



SR 17 WIDENING AND RECONSTRUCTION

EDS-545(38, 47, 54 and 55)

P.I. Nos. 222260, 221740, 222264 and 122840

Jefferson County

Value Engineering Study Report

Design Development Stage

November 2007

Design Consultants



Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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November 26, 2007

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

re: Project Numbers EDS-545(38, 47, 54, and 55), P. I. Nos. 222260, 221740, 222264, 122840
SR 17 Widening and Reconstruction, Wilkes and Elbert Counties
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 value engineering study report. The objective of the VE effort was to identify opportunities to enhance the value and constructability of the project and reduce costs.

All of the projects have the primary objective of widening and reconstruction of State Route 17 from two lanes to four lanes as part of the Governor's Road Improvement Program to promote economic development through an improved transportation network. Although the majority of the corridor follows the existing alignment, Unit 38 departs from the current alignment on a new location to bypass the Town of Tignall. This departure increases the cost of the facility and could represent an economic down-turn as traffic flows away for downtown Tignall.

As with all widening and reconstruction projects, safety improvements are a major component of the process. The VE team identified opportunities to increase safety by minimizing the number of median openings and shortening realignments and inducing a slow-down as vehicles approach the new intersections with the mainline.

We thank you for your assistance during the course of the VE team's work. Please do not hesitate to call upon us if you or any of the reviewers have any questions regarding the information presented in this report.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

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

EXECUTIVE SUMMARY

INTRODUCTION

This report documents the events and results of the value engineering study conducted by Lewis & Zimmerman Associates, Inc. for the Georgia Department of Transportation (GDOT). The subject of the study was the Widening and Reconstruction of State Route 17 composed of Project Nos. EDS-545(38, 47, 54, and 55), P. I. Nos. 222260, 221740, 222264, and 122840, being designed by GDOT, Jordan Jones & Goulding, and Parsons. The VE workshop was conducted November 5-9, 2007 at GDOT's Atlanta Headquarters using the design development documents.

Comprising the VE team was a multidisciplinary group with highway planning, design and construction experience. The team used the following six-phased VE Job Plan to guide its deliberations:

- Information Gathering Phase
- Function Identification and Analysis Phase
- Creative Idea Generation Phase
- Evaluation/Judgment of Creative Idea Phase
- Alternative Development Phase
- Presentation of Alternatives Phase

PROJECT DESCRIPTION

The projects, located in Wilkes and Elbert Counties, will widen State Route (SR) 17 from two 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 EDS-545(38) is located along SR 17 beginning at mile post (MP) 16.9 and ending at MP 23.2 in Wilkes County. Project EDS-545(47) is located along SR 17 from MP 13.0 to MP 16.9, just north of Washington, and MP 23.2 to MP 26.3, just north of Tignall, in Wilkes County. Project EDS-545(54) is located along SR 17 beginning at MP 26.3 in Wilkes County and ending at MP 3.6 in Elbert County. Finally, Project EDS-545(55) is located along SR 17 beginning at MP 3.60 and ending at MP 9.34 and is located entirely within Elbert County.

The length of each project is outlined in Table 1.

Table 1 – Project Length

P. I. Number:	EDS- <u>545(38)/222260</u>	EDS- <u>545(47)/221740</u>	EDS- <u>545(54)/222264</u>	EDS- <u>545(55)/122840</u>
Net Length of Roadway	6.678	7.650	5.494	5.722
Net Length of Bridges	0.000	0.000	0.182	0.038
Net Length of Project	6.678	7.650	5.676	5.760
Net Length of Exceptions	0.000	0.000	0.000	0.000
Gross Length of Project	6.678	7.650	5.676	5.760

The approved concept for Project EDS-545(38) provides four 12-ft. lanes with a 44-ft. depressed grass median for the entire project length. This project fills the gap along SR 17 between the Washington Bypass and Project EDS-545(47) in Wilkes County. Project EDS-545(47) consists of passing lanes at two sites along SR 17, known as EDS-545(47)-Site 1, the southern section, and EDS-545(47)-Site 2, the northern section. The typical section for Project EDS-545(47) consists of four 12-ft. lanes separated by a 44-ft. depressed grass median to be compatible with Project EDS-545(38). Project EDS-545(54) provides four 12-ft. lanes with a 44-ft. depressed grass median rural section to south of Bells Ferry Road, where a transition section provides a 14-ft. flush median for the remainder of the project. Finally, Project EDS-545(55) holds the typical four 12-ft. lanes and 14-ft. flush median section throughout its entire length.

The anticipated cost of construction is \$155,511,592, which includes \$45,547,210 for right-of-way and \$1,242,666 for reimbursable utilities. These figures are broken down as follows:

- EDS 545(38): \$45,074,025
- EDS-545(47): \$22,252,694
- EDS-545(54): \$39,184,524
- EDS-545(55): \$49,000,241

CONCERNS AND OBJECTIVES

Concerns

The VE team was concerned with the following:

- Although the majority of the corridor follows the existing alignment, Unit 38 departs from it to bypass the Town of Tignall, potentially causing an economic downturn as traffic flows away from the town.
- As with all new widening and reconstruction projects, safety improvements are a big component of the process. The number of median openings and shortening realignments cause a slow-down as vehicles approach the new intersections with the mainline.

- The traffic count does not appear to warrant the use of 44-ft.-wide depressed grass medians and 12-ft.-wide travel lanes.

Objective

The objective of the VE effort was to identify opportunities to increase capacity and improve safety, and where logically possible and warranted, reduce capital cost.

RESULTS

The VE team developed 34 cost-saving alternatives and one design suggestion for consideration by GDOT and the design team. Highlighted below are some of the more promising recommendations.

- With respect to the relatively low volume of anticipated traffic in the design year, several alternatives reduce the 44-ft.-wide depressed grass medians to 32 ft. wide, retaining the grassy section. These alternatives, Alt. Nos. 38-1, 47-1, and 54-1, reduce costs by \$780,000, 370,000, and 175,000, respectively, with a totally savings of about \$1,325,000. With the same low volume of traffic rationale, Alt. Nos. 38-3, 47-3, 54-3, and 55-2 reduce the travel lanes 12 ft. wide to 11 ft. wide. Initial savings could reach \$860,000, \$595,000, \$760,000, and \$793,000, respectively, ultimately reducing costs by nearly \$3 million.
- The use of 6-ft.-wide paved shoulders in lieu of 6.5-ft.-wide paved shoulders warrants further consideration, as a six-inch reduction on both sides of the mainline would not affect the functional aspects of the system, yet would afford significant savings. Alt. Nos. 38-2, 47-2, 54-2, and 55-1 reduce costs by \$102,000, \$95,000, \$86,000, and \$107,000, respectively. Savings for the entire corridor could amount to \$400,000.
- Regarding safety, several alternatives were developed that minimize the number of median openings within the corridor. Although acknowledging some inconveniences for residents, the elimination of conflicting turning movements improves the overall public safety and operation of the facility. These alternatives include: Alt. No. 47-7 at Station 190+00 with savings close to \$152,000; Alt. No. 47-13 at Station 483+00 with identical savings of about \$152,000; Alt. No. 47-14 that minimizes the number of median openings between Station 482+02 and Station 510+34 and saves another \$152,000; and Alt. No. 54-9 at Station 147+00 with a noted savings of \$278,000.
- Within Unit 38, several alternatives allude to potential savings regarding the use of the existing pavement and alignment of the existing and new location sections. Alt. No. 38-9 retains the existing roadway between Station 105+00 to Station 170+00 and identifies a potential first cost savings of close to \$900,000. If, as narrated in Alt. No. 38-10, the “original” new location could be realigned closer to the existing right-of-way between Station 170+00 to Station 276+00, then initial savings could amount to nearly \$400,000.
- Throughout the corridor, the four units, following Department guidelines and standards, realign numerous side roads/streets to assure a near perpendicular alignment with the newly widened mainline. This necessitates a substantial amount of re-work of the existing side roads/streets. In

those areas where the intersecting angle of the side road/street is not overtly skewed, retaining the existing alignment may be warranted as noted in the following alternatives:

- Alt. No. 38-12 retains the existing alignment of Church Street, saving more than \$900,000;
 - Alt. No. 47-5 retains the existing alignment between Station 103+30 and Station 140+00, saving \$370,000;
 - Alt. No. 54-11 retains the current alignment of River Road, reducing costs by \$260,000; and
 - Alt. No. 54-12 stays on the existing alignment between Station 300+00 to Station 400+00, reducing costs by close to \$250,000.
- Numerous alternatives address the shortening of the tie-ins of numerous side roads/streets with the mainline:
 - Alt. No. 47-11 realigns Boyd Road further north and saves about \$28,000;
 - Alt. No. 47-12/47-17 realigns the intersection of Norman Road/Vinson Road, saving almost \$62,000;
 - Alt. No. 54-14 eliminates the Old SR 17 tie-in to the mainline, saving close to \$95,000;
 - Alt. No. 55-6 shortens the tie-in of Old Elliam Road to save about \$37,000;
 - Alt. No. 55-7 shortens the tie-in of Hudson Road for nearly \$263,000 in first cost savings;
 - Alt. No. 55-12 shortens the tie-in of Bullard's Ferry Road, generating a savings of \$52,000;
 - Alt. No. 55-13 shortens the tie-in of Dunworley Drive to save close to \$53,000;
 - Alt. No. 55-15 eliminates the realignment of Oak Road, saving about \$103,000; and
 - Alt. No. 55-16 realigns Fairfax Circle to avoid a displacement and reduce costs by about \$110,000.

The Summary of VE Alternatives worksheet following this narrative outlines all of the alternatives and the design suggestion 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 in the Value Analysis and Conclusions section of the report.



SUMMARY OF VE ALTERNATIVES

PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222264 and 122840 VE STUDY
 SR 17 WIDENING AND RECONSTRUCTION
 Wilkes and Elbert Counties

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EDS-545(38) (38-x)						
38-1	Reduce median width to 32 ft.	\$ 11,779,810	\$ 11,000,526	\$ 779,284		\$ 779,284
38-2	Reduce outside shoulders to 6-ft. paved shoulders	\$ 104,513	\$ 2,822	\$ 101,691		\$ 101,691
38-3	Use 11-ft. travel lanes throughout	\$ 868,125	\$ 11,272	\$ 856,853		\$ 856,853
38-9	Use existing roadway pavement from Station (STA) 105+00 to STA 170+00	\$ 1,257,103	\$ 347,557	\$ 909,546		\$ 909,546
38-10	Realign "original" new location closer to the existing right-of-way between STAs 170+00 and 276+00	\$ 406,087	\$ -	\$ 406,087		\$ 406,087
38-12	Retain existing alignment on Church Street	\$ 1,001,860	\$ 65,808	\$ 936,052		\$ 936,052
38-13	Realign mainline at Delhi Road to avoid wetlands		DESIGN SUGGESTION			
38-14	Reconfigure Old SR 17 with new location between STAs 420+00 and 440+00	\$ 246,301	\$ 50,427	\$ 195,874		\$ 195,874
EDS-545(47) (47-x)						
47-1	Reduce median width to 32 ft.	\$ 5,144,250	\$ 4,776,010	\$ 368,240		\$ 368,240
47-2	Reduce outside shoulders to 6-ft. paved shoulders	\$ 95,532	\$ -	\$ 95,532		\$ 95,532
47-3	Use 11-ft. travel lanes throughout	\$ 593,927	\$ -	\$ 593,927		\$ 593,927
47-5	Retain existing alignment from STA 103+30 to STA 140+00	\$ 409,675	\$ 41,550	\$ 368,125		\$ 368,125
47-7	Eliminate the median opening at STA 190+00	\$ 151,845	\$ -	\$ 151,845		\$ 151,845
47-11	Realign Boyd Road to the north	\$ 48,694	\$ 21,124	\$ 27,570		\$ 27,570
47-12 / 42-17	Realign intersection of Norman Road/Vinson Road with SR 17 and reduce the extent of construction on the west side of SR 17	\$ 166,302	\$ 103,971	\$ 62,331		\$ 62,331
47-13	Eliminate the median opening at STA 483+00	\$ 151,845	\$ -	\$ 151,845		\$ 151,845
47-14	Minimize the number of median openings between STAs 482+02 and 510+34	\$ 151,578	\$ -	\$ 151,578		\$ 151,578



SUMMARY OF VE ALTERNATIVES

PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222264 and 122840 VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EDS-545(54) (54-x)						
54-1	Reduce median width to 32 ft. where feasible	\$ 4,427,632	\$ 4,253,980	\$ 173,652		\$ 173,652
54-2	Reduce outside shoulders to 6-ft. paved shoulders	\$ 86,958	\$ 1,213	\$ 85,745		\$ 85,745
54-3	Use 11-ft. travel lanes throughout	\$ 765,323	\$ 5,036	\$ 760,287		\$ 760,287
54-9	Eliminate median opening at STA 147+00	\$ 281,089	\$ 3,797	\$ 277,292		\$ 277,292
54-11	Retain River Road alignment with the mainline	\$ 337,226	\$ 77,137	\$ 260,089		\$ 260,089
54-12	Stay on existing alignment between STAs 300+00 and 400+00	\$ 724,418	\$ 471,281	\$ 253,137		\$ 253,137
54-13	Eliminate the Old SR 17 tie-in at Station 387+00	\$ 143,885	\$ 49,408	\$ 94,477		\$ 94,477
54-14	Selectively eliminate right-turn lanes in the five-lane section	\$ 98,058	\$ -	\$ 98,058		\$ 98,058
EDS-545(55) (55-x)						
55-1	Reduce outside shoulders to 6-ft. paved shoulders	\$ 108,258	\$ 1,287	\$ 106,971		\$ 106,971
55-2	Use 11-ft. travel lanes throughout	\$ 798,822	\$ 5,165	\$ 793,657		\$ 793,657
55-6	Shorten tie-in of Old Elliam Road and SR 17	\$ 102,618	\$ 65,650	\$ 36,968		\$ 36,968
55-7	Shorten tie-in of Hudson Road and SR 17	\$ 304,214	\$ 40,611	\$ 263,603		\$ 263,603
55-9	Use a concrete culvert in lieu of a bridge over Dry Fork Creek	\$ 1,127,283	\$ 364,805	\$ 762,478		\$ 762,478
55-11	Selectively eliminate right-turn lanes	\$ 175,138	\$ -	\$ 175,138		\$ 175,138
55-12	Shorten Bullard's Ferry Road tie-in length to SR 17	\$ 51,960	\$ -	\$ 51,960		\$ 51,960
55-13	Shorten Dunworley Drive tie-in length to SR 17	\$ 53,143	\$ -	\$ 53,143		\$ 53,143
55-15	Do not realign Oak Road	\$ 126,675	\$ 23,401	\$ 103,274		\$ 103,274
55-16	Realign Fairfax Circle south to avoid displacement	\$ 153,993	\$ 43,739	\$ 110,254		\$ 110,254

STUDY RESULTS

INTRODUCTION

The results are the major feature of the VE study conducted on the SR 17 Widening and Reconstruction project since they represent the benefits that can be realized by GDOT, the design team, and the users of the corridor.

During the VE workshop, many ideas for potential value enhancement were conceived and evaluated by the team for technical merit, applicability to the project, implementability considering the project's status, and the ability to meet GDOT's project value objectives. Research performed on those ideas considered to have the potential to enhance the value of the project resulted in the development of individual alternatives identifying specific changes to the project as a whole, or individual elements that comprise the project. For each alternative developed, the following information is provided:

- A summary of the original design,
- A description of the proposed change to the project,
- Sketches and design calculations, if appropriate,
- A capital cost comparison and life cycle discounted present worth cost comparison of the alternative and original design (where appropriate),
- An evaluation of the advantages and disadvantages of the alternative, and
- A brief narrative to compare the original design and the proposed change and provide a rationale for implementing the change into the project.

The capital cost comparisons used unit quantities contained in the project cost estimate prepared by the designers, whenever possible. If prices were not available, cost databases from GDOT and team members were consulted.

Each alternative developed is identified with an alternative number (Alt. No.) that can be tracked through the value engineering process, thus facilitating referencing between the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of VE Alternatives table. Summaries of the alternatives and design suggestions are provided on the Summary of VE Alternatives table.

RESULTS

The VE team generated 64 ideas for change and evaluated the ideas based on 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, constructability and soundness of the idea.

Of the ideas generated, 44 were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 34 alternatives with an impact on project costs and one design

suggestion. These alternatives and design suggestion are presented in detail following this narrative and on the Summary of VE Alternatives worksheets.

Highlighted below are some of the more promising recommendations.

- With respect to the relatively low volume of anticipated traffic in the design year, several alternatives reduce the 44-ft.-wide depressed grass medians to 32 ft. wide, retaining the grassy section. These alternatives, Alt. Nos. 38-1, 47-1, and 54-1, reduce costs by \$780,000, 370,000, and 175,000, respectively, with a totally savings of about \$1,325,000. With the same low volume of traffic rationale, Alt. Nos. 38-3, 47-3, 54-3, and 55-2 reduce the travel lanes 12 ft. wide to 11 ft. wide. Initial savings could reach \$860,000, \$595,000, \$760,000, and \$793,000, respectively, ultimately reducing costs by nearly \$3 million.
- The use of 6-ft.-wide paved shoulders in lieu of 6.5-ft.-wide paved shoulders warrants further consideration, as a six-inch reduction on both sides of the mainline would not affect the functional aspects of the system, yet would afford significant savings. Alt. Nos. 38-2, 47-2, 54-2, and 55-1 reduce costs by \$102,000, \$95,000, \$86,000, and \$107,000, respectively. Savings for the entire corridor could amount to \$400,000.
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- Within Unit 38, several alternatives allude to potential savings regarding the use of the existing pavement and alignment of the existing and new location sections. Alt. No. 38-9 retains the existing roadway between Station 105+00 to Station 170+00 and identifies a potential first cost savings of close to \$900,000. If, as narrated in Alt. No. 38-10, the “original” new location could be realigned closer to the existing right-of-way between Station 170+00 to Station 276+00, then initial savings could amount to nearly \$400,000.
- Throughout the corridor, the four units, following Department guidelines and standards, realign numerous side roads/streets to assure a near perpendicular alignment with the newly widened mainline. This necessitates a substantial amount of re-work of the existing side roads/streets. In those areas where the intersecting angle of the side road/street is not overtly skewed, retaining the existing alignment may be warranted as noted in the following alternatives:
 - Alt. No. 38-12 retains the existing alignment of Church Street, saving more than \$900,000;
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- Numerous alternatives address the shortening of the tie-ins of numerous side roads/streets with the mainline:
 - Alt. No. 47-11 realigns Boyd Road further north and saves about \$28,000;
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 - Alt. No. 55-12 shortens the tie-in of Bullard’s Ferry Road, generating a savings of \$52,000;
 - Alt. No. 55-13 shortens the tie-in of Dunworley Drive to save close to \$53,000;
 - Alt. No. 55-15 eliminates the realignment of Oak Road, saving about \$103,000; and
 - Alt. No. 55-16 realigns Fairfax Circle to avoid a displacement and reduce costs by about \$110,000.

EVALUATION OF ALTERNATIVES

When reviewing the study results, each part of an alternative or design suggestion should be considered on its own merit. There may be a tendency to disregard an alternative because of a concern about one part of it. Each area within an alternative or design suggestion that is acceptable should be considered for use in the final design, even if the entire alternative or design suggestion is not implemented. Variations of these alternatives and design suggestions by GDOT or the design team are encouraged.

All alternatives and design suggestions were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some are “mutually exclusive,” so acceptance of one may preclude the acceptance of another. In addition, some of the alternatives may be interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative. Design suggestions could also be interrelated, thus precluding a part of one or more suggestions from being implemented if another design suggestion is also implemented.

All alternatives should be carefully reviewed in order to select the combination of ideas with the greatest beneficial impact on the project. Once this has been accomplished, the total cost savings resulting from the VE study can be calculated based on implementing a revised, all-inclusive design solution.



SUMMARY OF VE ALTERNATIVES

PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222264 and 122840 VE STUDY SR 17 WIDENING AND RECONSTRUCTION <i>Wilkes and Elbert Counties</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(38) (38-x)						
38-1	Reduce median width to 32 ft.	\$ 11,779,810	\$ 11,000,526	\$ 779,284		\$ 779,284
38-2	Reduce outside shoulders to 6-ft. paved shoulders	\$ 104,513	\$ 2,822	\$ 101,691		\$ 101,691
38-3	Use 11-ft. travel lanes throughout	\$ 868,125	\$ 11,272	\$ 856,853		\$ 856,853
38-9	Use existing roadway pavement from Station (STA) 105+00 to STA 170+00	\$ 1,257,103	\$ 347,557	\$ 909,546		\$ 909,546
38-10	Realign "original" new location closer to the existing right-of-way between STAs 170+00 and 276+00	\$ 406,087	\$ -	\$ 406,087		\$ 406,087
38-12	Retain existing alignment on Church Street	\$ 1,001,860	\$ 65,808	\$ 936,052		\$ 936,052
38-13	Realign mainline at Delhi Road to avoid wetlands		DESIGN SUGGESTION			
38-14	Reconfigure Old SR 17 with new location between STAs 420+00 and 440+00	\$ 246,301	\$ 50,427	\$ 195,874		\$ 195,874
EDS-545(47) (47-x)						
47-1	Reduce median width to 32 ft.	\$ 5,144,250	\$ 4,776,010	\$ 368,240		\$ 368,240
47-2	Reduce outside shoulders to 6-ft. paved shoulders	\$ 95,532	\$ -	\$ 95,532		\$ 95,532
47-3	Use 11-ft. travel lanes throughout	\$ 593,927	\$ -	\$ 593,927		\$ 593,927
47-5	Retain existing alignment from STA 103+30 to STA 140+00	\$ 409,675	\$ 41,550	\$ 368,125		\$ 368,125
47-7	Eliminate the median opening at STA 190+00	\$ 151,845	\$ -	\$ 151,845		\$ 151,845
47-11	Realign Boyd Road to the north	\$ 48,694	\$ 21,124	\$ 27,570		\$ 27,570
47-12 / 42-17	Realign intersection of Norman Road/Vinson Road with SR 17 and reduce the extent of construction on the west side of SR 17	\$ 166,302	\$ 103,971	\$ 62,331		\$ 62,331
47-13	Eliminate the median opening at STA 483+00	\$ 151,845	\$ -	\$ 151,845		\$ 151,845
47-14	Minimize the number of median openings between STAs 482+02 and 510+34	\$ 151,578	\$ -	\$ 151,578		\$ 151,578

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **38-1**

DESCRIPTION: **REDUCE MEDIAN WIDTH TO 32 FT.**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of a 44-ft.-wide depressed grass median throughout the project.

ALTERNATIVE: (Sketch attached)

Use a 32-ft.-wide depressed grass median throughout the project.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Reduces future mowing costs
- Implements a common practice
- Maintains a safety clear zone

DISADVANTAGES:

- Reduces buffer between travel ways
- Narrows median
- Increases perceived loss of safety

DISCUSSION:

A reduction of 12 ft. in the median will not reduce the functional requirements as a safety and clear zone and will not have an adverse effect on vehicular traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 11,779,810	—	\$ 11,779,810
ALTERNATIVE	\$ 11,000,526	—	\$ 11,000,526
SAVINGS	\$ 779,284	—	\$ 779,284



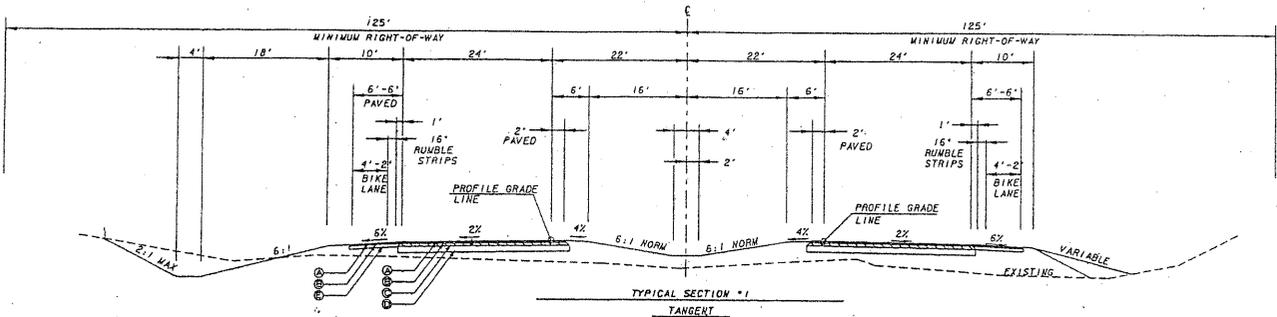
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

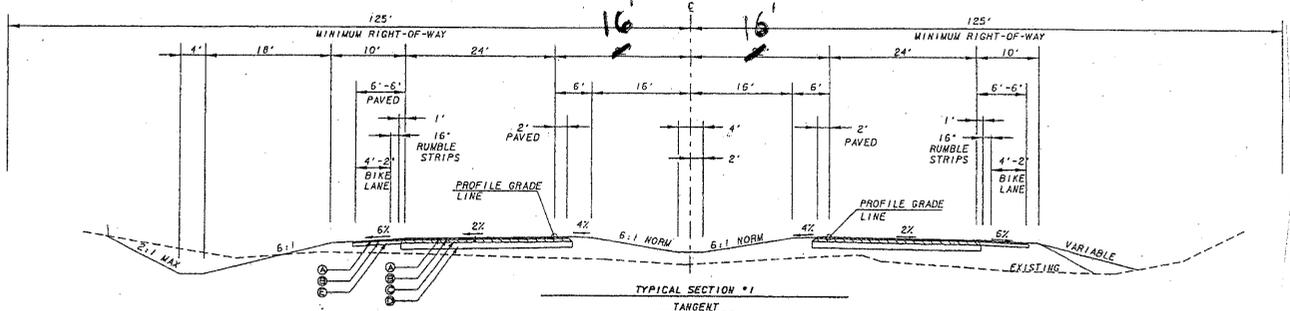
38-1'

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 6



AS DESIGNED ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:
38-1

SHEET NO.: 3 of 6

AS DESIGNED ALTERNATIVE

TYPE B MEDIAN CROSSOVER

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

NOTE:
 -- PAVEMENT OF MEDIAN CROSSOVERS (ALL TYPES) SHALL BE SLOPED FOR SURFACE DRAINAGE AS SPECIFIED.

* DIMENSION MAY VARY WHERE SPECIFIED IN THE PLANS. ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

• DIMENSIONS IN FEET (TYP)

** MEDIAN DROP INLET (9031S) CANNOT BE PLACED CLOSER THAN 20 FEET BACK FROM END OF NOSE OF THE MEDIAN.

MEDIAN DROP INLET (9031S) IS NOT RECOMMENDED FOR TYPE B MEDIAN CROSSOVERS WHERE GRADES ARE GREATER THAN 3%.

WIDTH OF MEDIAN	DESIGN SPEED			Y	W
	45 MPH	55MPH	65MPH		
32	350(200WIN)	450(350WIN)	650(450WIN)	60	4
44	150(50WIN)	300(150WIN)	450(300WIN)	240	16
64	N/A	150(50WIN)	300(150WIN)	390	26

Δ 'X' DIMENSION IS FOR DECELERATION ONLY. DOES NOT ACCOUNT FOR ANY STORAGE NEEDED. MIN. VALUES FOR 'X' ARE ONLY TO BE USED WHERE SPACING BETWEEN MEDIAN OPENINGS DOES NOT ALLOW FOR THE MORE DESIRABLE LENGTH.

$$2 \left[\frac{(420 \times 28)}{2} + (500 \times 28) + (44 \times 64) + (20 \times 16) \right] \div 9 = 4803 \text{ SY}$$

AS DESIGNED ALTERNATIVE

TYPE B MEDIAN CROSSOVER

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

NOTE:
 -- PAVEMENT OF MEDIAN CROSSOVERS (ALL TYPES) SHALL BE SLOPED FOR SURFACE DRAINAGE AS SPECIFIED.

* DIMENSION MAY VARY WHERE SPECIFIED IN THE PLANS. ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

• DIMENSIONS IN FEET (TYP)

** MEDIAN DROP INLET (9031S) CANNOT BE PLACED CLOSER THAN 20 FEET BACK FROM END OF NOSE OF THE MEDIAN.

MEDIAN DROP INLET (9031S) IS NOT RECOMMENDED FOR TYPE B MEDIAN CROSSOVERS WHERE GRADES ARE GREATER THAN 3%.

WIDTH OF MEDIAN	DESIGN SPEED			Y	W
	45 MPH	55MPH	65MPH		
32	350(200WIN)	450(350WIN)	650(450WIN)	60	4
44	150(50WIN)	300(150WIN)	450(300WIN)	240	16
64	N/A	150(50WIN)	300(150WIN)	390	26

Δ 'X' DIMENSION IS FOR DECELERATION ONLY. DOES NOT ACCOUNT FOR ANY STORAGE NEEDED. MIN. VALUES FOR 'X' ARE ONLY TO BE USED WHERE SPACING BETWEEN MEDIAN OPENINGS DOES NOT ALLOW FOR THE MORE DESIRABLE LENGTH.

$$2 \left[\frac{(240 \times 28)}{2} + (700 \times 28) + (4 \times 20) + (32 \times 64) \right] \div 9 = 5348 \text{ SY}$$

545 SY MORE PER
MEDIAN OPENING

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-1

SHEET NO.: 4 of 6

(9.5mm) $135 \text{ lb/sy} \times \frac{\text{ton}}{2000 \text{ lb}} \times \$75/\text{ton} = \$5.06/\text{sy}$ (A)

(19mm) $220 \text{ lb/sy} \times \frac{\text{ton}}{2000 \text{ lb}} \times \$75/\text{ton} = \$8.25/\text{sy}$ (B)

(25mm) $550 \text{ lb/sy} \times \frac{\text{ton}}{2000 \text{ lb}} \times \$75/\text{ton} = \$20.63/\text{sy}$ (C)

(GAB) $\frac{10''}{12''} \times \frac{150 \text{ lb}}{f+3} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \frac{9f+2}{1 \text{ sy}} \times \$24.32/\text{ton} = \$13.68/\text{sy}$ (D)

A+B+C+D mainline = \$47.62/sy

(GAB) $\frac{8''}{12''} \times \frac{150 \text{ lb}}{f+3} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \frac{9f+2}{1 \text{ sy}} \times \$24.32/\text{ton} = \$10.94/\text{sy}$ (E)

A+B+E shoulder = \$24.25/sy

A+B+C+E sideroad = \$44.88/sy

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-1

SHEET NO.: 5 of 6

Asphalt for Type B Median Openings (const. Detail M-3)

$$545 \text{ SY} \times (8) = 4360 \text{ SY}$$

Grading (8) % decrease

Grassing (8) % decrease

Major Drainage Structures (Less 12' per structure)

6 major Culverts Reduced by 5%

Right of Way

$$6.7 \text{ miles} \times \frac{5280 \text{ ft}}{1 \text{ mile}} \times 12 \text{ ft} \times \frac{1 \text{ Acre}}{43560 \text{ ft}^2} = 9.75 \text{ Acre decrease}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **38-2**

DESCRIPTION: **REDUCE OUTSIDE SHOULDERS TO 6-FT. PAVED SHOULDERS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 6.50-ft. paved shoulders that include a 12-in. buffer, 1.33-ft. rumble strip and a 4.167-ft. bicycle lane.

ALTERNATIVE: (Sketch attached)

Use 6.0-ft. paved shoulders composed of an 8-in. buffer, 1.33-ft. rumble strip and a 4.00-ft. bicycle lane.

