(188.4) = 34,854$$

$$\text{TYPE I MOD BMS } 6 [2 + 45.9333 + 46.6667] = 830 \text{ LF}$$

END BENTS SAME

$$\text{INTERMEDIATE BENT CAPS: } 42(3)(2)(2) / 27 = 18.7$$

$$\text{REINF @ } 110 \#/\text{CY} = 110(18.7) = 2057$$

CALCULATIONS



PROJECT: EDS-545(29, 30, 31, 32) and BRST-043-1(58),
 P. I. Nos. 222120, 222150, 222160, 1222170 and 232265,
 WIDENING AND RECONSTRUCTION SR 4 / US 1
 Jefferson County, Georgia Department of Transportation, District 2
 Design Development Stage

ALTERNATIVE NO.:

SHEET NO.: 5 of 6

PILING: HP 14x73, 70' LONG
 $L = 2(6)(70) = 840 \text{ LF}$

RT BRIDGE AREA = $43.25(140) = 6055 \text{ SF}$

LT BRIDGE AREA = $140 \left(\frac{67.9 + 57.5}{2} \right) = 8778$

RATIO = $\frac{8778 + 6055}{6055} = 2.45$

QUANTITIES FOR COSTS

	ORIGINAL DESIGN	X 2.45	ALTERN. DESIGN	X 2.45
SUPERSTR CONC	233.1	571.1	188.4	461.6
SUPERSTR REINF	48,136	117,933	34,854	85,392
TYPE I MOD BMS	0	0	830	2,034
TYPE III BMS	478	1,171	0	0
SUBST CONC	78.7	192.8	18.7	45.8
SUBST REINF	9,837	24,101	3,057	7,490
HP 12x53 PILING	1,000	2,450	0	0
HP 14x73 PILING	0	0	840	2,058

PROJECT DESCRIPTION

PROJECT LOCATIONS AND DESCRIPTIONS

All of the projects, EDS-545(29, 30, 31, and 32) and BRST-043-1(58), are in Jefferson County, Georgia and have the primary objective of widening State Route 4 (SR 4)/United States Route 1 (US 1) from two lanes to four lanes as part of the Governor's Road Improvement Program (G.R.I.P.) to promote economic development through an improved transportation network. Project BRST-043-1(58), the bridge replacement over Big Creek, is embedded within EDS-545(32) but identified as a separate project due to a different funding source.

Project EDS-545(29) runs from the north end of the Wadley Bypass to the south end of the Louisville Bypass. From the beginning of the project at County Road (CR) 183 north of Wadley, SR 4/US 1 (from hereon referred to as the mainline) would be widened on the west side to four lanes with a 44-ft. grassed median to CR 248/Walden Brett Road. At that point, the median would taper to 32 ft. to minimize wetland impacts, and the widening would shift to the east side of the mainline to 0.5 miles north of CR 326/Nimrod Road, where the median again tapers to 14 ft. at the end of the project, at US 1 Business (US 1 BUS) in Louisville, Georgia.

Project EDS-545(30) runs from US 1 BUS south of Louisville, to CR 325/Old US 1 and widens the mainline to the east side to four lanes with a 14-ft. flush median with a curb and gutter.

Project EDS-545(31) runs from CR 325/Old US 1, near the north end of the Louisville Bypass, to CR 138/Mennonite Church Road. The beginning of the mainline will be widened on the east side to four lanes with a 14-ft. flush median. The widening would continue to just north of CR 304/Country Club Drive, where the typical section changes to four lanes with a 44-ft. grassed median and continues for approximately one mile. At that point, the widening would shift to the west side to avoid an historic resource, then shift back to the east side to avoid another resource at CR 142/Wilchers Road/Bridges Road. Just north of CR 142/Wilchers Road/Bridges Road, the widening shifts to the west side and continues to just south of SR 296/Harvey Street, then shifts back to the east side for approximately 0.5 miles north of CR 136/Mae Lamb Road. From there, the widening shifts to the west side for approximately 0.75 miles, then shifts back to the east side to end the project at CR 138/Mennonite Church Road.

Project EDS-545(32) runs from CR 138/Mennonite Church Road northward to the proposed relocation of SR 88/Fall Line Freeway in Wrens, Georgia. From the beginning of the project, the mainline is widened on the east side to four lanes with a 44-ft. grassed median. The widening would continue for approximately 0.15 miles, then extend on new location west of the mainline to avoid two historic resources and a cemetery. The alignment would intersect CR 126/Lakes Williams Road, approximately 700 ft. west of the mainline, and return to the existing road just north of CR 127/Nelson Road. The mainline would be widened on the east side to just north of Big Creek, then shift to the west side to just south of CR 329/Campground Road. At that point, the widening would shift back to the east side to approximately 0.20 miles south of CR 129/Hoyt Braswell Road (South). From there, the proposed median would taper to minimize displacements and the widening would continue on the east side to approximately 0.30 miles north of CR 129/Hoyt Braswell Road (South). The typical section would be four lanes with a 32-ft. grassed median. At that point, the widening

would become symmetrical and continue to CR 129/Hoyt Braswell Road (North), where curb and gutter would be used for approximately 0.23 miles to the end of the project.

PROJECT LENGTH					
Project No./P. I. Number	EDS-545(29)/222120	EDS-545(30)/222150	EDS-545(31)/222160	EDS-545(32)/222170	BRST-043-1(58)
Net Length of Roadway	6.3788	2.8465	5.8991	6.4720	0.0000
Net Length of Bridges	0.1932	0.0000	0.0000	0.0265	0.0265 (included in EDS-545(32))
Net Length of Project	6.3788	2.8503	5.8991	6.4985	0.0000
Net Length of Exceptions	0.0000	0.0000	0.0000	0.0000	0.0000
Gross Length of Project	6.5720	2.8503	5.8991	6.4985	Grand Total: 21.8199

NEED AND PURPOSE

The mainline is a primary north-south corridor in eastern Georgia. The proposed projects, EDS-545(29, 30, 31, and 32), involve the widening and reconstruction of the mainline from the Wadley Bypass to SR 88/Stapleton Highway/Broad Street in Wrens. The roadway is reaching capacity and improvements will be required to maintain an acceptable level-of-service. The project will increase the capacity and level-of-service on the mainline by widening it from two lanes to four lanes.

The mainline improvements are part of the G.R.I.P. that was initiated in the 1980s to address the importance of stimulating economic growth via an improved transportation network. It identified a system of economic development highways that consist of existing primary routes, plus additional truck connector routes. The system would place 98% of the State's population within 20 miles of a multi-lane highway and provide access for oversized trucks to cities having populations between 2,000 and 5,000. Among the many benefits of such a system, areas lagging in growth would be provided greater opportunities to attract industry, business and jobs.

The demands created by population and economic growth will spill over onto the non-interstate highway systems that form a critical link for both large and small communities in the state, making highway access a prime prerequisite for community growth in the future. Currently, limitations on trucks restrict access for many Georgia communities, limiting economic potential. 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 attract the industry in most instances.

CONSTRUCTION COSTS

The probable cost of construction for the project is based on the following: Estimate Report for file "222120," Estimate Report for file "222160," Estimate Report for file "222170," and Estimate Report for file "232265," construction cost estimate which was prepared by Kimley-Horn and Associates, Inc. dated October 2007 and Estimate Report for file "EDS-545(30)" construction cost estimate prepared by Washington Group International dated November 2006. These documents list said construction costs

as \$101,247,042; right-of-way costs as \$10,560,000; and reimbursable utilities as \$2,485,222 for a total of \$114,238,264. These figures are broken down as follows: EDS 545(29) at \$34,456,040; EDS-545(30) at \$20,209,765; EDS-545(31) at \$29,789,280; EDS-545(32) at \$27,954,999; and BSRT-043-1(58) at \$1,829,172. The numbers include the following markups:

Construction (1) Engineering and Construction at 10.00%; and
(2) Inflation at 27.60% based on 8.00% per annum for 3.167 years to the midpoint of construction.

Right-of-Way (1) Scheduling Contingency at 55.00%;
(2) Administration/Court Costs at 60.00%; and
(3) Inflation Factor at 40.00%.

Reimbursable Utilities (1) Included in the pricing.

VALUE ANALYSIS AND CONCLUSIONS

GENERAL

This section describes the procedures used during the value engineering study. It is followed by separate narratives and conclusions concerning:

- Value Engineering Study Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Histograms
- Function Analysis
- Creative Idea Listing and Judgment of Ideas

A systematic approach was used in the VE study and the key procedures involved were organized into three distinct parts: 1) preparation; 2) VE workshop; and 3) post-study. A Task Flow Diagram that outlines each of the procedures included in the VE study is attached for reference.

PREPARATION EFFORT

Pre-study preparation for the VE effort consisted of scheduling study participants and tasks; gathering necessary background information on the facility; and compiling project data into a cost model and graphic cost histogram. Information relating to the design, construction, and operation of the facility is important as it forms the basis of comparison for the study effort. Information relating to funding, project planning operating needs, systems evaluations, basis of cost, soil conditions, and construction of the facility was also a part of the analysis.