ADVANTAGES:

- Reduces initial cost
- Reduces the quantity of pavement
- Slightly eases installation
- Implements a common practice

DISADVANTAGES:

- Reduces buffer between travelway and rumble strip
- Slightly narrows bicycle lane
- Increase perceived loss of safety

DISCUSSION:

A slight reduction in paved shoulder width will reduce cost with virtually no effect on vehicular or bicycle traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 104,513	—	\$ 104,513
ALTERNATIVE	\$ 2,822	—	\$ 2,822
SAVINGS	\$ 101,691	—	\$ 101,691

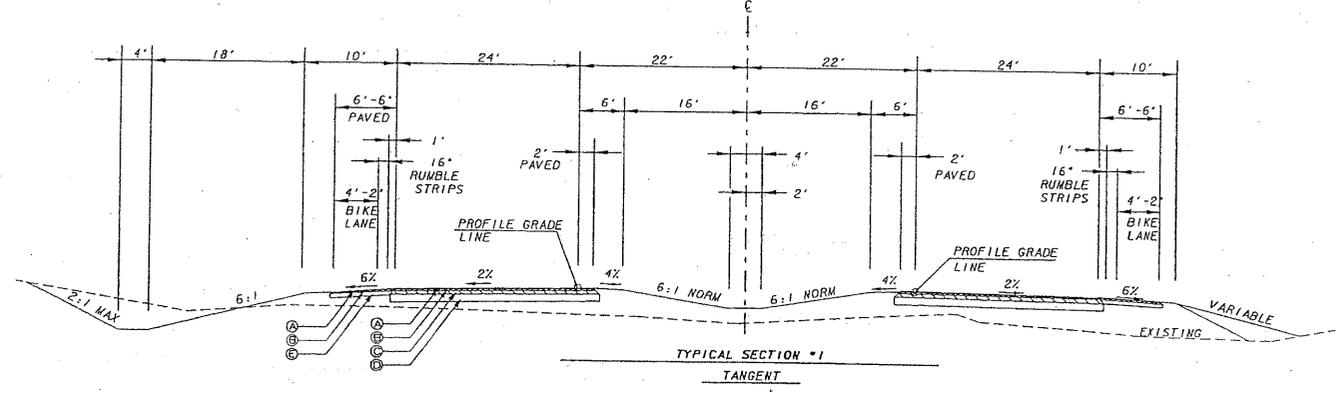
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

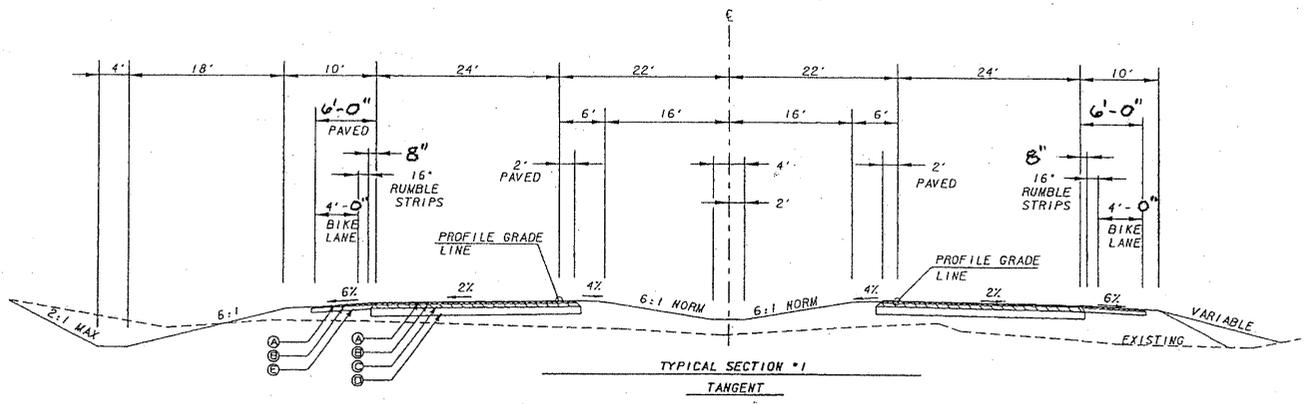
38-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-2

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 0.678 \text{ MI} = 35260'$$

SHOULDER AREA REDUCTION

$$= 2 (.5)(35260)/9 = 3918$$

$$\text{PERMANENT GRASSING} = 9(3918)/43560 = 0.81 \text{ AC}$$

$$\text{AGR. LIME} = 0.81 (800/200) = 1514 \text{ TN}$$

$$\text{LIQUID LIME} = 0.81 (3200/200) = 1310 \text{ GAL}$$

$$\text{MIXED GR. FERTILIZER} = 0.81 (335/200) = 1.36 \text{ TN}$$

$$\text{FERT. NITR. CONTENT} = 0.81 (10000/200) = 40.5 \text{ LB}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **38-3**

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

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design indicates 12-ft.-wide travel lanes.

ALTERNATIVE: (Sketch attached)

Use 11-ft.-wide travel lanes throughout the project.

ADVANTAGES:

- Reduces initial cost
- Reduces the quantity of pavement
- Slightly eases installation
- Reduces right-of-way requirements

DISADVANTAGES:

- Narrows travel lanes
- Increases perceived loss of safety

DISCUSSION:

The design year traffic is 4,200 vehicles per day with 8% trucks. Using 11-ft. travel lanes with this quantity of traffic will neither compromise safety nor reduce functionality while providing substantial savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 868,125	—	\$ 868,125
ALTERNATIVE	\$ 11,272	—	\$ 11,272
SAVINGS	\$ 856,853	—	\$ 856,853



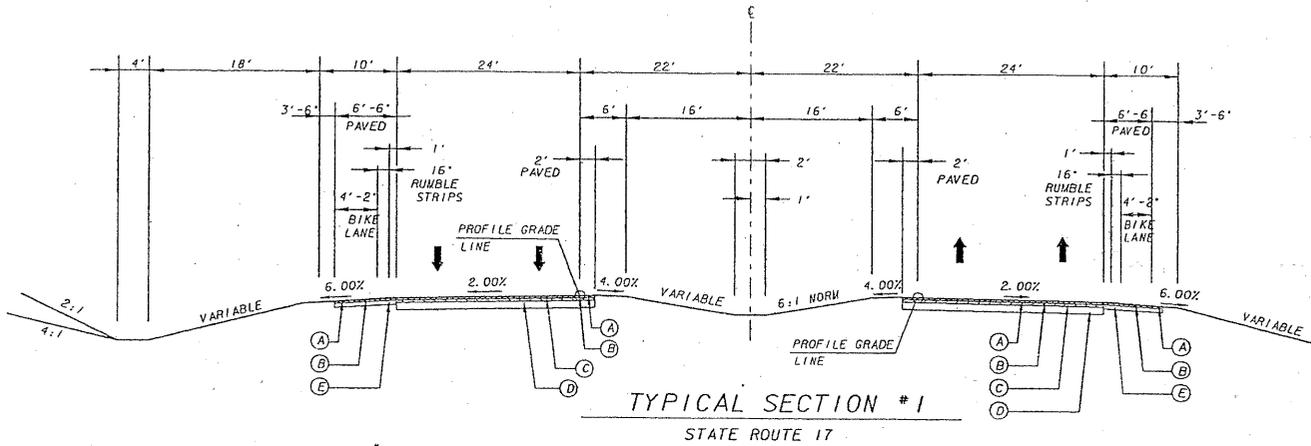
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

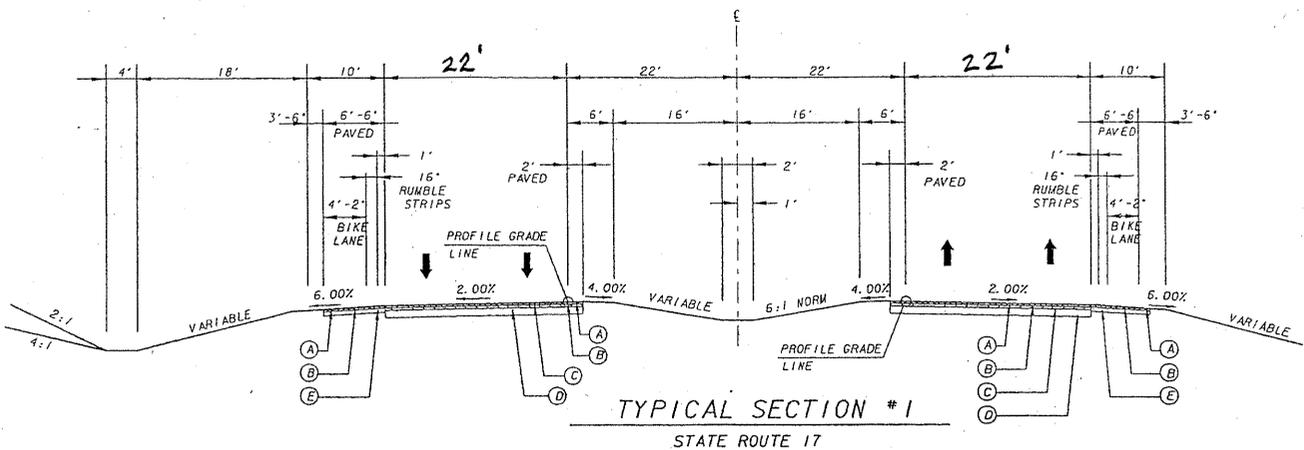
38-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-3

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 6.678 \text{ MI} = 35260$$

$$\text{LENGTH OF BRIDGES AND APPROACH SLABS} = 0$$

$$\text{NET PAYMENT LENGTH} = 35260$$

$$\begin{aligned} \text{REDUCTION IN PAYMENT AREA} &= 2(2)(1)(35260) / 9 \\ &= 15671 \text{ SY} \end{aligned}$$

$$\text{REDUCTION IN RIGHT-OF-WAY}$$

$$= 9(15671) / 43560 = 3.24 \text{ AC}$$

$$\text{ADDITIONAL GRASSING QUANTITIES: } 3.24$$

$$\text{PERM. GRASSING} = 3.24 \text{ AC}$$

$$\text{AGR. LIME} = 3.24 (3800 / 200) = 61.6 \text{ TN}$$

$$\text{LIQUID LIME} = 3.24 (3200 / 200) = 51.8 \text{ GL}$$

$$\text{MIXED GR. FERT.} = 3.24 (335 / 200) = 5.43 \text{ TN}$$

$$\text{NIT. CONCENT FERT.} = 3.24 (60000 / 200) = 162 \text{ LB}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 38-9

DESCRIPTION: USE THE EXISTING ROADWAY PAVEMENT AS MUCH AS
POSSIBLE BETWEEN STATION (STA) 105+00 AND
STA 170+00

SHEET NO.: 1 of 7

ORIGINAL DESIGN: (Sketch attached)

The current design shifts SR 17 to the east for widening and does not fully use the existing roadway pavement along the corridor.

ALTERNATIVE: (Sketch attached)

Maintain more of the existing alignment to use more of the existing roadway pavement and reduce the need for additional right-of-way.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Takes advantage of existing asset
- Implements common practice

DISADVANTAGES:

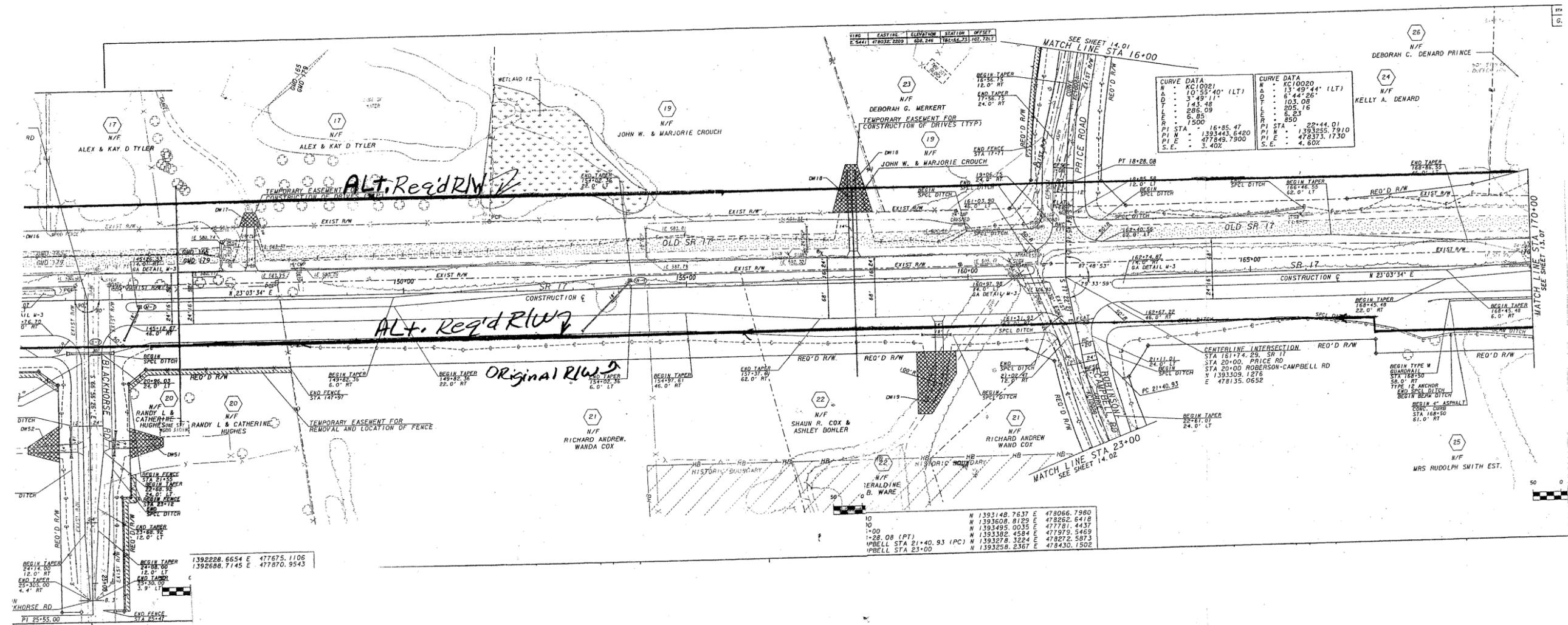
- Requires adjustment of proposed grades to meet existing profile
- Assumes existing pavement is reusable

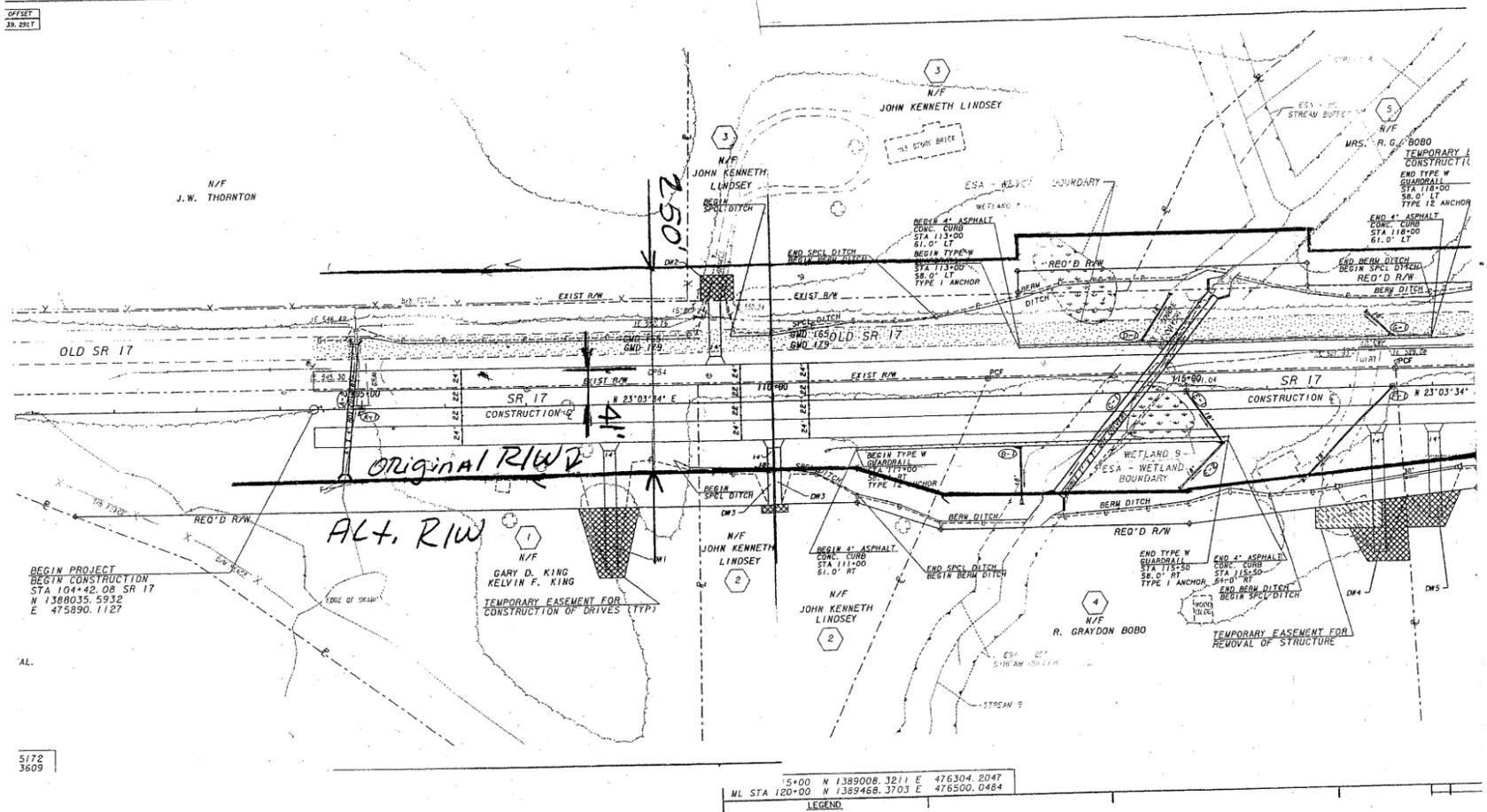
DISCUSSION:

The existing horizontal and vertical alignment could be adjusted from Station (STA) 105+00 to STA 170+00 to better utilize the existing roadway pavement and therefore minimize earthwork, pavement and right-of-way costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,257,103	—	\$ 1,257,103
ALTERNATIVE	\$ 347,557	—	\$ 347,557
SAVINGS	\$ 909,546	—	\$ 909,546

38-9
SHEET 2 of 7

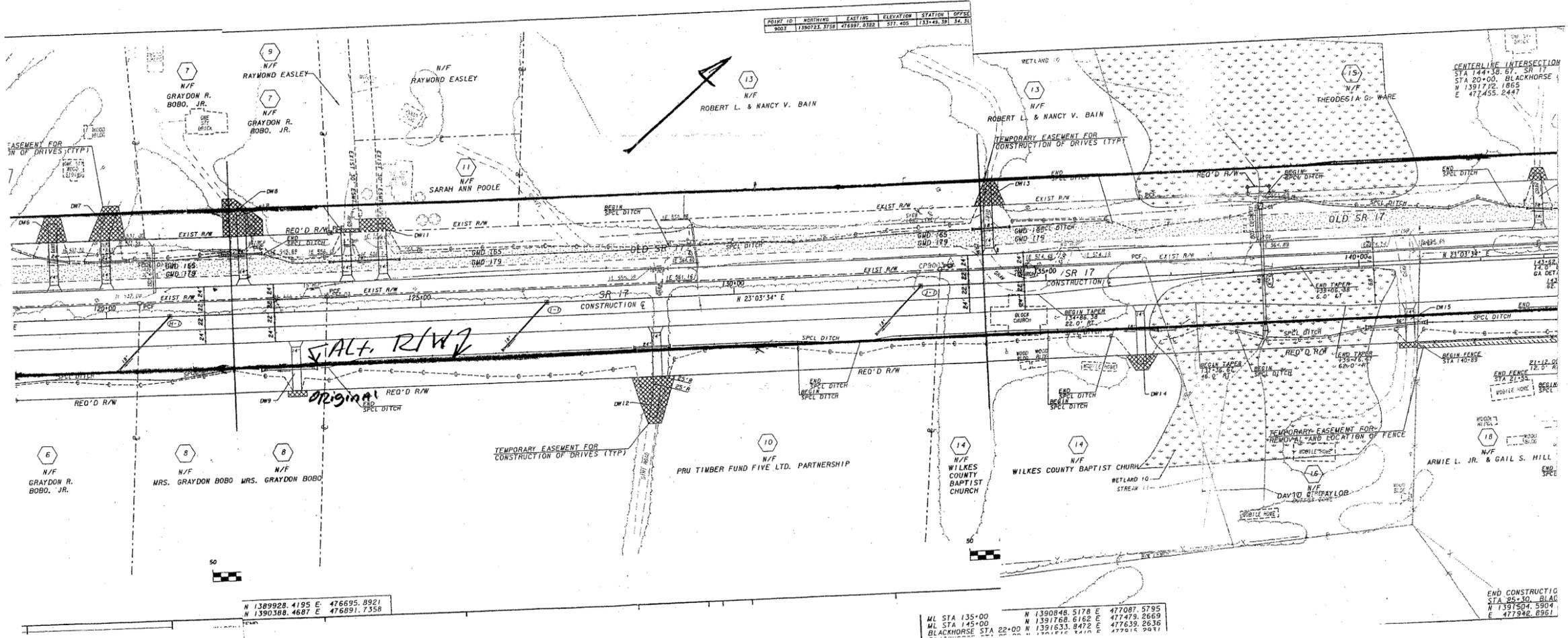




5172
3609

5+00 N 1389008.3211 E 476304.2047
ML STA 120+00 N 1389468.3703 E 476500.0484

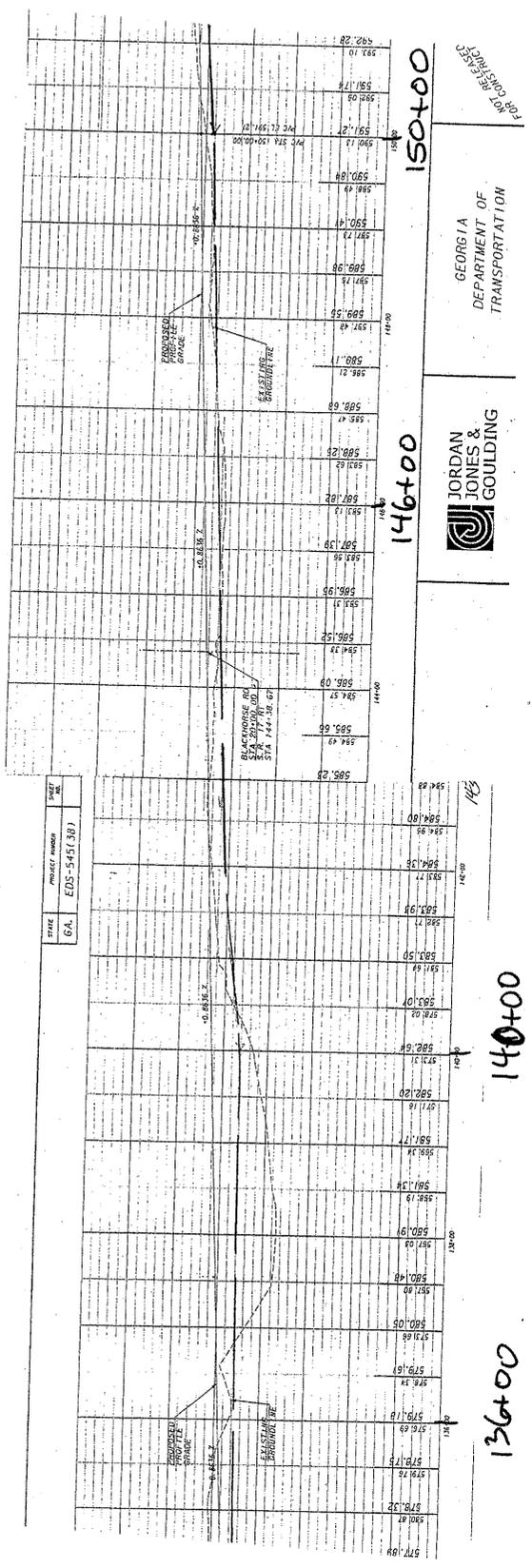
POINT NO.	NORTHING	EASTING	ELEVATION	STATION	OFFSET
9003	1390723.3758	476897.0382	517.405	133+48.31	24.21



N 1389928.4195 E 476695.8921
N 1390398.4687 E 476891.7358

ML STA 135+00 N 1390848.5178 E 477087.5795
ML STA 145+00 N 1391768.6162 E 477475.2669
BLACKHORSE STA 22+00 N 1391633.8472 E 477639.2636

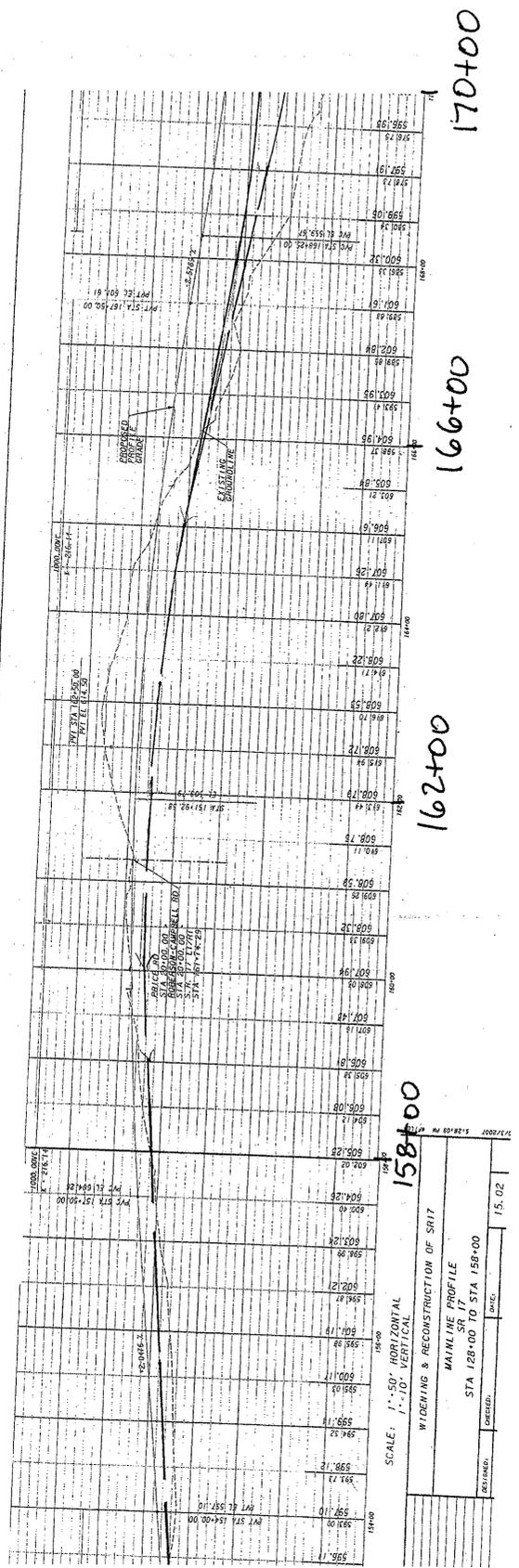
END CONSTRUCTION
STA 26+30.5304
N 1391504.5304
E 477542.8961



GEORGIA
DEPARTMENT OF
TRANSPORTATION

JORDAN
JONES &
GOULDING

FOR CONTRACT
30P000000003



SCALE: 1" = 50' HORIZONTAL
1" = 10' VERTICAL

WIDENING & RECONSTRUCTION OF SR17
MAINLINE PROFILE
SR 17
STA 128+00 TO STA 158+00

DESIGNED: [] CHECKED: [] DATE: 15.02

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-9

SHEET NO.: 6 of 7

STA 105+00 to STA 170+00 = 6500'

$\frac{6500'}{1800'}$ (grade change where pavement cannot be saved/retained)

$\Rightarrow 4700'$
 Grade Roadway Retained (24' - two lanes for southbound traffic)

$\frac{(4700' \times 24')}{9} \Rightarrow 12,540 \text{ s.y.}$ mainline Pavement

$12,533 \text{ s.y.} \times \$47.62/\text{s.y.} = \$597,155$ Original Cost

Original Earthwork for two lanes for 4700'

$\frac{4700' \times 11.2' \times 4 \text{ Aug. ht. from x-section/profile}}{27} \approx 78,000 \text{ c.y.}$

Typical outside shldr to outside shldr

$78,000 \text{ c.y.} \times \$7/\text{c.y.} = \$546,000$

The area of RLW is the same for both Original and Alt. Designs. However the Alt. will have one small Resident displacement.

(from GDOT RLW estimate)

Reloc. 1 Resident: \$40,000 parcel.

Damages: \$40,000

Alt. Constr. Cost to Resurface: $12,540 \text{ s.y.} \times \$5.06/\text{s.y.} =$

unit cost from

38-1

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **38-10**

DESCRIPTION: **REALIGN "ORIGINAL" NEW LOCATION CLOSER TO**
EXISTING RIGHT-OF-WAY BETWEEN STA 170+00 AND STA
276+00

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design shifts SR 17 on a new location STA 170+00 to STA 276+00 to correct a horizontal curve and go to a new location to align with the Tignall Bypass alignment.

ALTERNATIVE: (Sketch attached)

Use a new alignment between STA 170+00 and STA 276+00 that uses more of the existing right-of-way and saves a small business.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Takes advantage of existing asset
- Implements a greener solution by avoiding wetlands
- Retains the small business

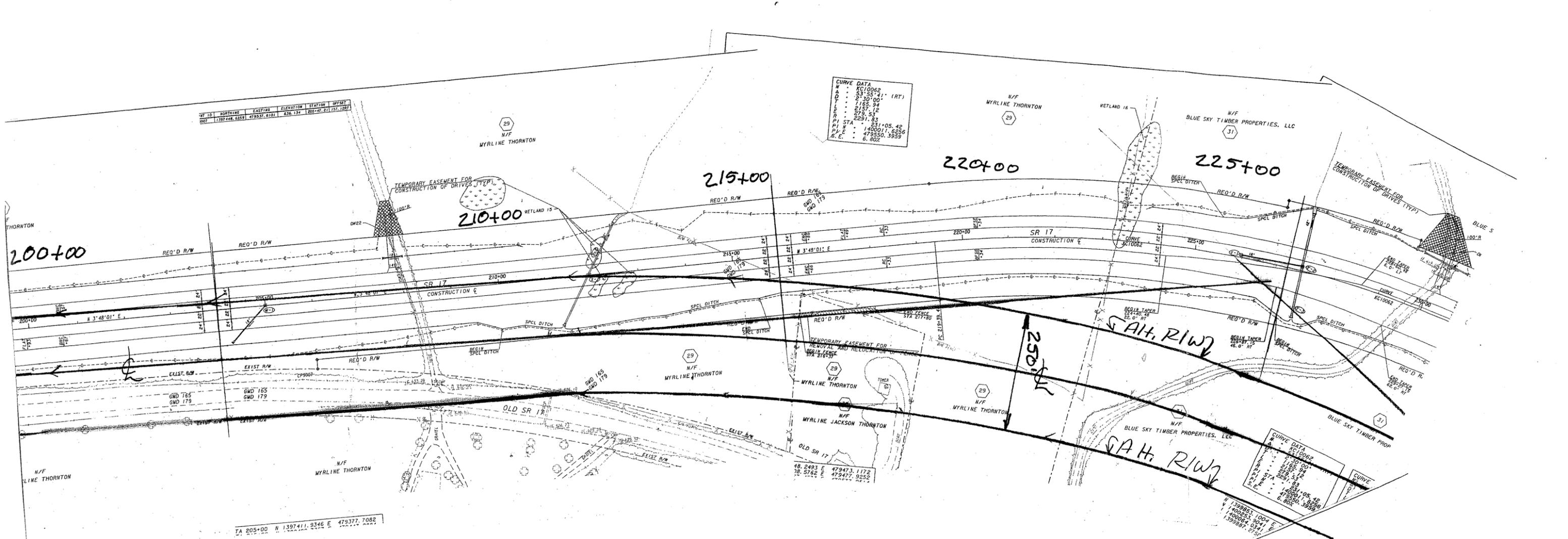
DISADVANTAGES:

- None apparent

DISCUSSION:

The current design abandons the existing right-of-way entirely along the new location section from STA 180+00 to STA 211+00. This alternative realignment would use most of the existing right-of-way between these stations and avoid displacing a small business and wetland Nos. 18 and 19.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 406,087	—	\$ 406,087
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 406,087	—	\$ 406,087



CURVE DATA	
W	KC10062
A	33°55'1" (RT)
D	2150.00'
T	175.94'
E	2157.12'
R	375.53'
P	225.13'
PI STA	231°05.42
P/E	140001.6256
S.E.	479550.3959
S.E.	6.80%

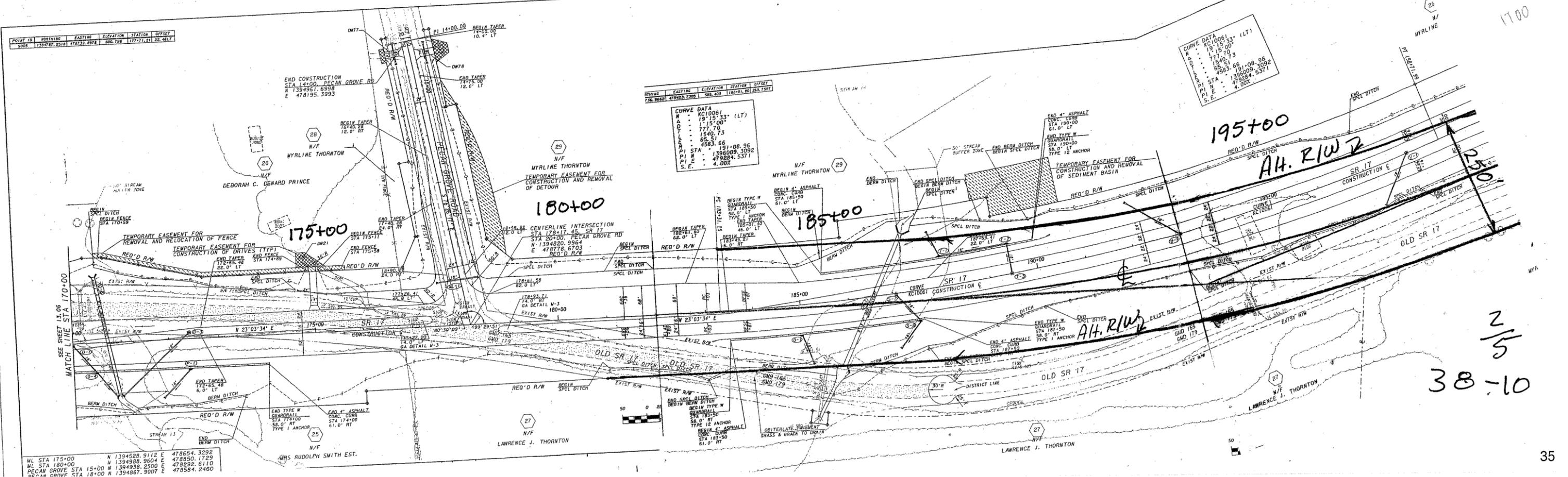
CURVE DATA	
W	KC10062
A	33°55'1" (RT)
D	2150.00'
T	175.94'
E	2157.12'
R	375.53'
P	225.13'
PI STA	231°05.42
P/E	140001.6256
S.E.	479550.3959
S.E.	6.80%

POINT ID	NORTHING	EASTING	ELEVATION	STATION	OFFSET
9005	139487.8518	478735.8973	966.748	177+71.21	22.4617

POINTING	EASTING	ELEVATION	STATION	OFFSET
256.9903	479492.1308	985.403	178+81.80	20.7501

CURVE DATA	
W	KC10061 (LT)
A	19°15'33"
D	1180.00'
T	777.70'
E	1540.75'
R	68.51'
P	4583.66'
PI STA	191°08.36
P/E	1396009.1092
S.E.	478778.6703
S.E.	4.00%

CURVE DATA	
W	KC10063 (LT)
A	19°15'33"
D	1180.00'
T	777.70'
E	1540.75'
R	68.51'
P	4583.66'
PI STA	191°08.36
P/E	1396009.1092
S.E.	478778.6703
S.E.	4.00%



ML STA 175+00	N 1394528.9112 E	478654.3292
ML STA 180+00	N 1394988.9604 E	478950.1729
PECAN GROVE STA 15+00	N 1394938.2500 E	478932.6110
PECAN GROVE STA 18+00	N 1394867.9007 E	478584.2460

2/5
38-10

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
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38-10

SHEET NO.: 4 of 5

R/W saved is a cost under Original Design:
 $1600' \times 100' \leftarrow \text{width of exist. R/W}$

$$\frac{43,560 \text{ SF}}{\text{AC}} = 3.67 \text{ AC}$$

Save business - Gas pumps & car wash.