VALUE ENGINEERING WORKSHOP EFFORT

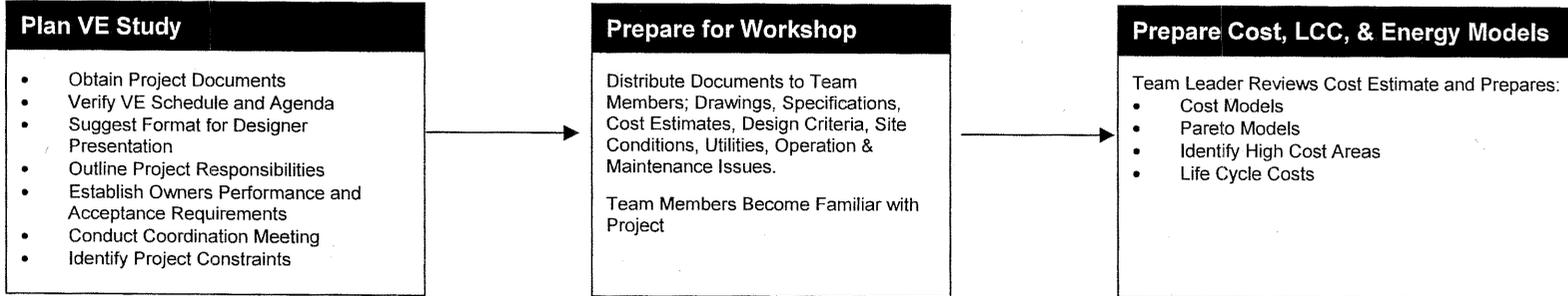
The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It includes six phases:

- Information Phase
- Function Identification and Analysis Phase
- Creative Phase
- Evaluation Phase
- Development Phase
- Presentation Phase

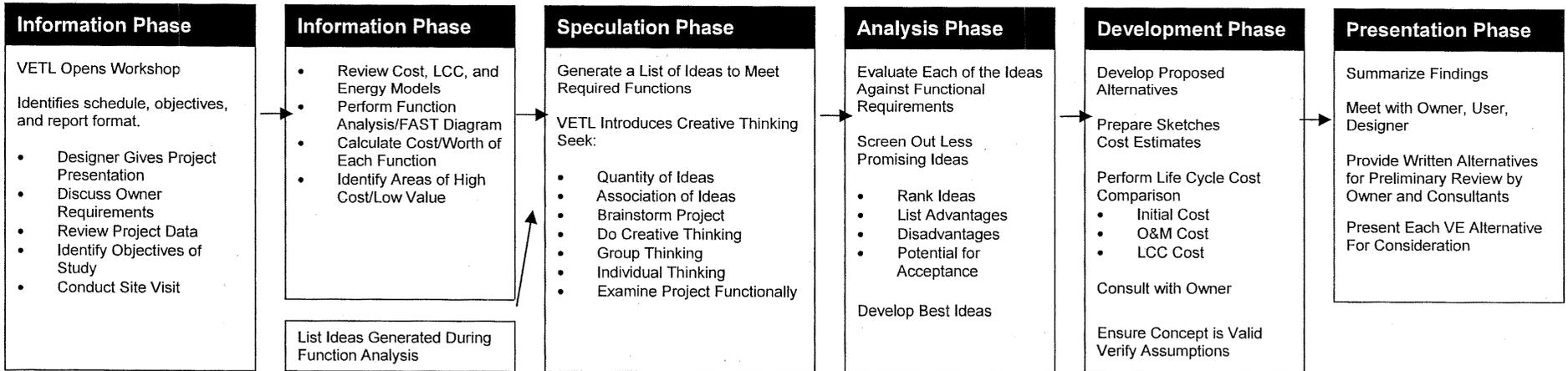


Value Engineering Study Task Flow Diagram

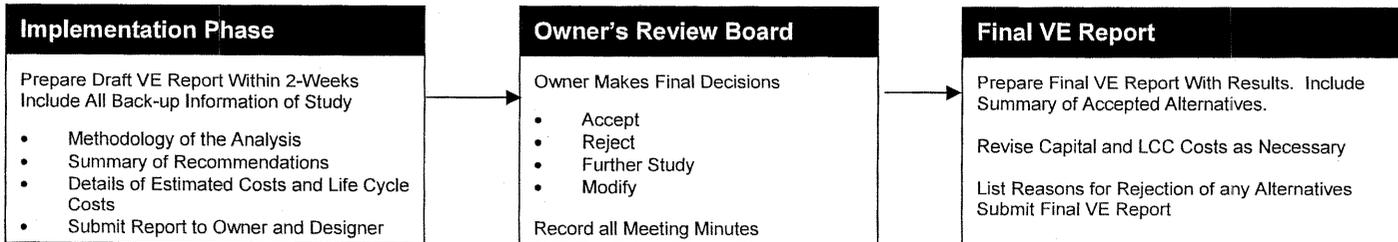
Pre-workshop Effort (Week Prior to Study)



Workshop Effort (3 - 5 Days)



Post-Workshop Effort (Follow-on Schedule)



Information Phase

At the beginning of the study, the conditions and decisions that have influenced the development of the project must be reviewed and understood. For this reason, the development manager presented information about the project to the VE team on first day of the session. Following the presentation, the VE team discussed the project using the following documents:

- Project Concept Report, Department of Transportation, State of Georgia, Office of Environmental/Location for EDS-545(29), Jefferson County, P. I. No. 222120; dated September 16, 1998;
- Estimate Report for File “222120” for Project EDS-545(29); P. I. No. 222120; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated October 10, 2007;
- Preliminary Right of Way Cost Estimate for Project EDS-545(29) Jefferson; P. I. No. 222120; prepared by the State of Georgia Department of Transportation Office of Right of Way; dated February 20, 2007;
- Utility Cost Estimate for Project EDS-545(29) Jefferson; P. I. No. 222120; prepared by the State of Georgia Department of Transportation Office, Office of Utility; dated January 24, 2007;
- Half Size Construction Plans entitled Plan and Profile of Proposed Widening and Reconstruction of US 1/SR 4 from Wadley Bypass to Louisville Bypass; Federal Aid Project EDS-545(29); Jefferson County; Federal Route # U.S. 1; State Route # 4; P. I. No. 222120; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; run date September 27, 2007;
- Bridge Foundation Investigation Report for Project EDS-545(29), P. I. No. 222120; U.S. 1/S.R. 4 Over Ogeechee River, Jefferson County, Georgia; prepared by QORE Property Sciences for Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated Mach 9, 2005;
- Traffic Engineering Report for SR 4/US 1 Improvements from Wadley Bypass at CR 183 to Louisville Bypass at SR 4/BUS/US 1 BUS; EDS-545(29); Jefferson County; P. I. No. 222120; U.S. 1/S.R. 4 Over Ogeechee River, Jefferson County, Georgia; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated May 2002;
- Soils Survey Report for Project EDS-545(29), P. I. No. 222120; Widening and Reconstruction of U.S. 1/S.R. 4 from Wadley Bypass to Louisville Bypass, Jefferson County, Georgia; prepared by QORE Property Sciences for Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated Mach 8, 2005;
- Project Concept Report, Department of Transportation, State of Georgia, Office of Environmental/Location for EDS-545(30), Jefferson County, P. I. No. 222150; dated September 16, 1998;
- Estimate Report for File “EDS-545(30),” prepared by Washington Infrastructure Services, Inc. for the State of Georgia Department of Transportation; dated November 28, 2006;
- Preliminary Right of Way Cost Estimate for Project EDS-545(30) Jefferson; P. I. No. 222150; prepared by the State of Georgia Department of Transportation Office of Right of Way; dated February 20, 2007;
- Utility Cost Estimate for Project EDS-545(30) Jefferson; P. I. No. 222150; prepared by the State of Georgia Department of Transportation Office, Office of Utility; dated January 24, 2007;
- Half Size Construction Plans entitled Plan and Profile of Proposed Widening and Reconstruction of the Louisville Bypass; Federal Aid Project EDS-545(30); Jefferson County; Federal Route No.

- U.S. 1; State Route No. 4; P. I. No. 222150; prepared by Washington Infrastructure Services, Inc. for the State of Georgia Department of Transportation; run date January 26, 2006;
- Traffic Engineering Report for SR 4/US 1 Improvements; Louisville Bypass from SR 4 BUS/US 1 BUS to CR 325/Old US 1; EDS-545(30); Jefferson County; P. I. No. 222150; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated May 2002;
 - Soils Survey Report for Project EDS-545(30), P. I. No. 222150; Widening and Reconstruction of Louisville Bypass, Jefferson County, Georgia; prepared by QORE Property Sciences for Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated February 28, 2005;
 - Project Concept Report, Department of Transportation, State of Georgia, Office of Environmental/Location for EDS-545(31), Jefferson County, P. I. No. 222160; dated September 16, 1998;
 - Estimate Report for File “222160” for Project EDS-545(31); P. I. No. 222160; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated October 17, 2007;
 - Preliminary Right of Way Cost Estimate for Project EDS-545(31) Jefferson; P. I. No. 222160; prepared by the State of Georgia Department of Transportation Office of Right of Way; dated February 20, 2007;
 - Utility Cost Estimate for Project EDS-545(31) Jefferson; P. I. No. 222160; prepared by the State of Georgia Department of Transportation Office, Office of Utility; dated January 24, 2007;
 - Half Size Construction Plans entitled Plan and Profile of Proposed Widening and Reconstruction of U. S. 1/S. R. 4 from C. R. 325/Clarks Mill, Road to C. R. 138/Mennonite Church Road; Federal Aid Project EDS-545(31); Jefferson County; Federal Route # U.S. 1; State Route # 4; P. I. No. 222160; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; run date September 27, 2007;
 - Traffic Engineering Report for SR 4/US 1 Improvements from CR 325/Old US 1 to CR 138; EDS-545(31); Jefferson County; P. I. No. 222160; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated May 2002;
 - Soils Survey Report for Project EDS-545(31), P. I. No. 222160; Widening and Reconstruction of U.S. 1/S.R. 4 from C.R. 325/Clarks Mill Road to C.R. 138/Mennonite Church Road, Jefferson County, Georgia; prepared by QORE Property Sciences for Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated February 28, 2005;
 - Project Concept Report, Department of Transportation, State of Georgia, Office of Environmental/Location for EDS-545(32), Jefferson County, P. I. No. 222170; dated September 16, 1998;
 - Estimate Report for File “222170” for Project EDS-545(32); P. I. No. 222170; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated October 3, 2007;
 - Preliminary Right of Way Cost Estimate for Project EDS-545(32) Jefferson; P. I. No. 222170; prepared by the State of Georgia Department of Transportation Office of Right of Way; dated February 20, 2007;
 - Utility Cost Estimate for Project EDS-545(32) Jefferson; P. I. No. 222170; prepared by the State of Georgia Department of Transportation Office, Office of Utility; dated January 24, 2007;
 - Half Size Construction Plans entitled Plan and Profile of Proposed Widening and Reconstruction of U. S. 1/S. R. 4 from North of C. R. 138/Mennonite Church Road to S. R. 88; Federal Aid Project EDS-545(32); Jefferson County; Federal Route # U. S. 1; S. R. # 4; P. I. No. 222170; prepared by

- Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; run date October 1, 2007;
- Traffic Engineering Report for SR 4/US 1 Improvements from CR 138 to CR 129; EDS-545(32); Jefferson County; P. I. No. 222170; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated May 2002;
 - Final Soil Survey Report for Project EDS-545(32), P. I. No. 222170; US HWY 1/SR 4 (from North of CR 138 to SR 88), Jefferson County, Georgia; prepared by ECS – Georgia, LLC for Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated June 20, 2005;
 - Estimate Report for File “232265” for Project BRST-043-1(58); P. I. No. 232265; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; dated October 3, 2007;
 - Half Size Construction Plans entitled Plan and Elevation S. R. 4 (U. S. 1) Over Big Creek; prepared by Kimley-Horn and Associates, Inc. for the State of Georgia Department of Transportation; run date May 5, 2007;
 - Item Mean Summary for 07/2006 to 06/2007 compiled by the State of Georgia Department of Transportation; dated August 14, 2007;
 - General Highway Map, Jefferson County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services, in cooperation with the U. S. Department of Transportation, Federal Highway Administration; dated 1985;
 - 2006 Georgia Official Highway and Transportation Map; prepared by the Department of Transportation; dated 2006;
 - Earthwork Volumes for EDS-545(29 and 32); prepared by Kimley-Horn and Associates, Inc.; dated October 23, 2007; and
 - Earthwork Volumes for EDS-545(30); prepared by Washington Group International; undated.

Function Identification and Analysis Phase

Based on historical and background data, a cost model and graphic function analysis were developed for this project by major construction elements. They were used to distribute costs by project element; serve as a basis for alternative functional categorization; and to assign worth to the categories, where worth is the least cost to provide the required function, as determined by the VE team. The VE team identified the functions of the various project elements and subsystems by using random function generation techniques resulting in the attached Random Function Analysis worksheet and Function Analysis Systems Technique (F.A.S.T.) diagram.

Speculation Phase

This VE study phase involved the creation and listing of ideas. Creative idea worksheets were organized by project element. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower cost to the owner, or to improve the quality of the project. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and association of ideas.

The Georgia Department of Transportation (GDOT), Kimley-Horn and Associates, Inc. (KHA), and Washington Group International (WGI) representatives may wish to review the creative list since it may contain ideas that can be further evaluated for potential use in the design.

Evaluation Phase

During this phase of the workshop, the VE team judged the ideas generated during the speculation phase. Advantages and disadvantages of each idea were discussed to find the best ideas for development. Ideas found to be irrelevant or not worthy of additional study were discarded. Those that represented the greatest potential for cost savings or improvement to the project were then developed further.

The VE team would like to develop all ideas, but time constraints usually limit the number that can be developed. Therefore, each idea was compared with the present schematic design concepts, in terms of how well it met the design intent. Advantages and disadvantages were discussed, and each team member rated the ideas on a scale of 1-5, with the best ideas rated 5. Total scores were summed for each idea and only highly-rated ideas were developed into alternatives. In cases where there was little cost impact, but an improvement to the project was anticipated, the designation DS, for design suggestion, was used. The design team should review this listing for possible incorporation of ideas into the project.

The creative listing was re-evaluated frequently during the process of developing alternatives. As the relationship between creative ideas became more clearly defined, their importance and ratings may have changed, or they may have been combined into a single alternative. For these reasons, some of the originally high-rated items may not have been developed into alternatives.

Development Phase

During the development phase, each highly rated idea was expanded into a workable solution. The development consisted of a description of the alternative, life cycle cost comparisons, where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed alternatives. Each alternative was written with a brief narrative to compare the original design to the proposed change. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in the report section entitled Study Results.

Presentation Phase

The last phase of the VE study was the presentation of the findings. The VE alternatives were screened by the VE team before draft copies of the Summary of Potential Cost Savings worksheets were provided to GDOT, KHA and WGI representatives during an informal oral presentation on the last day of the study. The VE alternatives were arranged in the same order as the idea listing sheets to facilitate cross-referencing.

POST-WORKSHOP EFFORT

The post-study portion of the VE study includes the preparation of this Value Engineering Study Report. Personnel from GDOT, KHA, and WGI will analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. Lewis & Zimmerman Associates, Inc. is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 36-hour Value Engineering (VE) study on the following projects: EDS-545(29, 30, 31, 32) and BRST-043-1(58), P. I. Nos. 222120, 222150, 222160, 222170, and 232265, Widening and Reconstruction of SR 4/US 1. The projects are located in Jefferson County, Georgia. It is expected the owner, the Georgia Department of Transportation (GDOT) and the design consultant, Kimley-Horn and Associates, Inc. (KHA), will be available to make a formal presentation concerning the project at the beginning of the workshop and be available to answer questions during the VE study effort.

VE Study Agenda

The VE study will follow the outline described below and be conducted October 22 -26, 2007. The study will be conducted in the Road Design's Conference Room, Room 444 of GDOT's General Office located at No. 2 Capitol Square Street, Atlanta, Georgia 30334. The point-of-contact is Ms. Lisa L. Myers, Design Review Engineer Manager, and Value Engineering Coordinator, who can be reached at 404-651-7468.

Monday, October 22nd

9:00 am – 9:15 am **General Introduction of all Parties and Review of the VE Process**

9:15 am - 11:15 am **Owner's/Designer's Presentation**

GDOT and KCA are to present information concerning the projects including, but not necessarily limited to: rationale for design, criteria for specific areas of study, project constraints, and the reasons for design decisions.

11:15 am - 12:00 noon **Commence Function Analysis Phase**

The VE team will continue their familiarization with the cost models and project data for each area of study. The cost model(s) will be refined, as necessary; define the function of each project element or system in the cost model, select the primary or basic functions, and determine the worth, or least cost, to provide the function. Cost/worth or value index ratios will be calculated, and high cost/low worth areas for study identified. In addition, the VE team will continue defining the function of each element/system to gain a thorough understanding of the project's needs and requirements.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Conclude the Function Analysis Phase and Commence the Creative Phase**

The VE team will conduct a brainstorming session and list as many ideas as possible for consideration. The aim is to obtain a large quantity of ideas through free association, by eliminating roadblocks to creativity and deferring judgment.

Tuesday, October 23rd

8:30 am - 10:00 am **Conclude Creative Phase and Complete Evaluation/Analytical Phase**

The VE team will analyze the ideas listed in the creative phase and select the best ideas for further development.

10:00 am - 12:00 noon **Development Phase**

VE team will develop creative ideas into alternate design solutions. Initial and life cycle cost estimates comparing original and proposed alternatives will be prepared. Selected alternatives for change will be developed and supported with sketches, calculations and written substantiation.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Continue Development Phase**

Wednesday, October 24th

8:30 am - 12:00 am **Continue Development Phase**

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 4:00 pm **Conclude Development Phase**

4:00 pm – 5:00 pm **Commence Summary Worksheets for Information Oral Presentation**

Upon completion of the Development Phase, the VE facilitator will commence preparation of the summary worksheets based on the alternatives developed by the VE team. The summary worksheets will form the basis of the informal oral presentation.

Thursday, October 25th

8:30 am - 12:00 am **Continue Development Phase**

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Continue Development Phase**

Friday, October 26th

8:00 am - 9:00 am

Finalize Summary Worksheets

9:00 am – 11:00 am

Informal Oral Presentation

The VE team presents its alternatives to the owner and design team representatives and is available to clarify any points. The process for accepting/rejecting VE alternatives is described and a target schedule for meeting to finalize implementation decisions is established.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise on the project elements involved. Team members consisted of a multidisciplinary group with professional design experience and a working knowledge of VE procedures. The VE team included the following professionals:

Joseph A. Leoni, PE	Roadway QA/QC Manager	ARCADIS U.S., Inc.
John P. Tiernan, PE	Senior Bridge Engineer	ARCADIS U.S., Inc.
Molapo R. M. Kgabo, PE	Construction Specialist/	Delon Hampton and Associates
		Transportation Engineer
Luis M. Venegas, PE, CVS, LEED® AP, FSAVE	Value Engineer Facilitator/ Team Leader	Lewis & Zimmerman Associates

OWNER AND DESIGNER PRESENTATION

The Georgia Department of Transportation, and the design teams of Kimley-Horn and Associates, Inc., and Washington Group International, presented an overview of the projects on Monday, October 22, 2007. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team “up-to-speed” regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING TEAM'S FINAL PRESENTATION

The VE team conducted a presentation on Friday, October 26, 2007 to GDOT, KHA, and WGI representatives. Copies of the draft Summary of Potential Cost Savings worksheets were provided.

A copy of the meeting participants is attached for reference.