Reloc. = \$25,000/parcel

Comm. \uparrow from GDOT R/W estimate

Displ. Impact = \$50,000

Save Rdwy construction is a cost under Original Design & Save Georgia Lane

$$\frac{700' \times 24'}{9} = 1,867 \text{ s.f.}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **38-12**

DESCRIPTION: **RETAIN EXISTING ALIGNMENT ON CHURCH STREET AT**
SR 17

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

Church Street is to be reconstructed to intersect SR 17 approximately 250 ft. south of its existing location. The length of the reconstruction of Church Street is 3,400 ft. In addition, Jones Street is being realigned for a length of 550 ft. to improve its intersection with Church Street.

ALTERNATIVE: (Sketch attached)

Leave Church Street on its present horizontal alignment. Reconstruct a minimal amount of Church Street to raise the grade approximately 5.50 ft. to match SR 17.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way impacts and cost
- Provides adequate intersection with SR 17

DISADVANTAGES:

- Retains existing less-than-optimal alignment at east intersection with Jones Street and Church Street
- Disrupts Church Street traffic during construction

DISCUSSION:

The new alignment provides an intersection angle of 81° 34'. The existing alignment of Church Street is on a slight curve at the intersection with an intersection angle of 77°. A tremendous amount of construction is required to provide an improvement of less than 5° in the intersection angle.

Church Street traffic can be detoured to Jones Street during construction. Once the profile adjustments on Church Street are completed, the proposed cul-de-sac on Jones Street can be constructed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,001,860	—	\$ 1,001,860
ALTERNATIVE	\$ 65,808	—	\$ 65,808
SAVINGS	\$ 936,052	—	\$ 936,052

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-12

SHEET NO.: 3 of 6

PAVEMENT AREA

ORIGINAL DESIGN

CHURCH STREET $A = 24(3950 - 590 - 105) / 9$
 $= 8787 \text{ SY}$

JONES STREET $A = 24(2000 - 1450 - 12) / 9$
 $= 1435 \text{ SY}$

ALTERNATIVE DESIGN

ASSUME 250' EXT SIDE OF SR 17 FOR PROFILE CHANGE

$A = 24(2)(250) / 9 = 1333 \text{ SY}$

EXCAVATION:

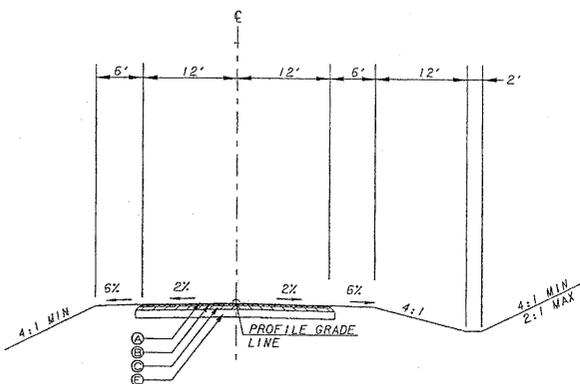
CHURCH STREET

STATION	ORIG. GRND	P/G	Δ
11+00	611.70	612.11	-0.41
12+00	607.04	605.13	1.91
13+00	603.91	598.14	5.77
14+00	597.86	591.16	6.70
15+00	590.22	584.19	6.03
16+00	584.95	578.39	11.56
17+00	574.66	574.50	20.16
18+00	592.58	572.53	20.05

Fill:

CHURCH ST

STATION	ORIG. GRND	P/G	Δ
21+00	571.10	572.04	0.94
22+00	560.22	569.24	9.02
23+00	555.73	566.47	10.74
24+00	541.52	564.66	23.14
25+00	545.75	564.19	18.44
26+00	557.73	565.02	7.29
27+00	559.5	566.21	6.71
28+00	561.8	567.41	5.61
29+00	564.07	568.69	4.54
30+00	566.42	569.81	3.39
31+00	570.29	571.01	0.72



TYPICAL SECTION - 3

SIDE ROAD TANGENT

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-12

SHEET NO.: 4 of 6

$$\begin{aligned} \text{CUT AREA} &= 2 \left[12\Delta + 6(\Delta + .42) + 12(\Delta + 2.10) + 2(\Delta + 3.60) + (\Delta + 3.60)^2(2)/2 \right] \\ &= 2\Delta^2 + 78.4\Delta + 95.76 \end{aligned}$$

STA.	Δ	A
11+00	0	0
12+00	1.91	252.8
13+00	5.77	614.7
14+00	6.70	710.8
15+00	6.03	641.2
16+00	11.56	1269.3
17+00	20.16	2489.2
18+00	20.05	2471.7

$$\begin{aligned} \text{VOLUME} &= 100 \left(.5 \times 0 + 252.8 + 614.7 \right. \\ &\quad \left. + 710.8 + 641.2 + 1269.3 + 2489.2 \right. \\ &\quad \left. + .5 \times 2471.7 \right) / 27 \\ &= 26,718 \text{ CY} \end{aligned}$$

$$\begin{aligned} \text{Fill AREA} &= 2 \left[12\Delta + 6(\Delta - .42) + 4(\Delta - .60)^2/2 \right] \\ &= 4\Delta^2 + 31.2\Delta - 3.60 \end{aligned}$$

STA.	Δ	A
21+00	0.94	29.3
22+00	4.02	603.3
23+00	10.74	491.3
24+00	23.14	2860.2
25+00	18.44	1931.9
26+00	7.29	436.4
27+00	6.71	385.8
28+00	5.61	297.3
29+00	4.54	220.5
30+00	3.39	148.1
31+00	0.72	20.9

$$\begin{aligned} \text{VOLUME} &= 100 \left(.5 \times 29.3 + 603.3 \right. \\ &\quad \left. + 491.3 + 2860.2 + 1931.9 + 436.4 \right. \\ &\quad \left. + 385.8 + 297.3 + 220.5 + 148.1 \right. \\ &\quad \left. + .5 \times 20.9 \right) / 27 \\ &= 25,963 \text{ CY} \end{aligned}$$

IGNORE CUT/FILL DIFFERENCE ON JONES ST.

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

38-12

SHEET NO.: 5 of 6

RIGHT-OF-WAY

CHURCH STREET : USE 125' WIDTH

$$\text{LENGTH} = (1940 - 1100 + 3250 - 2070) = 2020$$

$$\text{AREA} = 125(2020) / 43560 = 5.80$$

JONES ST. USE 100' - 40' = 60' WIDTH

$$\text{LENGTH} = 350$$

$$\text{AREA} = 60(350) / 43560 = 0.48$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **38-13**

DESCRIPTION: **REALIGN MAINLINE AT DELHI ROAD TO AVOID**
WETLANDS

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for SR 17 to be located to the east of Tignall, forming a Tignall Bypass. The new location forms a perpendicular intersection with Delhi Road by adjusting the alignment of Delhi Road to avoid a historic property.

ALTERNATIVE: (Sketch attached)

Realign the SR 17 new location at Delhi Road to avoid the wetlands at the southeast quadrant of the intersection and the historic property at the northwest quadrant of the intersection.

ADVANTAGES:

- Avoids wetlands
- Implements a greener solution
- May reduce right-of-way

DISADVANTAGES:

- Increases superelevation for curve KC0064

DISCUSSION:

The mainline at Delhi Road should be realigned to avoid the wetlands by shifting the alignment approximately 170 ft. to the west.

Although no cost savings could be identified, wetlands avoidance would address both sustainable design and environmental concerns.

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

SKETCHES



ALTERNATIVE NO.
38-13
ORIGINAL AND
ALTERNATIVE DESIGNS
SHEET 2 OF 3

PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
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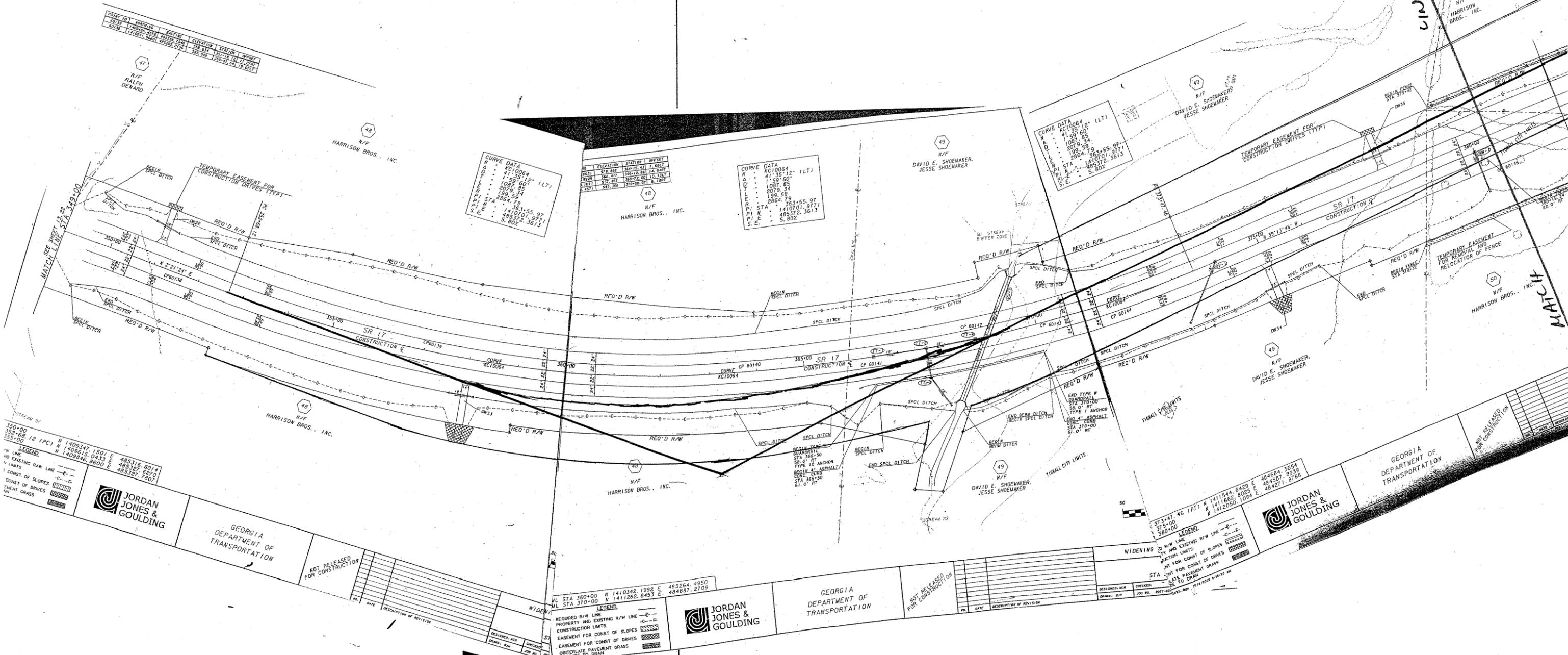
ALTERNATIVE NO.:

38-13

SHEET NO.: of

AS DESIGNED

ALTERNATIVE



GEORGIA DEPARTMENT OF TRANSPORTATION

NOT RELEASED FOR CONSTRUCTION

NO.	DATE	DESCRIPTION OF REVISION

NO.	DATE	DESCRIPTION OF REVISION



GEORGIA DEPARTMENT OF TRANSPORTATION

NOT RELEASED FOR CONSTRUCTION

NO.	DATE	DESCRIPTION OF REVISION

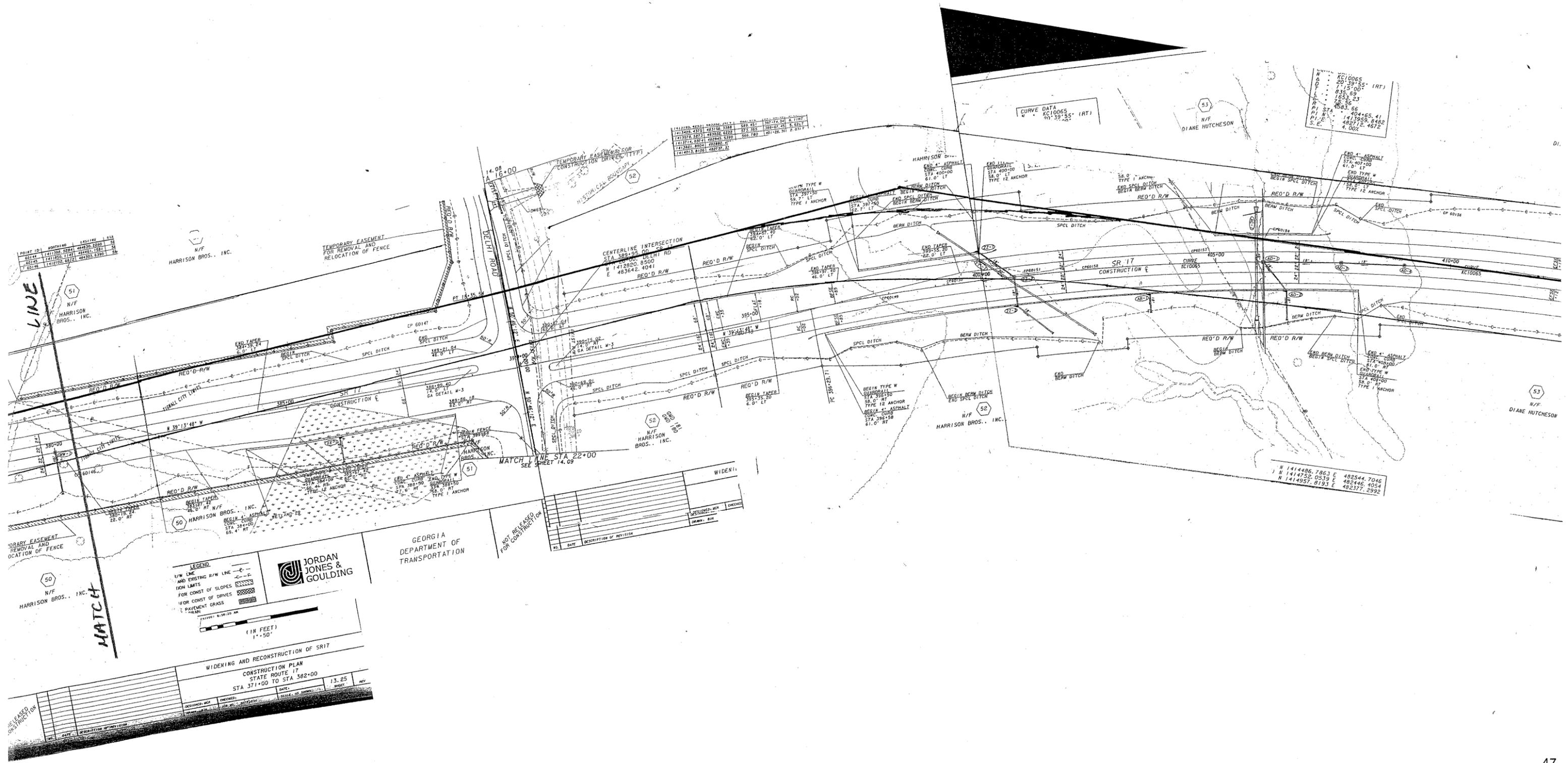
WIDENING 30' R/W LINE
EXISTING R/W LINE
PROPERTY AND EXISTING R/W LINE
CONSTRUCTION LIMITS
CONST. OF SLOPES
EASEMENT FOR CONST. OF DRIVES
EASEMENT FOR CONST. OF GRASS
OBTERLATE PAVEMENT GRASS
PENDING TO DRAW



GEORGIA DEPARTMENT OF TRANSPORTATION

NOT RELEASED FOR CONSTRUCTION

ALTERNATIVE NO.
38-13
ORIGINAL AND
ALTERNATIVE DESIGNS
SHEET 3 OF 3



VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **38-14**

DESCRIPTION: **RECONFIGURE OLD SR 17 WITH NEW LOCATION**
BETWEEN STA 420+00 AND STA 440+00

SHEET NO **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the tie-in of Old SR 17 to the new location centerline using 45 miles per hour (mph) speed design and involves one residential displacement.

ALTERNATIVE: (Sketch attached)

Tie in Old SR 17 to the new location centerline using a 35 mph design speed and thereby avoiding the residential displacement.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way impact and cost
- Eliminates one displacement

DISADVANTAGES:

- Decreases speed

DISCUSSION:

Decreasing the design speed from 45 mph to 35 mph reduces the radius required for the tie-in from 718 ft. to 340 ft. The tie-in can be shifted north using a smaller radius, thereby reducing asphalt and right-of-way required and eliminating a displacement. The Department does allow a 10 mph reduction in design speed at "T" intersections.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 246,301	—	\$ 246,301
ALTERNATIVE	\$ 50,427	—	\$ 50,427
SAVINGS	\$ 195,874	—	\$ 195,874

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

38-14

SHEET NO.: 3 of 4

Pavement (Additional) \$44.88/sy

1100 ft
 550 ft

$$\frac{550 \text{ ft} \times 24 \text{ ft}}{9} = \underline{1467 \text{ SY}} \text{ original}$$

500 ft
 250 ft

$$\frac{250 \text{ ft} \times 24 \text{ ft}}{9} = \underline{667 \text{ SY}} \text{ alternate}$$

Right of Way (Additional) \$4200/Acre

$$\frac{650' \times 160'}{43560} = \underline{2.4 \text{ Acres}} \text{ original}$$

$$\frac{350' \times 150'}{43560} = \underline{1.2 \text{ Acres}} \text{ alternate}$$

w/ alternate 1 less displacement, Residential (40K)

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 47-1

DESCRIPTION: **REDUCE MEDIAN WIDTH TO 32 FT.**

SHEET NO.: 1 of 6

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of a 44-ft.-wide depressed grass median throughout the project.

ALTERNATIVE: (Sketch attached)

Use a 32-ft.-wide depressed grass median throughout the project.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Reduces future mowing costs
- Implements a common practice
- Maintains a safety clear zone

DISADVANTAGES:

- Reduces buffer between travel ways
- Narrows median
- Increases perceived loss of safety

DISCUSSION:

A reduction of 12 ft. in the median will not reduce the functional requirements of the median as a safety and clear zone and will not have an adverse effect on vehicular traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 5,144,250	—	\$ 5,144,250
ALTERNATIVE	\$ 4,776,010	—	\$ 4,776,010
SAVINGS	\$ 368,240	—	\$ 368,240

SKETCHES

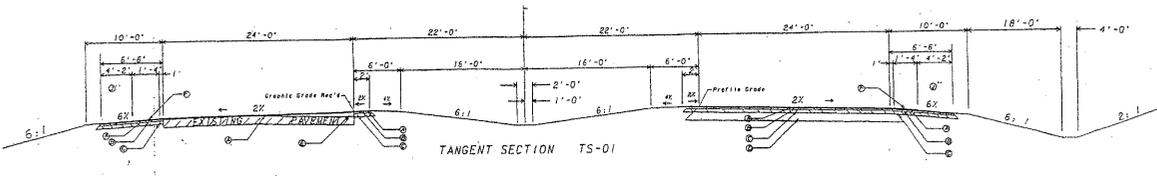
PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

47-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 6



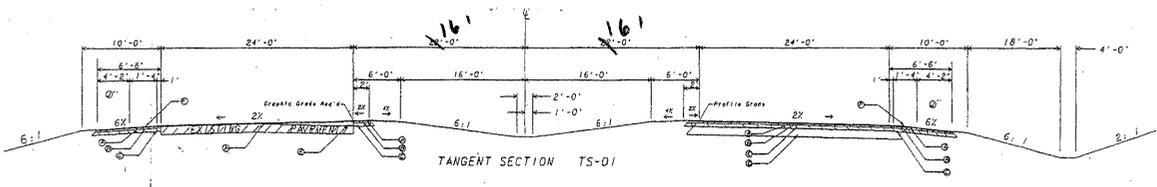
SKETCHES

PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

AS DESIGNED ALTERNATIVE

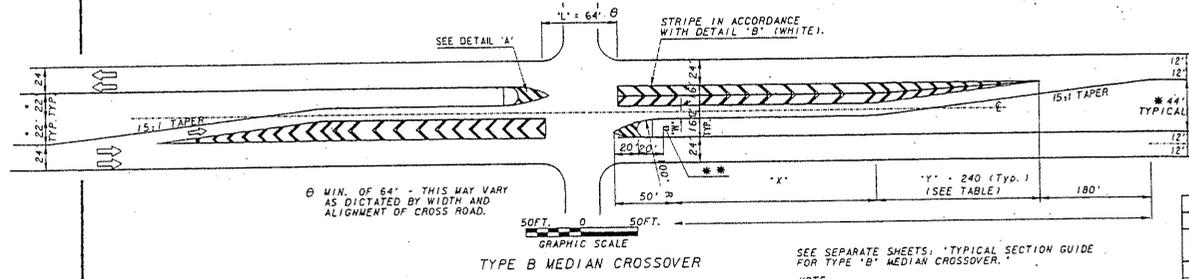
SHEET NO.: of



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:
47-1
 SHEET NO.: 3 of 6

AS DESIGNED ALTERNATIVE



Δ 'X' DIMENSION IS FOR DECELERATION ONLY. DOES NOT ACCOUNT FOR ANY STORAGE NEEDED. MIN. VALUES FOR 'X' ARE ONLY TO BE USED WHERE SPACING BETWEEN MEDIAN OPENINGS DOES NOT ALLOW FOR THE MORE DESIRABLE LENGTH.

WIDTH OF MEDIAN	DESIGN SPEED			Y	W
	45 MPH	55 MPH	65 MPH		
32	350(200W/IN)	450(350W/IN)	650(450W/IN)	60	4
44	150(150W/IN)	300(150W/IN)	450(300W/IN)	240	16
64	N/A	150(150W/IN)	300(150W/IN)	390	26

TYPE B MEDIAN CROSSOVER

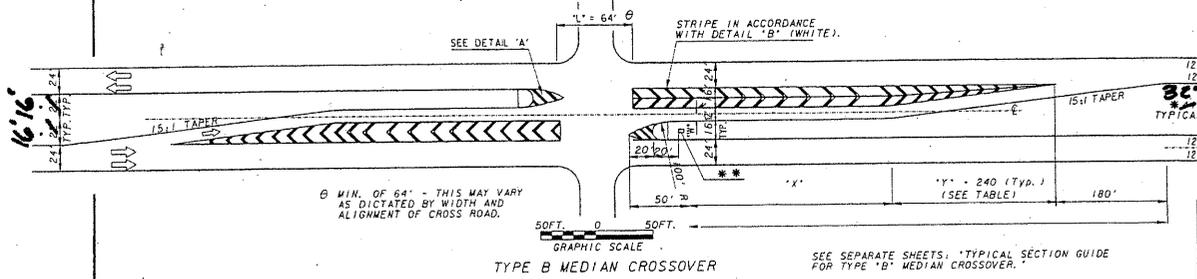
SEE SEPARATE SHEETS: TYPICAL SECTION GUIDE FOR TYPE 'B' MEDIAN CROSSOVER.

- * DIMENSION MAY VARY WHERE SPECIFIED IN THE PLANS. ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.
- DIMENSIONS IN FEET (TYP)

- ** MEDIAN DROP INLET (90315) CANNOT BE PLACED CLOSER THAN 20 FEET BACK FROM END OF NOSE OF THE MEDIAN.
- MEDIAN DROP INLET (90315) IS NOT RECOMMENDED FOR TYPE B MEDIAN CROSSOVERS WHERE GRADES ARE GREATER THAN 3%.

$$2 \left[\frac{(420 \times 28)}{2} + (500 \times 28) + (44 \times 64) + (20 \times 16) \right] \div 9 = 4803 \text{ SY}$$

AS DESIGNED ALTERNATIVE



Δ 'X' DIMENSION IS FOR DECELERATION ONLY. DOES NOT ACCOUNT FOR ANY STORAGE NEEDED. MIN. VALUES FOR 'X' ARE ONLY TO BE USED WHERE SPACING BETWEEN MEDIAN OPENINGS DOES NOT ALLOW FOR THE MORE DESIRABLE LENGTH.

WIDTH OF MEDIAN	DESIGN SPEED			Y	W
	45 MPH	55 MPH	65 MPH		
32	350(200W/IN)	450(350W/IN)	650(450W/IN)	60	4
44	150(150W/IN)	300(150W/IN)	450(300W/IN)	240	16
64	N/A	150(150W/IN)	300(150W/IN)	390	26

TYPE B MEDIAN CROSSOVER

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

- * DIMENSION MAY VARY WHERE SPECIFIED IN THE PLANS. ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.
- DIMENSIONS IN FEET (TYP)

- ** MEDIAN DROP INLET (90315) CANNOT BE PLACED CLOSER THAN 20 FEET BACK FROM END OF NOSE OF THE MEDIAN.
- MEDIAN DROP INLET (90315) IS NOT RECOMMENDED FOR TYPE B MEDIAN CROSSOVERS WHERE GRADES ARE GREATER THAN 3%.

$$2 \left[\frac{(240 \times 28)}{2} + (700 \times 28) + (4 \times 20) + (32 \times 64) \right] \div 9 = 5348 \text{ SY}$$

545 SY MORE PER MEDIAN OPENING

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-1

SHEET NO. 4 of 6

9.5mm $165 \text{ lb/sy} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \$35/\text{ton} = \$2.89/\text{sy}$ (A)

19mm $220 \text{ lb/sy} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \$35/\text{ton} = \$3.85/\text{sy}$ (B)

25mm $440 \text{ lb/sy} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \$35/\text{ton} = \$7.7/\text{sy}$ (C)

GAB $\frac{8''}{12} \times \frac{150 \text{ lb}}{f+3} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \frac{9f+2}{1 \text{ sy}} \times \$14/\text{ton} = \$6.3/\text{sy}$ (D)

A+B+C+D mainline = \$20.74/sy

A+B+C shoulders & side roads = \$14.44/sy

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-1

SHEET NO.: 5 of 6

Asphalt for Type B Median Openings (Const Detail M-3)

$$5455Y \times (11) = 5995SY \text{ more}$$

Grading (8)% decrease

Grassing (8)% decrease

Major Drainage Structures (Less 12' per structure)

4 major Culverts Reduced by 7%

Right of Way decrease

$$7.65 \text{ miles} \times \frac{5280 \text{ ft}}{1 \text{ mile}} \times 12 \text{ ft} \times \frac{1 \text{ Acre}}{43560 \text{ ft}^2} = 11.13 \text{ Acres}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 47-2

DESCRIPTION: REDUCE OUTSIDE SHOULDERS TO 6-FT. PAVED SHOULDERS

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 6.50-ft. paved shoulders that include a 12-in. buffer, 1.33-ft. rumble strip and a 4.167-ft. bicycle lane.

ALTERNATIVE: (Sketch attached)

Use 6.0-ft. paved shoulders composed of an 8-in. buffer, 1.33-ft. rumble strip and a 4.00-ft. bicycle lane.

ADVANTAGES:

- Reduces initial cost
- Reduces the quantity of pavement
- Slightly eases installation
- Implements a common practice

DISADVANTAGES:

- Reduces buffer between travelway and rumble strip
- Slightly narrows bicycle lane
- Increases perceived loss of safety

DISCUSSION:

A slight reduction in paved shoulder width will reduce cost with virtually no effect on vehicular or bicycle traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 95,532	—	\$ 95,532
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 95,532	—	\$ 95,532



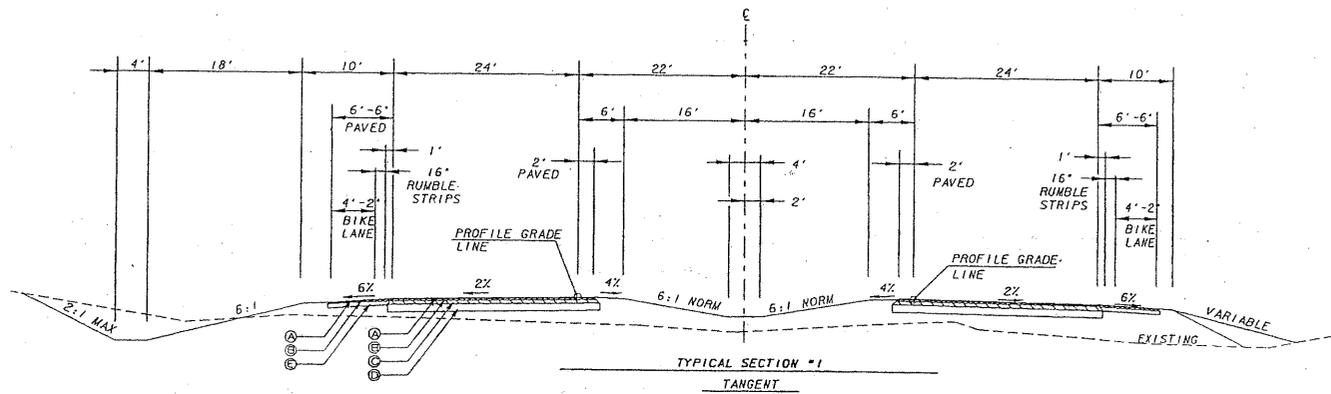
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

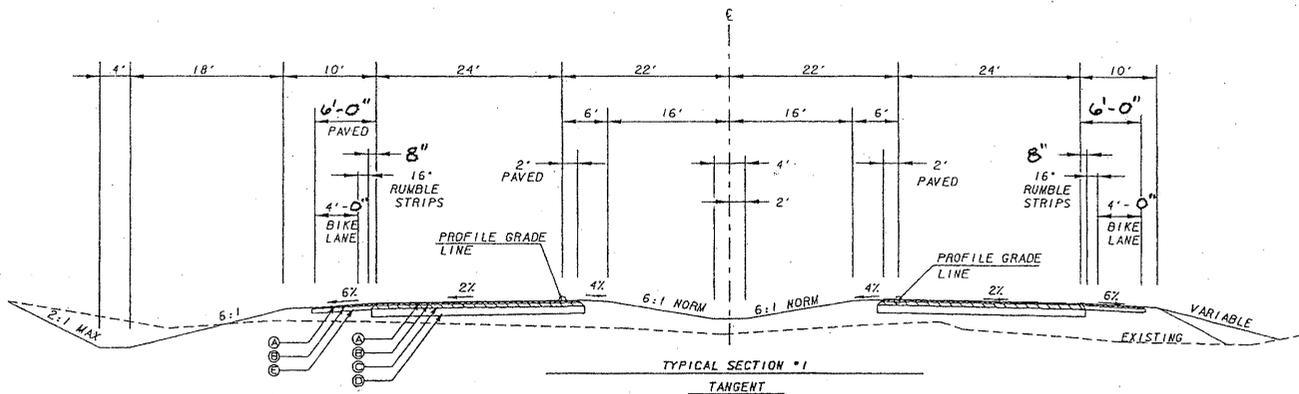
47-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-2

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 7.65 \text{ Mi} = 40392$$

SHOULDER AREA REDUCTION

$$= 2(1.5)(40392)/9 = 4488 \text{ SY}$$

~~$$\text{PERMANENT GRASSING} = 4488 / 43560 = 0.10 \text{ AC}$$~~

~~$$\text{AGR. LIME} = 0.10 (1) = \text{TN}$$~~

~~$$\text{LIQUID LIME} = 0.10 (1) = \text{GL}$$~~

~~$$\text{MIXED GR. FERTILIZER} = 0.10 (1) = \text{TN}$$~~

~~$$\text{FERT. NTR. CONTENT} = 0.10 (1) = \text{LB}$$~~

NO UNIT PRICES FOR ITEMS 10 NONE GRASSING

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **47-3**

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

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design indicates 12-ft.-wide travel lanes.