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: WIDENING AND RECONSTRUCTION SR 4/US 1 <i>Jefferson County, Georgia</i>		Date: October 22-26, 2007
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Lynn Bean GDOT Employee No.: em: lynn.bean@dot.state.ga.us	Organization: Georgia Department of Transportation (GDOT), District 2, Office of Construction Title: Assistant District Construction Engineer	ph: 478-553-2331 cell: fx: 478-522-4677
Name: Michael Haithcock, PE GDOT Employee No.: em: michael.haithcock@dot.state.ga.us	Organization: GDOT, Office of Consultant Design Title: Assistant Administrator	ph: 404-637-9758 cell: fx: 404-463-6136
Name: Kristy (Mellie) Langdon GDOT Employee No.: em: kristy.langdon@dot.state.ga.us	Organization: GDOT, Office of Traffic Operations Title: Traffic Design Engineer	ph: 404-635-8150 cell: fx: 404-635-8116
Name: James Magnus, CPESC GDOT Employee No.: em: james.magnus@dot.state.ga.us	Organization: GDOT, Office of Construction Title: Assistant State Construction Engineer	ph: 404-656-5306 cell: fx: 404-656-3507
Name: Jennifer E. Mathis GDOT Employee No.: em: jennifer.mathis@dot.state.ga.us	Organization: GDOT, Office of Environmental/Location Title: Senior Environmental Planner, NEPA Manager	ph: 404-699-4408 cell: fx: 404-699-4440
Name: Terrell McMillan GDOT Employee No.: em: terrell.mcmillan@dot.state.ga.us	Organization: GDOT, District 2, Office of Construction Title: Assistant Area Engineer, Area 3, Louisville	ph: 478-625-3861 cell: fx: 478-625-3682
Name: John (Jack) T. Muirhead GDOT Employee No.: em: jack.muirhead@dot.state.ga.us	Organization: GDOT, Office of Bridge Design Title: Assistant Bridge Design Group Leader	ph: 404-656-5197 cell: fx: 404-651-7076
Name: Lisa L. Myers GDOT Employee No.: em: lisa.myers@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Design Review Engineer Manager, Value Engineering Coordinator	ph: 404-651-7468 cell: fx: 404-463-6131
Name: Ron Wishon GDOT Employee No.: em: ron.wishon@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Assistant Project Review Engineer	ph: 404-651-7470 cell: fx: 404-463-6131
Name: William (Bill) B. Pate, PE GDOT Employee No.: em: bill.pate@kimley-horn.com	Organization: Kimley-Horn and Associates, Inc. (KHA) Title: Senior Vice President	ph: 678-596-4584 cell: 678-533-3904 fx: 770-825-0074

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: WIDENING AND RECONSTRUCTION SR 4/US 1 <i>Jefferson County, Georgia</i>		Date: October 22-26, 2007
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Peter Coakley, PE (MT) GDOT Employee No.: em: peter.coakley@kimley-horn.com	Organization: KHA Title: Project Manager	ph: 678-533-3906 cell: 678-469-8099 fx: 770-825-0074
Name: Erick Fry GDOT Employee No.: em: erick.fry@wgint.com	Organization: Washington Group International Title: Project Manager	ph: 770-952-8510 cell: 770-330-9060 fx: 770-952-8610
Name: Joseph A. Leoni, PE GDOT Employee No.: em: joe.leoni@arcadis-us.com	Organization: ARCADIS Title: Roadway QA/QC Manager	ph: 770-431-8666 cell: 770-294-9970 fx: 770-435-2666
Name: John P. Tiernan, PE GDOT Employee No.: em: john.tiernan@arcadis-us.com	Organization: ARCADIS Title: Senior Bridge Engineer	ph: 770-431-8666 cell: fx: 770-435-2666
Name: Molapo R. M. Kgabo, PE GDOT Employee No.: em: mkgabo@hntb.com	Organization: HNTB Corporation Title: Project Manager	ph: 770-946-5740 cell: 770-362-5101 fx: 404-841-2820
Name: Paresh J. Parikh, PE GDOT Employee No.: em: pparikh@delonhampton.com	Organization: Delon Hampton & Associates, Chartered Title: Manager of Engineering Services	ph: 404-419-8434 cell: fx: 404-524-2575
Name: Luis M. Venegas, PE, CVS-Life, LEED® AP, FSAVE GDOT Employee No.: em: lvenegas@lza.com	Organization: Lewis & Zimmerman Associates, Inc. Title: Value Engineering Facilitator	ph: 770-992-3032 cell: 678-488-4287 fx: 770-435-2666
Name: GDOT Employee No.: em:	Organization: Title:	ph: cell: fx:
Name: GDOT Employee No.: em:	Organization: Title:	ph: cell: fx:
Name: GDOT Employee No.: em:	Organization: Title:	ph: cell: fx:

ECONOMIC DATA

The VE team developed economic criteria used for evaluation with information gathered from the State of Georgia Department of Transportation, Kimley-Horn and Associates, Inc. and Washington Group International. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for planning project period interest rates are based on the following parameters:

Year of Analysis:	2007
Construction Start Up:	±2009 (December)
Construction Duration:	±24 Months (December 2011)
Economic Planning Life:	35 years for Pavement
Economic Planning Life:	50 years for Bridges
Discount Rate/Interest:	2.50% (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2007)
Inflation/Escalation Rate:	8.00% (Per GDOT)
Uniform Present Worth (UPW) Factor:	23.1452 for 35 years 28.3623 for 50 years
Cost of Power:	\$0.07 / kWhr (kilowatt hour) (assumed)
Operation and Maintenance Costs (Industry Norms):	
Equipment - With Many Moving Parts	5.00%-5.50%+ of Capital Cost
Equipment - With Minimal Moving Parts	3.50%-4.00% of Capital Cost
Equipment - Electronic	3.00% of Capital Cost
Structural	1.00%-2.00% (or less) of Capital Cost
Composite Mark-Up for Construction:	40.36% (1.4036)
(Composed of: Engineering and Construction at 10.00% and Escalation at 27.60% based on 8.00% per annum for 3.167 years to mid-point of construction.)	
Composite Mark-Up (Right-of-Way):	247.20% (3.4720)
(Composed of: Scheduling Contingency at 55.00%; Administration / Court Costs at 60.00%; and Inflation Factor at 40.00 %.)	

COST ESTIMATE SUMMARY AND COST HISTOGRAMS

The VE team prepared several cost models for the project that follow this page. The cost models are arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas and are based on the following: Estimate Report for file "222120," Estimate Report for file "222160," Estimate Report for file "222170," and Estimate Report for file "232265," construction cost estimates which were prepared by Kimley-Horn and Associates, Inc. dated October 2007 and Estimate Report for file "EDS-545(30)" construction cost estimate prepared by Washington Group International dated November 2006. As can be expected, judgments at this stage of the study are based on experience and intuition rather than facts, which are not uncovered until well along in the analysis of function. As a result of these qualified hypotheses, there appears to be a potential for initial savings in the following areas:

- Roadway Reduction Due to Alignment/Realignment
- Median Width Reduction
- Sidewalk Minimization
- Combining Intersections
- Reduction of Mainline Accesses
- Reduction of Big Creek Bridge Width

DESIGNER'S COST ESTIMATE

The cost estimate, as described above, did contain sufficiently detailed information to perform the value engineering effort. However, the following caveat is noted:

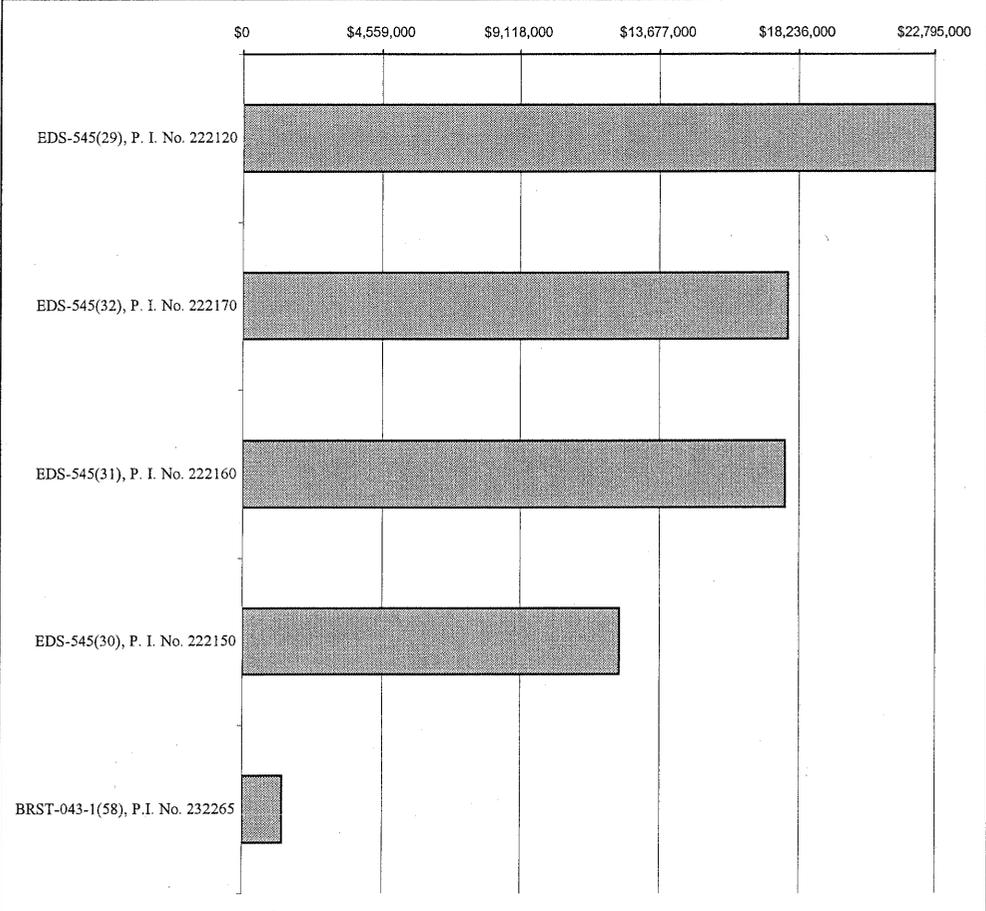
- For Unit 30; i.e., EDS-545(30), P. I. No. 222150, Item No. 402-3113, "Recycled Asphaltic Concrete 12.5 MM Superpave, Group 1 or 2, Including Bitumen Material and Hydrated Lime" was apparently inadvertently omitted from the estimate.