ALTERNATIVE: (Sketch attached)

Use 11-ft.-wide travel lanes throughout the project.

ADVANTAGES:

- Reduces initial cost
- Reduces the quantity of pavement
- Slightly eases installation
- Reduces right-of-way requirements

DISADVANTAGES:

- Narrows travel lanes
- Increases perceived loss of safety

DISCUSSION:

The design year traffic is 4,200 vehicles per day with 8% trucks. Using 11-ft.-wide travel lanes with this quantity of traffic will neither compromise safety nor reduce functionality while providing substantial savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 593,927	—	\$ 593,927
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 593,927	—	\$ 593,927

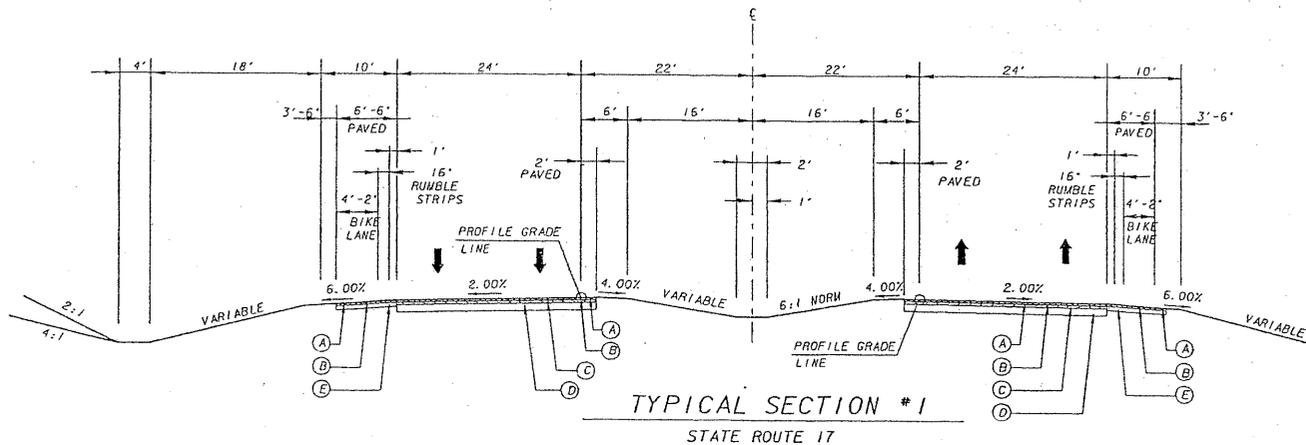
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

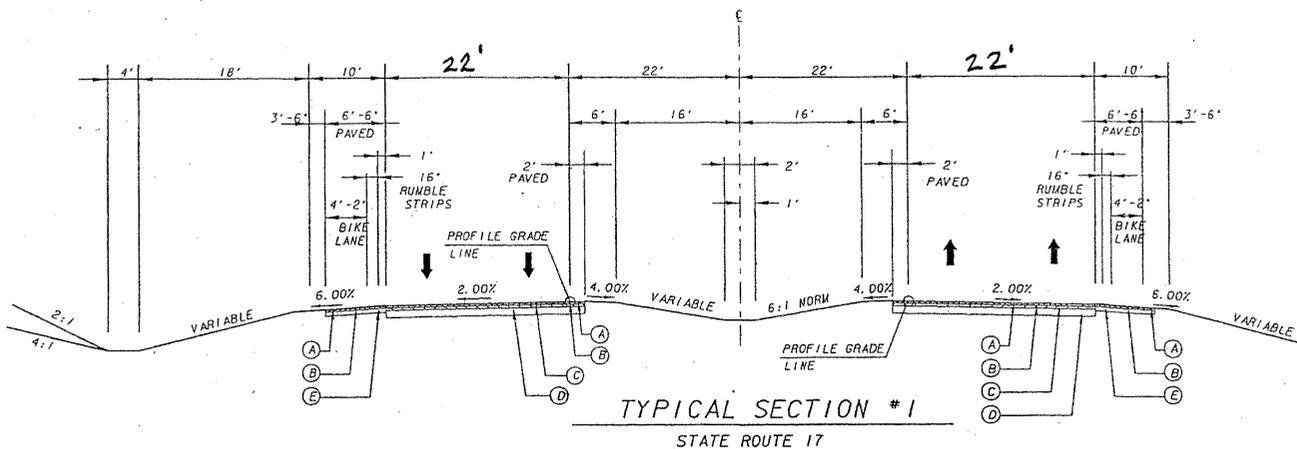
47-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-3

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 7.65 \text{ Mi} = 40,392 \text{ Ft}$$

$$\text{LENGTH OF BRIDGES AND APPROACH SLABS} = 0$$

$$\text{NET PAYMENT LENGTH} = 40392$$

$$\begin{aligned} \text{REDUCTION IN PAYMENT AREA} &= 2(2)(1)(40392)/9 \\ &= 17,952 \text{ SY} \end{aligned}$$

$$\text{REDUCTION IN RIGHT-OF-WAY}$$

$$= 9(17952)/43560 = 3.71 \text{ AC}$$

~~ADDITIONAL GRASSING QUANTITIES~~

~~$$\text{PERM. GRASSING} = \quad \quad \quad \text{AC}$$~~

~~$$\text{AGR. LIME} = \quad (\quad 1 \quad) = \quad \quad \text{TN}$$~~

~~$$\text{LIQUID LIME} = \quad (\quad 1 \quad) = \quad \quad \text{GL}$$~~

~~$$\text{MIXED GR. FERT.} = \quad (\quad 1 \quad) = \quad \quad \text{TN}$$~~

~~$$\text{NIT. CONTENT FERT.} = \quad (\quad 1 \quad) = \quad \quad \text{LB}$$~~

NO UNIT COSTS FOR GRASSING SO IGNORE

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **47-5**

DESCRIPTION: **RETAIN EXISTING ALIGNMENT FROM STA 103+30 TO**
STA 140+00

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design abandons the existing SR 17 alignment to flatten a horizontal curve and a vertical sag curve.

ALTERNATIVE: (Sketch attached)

Follow the existing alignment of SR 17 since the horizontal curve only has to be improved from a radius of 1,432 ft. to 1,480 ft.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way

DISADVANTAGES:

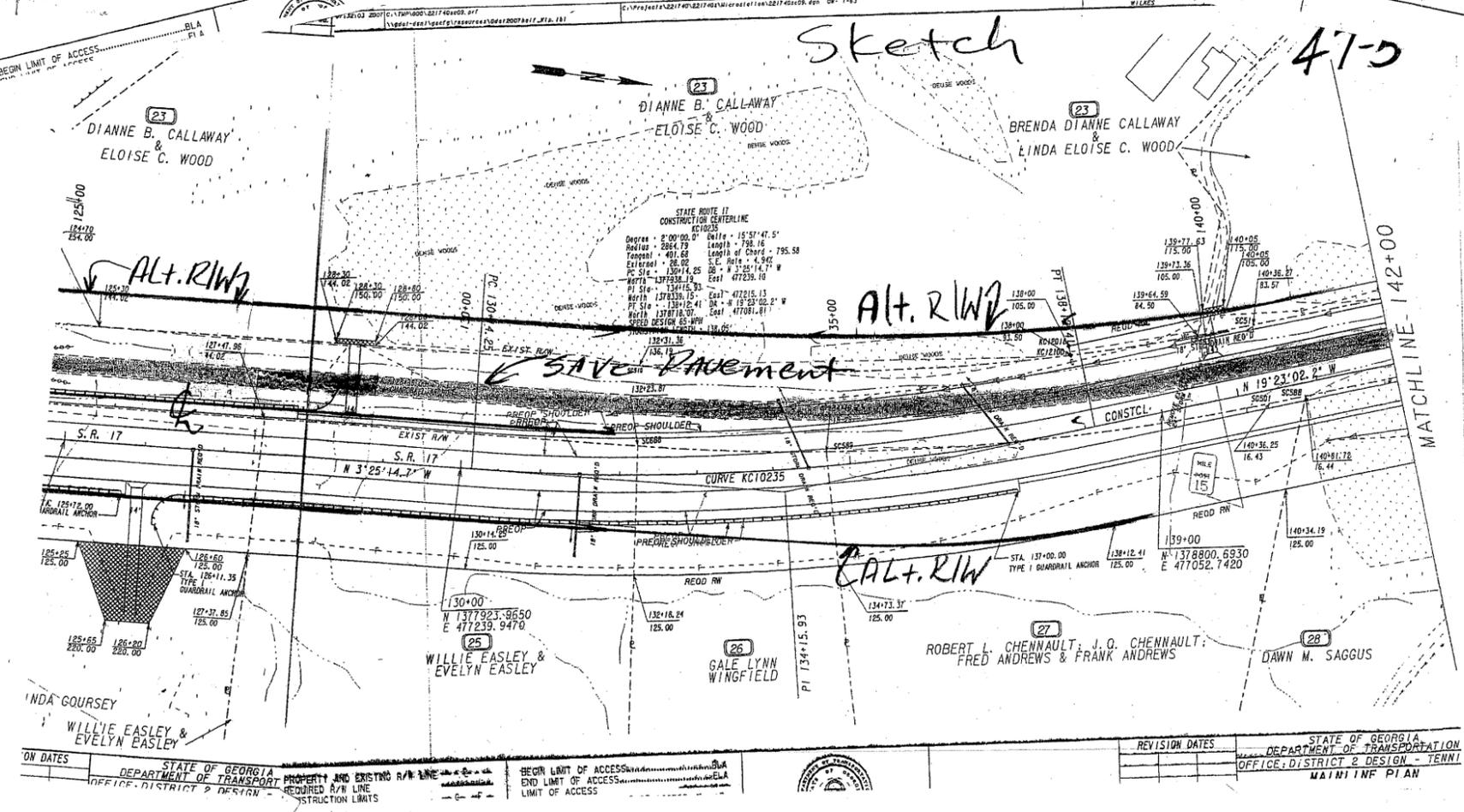
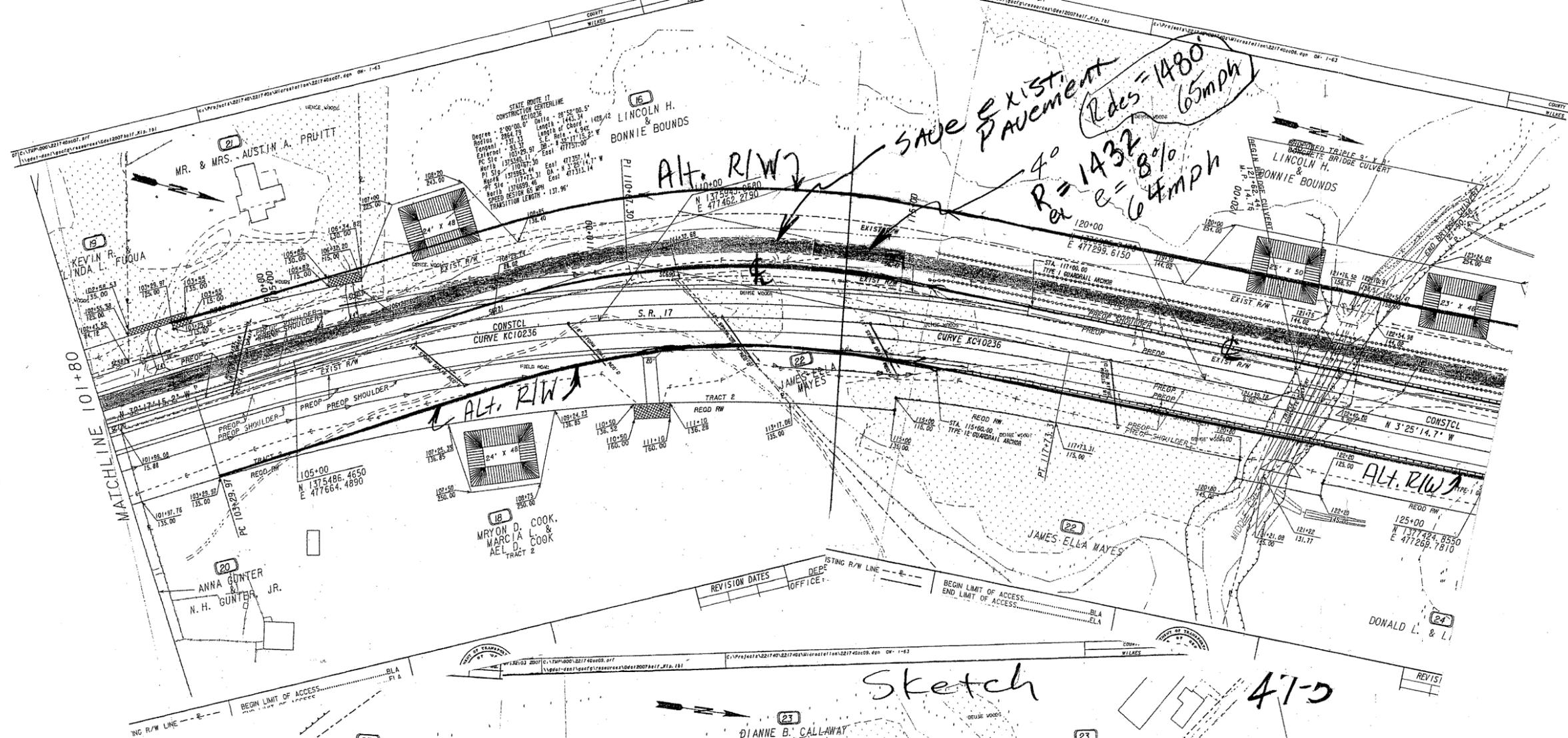
- Tightens design criteria for 65 miles per hour

DISCUSSION:

The current design realigns SR 17 from STA 103+30 to STA 140+00 to mainly “flatten” a 4° curve having a radius of 1,432 ft. The horizontal curve can be corrected to a radius of 1,480 ft. or the existing alignment could be retained and a design exception requested for 64 mile per hour (mph) (radius = 1,480 ft. with a superelevation of 8%). The vertical grades are acceptable within the 5% range and the vertical sag appears to also be acceptable (k [rate of vertical curvature] = 157) for 65 mph.

The cost savings is computed as if the $R = 1,432$ ft. is acceptable and the 64 mph is approved.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 409,675	—	\$ 409,675
ALTERNATIVE	\$ 41,550	—	\$ 41,550
SAVINGS	\$ 368,125	—	\$ 368,125



DATE	STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: DISTRICT 2 DESIGN	PROPERTY AND EXISTING R/W LINE REQUIRED R/W LINE CONSTRUCTION LIMITS	BEGIN LIMIT OF ACCESS END LIMIT OF ACCESS LIMIT OF ACCESS	STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: DISTRICT 2 DESIGN - TENNESSEE MAINLINE PLAN
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47-5
2/5

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-5

SHEET NO.: 4 of 5

The cost of Original spent to re Align SR 17
 (Savings for Alternate)

$$L = (103 + 30) - (140 + 0) = 3670'$$

$$\frac{3670' \times 24'}{9} = 9,787 \text{ s.y.}$$

$$\frac{700' \times 20'}{43,560} = 0.321 \text{ AC (extra R/W for Original)}$$

EXTRA Earth work Req'd for Original Savings under Alt.
 $\frac{3,670' \times 3' \text{ Aug. Ht.} \times 44'}{27} = 17,942 \text{ CY}$

Alt. Resurfaces existing Rdwy with 165#
 12.5mm Asphaltic Concrete = 9,787 s.y. ^{1/2}

At VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 47-7

DESCRIPTION: **ELIMINATE THE MEDIAN OPENING AT STA 190+00**

SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The current design provides for a median opening on the widened SR 17 at Station 190+00.

ALTERNATIVE:

Eliminate the median opening at STA 190+00 and provide for a grass depressed median.

ADVANTAGES:

- Reduces initial cost
- Improves safety by eliminating conflicting traffic movements
- Implements a greener solution/sustainable design
- Eases design and construction

DISADVANTAGES:

- Requires property owner to travel longer distance to make a u-turn
- Eliminates an amenity
- May challenge a Department criteria for distances between median openings

DISCUSSION:

The additional pavement necessary to provide this median opening may not be warranted as only one property owner (Donald R. Saggus, Jr. and Dawn M. Saggus) would benefit from this amenity.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 151,845	—	\$ 151,845
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 151,845	—	\$ 151,845

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

47-7

ELIMINATION OF MEDIAN OPENING @ STA 190+00

SHEET NO.: 2 of 3

$$44,700 \text{ SQ FT} \Rightarrow 4966.67 \text{ SQ YDS}$$

$$4966.67 \text{ SQ YDS} \times \$20.74/\text{SQ YDS} = \cancel{\$103,008.74}$$

$$\$103,008.74$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **47-11**

DESCRIPTION: **REALIGN BOYD ROAD TO THE NORTH**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design realigns Boyd Road to the south of the existing Boyd Road alignment to avoid an existing aerial tower.

ALTERNATIVE: (Sketch attached)

Realign Boyd Road to the north of the existing Boyd Road alignment affording a shorter route to avoid the existing aerial tower.

ADVANTAGES:

- Reduces initial cost
- Reduces quantity of pavement
- Reduces right-of-way requirements

DISADVANTAGES:

- Clears dense woods

DISCUSSION:

Realigning Boyd Road to the north will allow for a quicker tie-in to the mainline and existing Boyd Road while still avoiding the existing aerial tower.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 48,694	—	\$ 48,694
ALTERNATIVE	\$ 21,124	—	\$ 21,124
SAVINGS	\$ 27,570	—	\$ 27,570

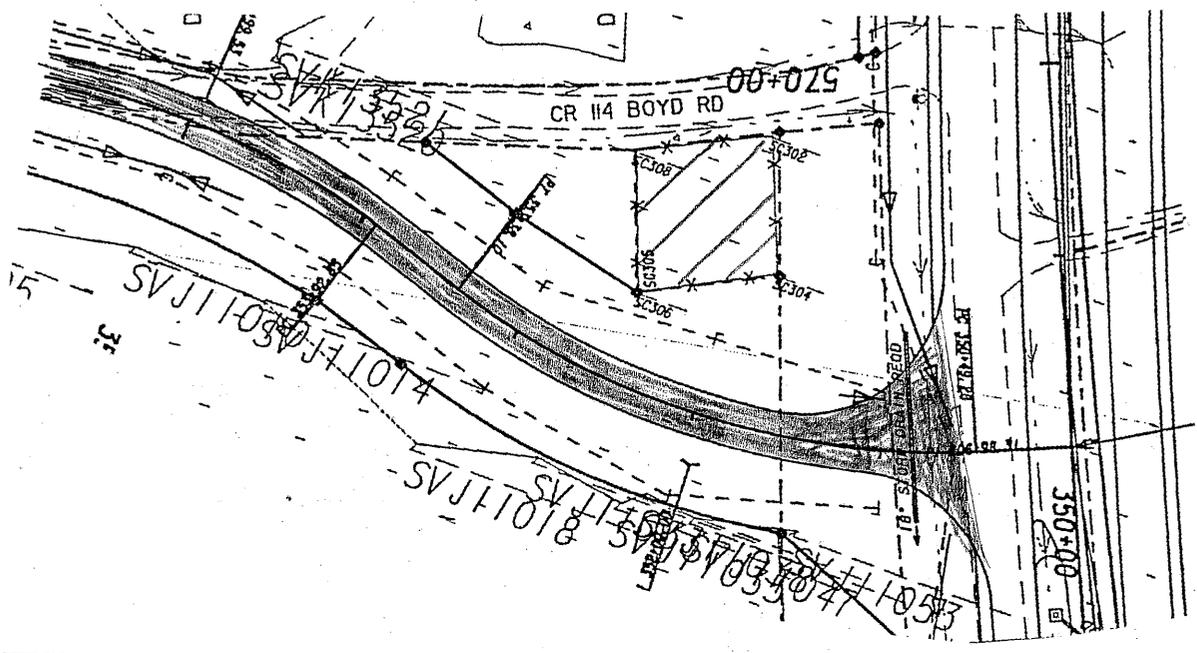
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

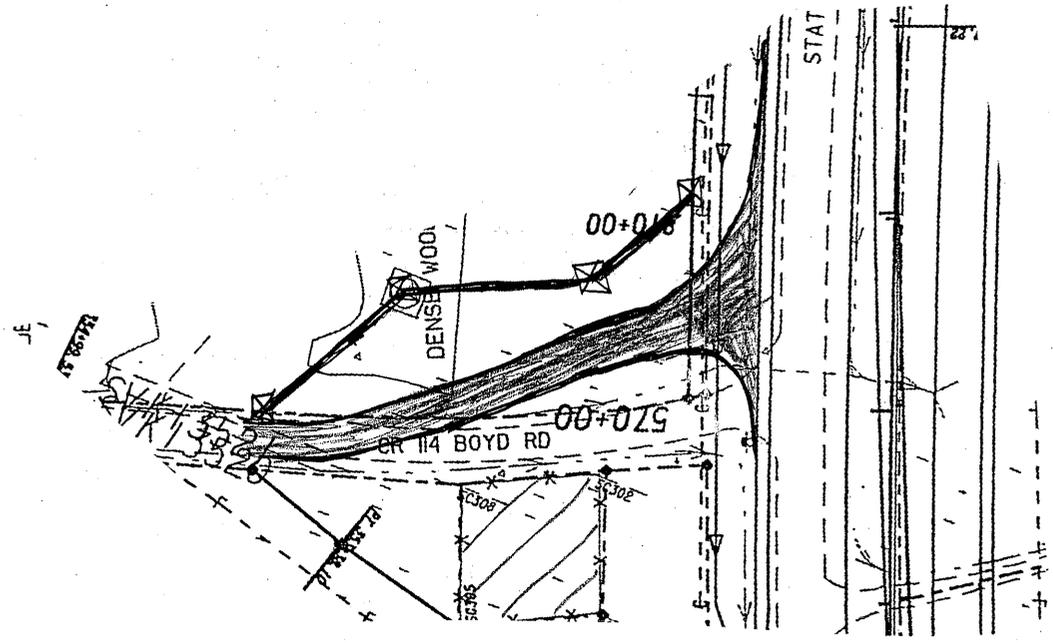
47-11

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-11

SHEET NO.: 3 of 4

Original Design Pavement Area for Boyd Rd

$$\frac{575' \times 24'}{9} = 1534.54$$

Right of Way Area (original)

$$\frac{100' \times 575'}{43560} = 1.32 \text{ Acres}$$

Alternate Design Pavement Area for Boyd Rd

$$\frac{250' \times 24'}{9} = 667.54$$

Right of Way Area (Alternate)

$$\frac{100' \times 250'}{43560} = 0.57 \text{ Acres}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **47-12/**
47-17

DESCRIPTION: **REALIGN INTERSECTION OF NORMAN ROAD/VINSON**
ROAD WITH SR 17 AND REDUCE THE EXTENT OF
CONSTRUCTION ON THE WEST SIDE OF SR 17

SHEET NO.: **1 of 8**

ORIGINAL DESIGN: (Sketch attached)

Four horizontal curves are used in the realignment of Norman Road/Vinson Road at its intersection with SR 17. The vertical alignment is lowered as much as 20 ft. on the west side of SR 17. Construction ends at STA 34+00.

ALTERNATIVE: (Sketch attached)

Reduce the two horizontal curves by connecting the Points of Intersection (PIs) at STAs 21+85 and 28+59. Use a maximum grade of 8% on the west side of SR 17 to reduce the length of reconstruction.

ADVANTAGES:

- Simplifies horizontal geometry
- Provides a continuous tangent alignment through the intersection
- Reduces initial cost
- Improves safety
- Reduces extent of construction

DISADVANTAGES:

- Steepens grade on the west side
- Reduces clearance to historic property

DISCUSSION:

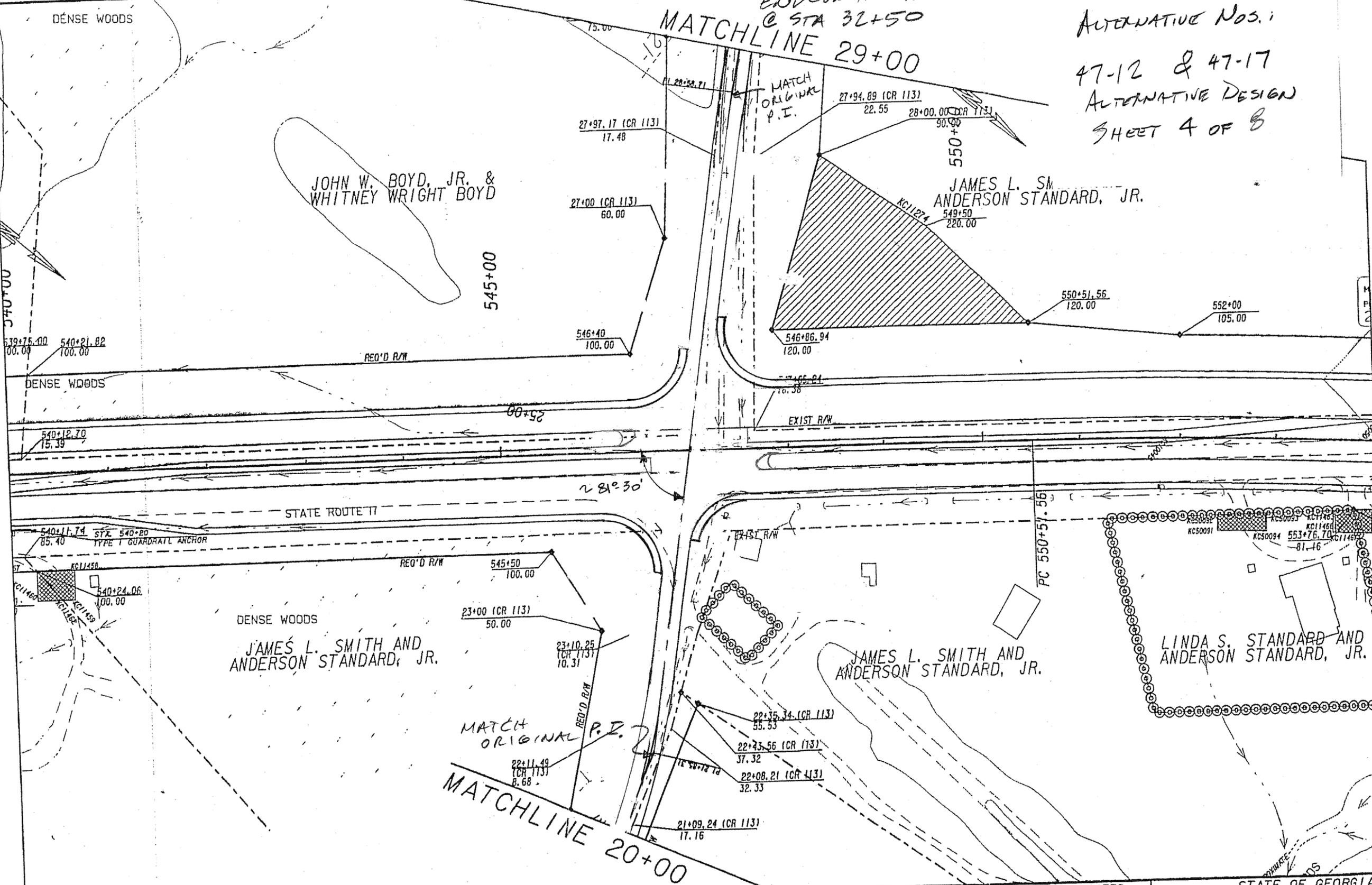
A tangent alignment can be provided through the intersection that results in a crossing skew angle of approximately 81° 30'. Since this is a minor unpaved road, steepening the grade to a maximum of 8% is appropriate. K-value for a 30 mph design speed can be obtained. The extent of construction can be reduced by 150 ft.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 166,302	—	\$ 166,302
ALTERNATIVE	\$ 103,971	—	\$ 103,971
SAVINGS	\$ 62,331	—	\$ 62,331

MATCHLINE 540+00

END CONSTRUCTION
 @ STA 32+50
 MATCHLINE 29+00

ALTERNATIVE NOS. 1
 47-12 & 47-17
 ALTERNATIVE DESIGN
 SHEET 4 OF 8



221740.dwg
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 fgrimes

PROPERTY AND EXISTING R/W LINE --- P ---
 REQUIRED R/W LINE --- F ---
 CONSTRUCTION LIMITS --- G ---
 EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES --- H ---

BEGIN LIMIT OF ACCESS.....BLA
 END LIMIT OF ACCESS.....ELA
 LIMIT OF ACCESS --- I ---
 REQUIRED R/W AND LIMIT OF ACCESS --- J ---
 HISTORIC BOUNDARY --- K ---

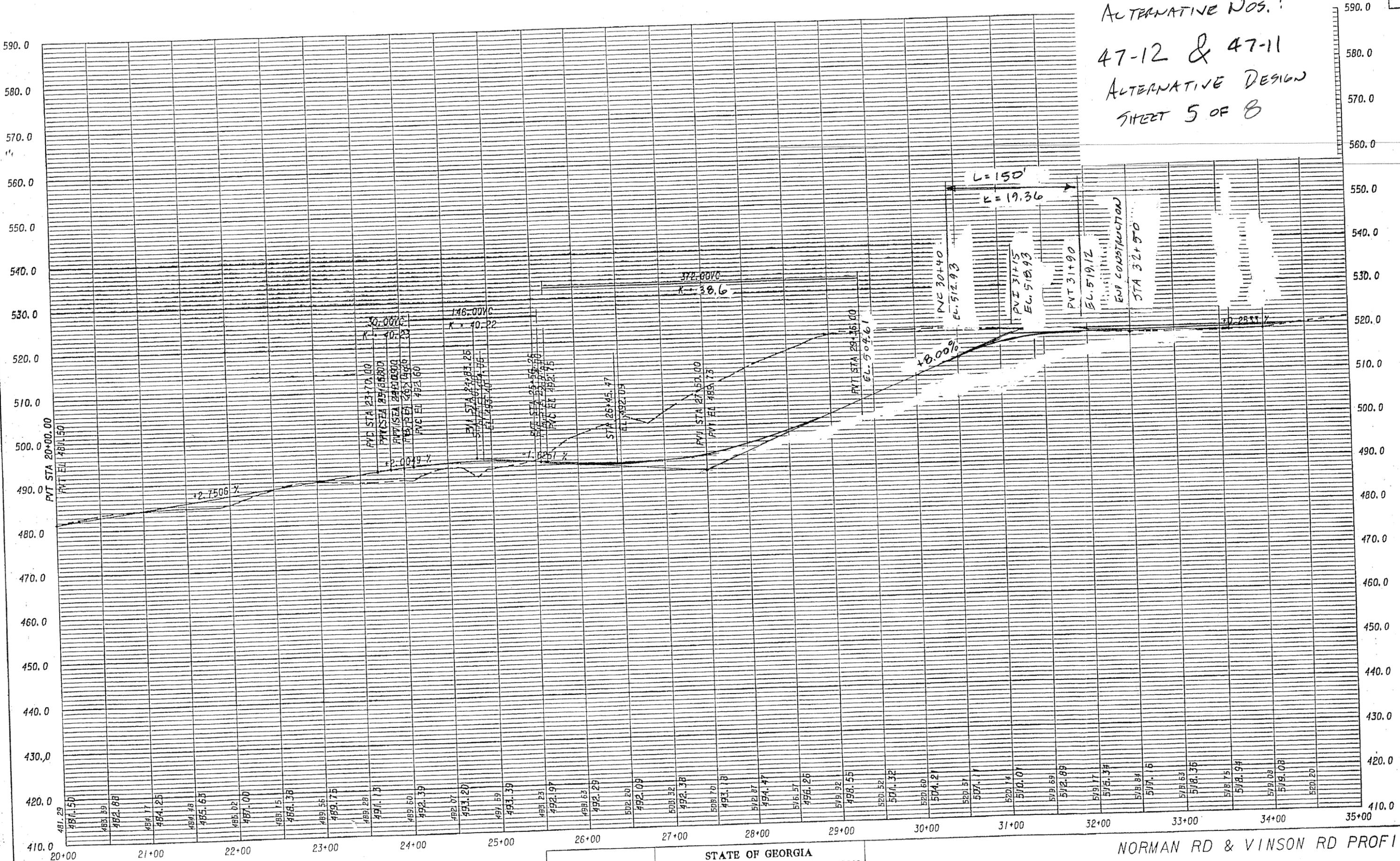


REVISION DATES	

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 OFFICE: DISTRICT 2 DESIGN -
 CONSTRUCTION LAY

SITE 2
 STA 554+00

ALTERNATIVE NOS.:
 47-12 & 47-11
 ALTERNATIVE DESIGN
 SHEET 5 OF 8



STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION

NORMAN RD & VINSON RD PROFILE

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-12 & 47-17

SHEET NO.: 6 of 8

K-VALUE CALCS: FOR A DESIGN SPEED OF 30 MPH

FOR A SAG CURVE, $K_{MIN} = 37$

STA 27+50 $37 = \frac{L}{8 - (-1.6251)}$

$L = 356.2$ USE 372'

FOR A CREST CURVE, $K_{MIN} = 19$

STA 31+15 $19 = \frac{L}{8 - 0.2533}$

$L = 147.2$ USE 150'

COST SAVINGS RESULT FROM LESS EXCAVATION DUE TO STEEPER GRADE AND SHORTENING THE CONSTRUCTION

LIMITS ON THE WEST SIDE OF SR 17, RIGHT-OF-WAY CAN BE REDUCED VERY SLIGHTLY SINCE NORMAN ROAD IS NOT MOVED AS FAR SOUTH ON THE EAST SIDE.