COST HISTOGRAM



Project: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

TOTAL PROJECT	COST	PERCENT	CUM. PERCENT
EDS-545(29), P. I. No. 222120	22,794,440	31.60%	31.60%
EDS-545(32), P. I. No. 222170	17,875,501	24.78%	56.38%
EDS-545(31), P. I. No. 222160	17,787,201	24.66%	81.04%
EDS-545(30), P. I. No. 222150	12,373,095	17.15%	98.19%
BRST-043-1(58), P.I. No. 232265	1,303,200	1.81%	100.00%
Construction Subtotal	\$ 72,133,437	100.00%	
Engineering and Construction at	10.00%	\$ 7,213,344	
Inflation Based on 8.00% per annum for 3.167 Years	27.60%	\$ 21,900,261	
Construction Total	\$ 101,247,042		Construction
			Mark-Up: 40.36%
Right-of-Way Costs; EDS-545(29), P. I. No. 222120	\$ 686,908		
Right-of-Way Costs; EDS-545(30), P. I. No. 222150	\$ 708,656		
Right-of-Way Costs; EDS-545(31), P. I. No. 222160	\$ 917,667		
Right-of-Way Costs; EDS-545(32), P. I. No. 222170	\$ 712,834		
Right-of-Way Costs; BRST-043-1(58), P.I. No. 232265	\$ -		
Right-of-Way Subtotal	\$ 3,026,065		
Scheduling Contingency	55.00%	\$ 1,664,336	
Administration / Court Costs	60.00%	\$ 2,814,240	
Inflation Factor	40.00%	\$ 3,001,856	
Right-of-Way Total	\$ 10,506,000		ROW
			Mark-Up: 247.18%
Right-of-Way Costs; EDS-545(29), P. I. No. 222120	\$ 76,590		
Reimbursable Utilities Costs; EDS-545(30), P. I. No. 222150	\$ 381,793		
Reimbursable Utilities Costs; EDS-545(31), P. I. No. 222160	\$ 1,637,028		
Reimbursable Utilities Costs; EDS-545(32), P. I. No. 222170	\$ 389,811		
Reimbursable Utilities Costs; BRST-043-1(58), P.I. No. 232265	\$ -		
Reimbursable Utilities Subtotal	\$ 2,485,222		
GRAND TOTAL	\$ 114,238,264		



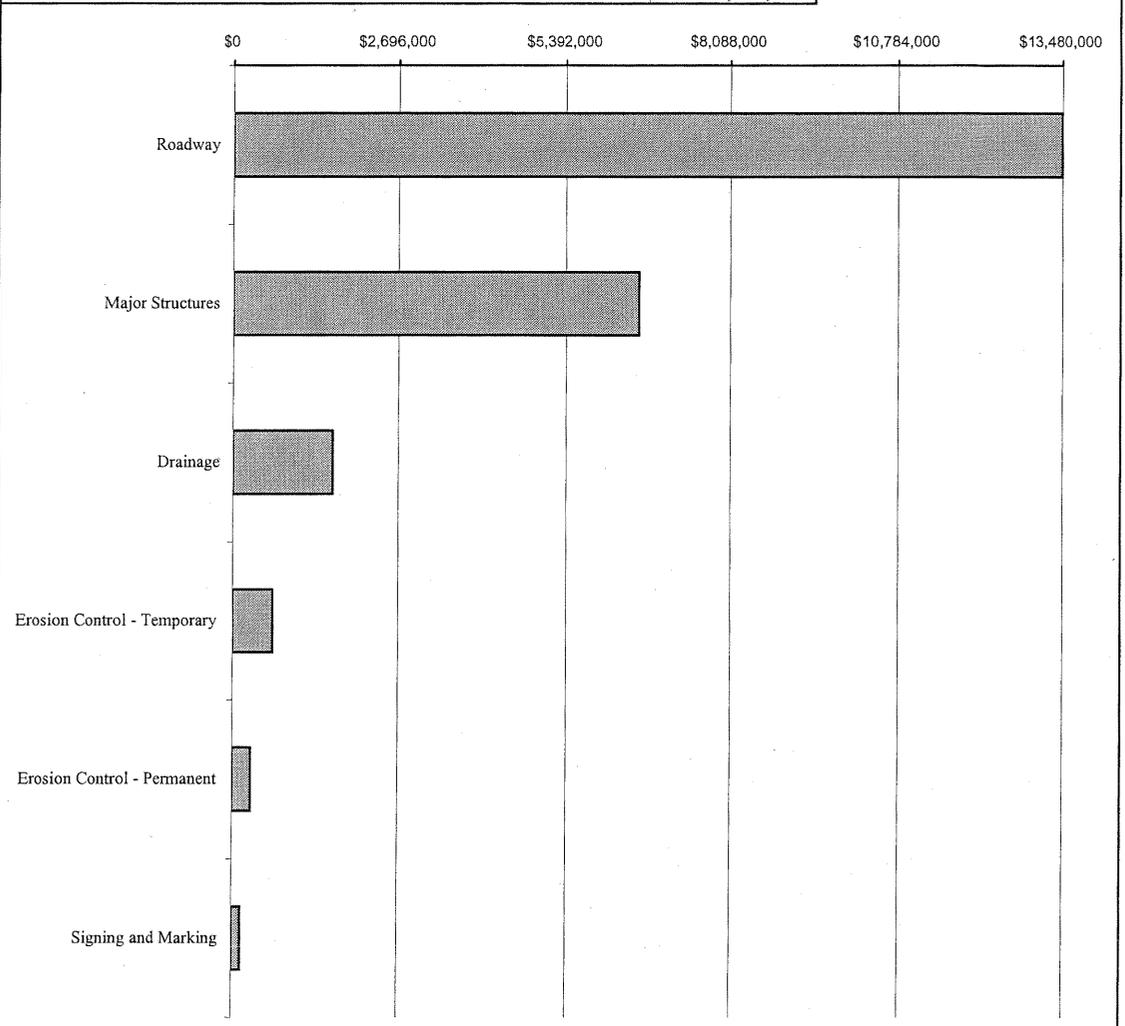
Costs in graph are not marked-up.

* Escalation rate was provided by the Department based on recent history. Anticipated Let Date is 12/2009 with a construction period of approximately 24 months completing in 12/2011; as such, midpoint of construction is 12/2010. The span is 38 months from 10/2007 or 3.167 years.

COST HISTOGRAM

Project: **WIDENING AND RECONSTRUCTION OF SR 4/US 1**
Jefferson County, Georgia

EDS-545(29), P. I. No. 222120	COST	PERCENT	CUM. PERCENT
Roadway	13,475,457	59.12%	59.12%
Major Structures	6,586,650	28.90%	88.01%
Drainage	1,629,237	7.15%	95.16%
Erosion Control - Temporary	655,490	2.88%	98.04%
Erosion Control - Permanent	306,073	1.34%	99.38%
Signing and Marking	141,533	0.62%	100.00%
Construction Subtotal	\$ 22,794,440	100.00%	
Engineering and Construction at 10.00%	\$ 2,279,444		
Inflation Based on 8.00% per annum for 3.167 Years 27.60%	\$ 6,920,566		
Construction Total	\$ 31,994,450		
Right-of-Way Costs; EDS-545(29), P. I. No. 222120	\$ 686,908		
Right-of-Way Subtotal	\$ 686,908		
Scheduling Contingency 55.00%	\$ 377,799		
Administration / Court Costs 60.00%	\$ 638,824		
Inflation Factor 40.00%	\$ 681,413		
Right-of-Way Total	\$ 2,385,000		
Reimbursable Utilities; EDS-545(29), P. I. No. 222120	\$ 76,590		
Reimbursable Utilities Subtotal	\$ 76,590		
GRAND TOTAL	\$ 34,456,040		