PAVEMENT REDUCTION AREA = $150(24) / 4 = 400 \text{ SY}$

STATION	P/G ORIGINAL ELEV.	P/G ALTERN. ELEV.	ORIG. GROUND
27+50	493.18	494.21	508.70
28+50	496.26	498.69	516.57
29+50	501.32	505.73	520.52
30+50	507.11	513.70	520.51
31+50	512.89	518.61	519.69
32+50	517.16	519.27	518.84
33+50	518.94	519.53	518.75

CALCULATIONS

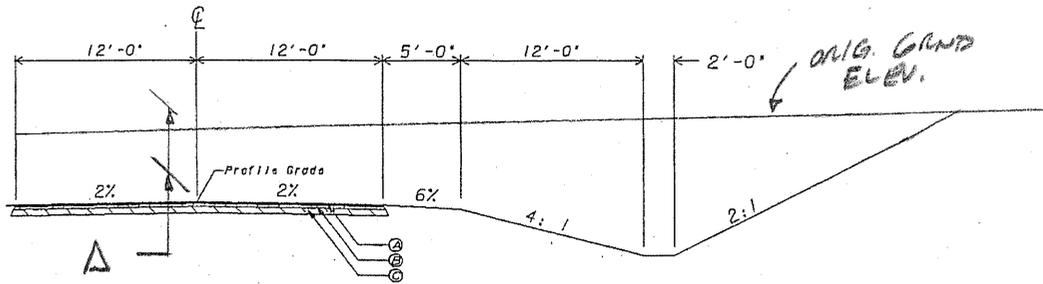


PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

47-12 & 47-17

SHEET NO.: 7 of 8



TANGENT SECTION TS-09

STA. 20+00.00 TO STA. 25+00.00 CR 113

$$\begin{aligned}
 \text{AREA} &= 2 \left[12\Delta + 5(\Delta + 3.9) + 12(\Delta + 2.04) + 2(\Delta + 3.54) + (\Delta + 3.54)^2 (2/2) \right] \\
 &= 2\Delta^2 + 62\Delta + 92.08
 \end{aligned}$$

STA.	ORIGINAL Δ	A	ALTERN. Δ	A
27+50	15.52	1536	14.49	1410
28+50	20.31	2177	17.88	1840
29+50	19.20	2020	14.79	1447
30+50	13.40	1282	6.81	607
31+50	6.80	606	1.08	162
32+50	1.68	202		0
33+50		0		0

$$\begin{aligned}
 \text{ORIGINAL VOLUME} &= 100 \left[.5 \times 1536 + 2177 + 2020 + 1282 + 606 + 202 + .5 \times 0 \right] / 27 \\
 &= 26130 \text{ CY}
 \end{aligned}$$

$$\begin{aligned}
 \text{ALTERN. VOLUME} &= 100 \left[.5 \times 1410 + 1840 + 1447 + 607 + 162 + .5 \times 0 \right] / 27 \\
 &= 17633 \text{ CY}
 \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **47-13**

DESCRIPTION: **ELIMINATE THE MEDIAN OPENING AT STA 483+00**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design provides for a median opening on the widened SR 17 at STA 483+00.

ALTERNATIVE:

Eliminate the median opening at STA 483+00 and provide for a grass depressed median.

ADVANTAGES:

- Reduces initial cost
- Improves safety by eliminating conflicting traffic movements
- Implements a greener solution/sustainable design
- Eases design and construction

DISADVANTAGES:

- Requires property owner to travel longer distance to make a u-turn
- Loses an amenity
- May challenge a Department criteria for distances between median openings

DISCUSSION:

The additional pavement necessary to provide this median opening may not be warranted as there is no property owner that would benefit from this amenity.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 151,845	—	\$ 151,845
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 151,845	—	\$ 151,845

CALCULATIONS



PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

47-13

ELIMINATION OF MEDIAN OPENING @ STA 483+00

SHEET NO.: 2 of 3

$$44,700 \text{ SQ FT} \Rightarrow 4966.67 \text{ SQ YDS}$$

$$4966.67 \text{ SQ YDS} \times \$20.74/\text{SQ YDS}$$
$$= \$103,008.74$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **47-14**

DESCRIPTION: **MINIMIZE THE NUMBER OF MEDIAN OPENINGS**
BETWEEN STAS 482+02 AND 510+34

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design indicates median openings at STAs 482+02 and 510+34. There are no intersections at these locations.

ALTERNATIVE:

Eliminate the median openings at STAs 482+02 and 510+34, and provide a new median opening at STA 493+00.

ADVANTAGES:

- Reduces initial cost
- Improves safety due to fewer median openings
- Reduces amount of pavement
- Simplifies design and construction

DISADVANTAGES:

- Requires longer travel distance to make u-turns
- Loses amenity
- May challenge a Department standard regarding maximum distances between median openings

DISCUSSION:

Since median openings add costs due to the additional amount of pavement is required, a reduction in openings reduces cost while improving the facility's overall safety by eliminating conflicting and turning movements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 151,578	—	\$ 151,578
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 151,578	—	\$ 151,578

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

47-14

SHEET NO.: 2 of 3

$$44,700 \text{ SQ FT} \Rightarrow 4966.67 \text{ SQ YDS}$$

$$4966.67 \text{ SQ YDS} \times \$20.74/\text{SQ YDS} \\ = \$103,008.74$$



SUMMARY OF VE ALTERNATIVES

PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222264 and 122840 VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EDS-545(54) (54-x)						
54-1	Reduce median width to 32 ft. where feasible	\$ 4,427,632	\$ 4,253,980	\$ 173,652		\$ 173,652
54-2	Reduce outside shoulders to 6-ft. paved shoulders	\$ 86,958	\$ 1,213	\$ 85,745		\$ 85,745
54-3	Use 11-ft. travel lanes throughout	\$ 765,323	\$ 5,036	\$ 760,287		\$ 760,287
54-9	Eliminate median opening at STA 147+00	\$ 281,089	\$ 3,797	\$ 277,292		\$ 277,292
54-11	Retain River Road alignment with the mainline	\$ 337,226	\$ 77,137	\$ 260,089		\$ 260,089
54-12	Stay on existing alignment between STAs 300+00 and 400+00	\$ 724,418	\$ 471,281	\$ 253,137		\$ 253,137
54-13	Eliminate the Old SR 17 tie-in at Station 387+00	\$ 143,885	\$ 49,408	\$ 94,477		\$ 94,477
54-14	Selectively eliminate right-turn lanes in the five-lane section	\$ 98,058	\$ -	\$ 98,058		\$ 98,058
EDS-545(55) (55-x)						
55-1	Reduce outside shoulders to 6-ft. paved shoulders	\$ 108,258	\$ 1,287	\$ 106,971		\$ 106,971
55-2	Use 11-ft. travel lanes throughout	\$ 798,822	\$ 5,165	\$ 793,657		\$ 793,657
55-6	Shorten tie-in of Old Elliam Road and SR 17	\$ 102,618	\$ 65,650	\$ 36,968		\$ 36,968
55-7	Shorten tie-in of Hudson Road and SR 17	\$ 304,214	\$ 40,611	\$ 263,603		\$ 263,603
55-9	Use a concrete culvert in lieu of a bridge over Dry Fork Creek	\$ 1,127,283	\$ 364,805	\$ 762,478		\$ 762,478
55-11	Selectively eliminate right-turn lanes	\$ 175,138	\$ -	\$ 175,138		\$ 175,138
55-12	Shorten Bullard's Ferry Road tie-in length to SR 17	\$ 51,960	\$ -	\$ 51,960		\$ 51,960
55-13	Shorten Dunworley Drive tie-in length to SR 17	\$ 53,143	\$ -	\$ 53,143		\$ 53,143
55-15	Do not realign Oak Road	\$ 126,675	\$ 23,401	\$ 103,274		\$ 103,274
55-16	Realign Fairfax Circle south to avoid displacement	\$ 153,993	\$ 43,739	\$ 110,254		\$ 110,254

VALUE ENGINEERING ALTERNATIVE



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 54-1

DESCRIPTION: REDUCE MEDIAN WIDTH TO 32 FT. WHERE FEASIBLE

SHEET NO.: 1 of 6

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of a 44-ft.-wide depressed grass median for the majority of the project.

ALTERNATIVE: (Sketch attached)

Use a 32-ft.-wide depressed grass median where feasible.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Reduces future mowing costs
- Implements a common practice
- Maintains a safety clear zone

DISADVANTAGES:

- Reduces buffer between travel ways
- Narrows median
- Increases perceived loss of safety

DISCUSSION:

A reduction of 12 ft. in the median will not reduce the functional requirements of the median as a safety and clear zone and will not have an adverse effect on vehicular traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,427,632	—	\$ 4,427,632
ALTERNATIVE	\$ 4,253,980	—	\$ 4,253,980
SAVINGS	\$ 173,652	—	\$ 173,652

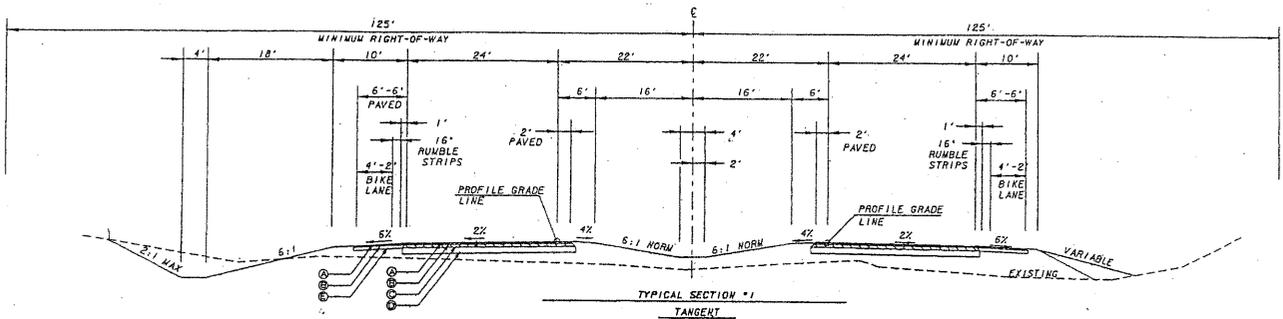
PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

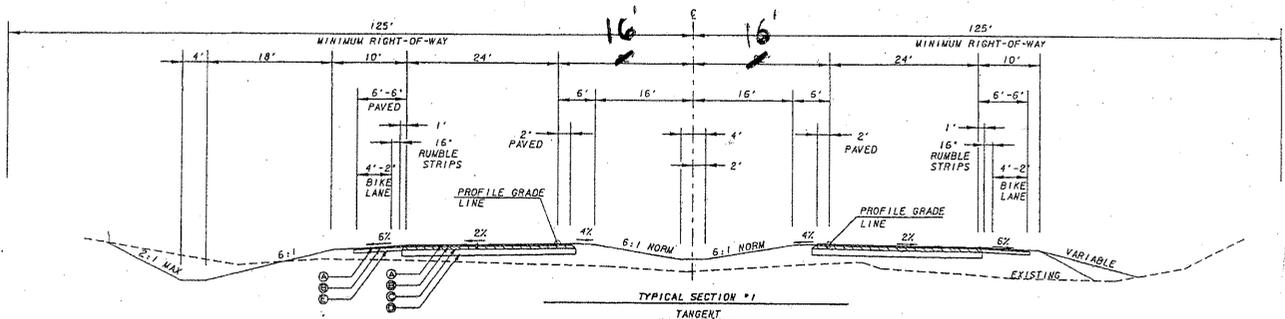
54-1"

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 6



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:
 54-1

SHEET NO.: 4 of 6

Asp. (54)

$$\textcircled{12.5mm} \quad 165 \# / s.y. \times \frac{T}{2000} \# \times \$75/T = \$6.19 / s.y.$$

$$\textcircled{19mm} \quad 220 \# / s.y. \times \frac{T}{2000} \# \times \$75/T = \$8.25 / s.y.$$

$$\textcircled{25mm} \quad 550 \# / s.y. \times \frac{T}{2000} \# \times \$75/T = \$20.63 / s.y.$$

$$\textcircled{9AB} \quad 150 \# / CF \times \frac{T}{2000} \# \times 1' \times \frac{9SE}{SY} \times \$24.32 = \$16.38 / SY$$

$$\$51.45$$

shldr & side Rd.

$$165 \# / s.y. \times \frac{T}{2000} \# \times \$75/T = \$6.19$$

$$220 \# / s.y. \times \frac{T}{2000} \# \times \$75/T = \$8.25$$

$$8" \text{ GAB} = \$10.93$$

$$\text{shldr} = \$25.37$$

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

54-1

SHEET NO.: 5 of 6

Asphalt for Type B Median Openings (Const. Detail M-3)

$$545 \text{ SY} \times (4) = 2180 \text{ SY}$$

Grading (5) % decrease

Grassing (5) % decrease

Right of Way decrease only portion divided median
of roadway

$$\frac{20000 \text{ ft} \times 12 \text{ ft}}{43560} = 5.5 \text{ Acres}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **54-2**

DESCRIPTION: **REDUCE OUTSIDE SHOULDERS TO 6-FT. PAVED SHOULDERS**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 6.50-ft.-wide paved shoulders that include a 12-in. buffer, 1.33-ft. rumble strip and a 4.167-ft. bicycle lane.

ALTERNATIVE: (Sketch attached)

Use 6.0-ft.-wide paved shoulders composed of an 8-in. buffer, 1.33-ft. rumble strip and a 4.00-ft. bicycle lane.

ADVANTAGES:

- Reduces initial cost
- Reduces quantity of pavement
- Slightly eases installation
- Implements a common practice

DISADVANTAGES:

- Reduces buffer between travelway and rumble strip
- Slightly narrows bicycle lane
- Increases perceived loss of safety

DISCUSSION:

A slight reduction in paved shoulder width will reduce cost with virtually no effect on vehicular or bicycle traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 86,958	—	\$ 86,958
ALTERNATIVE	\$ 1,213	—	\$ 1,213
SAVINGS	\$ 85,745	—	\$ 85,745

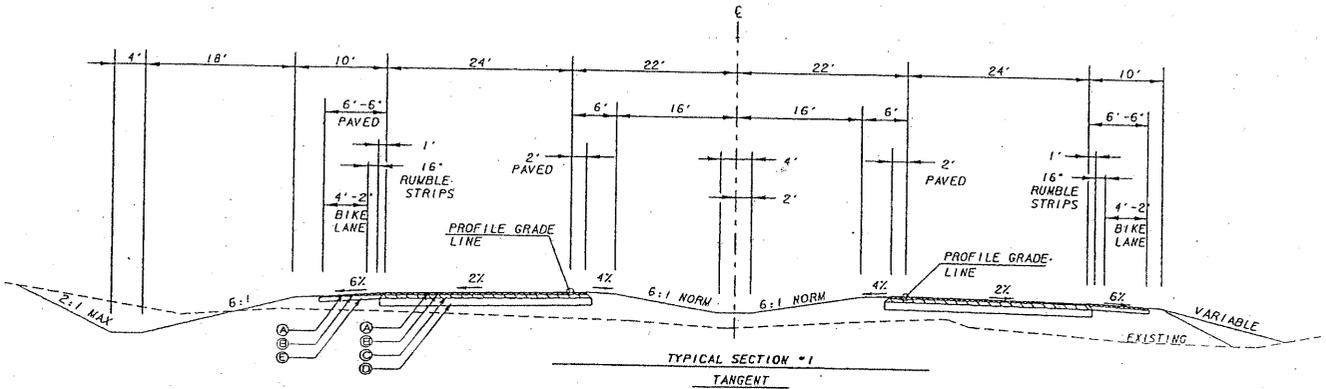
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

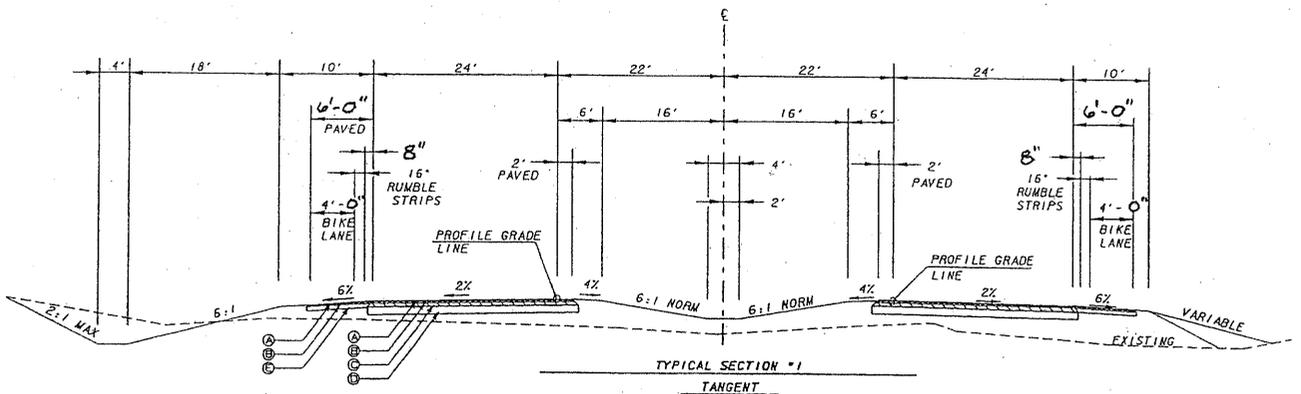
54-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5



AS DESIGNED ALTERNATIVE



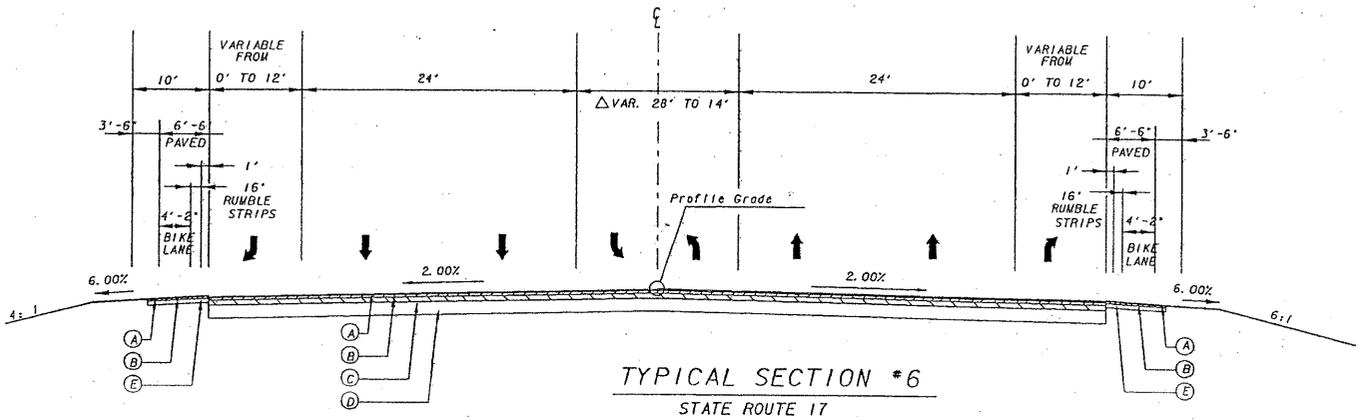
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

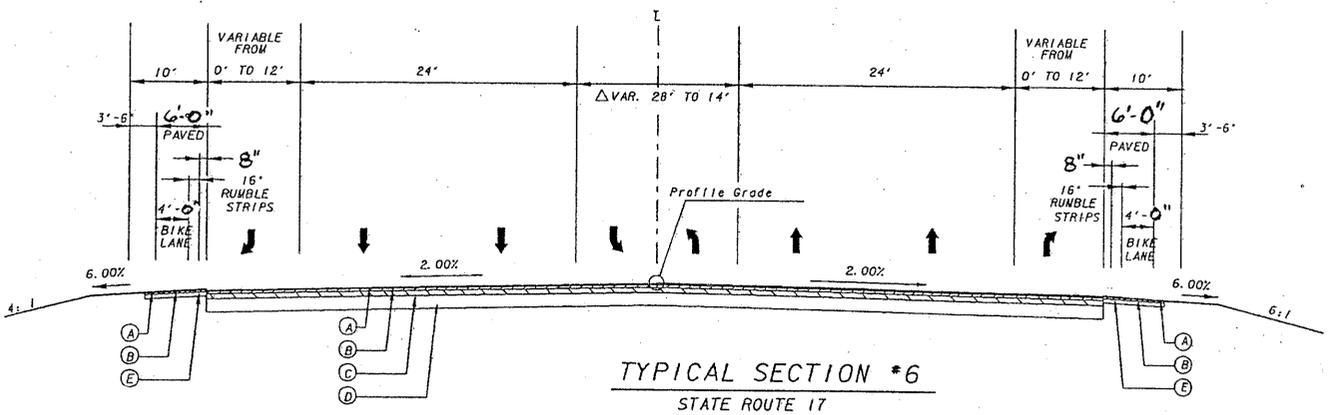
54-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 5



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

54-2

SHEET NO.: 4 of 5

$$\text{PROJECT LENGTH} = 5.494 \text{ Mi} = 29008 - 962 = 28046$$

SHOULDER AREA REDUCTION

$$= 2 (.5)(28046) / 9 = 3116 \text{ sq ft}$$

$$\text{PERMANENT GRASSING} = 9(3116) / 43560 = 0.64 \text{ AC}$$

$$\text{AGR. LIME} = 0.64 (340 / 80) = 2.72 \text{ TN}$$

$$\text{LIQUID LIME} = 0.64 (282 / 80) = 2.26 \text{ GL}$$

$$\text{MIXED GR. FERTILIZER} = 0.64 (53 / 80) = 0.42 \text{ TN}$$

$$\text{FERT. NITR. CONTENT} = 0.64 (3760 / 80) = 30.1 \text{ LB}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 54-3

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

SHEET NO.: 1 of 5

ORIGINAL DESIGN: (Sketch attached)

The current design indicates 12-ft.-wide travel lanes.

ALTERNATIVE: (Sketch attached)

Use 11-ft. wide travel lanes throughout the project.

ADVANTAGES:

- Reduces initial cost
- Reduces quantity of pavement
- Slightly eases installation
- Reduces right-of-way requirements

DISADVANTAGES:

- Narrows travel lanes
- Increases perceived loss of safety

DISCUSSION:

The design year traffic is 4,200 vehicles per day with 8% trucks. Using 11-ft.-wide travel lanes with this quantity of traffic will neither compromise safety nor reduce functionality while providing substantial savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 765,363	—	\$ 765,363
ALTERNATIVE	\$ 5,036	—	\$ 5,036
SAVINGS	\$ 760,287	—	\$ 760,287

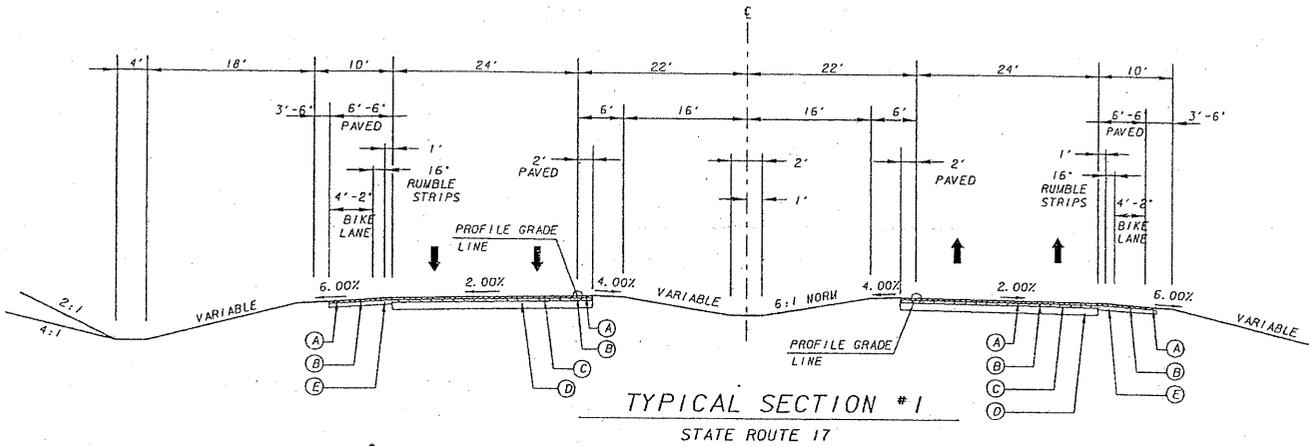
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

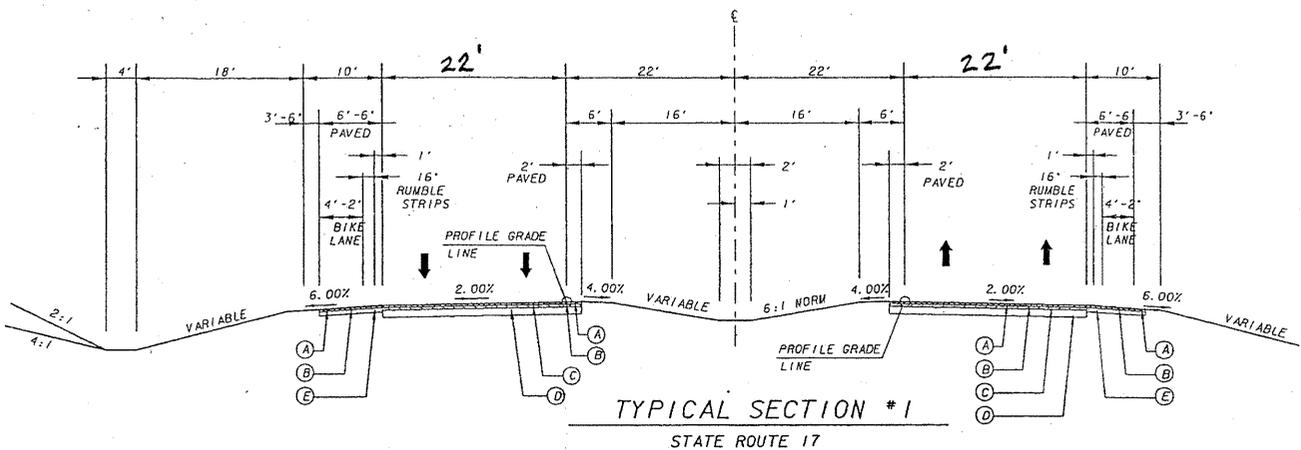
54-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5



AS DESIGNED ALTERNATIVE



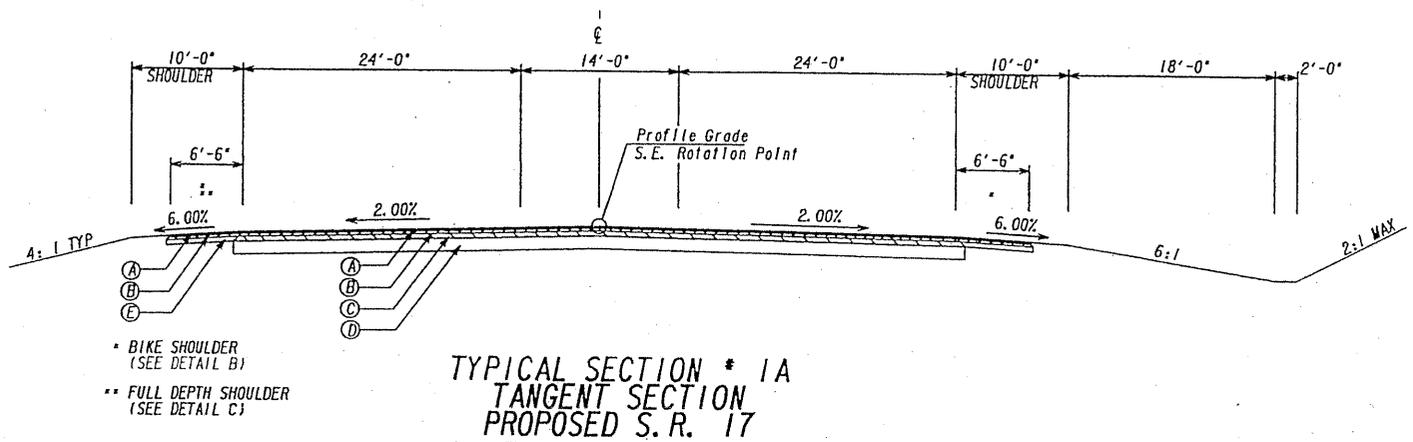
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

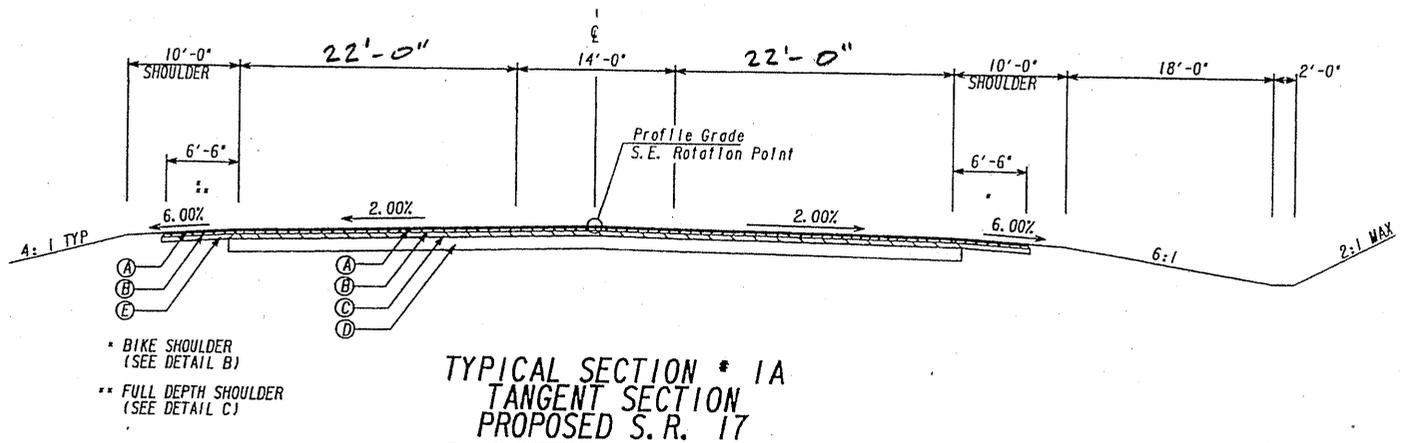
54-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 5



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

54-3

SHEET NO.: 4 of 5

$$\text{PROJECT LENGTH} = 5.676 \text{ MI} = 29,969$$

$$\text{LENGTH OF BRIDGES AND APPROACH SLABS} = 1080$$

$$\text{NET PAYMENT LENGTH} = 28,889$$

$$\begin{aligned} \text{REDUCTION IN PAYMENT AREA} &= 2(2)(1)(28889)/9 \\ &= 12,840 \end{aligned}$$

$$\text{REDUCTION IN RIGHT-OF-WAY}$$

$$= 9(12840)/43560 = 2.65 \text{ AC}$$

ADDITIONAL GRASSING QUANTITIES:

$$\text{PERM. GRASSING} = 2.65 \text{ AC}$$

$$\text{AGR. LIME} = 2.65 (340/80) = 11.3 \text{ TN}$$

$$\text{LIQUID LIME} = 2.65 (282/80) = 9.34 \text{ GL}$$

$$\text{MIXED GR. FERT.} = 2.65 (53/80) = 1.76 \text{ TN}$$

$$\text{NIT. CONCENT FERT.} = 2.65 (3760/80) = 125 \text{ LB}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **54-9**

DESCRIPTION: **ELIMINATE THE MEDIAN OPENING AT STA 147+00**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design provides for a median opening on the widened SR 17 at STA 147+00.