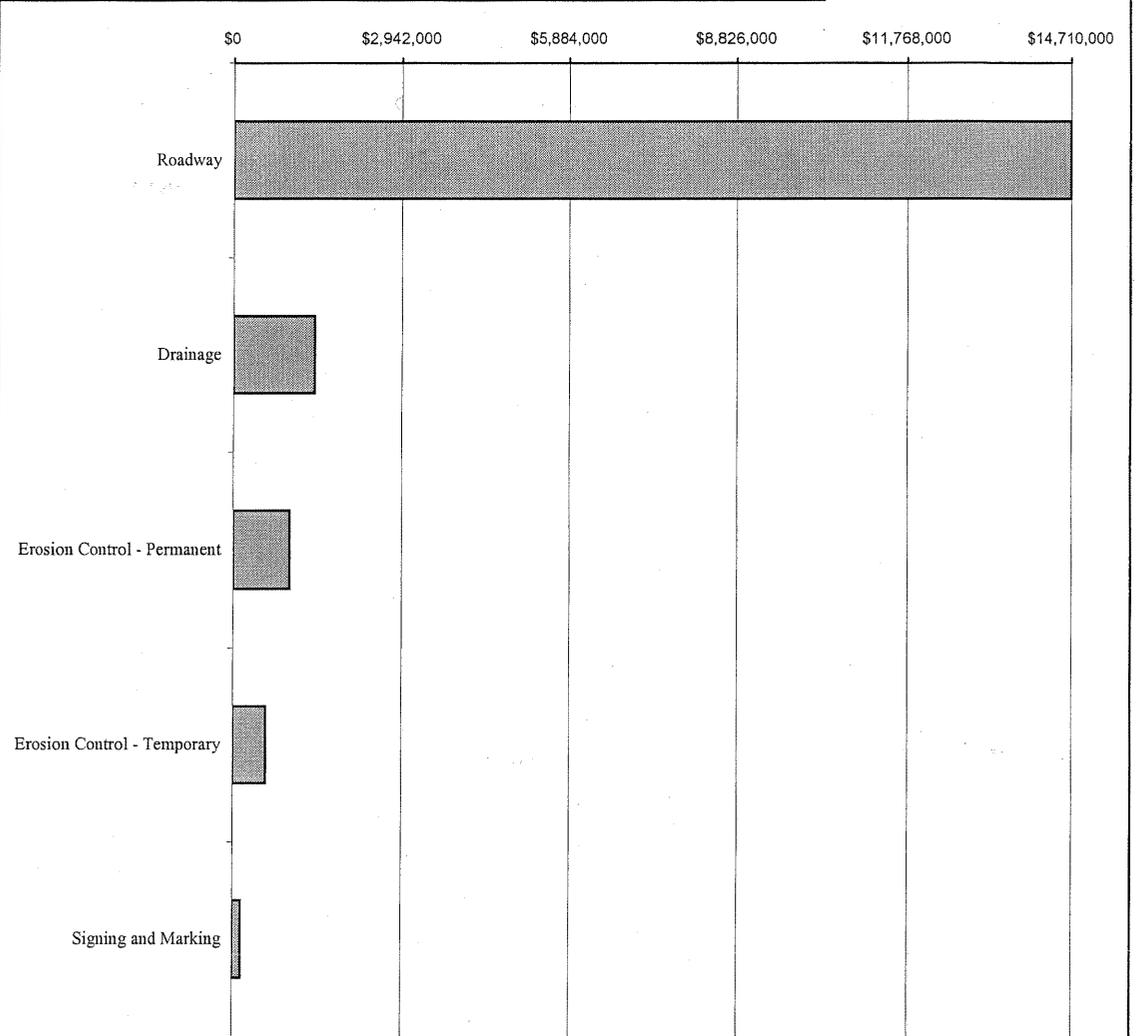


Costs in graph are not marked-up.
 * Escalation rate was provided by the Department based on recent history. Anticipated Let Date is 12/2009 with a construction period of approximately 24 months completing in 12/2011; as such, midpoint of construction is 12/2010. The span is 38 months from 10/2007 or 3.167 years.

COST HISTOGRAM

Project: **WIDENING AND RECONSTRUCTION OF SR 4/US 1**
Jefferson County, Georgia

EDS-545(32), P. I. No. 222170	COST	PERCENT	CUM. PERCENT
Roadway	14,702,963	82.25%	82.25%
Drainage	1,436,018	8.03%	90.29%
Erosion Control - Permanent	1,000,405	5.60%	95.88%
Erosion Control - Temporary	585,393	3.27%	99.16%
Signing and Marking	150,721	0.84%	100.00%
Construction Subtotal	\$ 17,875,500	100.00%	
Engineering and Construction at 10.00%	\$ 1,787,550		
Inflation Based on 8.00% per annum for 3.167 Years 27.60%	\$ 5,427,138	Construction	
Construction Total	\$ 25,090,188	Mark-Up:	40.36%
Right-of-Way Costs; EDS-545(32), P. I. No. 222170	\$ 712,834		
Right-of-Way Subtotal	\$ 712,834		
Scheduling Contingency 55.00%	\$ 392,059		
Administration / Court Costs 60.00%	\$ 662,936		
Inflation Factor 40.00%	\$ 707,131	ROW	
Right-of-Way Total	\$ 2,475,000	Mark-Up:	247.21%
Reimbursable Utilities; EDS-545(32), P. I. No. 222170	\$ 389,811		
Reimbursable Utilities Subtotal	\$ 389,811		
GRAND TOTAL	\$ 27,954,999		



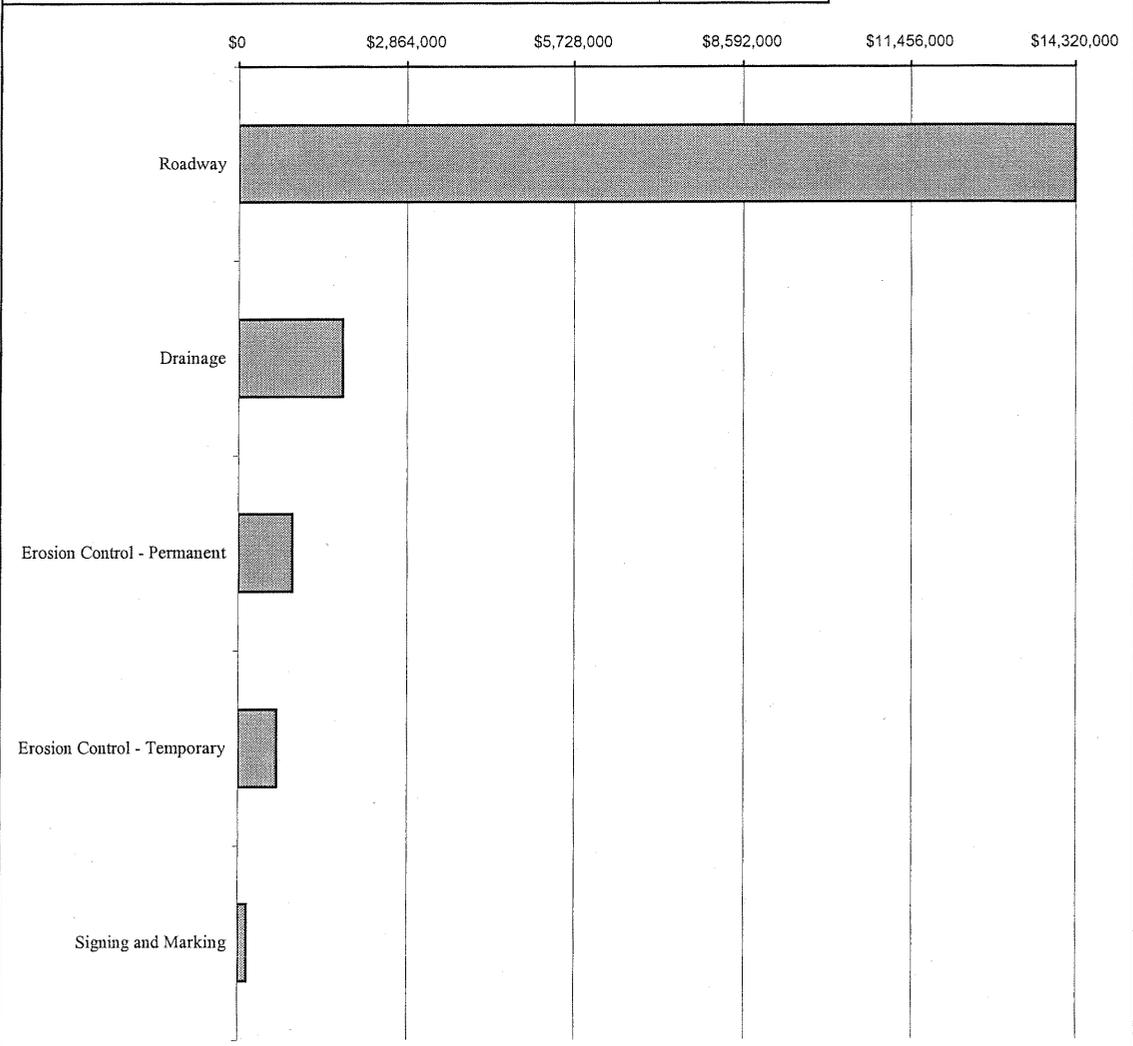
Costs in graph are not marked-up.

* Escalation rate was provided by the Department based on recent history. Anticipated Let Date is 12/2009 with a construction period of approximately 24 months completing in 12/2011; as such, midpoint of construction is 12/2010. The span is 38 months from 10/2007 or 3.167 years.

COST HISTOGRAM

Project: **WIDENING AND RECONSTRUCTION OF SR 4/US 1**
Jefferson County, Georgia

EDS-545(31), P. I. No. 222160	COST	PERCENT	CUM. PERCENT
Roadway	14,316,235	80.49%	80.49%
Drainage	1,765,874	9.93%	90.41%
Erosion Control - Permanent	909,703	5.11%	95.53%
Erosion Control - Temporary	651,411	3.66%	99.19%
Signing and Marking	143,979	0.81%	100.00%
Construction Subtotal	\$ 17,787,202	100.00%	
Engineering and Construction at 10.00%	\$ 1,778,720		
Inflation Based on 8.00% per annum for 3.167 Years 27.60%	\$ 5,400,330	Construction	
Construction Total	\$ 24,966,252	Mark-Up:	40.36%
Right-of-Way Costs; EDS-545(31), P. I. No. 222160	\$ 917,667		
Right-of-Way Subtotal	\$ 917,667		
Scheduling Contingency 55.00%	\$ 504,717		
Administration / Court Costs 60.00%	\$ 853,430		
Inflation Factor 40.00%	\$ 910,326	ROW	
Right-of-Way Total	\$ 3,186,000	Mark-Up:	247.18%
Reimbursable Utilities; EDS-545(31), P. I. No. 222160	\$ 1,637,028		
Reimbursable Utilities Subtotal	\$ 1,637,028		
GRAND TOTAL	\$ 29,789,280		

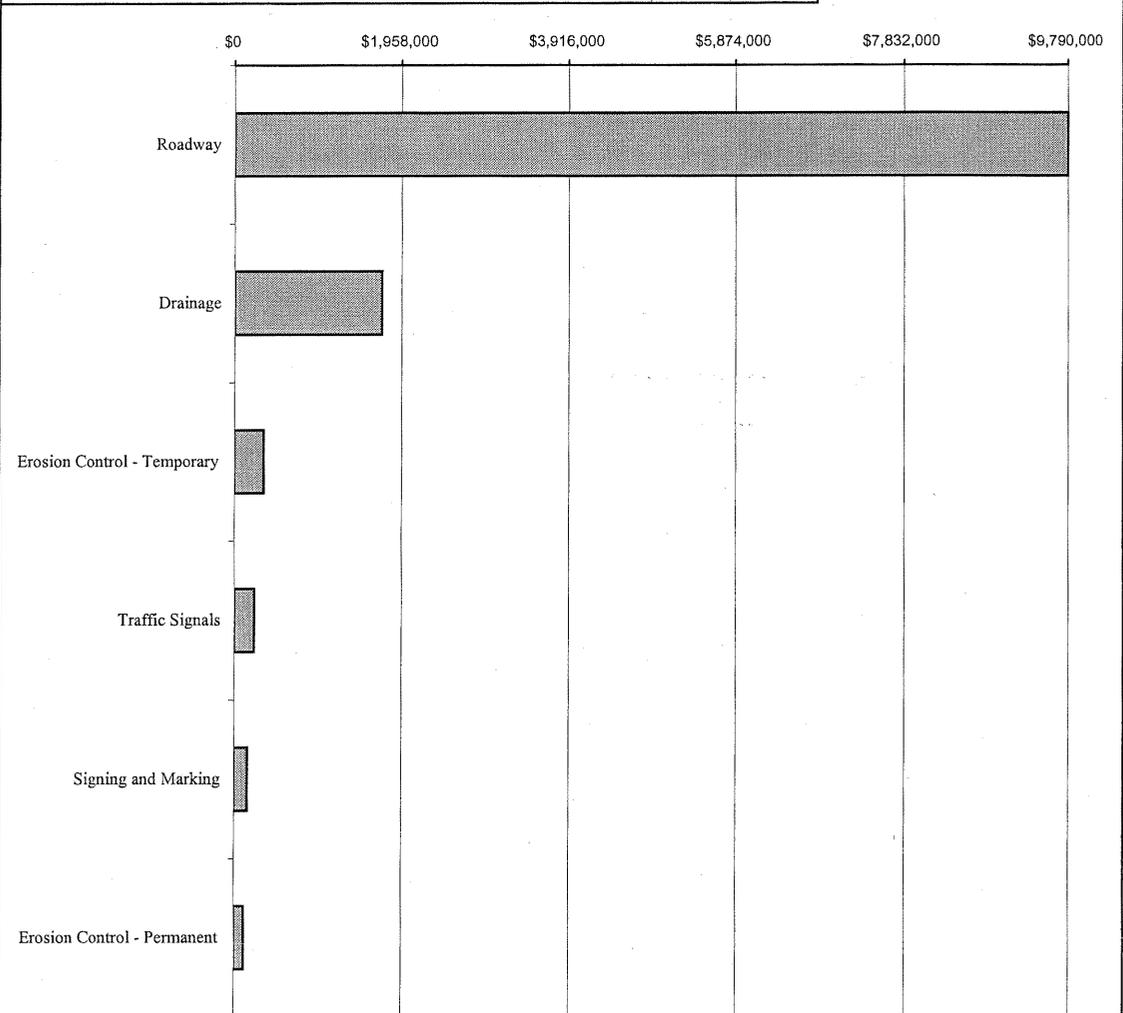


Costs in graph are not marked-up.
 * Escalation rate was provided by the Department based on recent history. Anticipated Let Date is 12/2009 with a construction period of approximately 24 months completing in 12/2011; as such, midpoint of construction is 12/2010. The span is 38 months from 10/2007 or 3.167 years.

COST HISTOGRAM

Project: **WIDENING AND RECONSTRUCTION OF SR 4/US 1**
Jefferson County, Georgia

EDS-545(30), P. I. No. 222150	COST	PERCENT	CUM. PERCENT
Roadway	9,789,674	79.12%	79.12%
Drainage	1,731,391	13.99%	93.11%
Erosion Control - Temporary	340,804	2.75%	95.87%
Traffic Signals	240,000	1.94%	97.81%
Signing and Marking	156,588	1.27%	99.07%
Erosion Control - Permanent	114,639	0.93%	100.00%
Construction Subtotal	\$ 12,373,096	100.00%	
Engineering and Construction at 10.00%	\$ 1,237,310		
Inflation Based on 8.00% per annum for 3.167 Years 27.60%	\$ 3,756,566		
Construction Total	\$ 17,366,972		
		Mark-Up:	40.36%
Right-of-Way Costs; EDS-545(30), P. I. No. 222150	\$ 708,656		
Right-of-Way Subtotal	\$ 708,656		
Scheduling Contingency 55.00%	\$ 389,761		
Administration / Court Costs 60.00%	\$ 659,050		
Inflation Factor 40.00%	\$ 702,987		
Right-of-Way Total	\$ 2,461,000		
		ROW Mark-Up:	247.28%
Reimbursable Utilities; EDS-545(30), P. I. No. 222150	\$ 381,793		
Reimbursable Utilities Subtotal	\$ 381,793		
GRAND TOTAL	\$ 20,209,765		



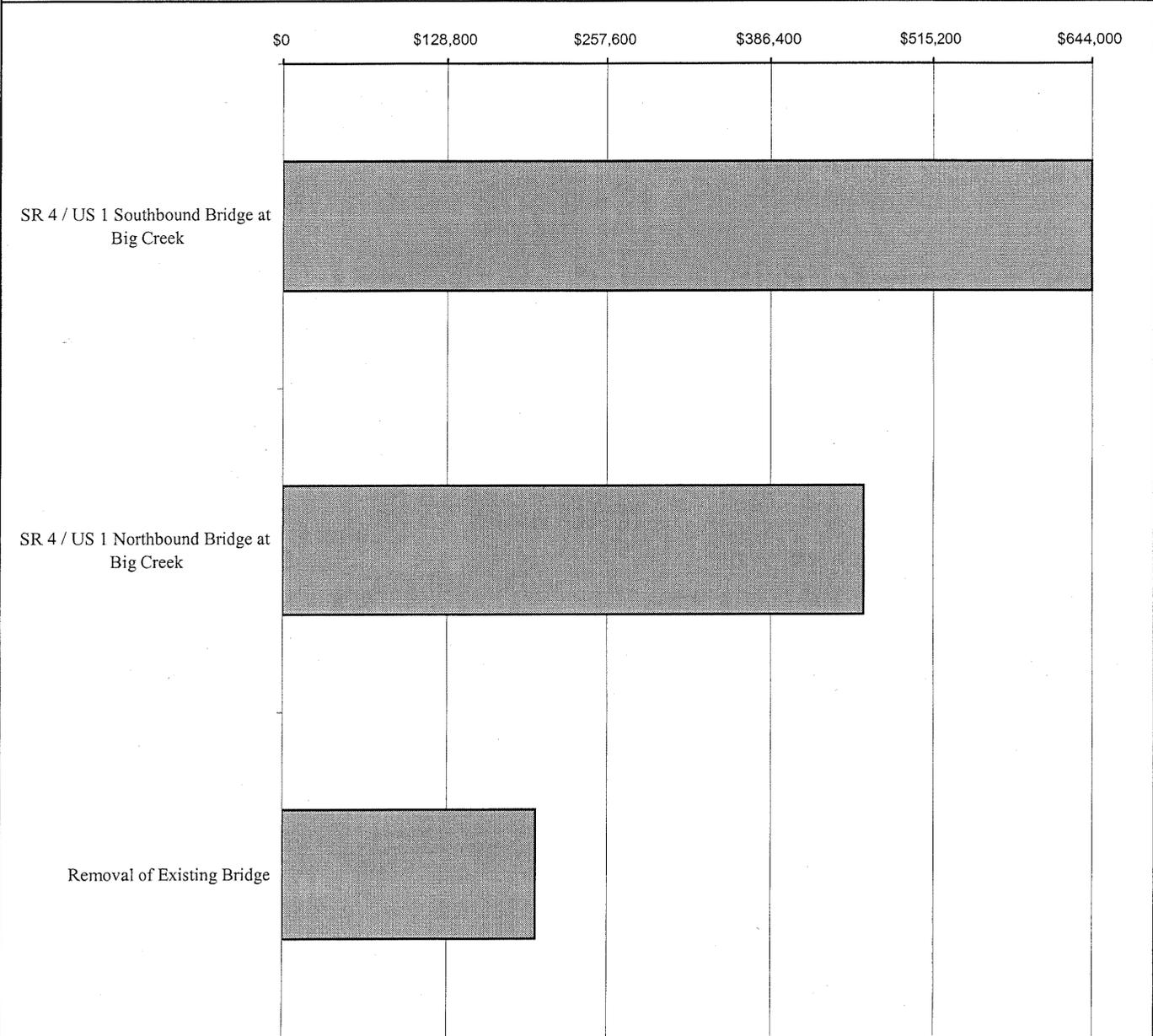
Costs in graph are not marked-up.