ALTERNATIVE:

Eliminate the median opening at STA 147+00 and provide for a grass depressed median.

ADVANTAGES:

- Reduces initial cost
- Improves safety by eliminating conflicting traffic movements
- Implements a greener solution/sustainable design
- Eases design and construction

DISADVANTAGES:

- Requires property owner to travel longer distance to make a u-turn
- Loses an amenity
- May challenge a Department criteria for distances between median openings

DISCUSSION:

The additional pavement necessary to provide this median opening may not be warranted as there is no property owner that would benefit from this amenity.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 281,089	—	\$ 281,089
ALTERNATIVE	\$ 3,797	—	\$ 3,797
SAVINGS	\$ 277,292	—	\$ 277,292

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
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ALTERNATIVE NO.:

54-9

SHEET NO.: 2 of 3

$$44700 \text{ SQ FT} \Rightarrow 4966.67 \text{ SY}$$

$$4966.67 \text{ SY} \times \$51.45/\text{SY} = \underline{\underline{\$255535.17}}$$

$$44,700 \text{ SF} / 43,560 \text{ SY/AC} = 1.03 \text{ AC}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **54-11**

DESCRIPTION: **RETAIN RIVER ROAD ALIGNMENT WITH THE MAINLINE**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design realigns River Road to intersection with SR 17 at 90°.

ALTERNATIVE: (Sketch attached)

Retain the current alignment of River Road as it intersects the mainline keeping the present skew angle.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way

DISADVANTAGES:

- Intersects at less than 90° with the mainline
- Moves the median opening farther north

DISCUSSION:

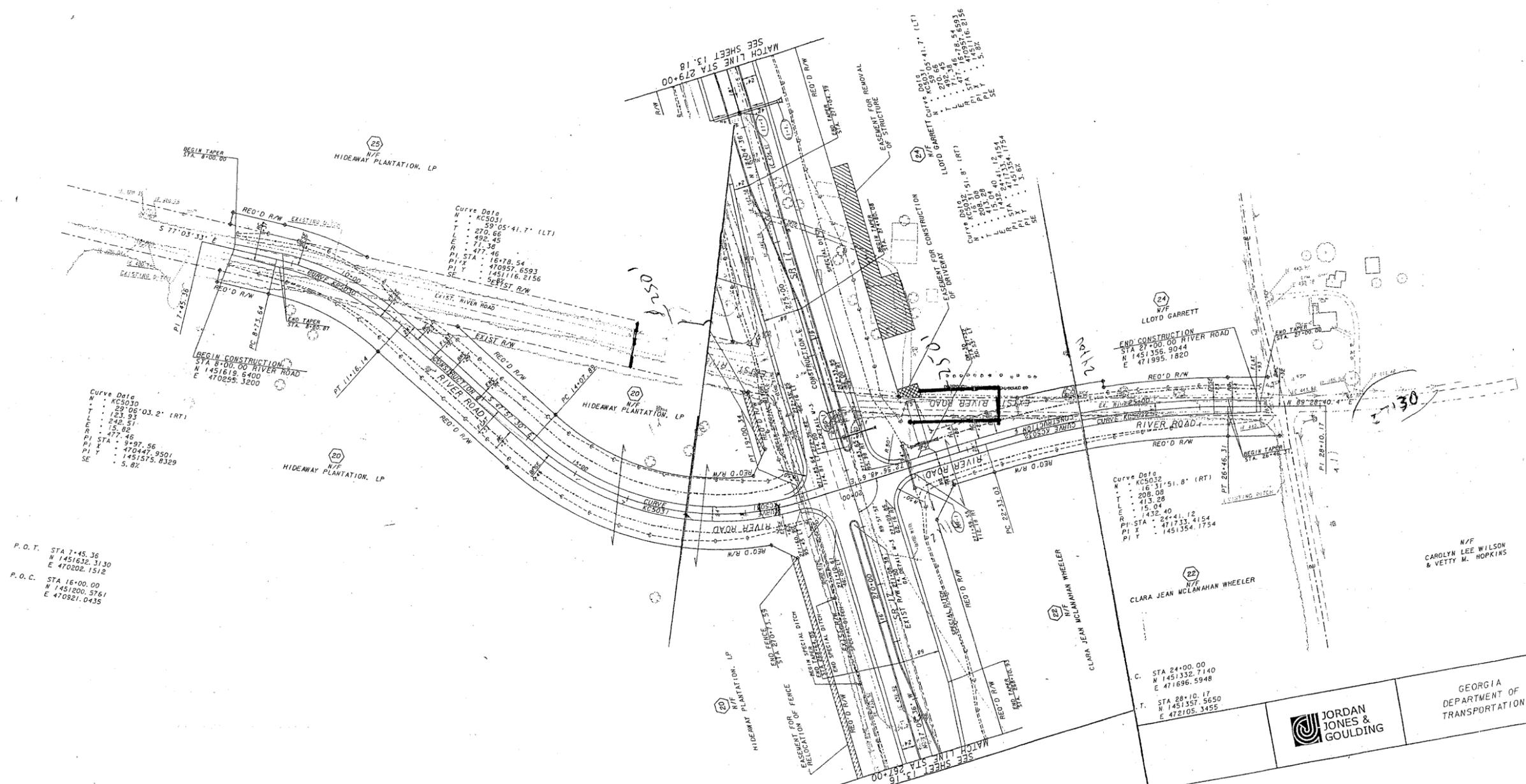
Using the existing alignment for River Road will save pavement and right-of-way costs as the tie-in will be much shorter. The median opening will have to be adjusted, and the intersection angle will be less than 90°.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 337,226	—	\$ 337,226
ALTERNATIVE	\$ 77,137	—	\$ 77,137
SAVINGS	\$ 260,089	—	\$ 260,089

ALTERNATIVE No.:

54-11

ORIGINAL AND
ALTERNATIVE DESIGNS
SHEET 2 OF 4



GEORGIA
DEPARTMENT OF
TRANSPORTATION

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

54-11

SHEET NO.: 3 of 4

ORIGINAL

$$1790 \text{ FT} \times 24 \text{ FT} = 42960 \text{ SF} \Rightarrow 4773.33 \text{ SY}$$

$$4773.33 \text{ SY} \times \$51.45/\text{SY} = \$245,587.83$$

PROPOSED

$$500 \text{ FT} \times 24 \text{ FT} = 12000 \text{ SF} \Rightarrow 1333.33 \text{ SY}$$

$$1333.33 \text{ SY} \times \$51.45/\text{SY} = \underline{\underline{\$68,599.83}}$$

R/W ORIGINAL

$$1,670 \text{ FT} \times 120 \text{ FT} = 200,400 \text{ SF} \Rightarrow 4.6 \text{ ACRES}$$

$$4.6 \text{ ACRES} \times \$4200/\text{ACRES} = \underline{\underline{\$19,320.00}}$$

PROPOSED

$$250 \text{ FT} \times 20 \text{ FT} = 5000 \text{ SF} \Rightarrow .115 \text{ ACRES}$$

$$.115 \text{ ACRES} \times \$4200.00 = \underline{\underline{\$483.00}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **54-12**

DESCRIPTION: **KEEP EXISTING SR 17 ALIGNMENT BETWEEN STAS 320+00 AND 400+00**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design routes SR 17 on a new alignment from STA 320+00 to STA 400+00, avoiding two cemeteries and numerous displacements.

ALTERNATIVE: (Sketch attached)

Keep the existing SR 17 alignment to use the existing right-of-way and, if possible, save any existing pavement.

ADVANTAGES:

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

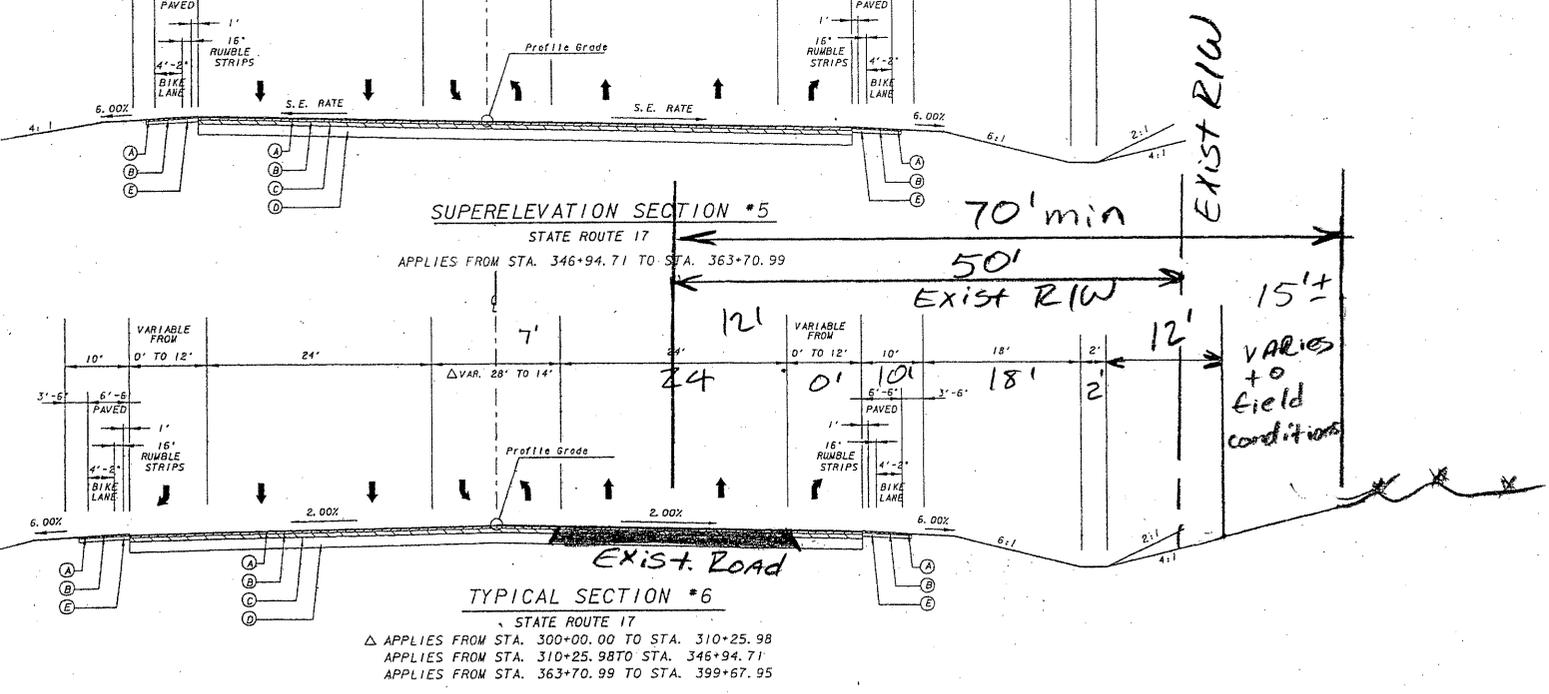
DISADVANTAGES:

- Displaces an additional five residents

DISCUSSION:

After further investigation of the existing route along this section of SR 17, it appears that very little if none of the existing pavement can be saved. Since all of the widening must be to the east beginning at STA 320+00 to avoid a cemetery and then shift to the west to avoid another cemetery, it would be difficult to save any pavement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 724,418	—	\$ 724,418
ALTERNATIVE	\$ 471,281	—	\$ 471,281
SAVINGS	\$ 253,137	—	\$ 253,137



- (A) ASPHALTIC CONCRETE, 12.5mm SUPERPAVE, 165 LBS./S.Y.
- (B) ASPHALTIC CONCRETE, 19mm SUPERPAVE, 220 LBS./S.Y.
- (C) ASPHALTIC CONCRETE BASE, 25mm SUPERPAVE, 550 LBS./S.Y.
- (D) GRADED AGGREGATE BASE, 12"
- (E) GRADED AGGREGATE BASE, 8"
- (F) ASPHALTIC CONCRETE LEVELING
- (G) PAVEMENT RESURFACING FABRIC STRIPS, TYPE 2, 20 IN.

NOTES:

- SHOULDER TO SLOPE AT NORMAL RATE OR SUPERELEVATION RATE, WHICHEVER IS GREATER.
- SHOULDER TO SLOPE AT NORMAL RATE, HOWEVER, THE ALGEBRAIC DIFFERENCE IN PAVING SLOPE AND SHOULDER SLOPE SHALL NOT EXCEED 0%. MINIMUM SHOULDER SLOPE TO BE 2%.

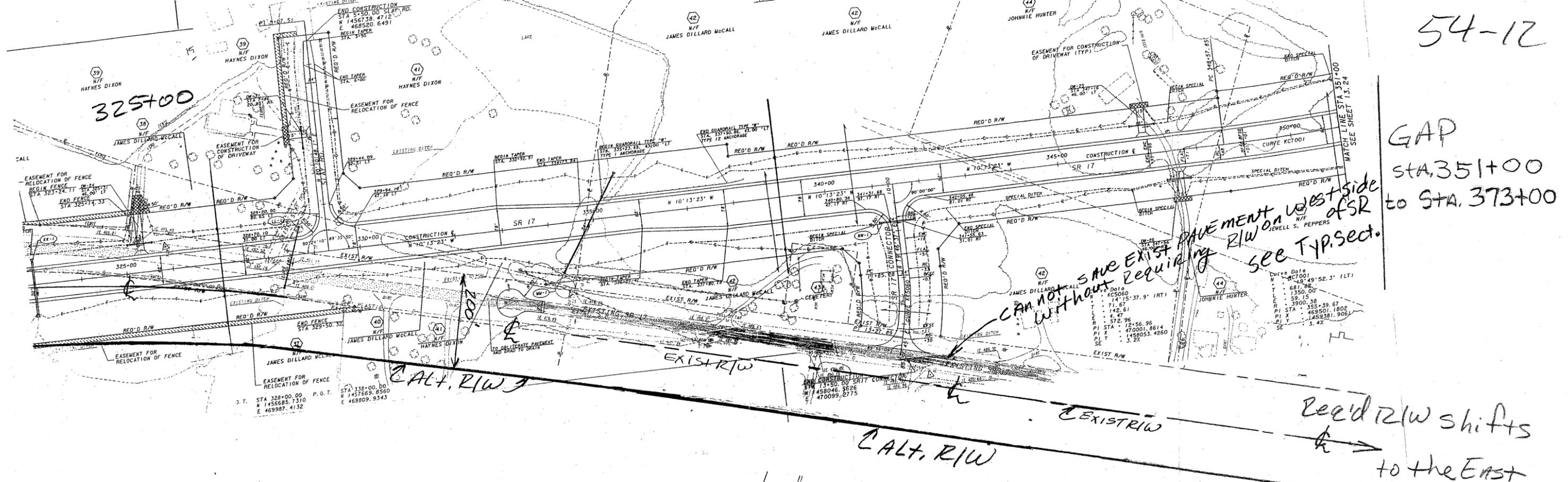
SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	0'-6"	0'-10"
2:1	OVER 6'	OVER 10'

54-12

Req'd RIW for Rural 5 Lane Section:
200'±

2/15

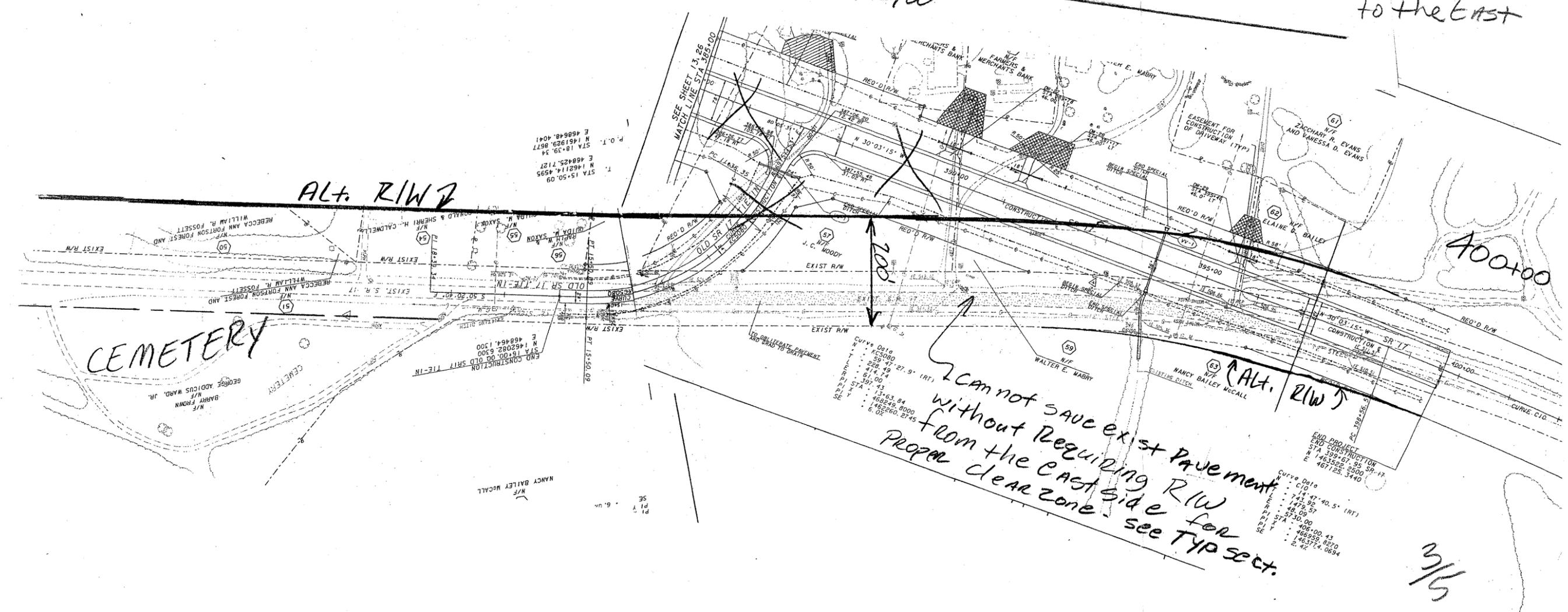
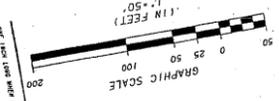
54-12



GAP
STA. 351+00
to STA. 373+00

CAN NOT SAVE EXIST PAVEMENT on west side of SR without requiring R/W on west side of SR see TYP. sect.

Req'd R/W shifts
to the East



CEMETERY

CAN NOT SAVE EXIST PAVEMENT without requiring R/W from the east side for proper clear zone see TYP. sect.

3/5

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
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 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
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ALTERNATIVE NO.:

54-12

SHEET NO.: 4 of 5

Original Cost (RLW saved under Alt.)
 $6500' \times 100' \leftarrow$ Exist RLW saved
 $\frac{43,560 SF}{AC} = 14.92 AC$

Original Cost (Const. saved under Alt.)
 Earth work along existing grade would save excavation
 $\frac{64' (Avg) \times 6500' \times 3' height}{27} = 46,200 c.y.$

Alt. RLW Costs

Alt. causes 5 add'l displacements, but saves two displacements from "Original" Alignment
 $5 \text{ displ.} - 2 \text{ displ.} = 3 \text{ displacements}$
 3 Reloc. @ \$40,000
 3 Land = 3 AC
 Damages: \$20,000 EA.

Original Construction Cost: could possibly save some pavement in middle of alignment and a short portion on the end.

$\frac{600' \pm \times 24'}{9} = 1,600 \text{ sy @}$
 and side road $\frac{400' \times 24'}{9} = 1,070 \text{ sy side road}$
 $\frac{2,670 \text{ sy of pavement}}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **54-13**

DESCRIPTION: **ELIMINATE THE OLD SR 17 TIE-IN TO MAINLINE AT STA**
387+00

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

A tie-in is provided at STA 387+00 to connect Old SR 17 with the new mainline alignment.

ALTERNATIVE: (Sketch attached)

Omit the Old SR 17 tie-in and provide a cul-de-sac where Old SR 17 approaches the new mainline alignment.

ADVANTAGES:

- Reduces initial cost
- Improves safety by eliminating an intersection on the mainline
- Reduces construction disruption on Old SR 17

DISADVANTAGES:

- Reduces access to the new alignment

DISCUSSION:

Only a few residences and a cemetery are located between Sam State Road (County Road (CR) 50) and the proposed tie-in on Old SR 17. Without the tie-in, the farthest someone would have to travel to access the new alignment is approximately 2,000 ft.

Eliminating an intersection will improve safety on the new alignment.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 143,885	—	\$ 143,885
ALTERNATIVE	\$ 49,408	—	\$ 49,408
SAVINGS	\$ 94,477	—	\$ 94,477

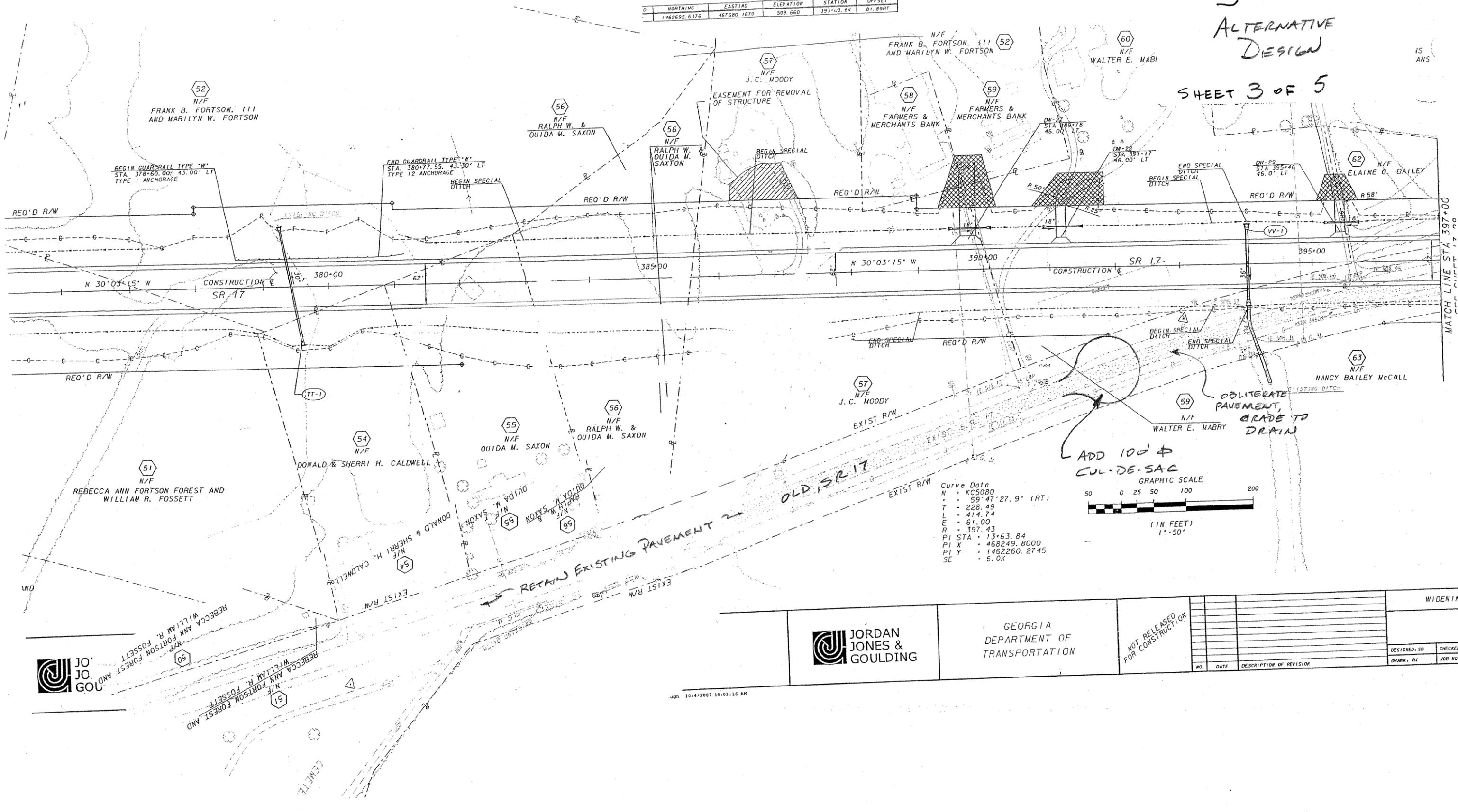
ALTERNATIVE No.:

54-13

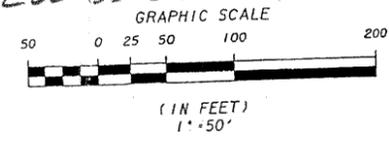
ALTERNATIVE DESIGN

SHEET 3 OF 5

D	NORTHING	EASTING	ELEVATION	STATION	OFFSET
	1462692.6376	467680.1670	509.660	393+03.64	81.89RT



Curve Data
 N = KC5080
 T = 228.49
 L = 414.74
 E = 61.00
 R = 397.43
 PI STA = 13+63.84
 PI X = 468249.8000
 PI Y = 1462260.2745
 SE = 6.02



ADD 100' ϕ
 CUL-DE-SAC

OBLITERATE
 PAVEMENT,
 GRADE TO
 DRAIN



Jordan Jones & Goulding

Jordan Jones & Goulding

Georgia Department of Transportation

NOT RELEASED FOR CONSTRUCTION

DESIGNED: SD		CHECKED:	
DRAWN: RJ		JOB NO.:	
NO.	DATE	DESCRIPTION OF REVISION	

10/4/2007 10:03:16 AM

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
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ALTERNATIVE NO.:

54-13

SHEET NO.: 4 of 5

ADDITIONAL PAVEMENT AREA FOR CUL-DE-SAC

$$= \pi (50^2) / 9 = 873 \text{ SY}$$

OMIT RIGHT TURN PAVEMENT ON MAINLINE:

$$A = [(38700 - 38327)(16) + (38327 - 38147)(8)] / 9$$

$$= 823 \text{ SY}$$

OMIT OLD SR 17 TIE-IN PAVEMENT

$$A = 24(1600 - 1048) / 9 = 1472 \text{ SY}$$

OMIT 24" ϕ PIPE UNDER TIE-IN

$$L = 80 \text{ LF}$$

RIGHT-OF-WAY REDUCTION: 120' WIDE \times 170'

FOR TIE-IN, 400' \times 15' ALONG MAINLINE

$$A = [120(170) + 400(15)] / 43560 = 0.61 \text{ AC}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **54-14**

DESCRIPTION: **SELECTIVELY ELIMINATE RIGHT-TURN LANES IN THE**
FIVE-LANE SECTION

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

Right-turn lanes are provided at all crossroads.

ALTERNATIVE:

Selectively eliminate right-turn lanes where demand appears to be low and unwarranted.

ADVANTAGES:

- Reduces initial cost
- Improves safety by eliminating an intersection on the mainline
- Reduces construction time
- Simplifies design and construction

DISADVANTAGES:

- Requires right-turning traffic to slow down in a through lane
- Slightly reduces safety

DISCUSSION:

Some of the crossroads appear to have little traffic or no connectivity. Right-turn demands at these locations will be very low. Omitting right-turn lanes at these locations will reduce cost and construction time.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 98,058	—	\$ 98,058
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 98,058	—	\$ 98,058



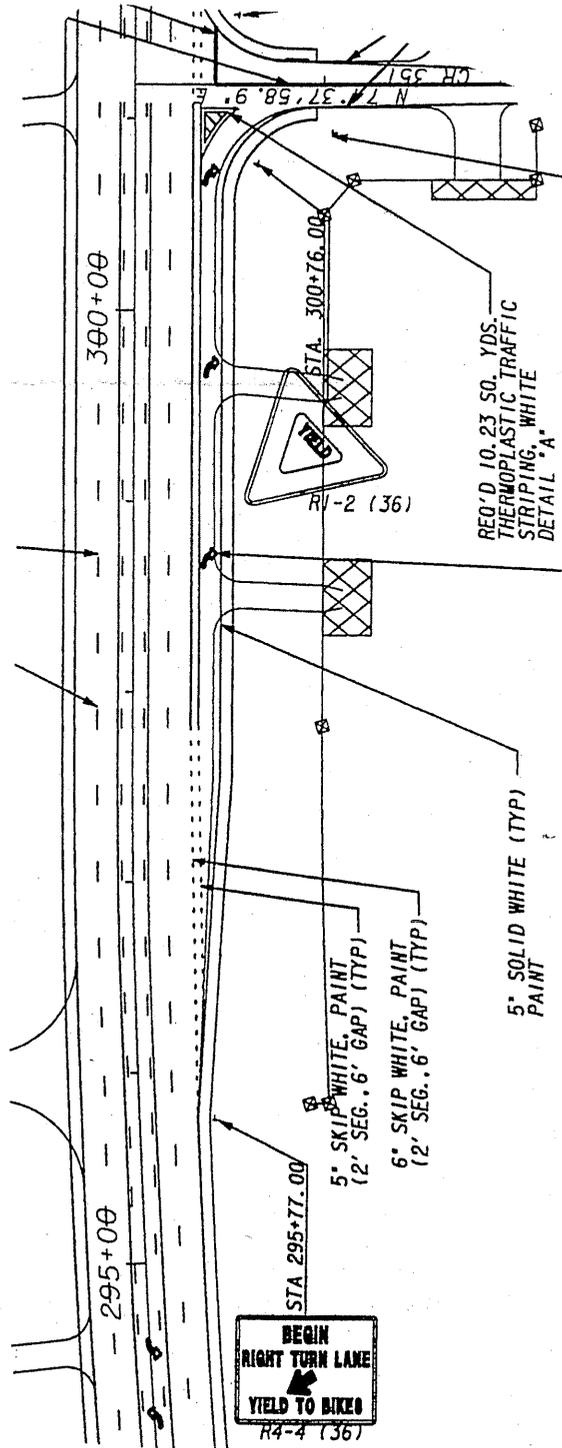
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

54-14

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



TYPICAL RIGHT TURN LANE

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

54-14

SHEET NO.: 3 of 4

RIGHT TURN LANES CAN BE OMITTED AT THE FOLLOWING INTERSECTIONS:

BELLS FERRY RD
 STA. 309+60

TURN LANE WIDTH = 17'
 TAPER LENGTH = 180.6'
 TURN LANE LENGTH = 354

$$\text{PAVEMENT AREA} = [8.5(180.6) + 17(354)] / 9 = 839 \text{ SF}$$

$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER L}}{2} + \text{TURN LANE L} \right) (17) / 43560 \\ &= \left(\frac{180.6}{2} + 354 \right) (17) / 43560 \\ &= 0.17 \text{ AC} \end{aligned}$$

SLAY ROAD
 STA. 329+30

TURN LANE WIDTH = 16'
 TAPER LENGTH = 180.9'
 TURN LANE LENGTH = 363

$$\text{PAVEMENT AREA} = [8(180.9) + 16(363)] / 9 = 806 \text{ SF}$$

$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER L}}{2} + \text{TURN LANE L} \right) (16) / 43560 \\ &= \left(\frac{180.9}{2} + 363 \right) (16) / 43560 \\ &= 0.17 \text{ AC} \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **55-1**

DESCRIPTION: **REDUCE OUTSIDE SHOULDERS TO 6-FT.-WIDE PAVED SHOULDERS**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the use of 6.50-ft.-wide paved shoulders that include a 12-in. buffer, 1.33-ft. rumble strip and a 4.167-ft. bicycle lane.

ALTERNATIVE: (Sketch attached)

Use 6.0-ft. paved shoulders composed of an 8-in. buffer, 1.33-ft. rumble strip and a 4.00-ft. bicycle lane.

ADVANTAGES:

- Reduces initial cost
- Reduces quantity of pavement
- Slightly eases installation
- Implements a common practice

DISADVANTAGES:

- Reduces buffer between travelway and rumble strip
- Slightly narrows bicycle lane
- Increases perceived loss of safety

DISCUSSION:

A slight reduction in paved shoulder width will reduce cost with virtually no effect on vehicular or bicycle traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 108,258	—	\$ 108,258
ALTERNATIVE	\$ 1,287	—	\$ 1,287
SAVINGS	\$ 106,971	—	\$ 106,971

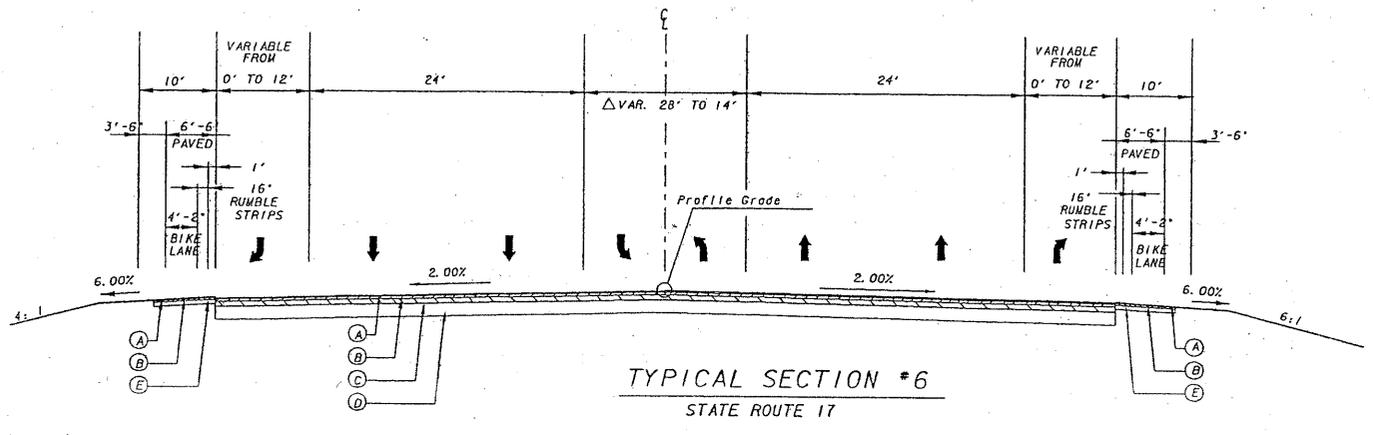
PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

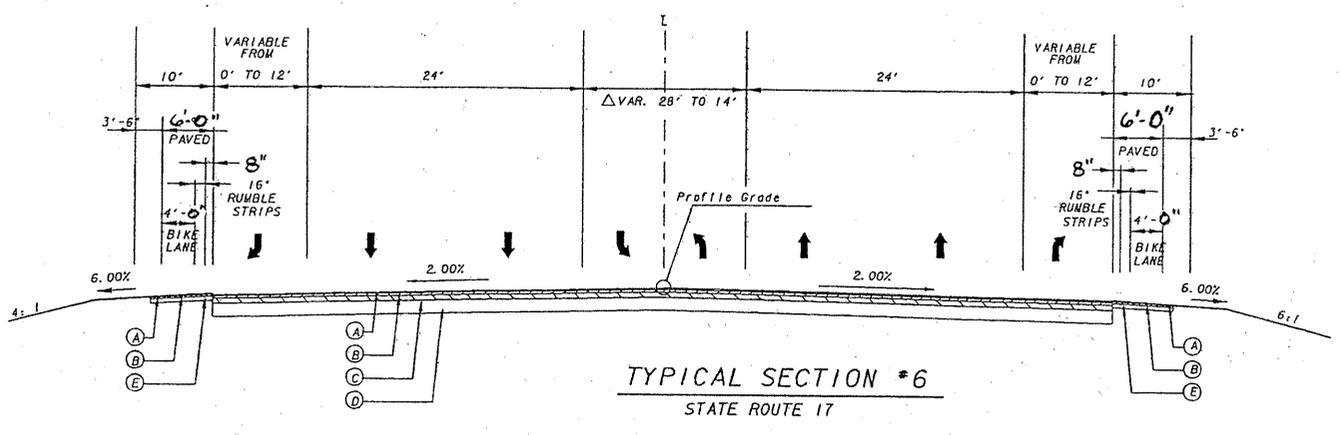
55-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage
 (55)

ALTERNATIVE NO.:
 55-1
 SHEET NO.: 3 of 5

Same pavement section & prices
 (54) = \$51.45 ←

(55) shoulders

(Asph
 125mm)

$$165 \frac{\#}{sy} \times \frac{T}{2000 \#} \times \frac{\$75}{T} = \$6.19/sy$$

(Asph
 19mm)

$$220 \frac{\#}{sy} \times \frac{T}{2000 \#} \times \frac{\$75}{T} = \$8.25/sy$$

(6" GAB)

$$150 \frac{\#}{cy} \times \frac{T}{2000} \times 0.5 \times \frac{9^{SF}}{sy} \times \frac{\$24.32}{T} = \$8.19$$

$$\underline{\$22.63/sy} \leftarrow$$

(55) side Rds

$$165 \frac{\#}{sy} \text{ (same as above)} = \$6.19/sy$$

(Asph.
 19mm)

$$330 \frac{\#}{sy} \times \frac{T}{2000 \#} \times \frac{\$75}{T} = \$12.38/sy$$

$$150 \frac{\#}{cy} \times \frac{T}{2000} \times 0.67 \times \frac{9^{SF}}{sy} \times \frac{\$24.22}{T} = \$10.94/sy$$

$$\underline{\$29.51/sy} \leftarrow$$

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-1

SHEET NO.: 4 of 5

BRIDGE

$$\text{PROJECT LENGTH} = 5.722 \text{ MI} = 30,212' - 200'$$

$$= 30,012'$$

SHOULDER AREA REDUCTION

$$= 2(.5)(30,012') / \frac{9}{64} = 3,335 \text{ SY}$$

$$\text{PERMANENT GRASSING} = 9(3335) / 43560 = 0.69 \text{ AC}$$

$$\text{AGR. LIME} = 0.69 (170 / 85) = 1.38 \text{ TN}$$

$$\text{LIQUID LIME} = 0.69 (213 / 85) = 1.73 \text{ GL}$$

$$\text{MIXED GR. FERTILIZER} = 0.69 (77 / 85) = 0.63 \text{ TN}$$

$$\text{FERT. NITR. CONTENT} = 0.69 (8500 / 85) = 69.0 \text{ LB}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY
 SR 17 WIDENING AND RECONSTRUCTION
 Wilkes and Elbert Counties

ALTERNATIVE NO.: 55-2

DESCRIPTION: USE 11-FT.-WIDE TRAVEL LANES THROUGHOUT

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The current design indicates 12-ft.-wide travel lanes.

ALTERNATIVE: (Sketch attached)

Use 11-ft.-wide travel lanes throughout the project.

ADVANTAGES:

- Reduces initial cost
- Reduces quantity of pavement
- Slightly eases installation
- Reduces right-of-way requirements

DISADVANTAGES:

- Narrows travel lanes
- Increases perceived loss of safety

DISCUSSION:

The design year traffic is 4,200 vehicles per day with 8% trucks. Using 11-ft.-wide travel lanes with this quantity of traffic will neither compromise safety nor reduce functionality while providing substantial savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 798,822	—	\$ 798,822
ALTERNATIVE	\$ 5,165	—	\$ 5,165
SAVINGS	\$ 793,657	—	\$ 793,657

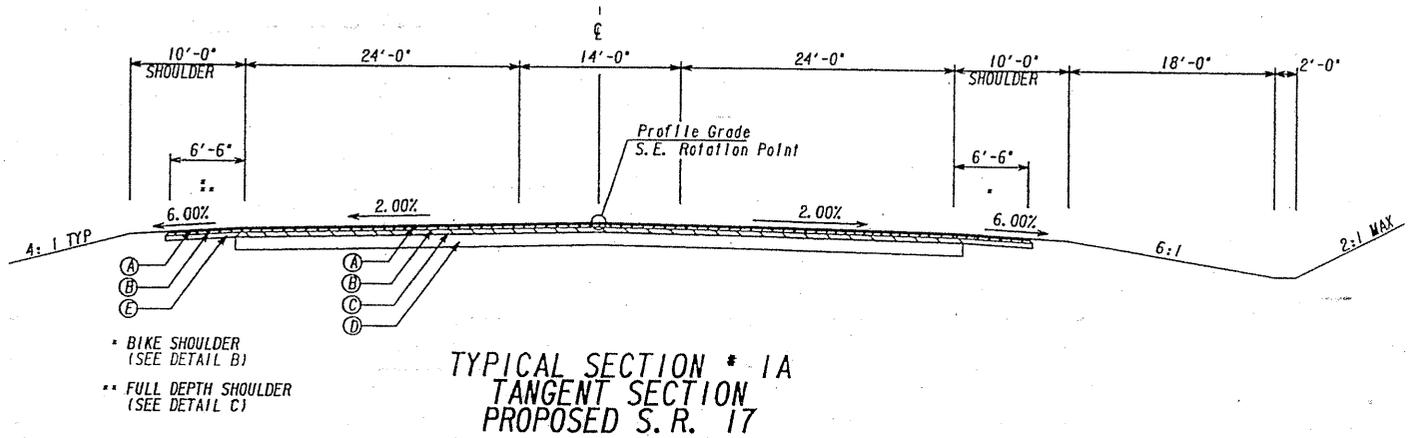
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

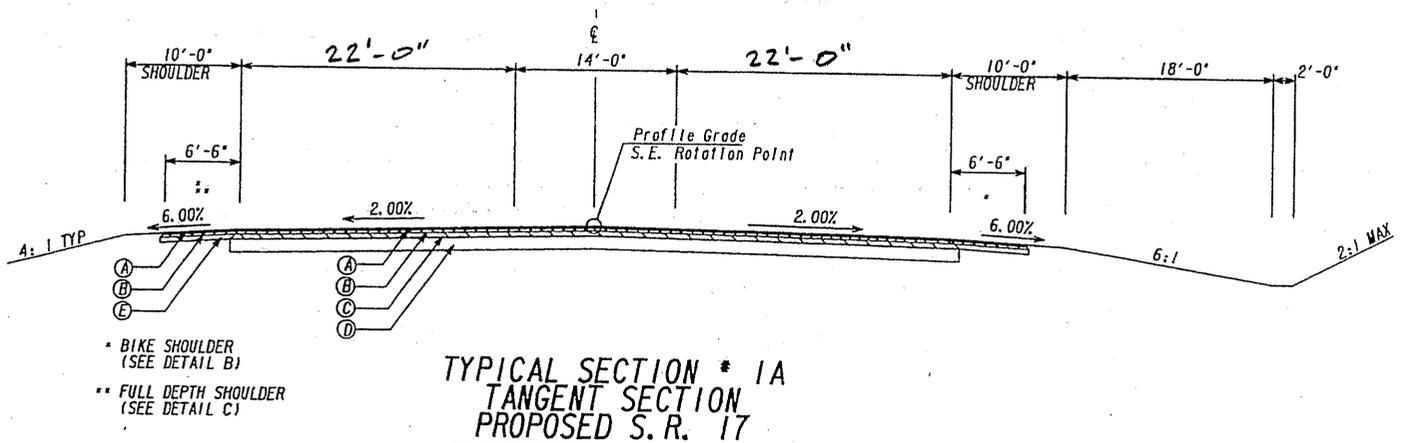
55-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-2

SHEET NO.: 3 of 4

$$\text{PROJECT LENGTH} = 5.760 \text{ MI} = 30,413$$

$$\text{LENGTH OF BRIDGES AND APPROACH SLABS} = 260$$

$$\text{NET PAYMENT LENGTH} = 30,153$$

$$\begin{aligned} \text{REDUCTION IN PAYMENT AREA} &= 2(2)(1)(30,153)/9 \\ &= 13,401 \text{ SY} \end{aligned}$$

$$\text{REDUCTION IN RIGHT-OF-WAY}$$

$$= 9(13,401)/43,560 = 2.77 \text{ AC}$$

ADDITIONAL GRASSING QUANTITIES:

$$\text{PERM. GRASSING} = 2.77 \text{ AC}$$

$$\text{AGR. LIME} = 2.77 (170/85) = 5.54 \text{ TN}$$

$$\text{LIQUID LIME} = 2.77 (213/85) = 6.94 \text{ GL}$$

$$\text{MIXED GR. FERT.} = 2.77 (77/85) = 2.51 \text{ TN}$$

$$\text{NIT. CONTROL FERT.} = 2.77 (8500/85) = 277 \text{ LB}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **55-6**

DESCRIPTION: **SHORTEN TIE-IN OF OLD ELLIAM ROAD AND SR 17**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN:

The current design ties Elliam Road into the mainline alignment at STA 111+23.73, approximately 300 ft. south of the existing alignment to a 90° intersection with SR 17. It has a design speed of 45 miles per hour (mph) and a curve radius of 730 ft.

ALTERNATIVE: (Sketch attached)

Tie Old Elliam Road into the mainline to intersect at STA 112+30, approximately 200 ft. south of its current intersection. This configuration retains the desired 90° intersection angle with SR 17.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Eliminates a displacement
- Reduces overall construction
- Retains 90° intersection angle

DISADVANTAGES:

- Increases superelevation

DISCUSSION:

In accordance with the Department's Design Manual, the design speed can be dropped 10 mph (from 45 mph to 35 mph), thereby providing for a smaller radius and shortening the amount of reconstruction for Old Elliam Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 102,618	—	\$ 102,618
ALTERNATIVE	\$ 65,650	—	\$ 65,650
SAVINGS	\$ 36,968	—	\$ 36,968

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-6

SHEET NO.: 3 of 6

ORIGINAL

FULL DEPTH (ORIGINAL)

$$539.92 \text{ FT} \times 24 \text{ FT} = 12958.08 \text{ SF} \Rightarrow 1439.79 \text{ SY}$$

OVERLAY (ORIGINAL)

$$417.3 \text{ FT} \times 16 \text{ FT} = 6676.80 \text{ SF} \Rightarrow 741.87 \text{ SY}$$

WIDENING (FULL DEPTH) (ORIGINAL)

$$417.3 \times 4 \text{ FT} \times 2 = 3338.4 \text{ SF} \Rightarrow 370.93 \text{ SY}$$

$$1439.79 \text{ SY} \times \$29.51/\text{SY} = \$42488.20 \text{ (FULL DEPTH ORIGINAL)}$$

$$741.87 \text{ SY} \times \$6.19/\text{SY} = \$4592.18 \text{ (OVERLAY ORIGINAL)}$$

$$370.93 \text{ SY} \times \$29.51/\text{SY} = \$10,946.14 \text{ (WIDENING ORIGINAL)}$$

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

55-6

SHEET NO.: 4 of 6

Proposed

$$400 \text{ ft} \times 24 \text{ ft} = 9600 \text{ SF} \Rightarrow 1066.67 \text{ SY (FULL DEPTH)}$$

$$170 \text{ ft} \times 16 \text{ ft} = 2720 \text{ SF} \Rightarrow 302.22 \text{ SY (OVERLAY)}$$

$$170 \text{ ft} \times 4 \text{ ft} \times 2 = 1360 \text{ SF} \Rightarrow 151.11 \text{ SY (WIDENING)}$$

$$1066.67 \text{ SY} \times \$29.51/\text{SY} = \$31,477.43 \text{ (FULL DEPTH)}$$

$$302.22 \text{ SY} \times \$6.19/\text{SY} = \$1,870.74 \text{ (OVERLAY)}$$

$$151.11 \text{ SY} \times \$29.51/\text{SY} = \$4,459.26 \text{ (WIDENING)}$$

1AL
4,3560

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

55-6

SHEET NO.: 5 of 6

R/W

ORIGINAL R/W

$$967 \text{ FT} \times 120 \text{ FT} = 116040 \text{ SF} \Rightarrow 2.66 \text{ ACRES}$$

$$2.66 \text{ ACRE} \times \$4200.00/\text{ACRE} = \$11172.00$$

PROPOSED R/W

$$600 \text{ FT} \times 120 \text{ FT} = 72000 \text{ SF} \Rightarrow 1.65 \text{ ACRES}$$

$$1.65 \text{ ACRES} \times \$4200.00/\text{ACRE} = \$6930.00$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **55-7**

DESCRIPTION: **SHORTEN TIE-IN FOR HUDSON ROAD AND SR 17**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current design provides the Hudson Road tie-in with the mainline approximately 900 ft. farther north than its current intersection in order to have a 90° angle with SR 17.

ALTERNATIVE: (Sketch attached)

Shorten the tie-in of Hudson Road and the mainline to intersect at approximately 120 ft. north of its current intersection. This configuration retains the desired 90° intersection angle with SR 17.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Eliminates a displacement
- Reduces overall construction
- Retain 90° intersection angle

DISADVANTAGES:

- Increases superelevation

DISCUSSION:

According to the cross section, the mainline can be tied in at STA 116+00. Displaced parcel 29 can be eliminated if more of the existing Hudson Road is used and the tie-in shortened.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 304,214	—	\$ 304,214
ALTERNATIVE	\$ 40,611	—	\$ 40,611
SAVINGS	\$ 263,603	—	\$ 263,603

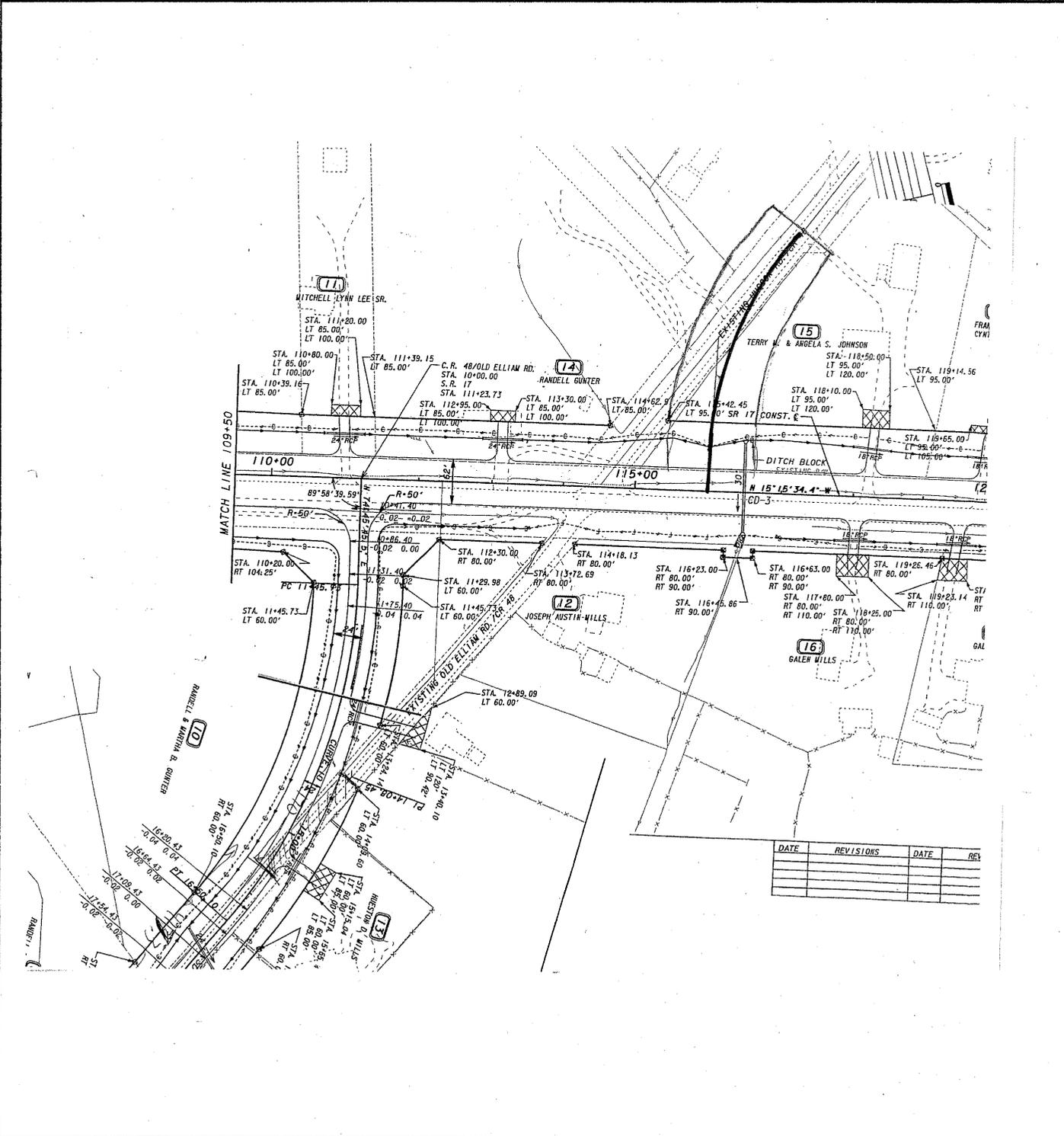
PROJECT: **EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

55-7

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



DATE	REVISIONS	DATE	REV

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-7
 SHEET NO.: 3 of 4

ORIGINAL FULL DEPTH

$$1271.53 \text{ FT} \times 24 \text{ FT} = 30516.72 \text{ SF} \Rightarrow 3390.75 \text{ SY}$$

$$3390.75 \text{ SY} \times \$29.51/\text{SY} = \$100,061.03$$

PROPOSED FULL DEPTH (SHORTENED TIE-IN)

$$330 \text{ FT} \times 24 \text{ FT} = 7920 \text{ SF} \Rightarrow 880 \text{ SY}$$

$$880 \text{ SY} \times \$29.51/\text{SY} = \$25,968.80$$

R/W

$$1377 \text{ FT} \times 120 \text{ FT} = 165240 \text{ SF} \Rightarrow 3.79 \text{ ACRES (ORIGINAL)}$$

$$300 \text{ FT} \times 120 \text{ FT} = 36000 \text{ SF} \Rightarrow .826 \text{ ACRES (PROPOSED)}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 55-9

DESCRIPTION: USE A CONCRETE BOX CULVERT IN LIEU OF A BRIDGE
OVER DRY FORK CREEK

SHEET NO.: 1 of 5

ORIGINAL DESIGN: (Sketch attached)

The current design provides for a new, 200-ft.-long x 85.25-ft. out-to-out bridge on the mainline over the Dry Fork Creek.

ALTERNATIVE: (Sketch attached)

Use a concrete box culvert in lieu of a new bridge over Dry Fork Creek.

ADVANTAGES:

- More economical
- Accelerates construction
- Slightly eases installation
- Eliminates future bridge maintenance costs

DISADVANTAGES:

- Not environmentally sensitive

DISCUSSION:

The drainage area for this crossing is only 6.90 square miles with a discharge of 2,450 cf per second for the 100-year storm. The creek is approximately 35 ft. wide at the crossing with a flow depth of about 9 ft. A culvert will be hydraulically adequate, quicker to construct and more economical.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,127,283	—	\$ 1,127,283
ALTERNATIVE	\$ 364,805	—	\$ 364,805
SAVINGS	\$ 762,478	—	\$ 762,478

SKETCHES



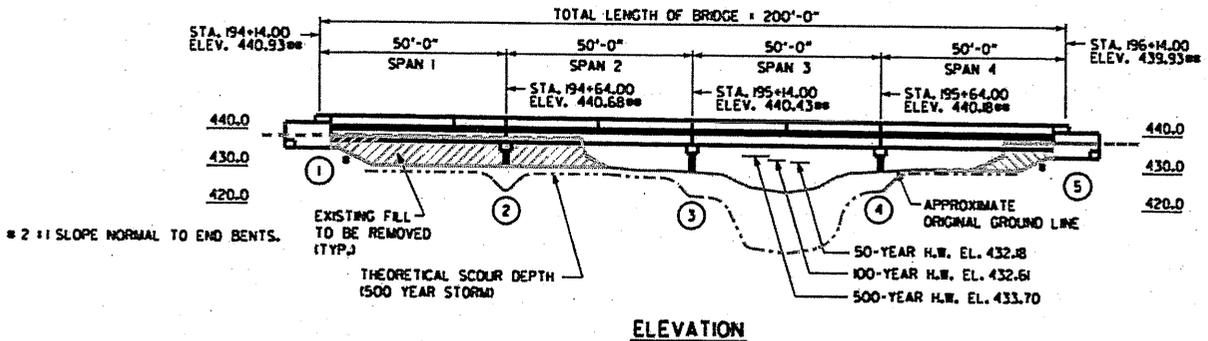
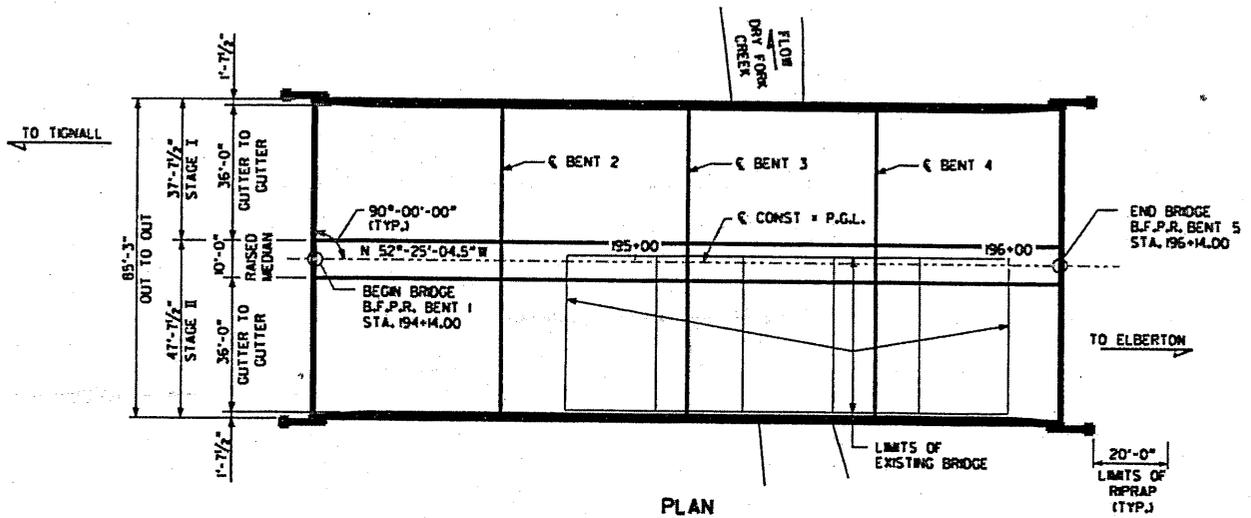
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE-NO.:

55-9

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-9

SHEET NO.: 4 of 5

CULVERT SIZE:

$$Q = 2540 \text{ CFS}$$

ASSUME ALLOWABLE VELOCITY = 8 FPS

$$A = 2540/8 = 317.5$$

FOR 4-BARRELS, $A = 317.5/4 = 79.375$

USE TWO DOUBLE 9x9 BOX CULVERTS

7' OF FILL ON TOP OF CULVERT, 90° SKEW, 4:1 SLOPE

$$\text{SO CULVERT LENGTH} = 2[7 + 24 + 10 + 4(7)] = 138'$$

QUANTITIES ARE 2.973 CY/FT CONC AND 184.5 #/FT REINF

PARAPET QUANTITIES 9.6 CY CONC, 1078 # REINF

$$\text{CONC TOTAL} = 138(2.973) + 9.6 = 414 \text{ CY}$$

$$\text{REINF TOTAL} = 138(184.5) + 1078 = 26540 \#$$

$$\text{ADDITIONAL PAVING} = 82(200)/9 = 1822 \text{ SY}$$

$$\text{ADDITIONAL EMBANKMENT} = 190(11)(107)/27 = 8282 \text{ CY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **55-11**

DESCRIPTION: **SELECTIVELY ELIMINATE RIGHT-TURN LANES**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

Right-turn lanes are provided at all crossroads.

ALTERNATIVE: (Sketch attached)

Selectively eliminate right-turn lanes where demand appears to be low and unwarranted.

ADVANTAGES:

- Reduces initial cost
- Improves safety by eliminating an intersection on the mainline
- Accelerates construction
- Simplifies design and construction

DISADVANTAGES:

- Requires right-turning traffic to slow down in a through lane
- Slightly reduces safety

DISCUSSION:

Some of the crossroads appear to have little traffic or no connectivity. Right-turn demands at these locations will be very low. Omitting right-turn lanes at these locations will reduce cost and construction time.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 175,138	—	\$ 175,138
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 175,138	—	\$ 175,138

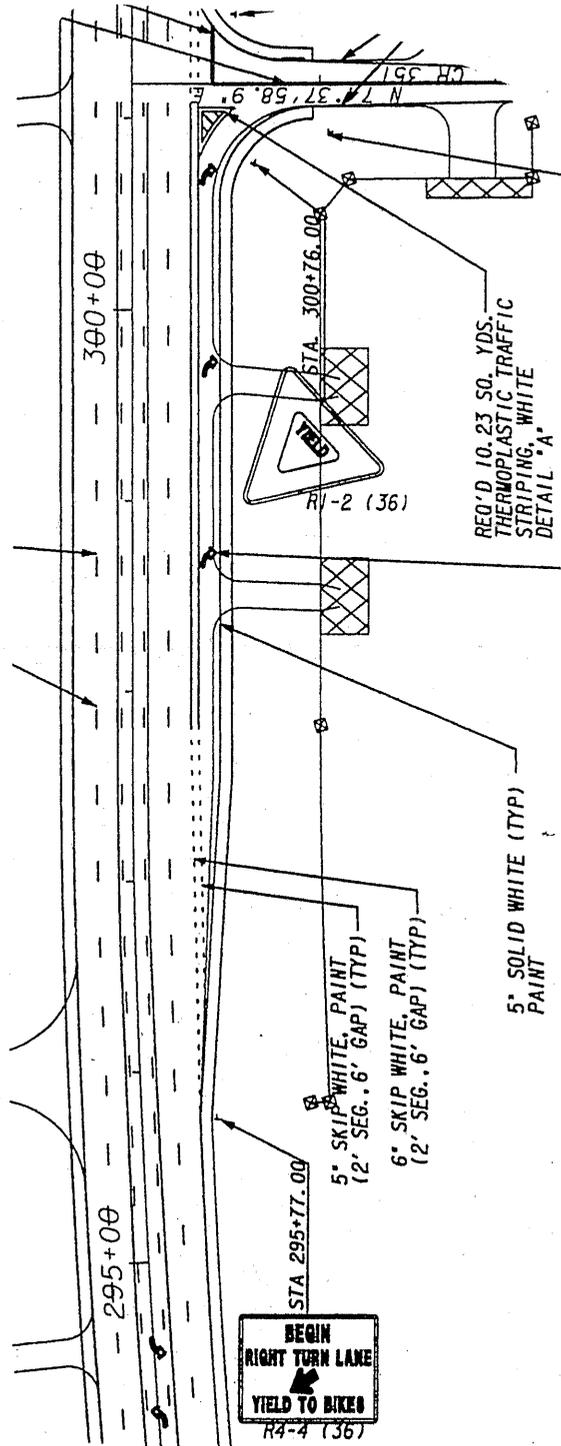
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-11

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 6



TYPICAL RIGHT TURN LANE

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-11

SHEET NO.: 3 of 6

RIGHT TURN LANES CAN BE OMITTED AT THE FOLLOWING INTERSECTIONS:

HAROLD ADDISON RD TURN LANE WIDTH = 12'
 STA. 223+62 TAPER LENGTH = 200'
 TURN LANE LENGTH = 325'

$$\text{PAVEMENT AREA} = [6(200) + 12(325)] / 9 = 567 \text{ SF}$$

$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER } L}{2} + \text{TURN LANE } L \right) (12) / 43560 \\ &= \left(\frac{200}{2} + 325 \right) (12) / 43560 \\ &= 0.12 \text{ AC} \end{aligned}$$

OTIS SMITH ROAD TURN LANE WIDTH = 12'
 STA. 229+67 TAPER LENGTH = 180'
 TURN LANE LENGTH = 350'

$$\text{PAVEMENT AREA} = [6(180) + 12(350)] / 9 = 587 \text{ SF}$$

$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER } L}{2} + \text{TURN LANE } L \right) (12) / 43560 \\ &= \left(\frac{180}{2} + 350 \right) (12) / 43560 \\ &= 0.12 \text{ AC} \end{aligned}$$

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-11

SHEET NO.: 4 of 6

RIGHT TURN LANES CAN BE OMITTED AT THE FOLLOWING INTERSECTIONS:

DONWOLLEY DR.
 STA. 311+23

TURN LANE WIDTH = 12'
 TAPER LENGTH = 180'
 TURN LANE LENGTH = 360'

$$\text{PAVEMENT AREA} = [6(180) + 12(360)] / 9 = 600 \text{ SF}$$

$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER } L}{2} + \text{TURN LANE } L \right) (12) / 43560 \\ &= \left(\frac{180}{2} + 360 \right) (12) / 43560 \\ &= 0.12 \text{ AC} \end{aligned}$$

OAK RD
 STA. 324+65

TURN LANE WIDTH = 12'
 TAPER LENGTH = 170'
 TURN LANE LENGTH = 360'

$$\text{PAVEMENT AREA} = [6(170) + 12(360)] / 9 = 593 \text{ SF}$$

$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER } L}{2} + \text{TURN LANE } L \right) (12) / 43560 \\ &= \left(\frac{170}{2} + 360 \right) (12) / 43560 \\ &= 0.12 \text{ AC} \end{aligned}$$

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-11

SHEET NO.: 5 of 6

RIGHT TURN LANES CAN BE OMITTED AT THE FOLLOWING INTERSECTIONS:

CHARLES BUTLER RD
 STA 33105

TURN LANE WIDTH = 12'
 TAPER LENGTH = 170'
 TURN LANE LENGTH = 360

$$\text{PAVEMENT AREA} = [0(170) + 12(360)] / 9 = 593 \text{ SF}$$

$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER } L}{2} + \text{TURN LANE } L \right) (12) / 43560 \\ &= \left(\frac{170}{2} + 360 \right) (12) / 43560 \\ &= 0.12 \text{ AC} \end{aligned}$$

~~TURN LANE WIDTH =
 TAPER LENGTH =
 TURN LANE LENGTH =~~

~~$$\text{PAVEMENT AREA} = [() + ()] / 9 = \text{ SF}$$~~

~~$$\begin{aligned} \text{R/W AREA} &= \left(\frac{\text{TAPER } L}{2} + \text{TURN LANE } L \right) () / 43560 \\ &= \left(\frac{ }{2} + () \right) () / 43560 \\ &= \text{ AC} \end{aligned}$$~~

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **55-12**

DESCRIPTION: **SHORTEN BULLARD'S FERRY ROAD TIE-IN LENGTH TO**
SR 17

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The present design realigns Bullard's Ferry Road for 40 miles per hour (mph) design speed with a radius of 600 ft. which requires a 700-ft. realignment to tie into SR 17.