* Escalation rate was provided by the Department based on recent history. Anticipated Let Date is 12/2009 with a construction period of approximately 24 months completing in 12/2011; as such, midpoint of construction is 12/2010. The span is 38 months from 10/2007 or 3.167 years.

COST HISTOGRAM

Project: **WIDENING AND RECONSTRUCTION OF SR 4/US 1**
Jefferson County, Georgia

BRST-043-1(588), P. I. No. 232265	COST	PERCENT	CUM. PERCENT
SR 4 / US 1 Southbound Bridge at Big Creek	644,000	49.42%	49.42%
SR 4 / US 1 Northbound Bridge at Big Creek	459,200	35.24%	84.65%
Removal of Existing Bridge	200,000	15.35%	100.00%
Construction Subtotal	\$ 1,303,200	100.00%	
Engineering and Construction at 10.00%	\$ 130,320		
Inflation Based on 8.00% per annum for 3.167 Years 27.60%	\$ 395,661	Construction	
GRAND TOTAL	\$ 1,829,181	Mark-Up:	40.36%



Costs in graph are not marked-up.
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FUNCTION ANALYSIS

Function Analysis was performed to define the requirements for each project element, and ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain a given requirement. Random Function Analysis worksheets for the project are attached. This part of the function analysis stimulated the VE team members to think in terms of the areas in which to channel their creative idea development.

Function Analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if disproportionate amounts of money are spent on support functions. These elements add cost to the final product, but have a relatively low worth to the basic function.

In addition to the random function analysis, the team developed a Function Analysis System Technique (F.A.S.T.) diagram for each phase used to show the flow of function within the phases. It helps to confirm the project is addressing those issues that have been voiced by the owner as being important. The diagrams were generated by asking the key question: "What is the most important function to be accomplished by this phase?" The answer is characterized by a verb/noun pair. In turn, another question is asked: "Why?" The answer is again listed in a verb/noun pair, and the process continued from left to right. If the result is a true F.A.S.T. diagram, the flow of functions from right to left will answer the question "Why?" No F.A.S.T. diagram is ever completed. The readers of this report may wish to challenge themselves to see how far they can carry the construction of the F.A.S.T. diagram.

This F.A.S.T. diagram notes the critical function paths and identifies the projects' basic functions as Promoting/Growth and Promoting/Economic Development by Increasing/Capacity. The F.A.S.T. diagram is included at the end of this section of the report.

FUNCTION ANALYSIS SYSTEMS TECHNIQUE (F. A. S. T.)

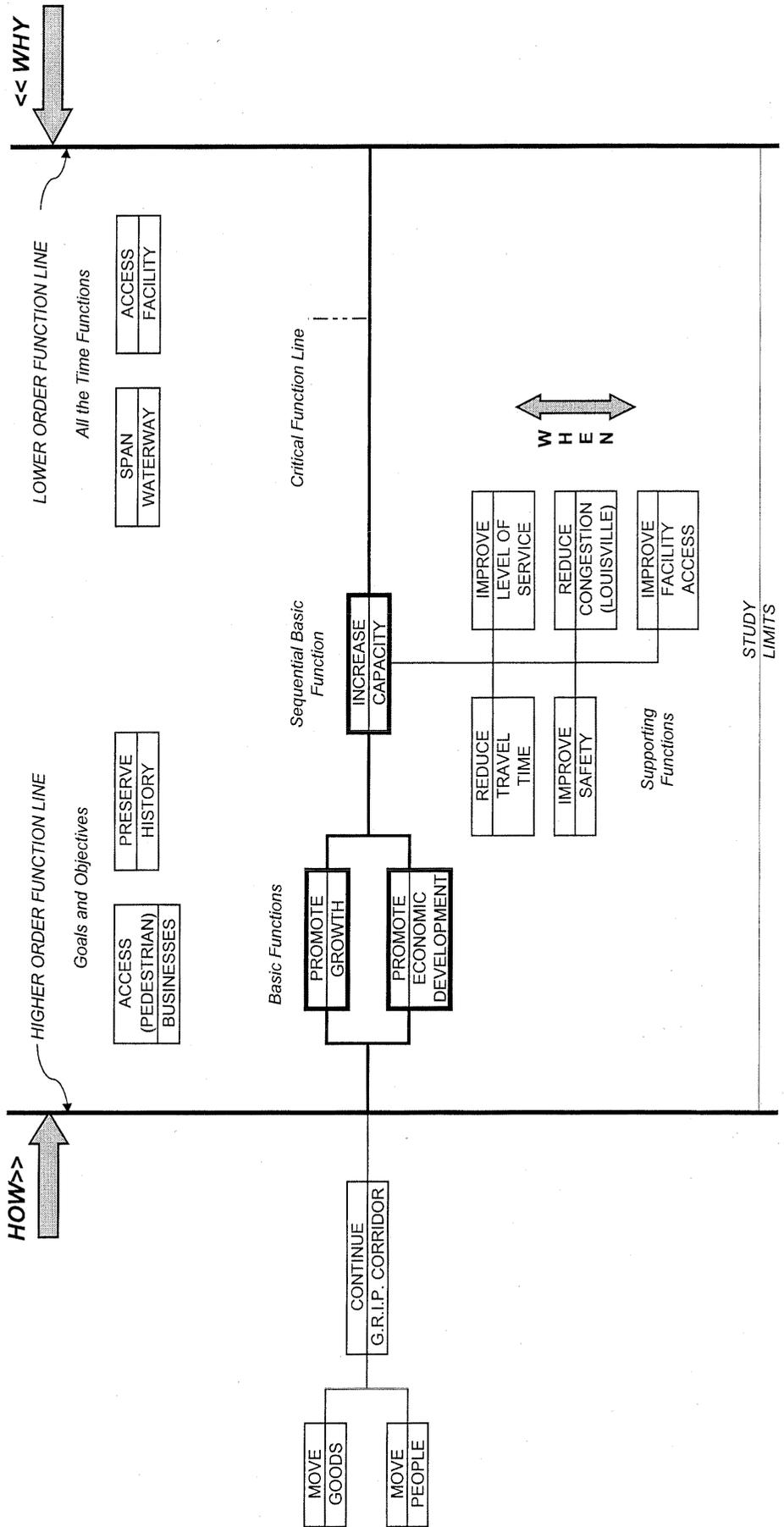


Widening and Reconstruction of SR 4/US 1

EDS-545(29, 30, 31, 32) and BRST-043-1(58),

P. I. Nos. 222120, 222150, 222160, 222170 and 232265

Georgia Department of Transportation, District 2
Jefferson County, Georgia



CREATIVE IDEA LISTING AND JUDGEMENT OF IDEAS

During the speculation/creative phase, numerous ideas, alternative proposals and/or recommendations were generated using conventional brainstorming techniques as recorded on the following pages. These ideas were discussed and the advantages/disadvantages of each listed. The VE team compared each idea with the concept solution determining whether it improved value, was equal in value, or lessened the value of the solution.

The ideas were ranked on a scale of 1 to 5 on how well the VE team believed the idea met necessary criteria and program needs. The higher rated ideas were developed into formal alternatives and included in the VE workshop. Some ideas were judged to have minimal cost impacts on the project but provided enhancements in the form of improved operations, efficiency, constructibility or potential to save unknown or hidden costs. These were given the designation "DS" which indicates a design suggestion. This designation is also used when an idea is difficult to price but improves the functionality of the project or system, and is deemed to be of significant value to the owner, user, operator or designer.

Typically, all ideas rated 4 or 5 are included in the Study Report. When this is not the case, an idea was combined with another related idea or discarded, as a result of additional research that indicated the concept as not being cost-effective or technically feasible.

All readers are encouraged to review the Creative Idea Listing and Evaluation worksheets since they may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING



PROJECT: **WIDENING AND RECONSTRUCTION SR 4/US 1**
Jefferson County, Georgia

SHEET NO.: **1 of 2**

NO.	IDEA DESCRIPTION	RATING
	EDS-545(29)	
29-1	Use 32-ft. median vs. 44-ft. median	4
29-2	Use 6-ft. shoulders throughout	5
29-3	Use 11-ft. through lanes	5
29-4	Use common intersection for CR 327/Old US 1 and CR 274/River Road	4
29-5	Use common intersection for CR 248/Walden Brett Road and CR 248/Mole Road	4
29-6	Do not widen existing bridges as Ogeechee River and Ogeechee River Overflow	2
29-7	Use a concrete overlay in lieu of asphalt overlay on existing bridges	4
	EDS-545(30)	
30-1	Eliminate sidewalk paving from beginning to Old SR 17	5
30-2	Eliminate sidewalk shoulder from beginning to Old SR 17	4
30-3	Use common intersection at Bob Culvern Road and US 1/SR 4 BUS South	4
30-4	Close off Compton Drive	5
30-5	Use 12-ft. urban shoulders	4
30-6	Use 11-ft. through lanes	5
30-7	Close off Old SR 17 on west side of US 1/SR 4 and connect to Midville Road	4
30-8	Provide dedicated left-turn lanes at School Street	4
30-9	Eliminate one access to Ingles Market from mainline	4
30-10	Eliminate both accesses to Ingles Market from mainline	3
	EDS-545(31)	
31-1	Use 11-ft. through lanes	5
31-2	Use 32-ft. median vs. 44-ft. median	4
31-3	Eliminate sidewalk paving from beginning to Station (STA) 580+00	5
31-4	Use 6-ft. paved shoulder in rural section	5
31-5	Eliminate access road at CR 325/Clarks Mill Road	5

Rating: 1 → 2 = Not to be Developed; 3 – 4 = Varying Degree of Development Potential; 5 = Most Likely to be Developed;
 DS = Design Suggestion; ABD = Already Being Done; N/A = Not Applicable