ALTERNATIVE: (Sketch attached)

Realigning Bullard's Ferry Road for a 35 mph design speed with a radius of 250 ft. ($e_{max} = 4\%$). This configuration requires a realignment of 360 ft. and retains the desired 90° intersection angle with SR 17.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Reduces overall construction
- Retains 90° intersection angle

DISADVANTAGES:

- Reduces design speed

DISCUSSION:

The current design for the realignment of Bullard's Ferry Road is 40 mph with an e_{max} of 4% and uses a 600-ft. radius. The Department's Design Policy Manual states it is an acceptable design to reduce the design speed by 10 mph for the last curve of a "T" intersection before tying into the mainline.

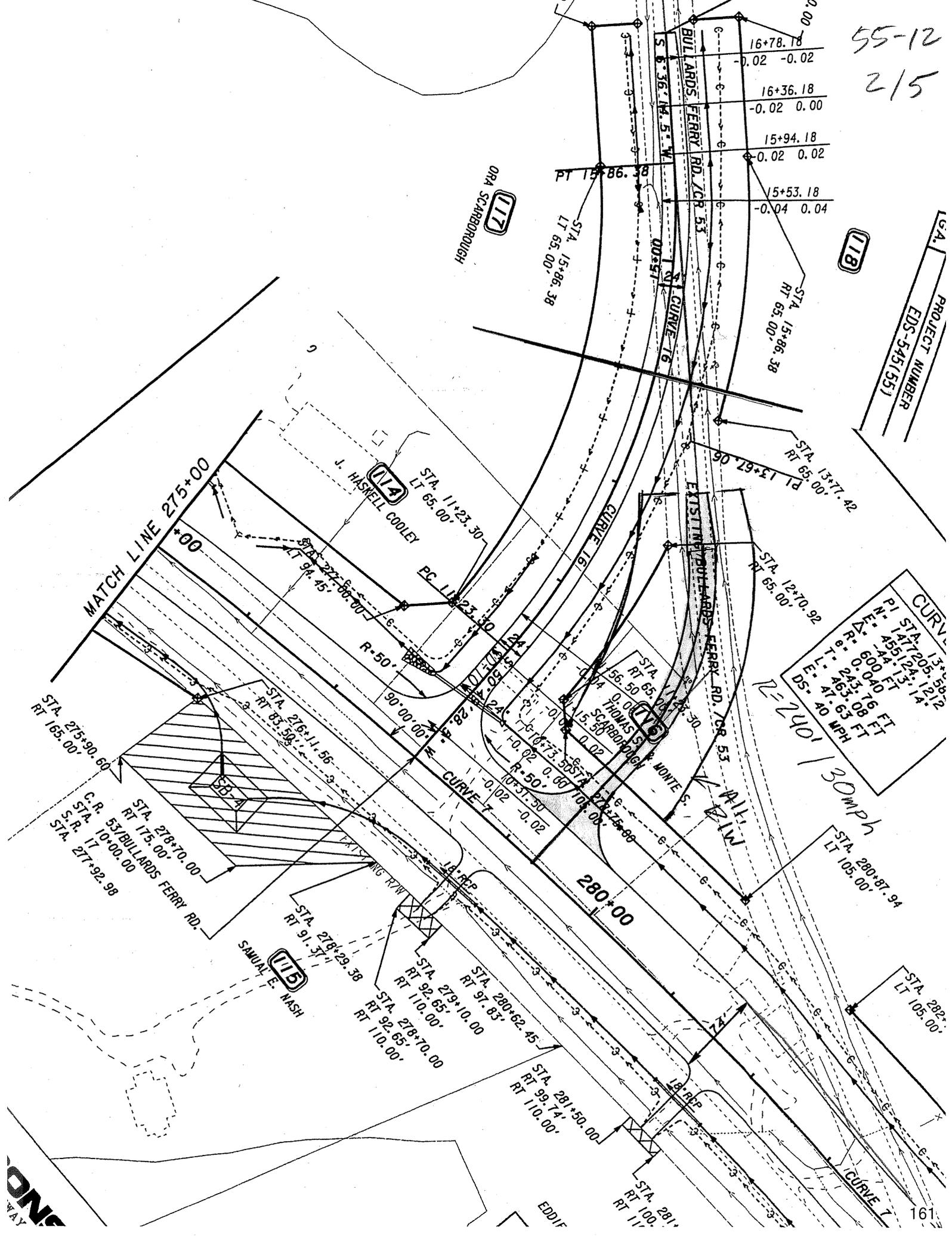
In this case, the realignment can use a 250-ft. radius with e_{max} of 4% to shorten the realignment length to 360 ft. versus 700 ft.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 51,960	—	\$ 51,960
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 51,960	—	\$ 51,960

55-12
215

PROJECT NUMBER
EDS-545155

CURVE DATA
PI STA 13+205.56
EA = 455.12A 1212
T = 600.00
EL = 243.76 FT
DS = 47.63 FT
R = 240' / 30 MPH



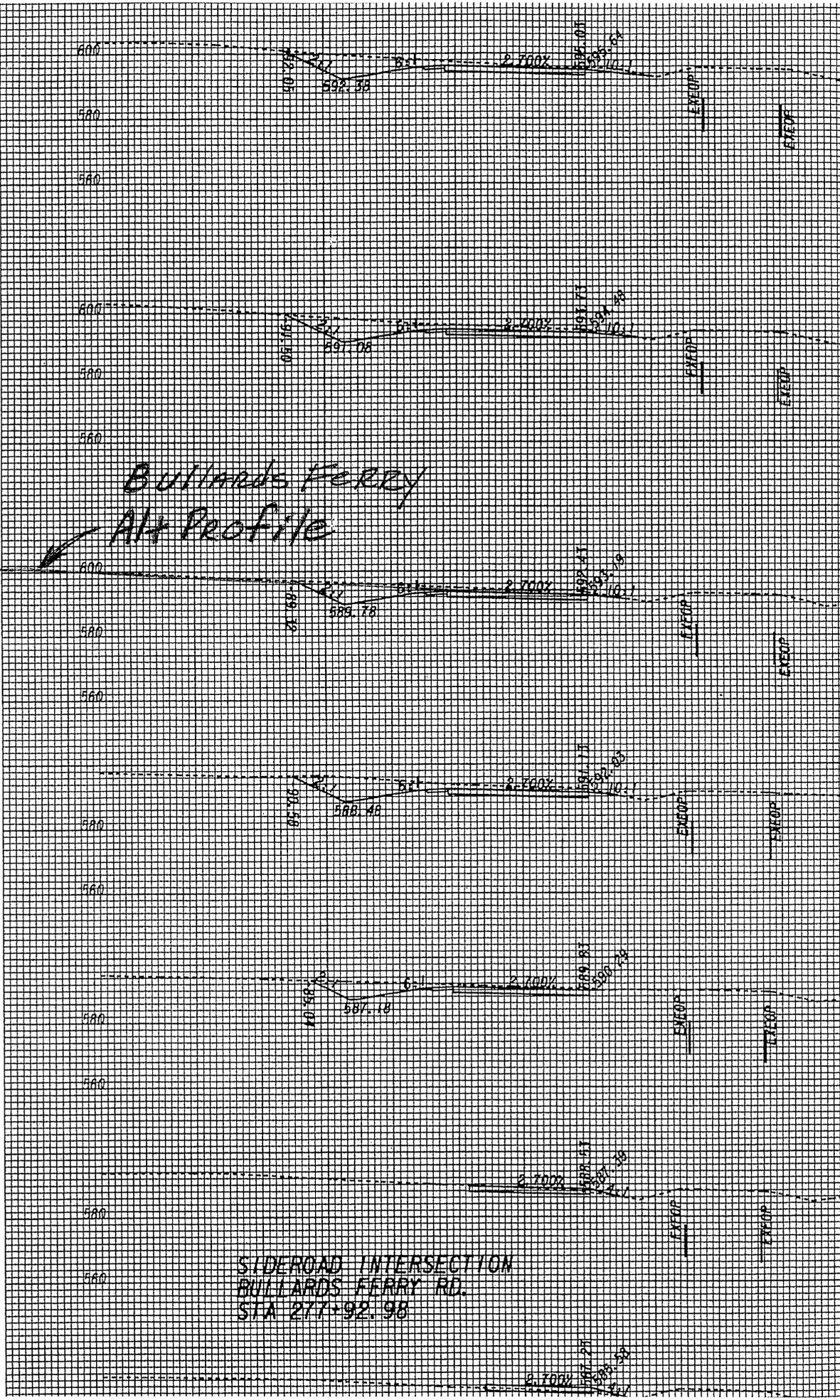


PARSONS
 5380 TRIANGLE PARKWAY, SUITE 100
 NORCROSS, GA 30092

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION

CROSS SEC
 S.R. 17 IMPROV
 STAGE 1 CONS

55-12
 3/5



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION OF SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-12

SHEET NO.: 4 of 5

Original Realignment 700'
 - Alt. Realignment 360'

(extra Original Cost) $\frac{340' \times 24'}{9} = 907 \text{ s.y. (savings)}$

$\frac{340' \times 3' \text{ Aug.} \times 36' \text{ Aug.}}{27} = 1,360 \text{ c.y. (extra Original Earthwork (savings))}$

extra Original E/W (savings)

$\frac{300' \times 120'}{43,560} = 0.826 \text{ AC}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: 55-13

DESCRIPTION: SHORTEN DUNWORLEY DRIVE TIE-IN LENGTH TO SR 17

SHEET NO.: 1 of 4

ORIGINAL DESIGN:

The current design realigns Dunworley Drive a radius of 700 ft. at 35 miles per hour (mph).

ALTERNATIVE: (Sketch attached)

Realign Dunworley Drive for a radius of 350 ft. at 35 mph design speed. This configuration retains the desired 90° intersection angle with SR 17.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Reduces overall construction
- Retains 90° intersection angle
- Retains original 35 mph design speed

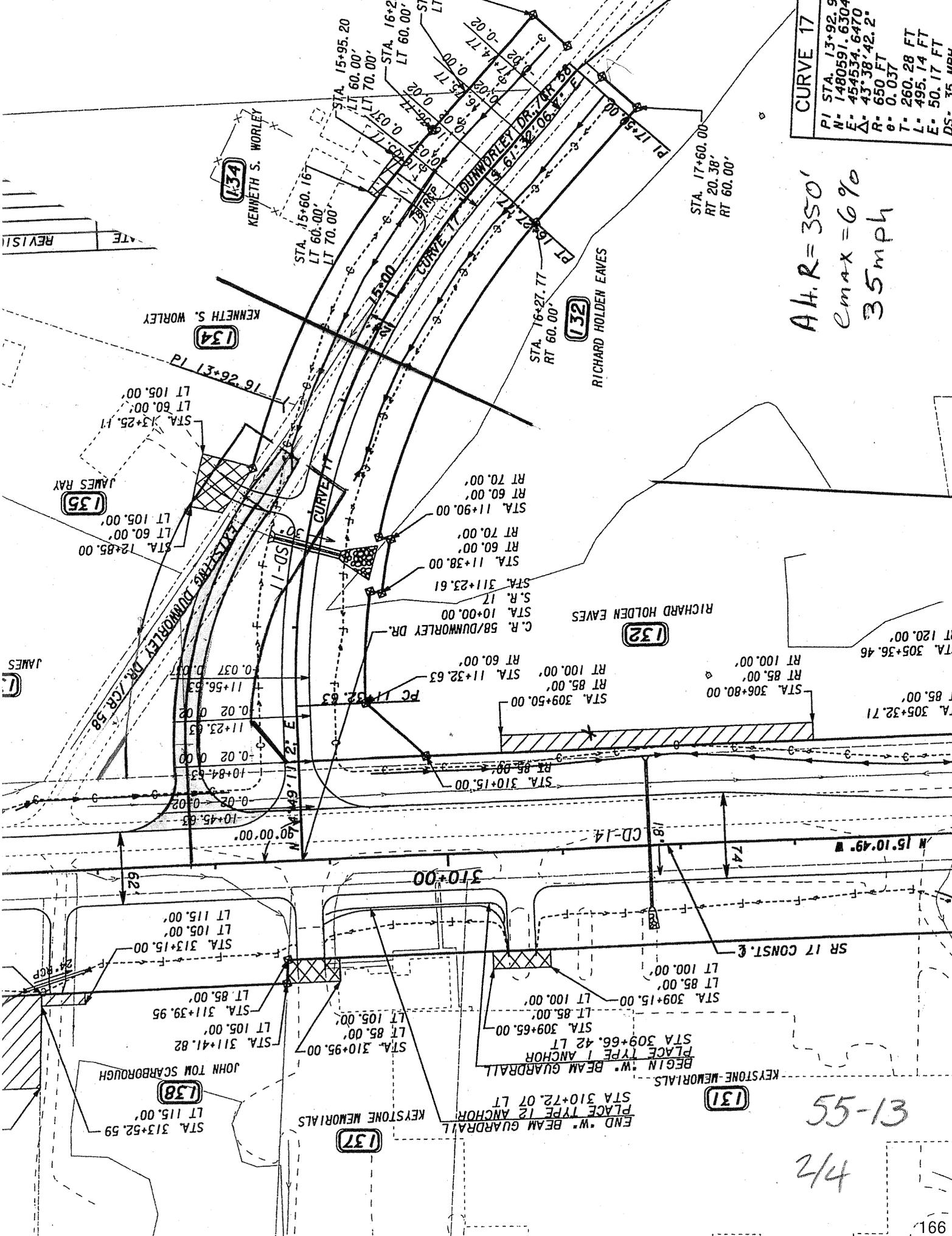
DISADVANTAGES:

- None apparent

DISCUSSION:

This alternative proposes to tie Dunworley Drive into SR 17 with a shorter radius to reduce the realignment length. The alternative alignment still satisfies a profile for 35 mph. The difference between the original and the alternative realignment length is 350 ft.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 53,143	—	\$ 53,143
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 53,143	—	\$ 53,143



CURVE 17

PI STA.	13+92.91
N	1480591.6304
E	454534.6470
Δ	43°38'42.2"
R	650 FT
e	0.037
T	260.28 FT
L	495.14 FT
E	50.17 FT
DS	35 MPH

A.H.R. = 350'
 e_max = 6%
 35mph

REVISED DATE

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

35-13

SHEET NO.: 3 of 4

Original Length 700'
 Alt. Length 350'

 350'

EXTRA Original Cost $\frac{350' \times 24'}{9} = 934 \text{ sy}$
 (savings)

EXTRA Original Earthwork $\frac{350' \times 3' \text{ Avg.} \times 36 \text{ ft}'}{27} =$
 = 1,400 c.y. (savings)

EXTRA Original R/W (savings)

$\frac{300' \times 120'}{43,560} = 0.726 \text{ AC}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **55-15**

DESCRIPTION: **DO NOT REALIGN OAK ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design realigns and relocates Oak Road.

ALTERNATIVE: (Sketch attached)

Realign Oak Road closer to the existing intersection with SR 17. This configuration retains the desired 90° intersection angle with SR 17.

ADVANTAGES:

- Reduces initial cost
- Reduces right-of-way
- Reduces overall construction
- Retains 90° intersection angle

DISADVANTAGES:

- Right-of-way encroaches on a residence
- No longer aligns with Joudan Road across SR 17
- Reduces design speed

DISCUSSION:

This alternative proposes tying in Oak Road into SR 17 with a shorter radius to reduce the realignment length. The alternative alignment still satisfies a profile for 25 mph and avoids a residence. Since there is not a divided section in this area, there is no need to align with Joudan Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 126,675	—	\$ 126,675
ALTERNATIVE	\$ 23,401	—	\$ 23,401
SAVINGS	\$ 103,274	—	\$ 103,274

SKETCHES



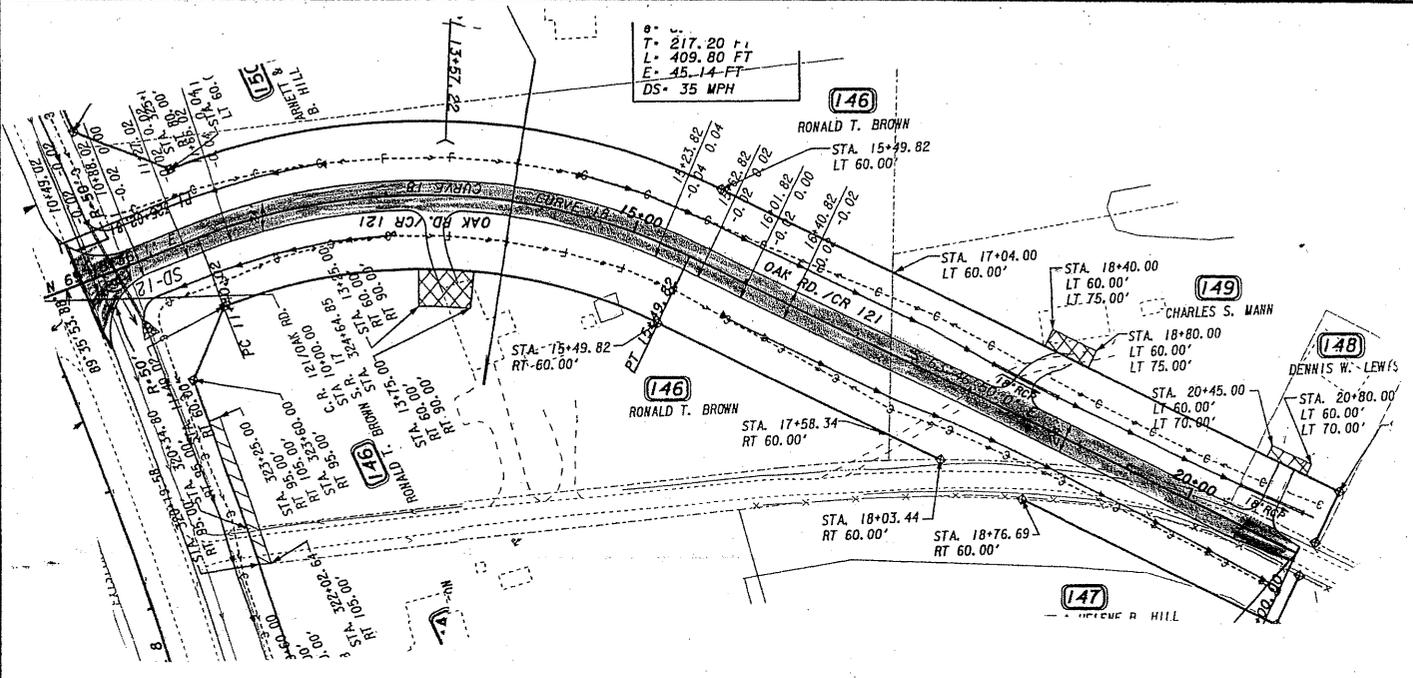
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

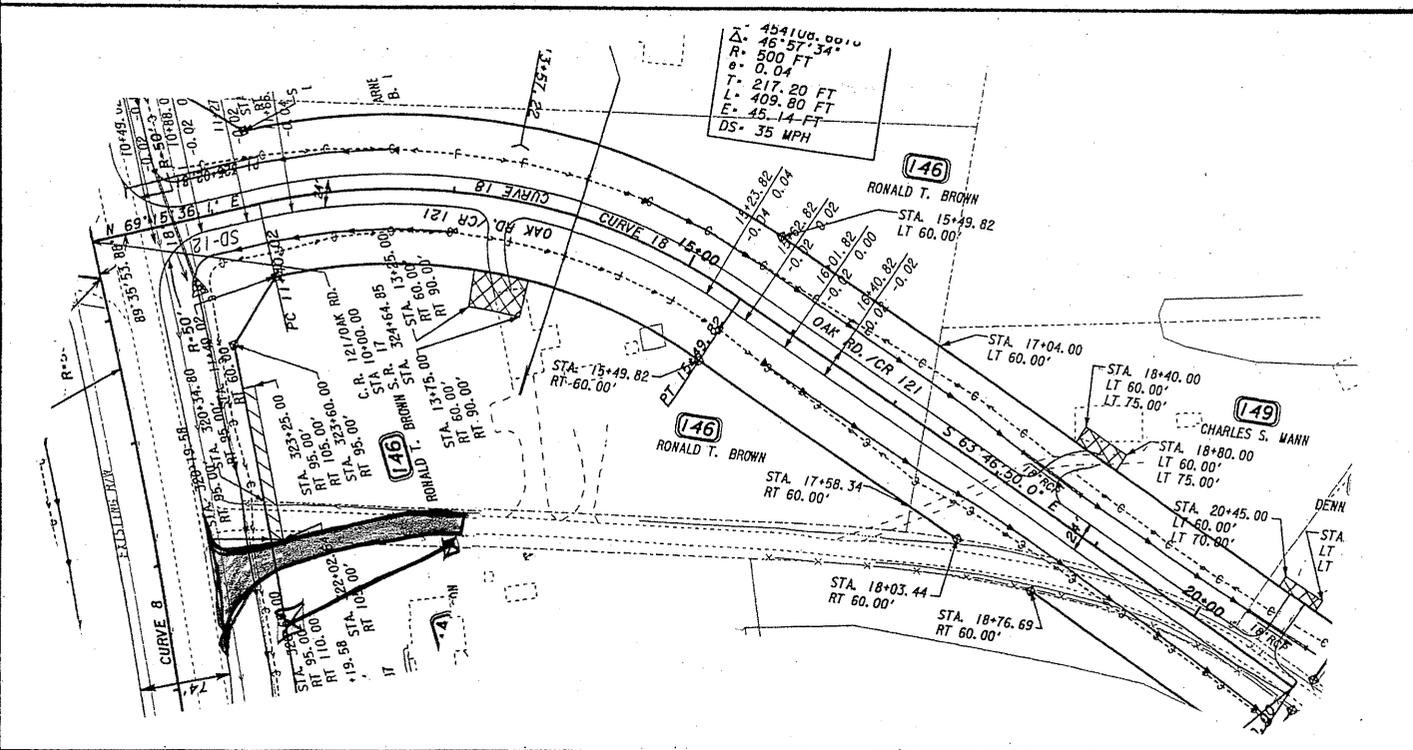
55-15

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
 WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
 Design Development Stage

ALTERNATIVE NO.:

55-15

SHEET NO.: 3 of 4

Asphalt \$29.51/sy

$$\frac{1000\text{ft} \times 24\text{ft}}{9} = 2667\text{SY original}$$

$$\frac{250\text{ft} \times 24\text{ft}}{9} = 667\text{SY alternate}$$

Right of Way \$4200/Acre

$$\frac{120\text{ft} \times 1000\text{ft}}{43560} = 2.75\text{ Acres original}$$

$$\frac{50\text{ft} \times 100\text{ft}}{43560} = 0.12\text{ Acre alternate}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **EDS-545(38, 47, 54, 55), P.I. Nos. 22260, etc. VE STUDY**
SR 17 WIDENING AND RECONSTRUCTION
Wilkes and Elbert Counties

ALTERNATIVE NO.: **55-16**

DESCRIPTION: **REALIGN FAIRFAX CIRCLE TO AVOID DISPLACEMENT**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design uses the existing Fairfax Circle alignment and roadway but displaces a property owner.

ALTERNATIVE: (Sketch attached)

Shift the alignment of Fairfax Circle 20 ft. to the south of the proposed “new” alignment and tie into the existing road approximately 20 ft. from where the current design ties in.

ADVANTAGES:

- Reduces right-of-way
- Retains 90° intersection angle
- Avoids a displacement
- Reduces initial cost

DISADVANTAGES:

- Lengthens alignment
- Increases amount of pavement

DISCUSSION:

Shifting the alignment to the south results in avoiding the residence on Parcel 177. The alignment will be longer, and pavement costs will be higher, but it is less expensive to relocate the road than to displace the property owner.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 153,993	—	\$ 153,993
ALTERNATIVE	\$ 43,739	—	\$ 43,739
SAVINGS	\$ 110,254	—	\$ 110,254

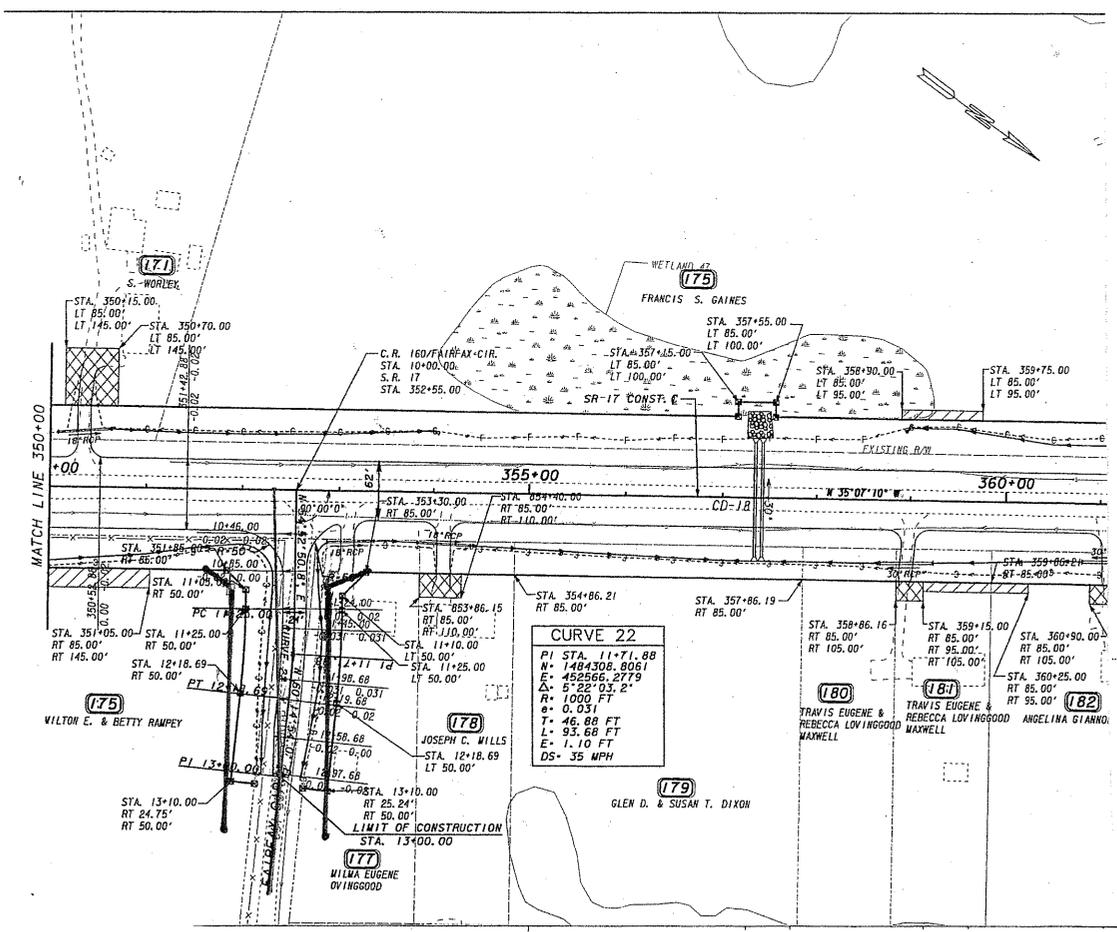
PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
 Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

55-16

SHEET NO.: 2 of 5

AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

55-11
SHEET NO.: 3 of 3

PAVEMENT

ORIGINAL

$$202 \text{ FT} \times 2 \text{ FT} \times 2 = 808 \text{ SF} \Rightarrow \underline{89.78 \text{ SY}} \text{ (WIDENING)}$$

$$55 \text{ FT} \times 24 \text{ FT} = 1320 \text{ SF} \Rightarrow 146.67 \text{ SY} \text{ (FULL DEPTH)}$$

$$= 236.45 \text{ SY}$$

$$236.45 \text{ SY} \times \$29.51 = \$6978.00$$

PROPOSED

$$370 \text{ FT} \times 24 \text{ FT} = 8880 \text{ SF} \Rightarrow 986.67 \text{ SY}$$

$$986.67 \text{ SY} \times \$29.51 = \$29,117.00$$

CALCULATIONS



PROJECT: EDS-545(38, 47, 54, 55), P. I. Nos. 222260, 221740, 222265, and 122840,
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2
Design Development Stage

ALTERNATIVE NO.:

55-16

RLW

SHEET NO.: 4 of 5

ORIGINAL

$$220 \text{ FT} \times 100 \text{ FT} = 22000 \text{ SF} \Rightarrow .51 \text{ ACRES}$$

$$.51 \text{ ACRES} \times \$4200 = \$2142.00$$

PROPOSED

$$350 \text{ FT} \times 100 \text{ FT} = 35000 \text{ SF} \Rightarrow .803 \text{ ACRES}$$

$$.803 \text{ ACRES} \times \$4200.00 = \$3373.00$$

PROJECT DESCRIPTION

NEED AND PURPOSE

The widening and reconstruction of SR 17 are part of the Governor's Road Improvement Program (G.R.I.P.) and involve the multi-laning of this primary north-south corridor in east Georgia, serving as a catalyst for the development of the region. The improvements will aid in the economic development of sparsely populated rural areas and small towns along this route. Traffic carrying capacity will be increased, and safety and operational characteristics along this segment will be improved.

These four projects have a functional classification of Rural Principal Arterials.

PROJECT LOCATIONS

Project EDS-545(38) is located along SR 17 beginning at mile post (MP) 16.9 and ending at MP 23.2 in Wilkes County. Project EDS-545(47) is located along SR 17 from MP 13.0 to MP 16.9, just north of Washington, and MP 23.2 to MP 26.3, just north of Tignall, in Wilkes County. Project EDS-545(54) is located along SR 17 beginning at MP 26.3 in Wilkes County and ending at MP 3.6 in Elbert County. Finally, Project EDS-545(55) is located along SR 17 beginning at MP 3.60 and ending at MP 9.34 and is located entirely within Elbert County.

The length of each project is outlined in Table 1.

Table 1 – Project Length

P. I. Number:	EDS- <u>545(38)/222260</u>	EDS- <u>545(47)/221740</u>	EDS- <u>545(54)/222264</u>	EDS- <u>545(55)/122840</u>
Net Length of Roadway	6.678	7.650	5.494	5.722
Net Length of Bridges	0.000	0.000	0.182	0.038
Net Length of Project	6.678	7.650	5.676	5.760
Net Length of Exceptions	0.000	0.000	0.000	0.000
Gross Length of Project	6.678	7.650	5.676	5.760

APPROVED CONCEPTS

The approved concept for Project EDS-545(38) provides four 12-ft. lanes with a 44-ft. depressed grass median for the entire project length. This project fills the gap along SR 17 between the Washington Bypass and Project EDS-545(47) in Wilkes County. Project EDS-545(47) consists of passing lanes at two sites along SR 17, known as EDS-545(47)-Site 1, the southern section, and EDS-545(47)-Site 2, the northern section. The typical section for Project EDS-545(47) consists of four 12-ft. lanes separated by a 44-ft. depressed grass median to be compatible with Project EDS-545(38). Project EDS-545(54) provides four 12-ft. lanes with a 44-ft. depressed grass median rural section to south of Bells Ferry Road, where a transition section provides a 14-ft. flush median for the remainder of the project. Finally, Project EDS-545(55) holds the typical four 12-ft. lanes and 14-ft. flush median section throughout its entire length.

CONSTRUCTION COSTS

The anticipated cost of construction is \$155,511,592, which includes \$45,547,210 for right-of-way and \$1,242,666 for reimbursable utilities. These figures are broken down as follows:

EDS 545(38): \$45,074,025
EDS-545(47): \$22,252,694
EDS-545(54): \$39,184,524
EDS-545(55): \$49,000,241

The numbers include the following markups:

Construction:

- Engineering and Construction - 10.00%
- Zero Inflation for EDS-545(38, 54 and 55) and for EDS-545(47) - 33.98% based on 5.00% per annum for 6.00 years

Right-of-Way:

- Scheduling Contingency - 55.00%
- Administration/Court Costs - 60.00%
- Inflation Factor - 40.00%.

Reimbursable Utilities are included in the pricing.

VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

This section describes the procedures used during the VE study. It is followed by separate narratives and conclusions including:

- 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

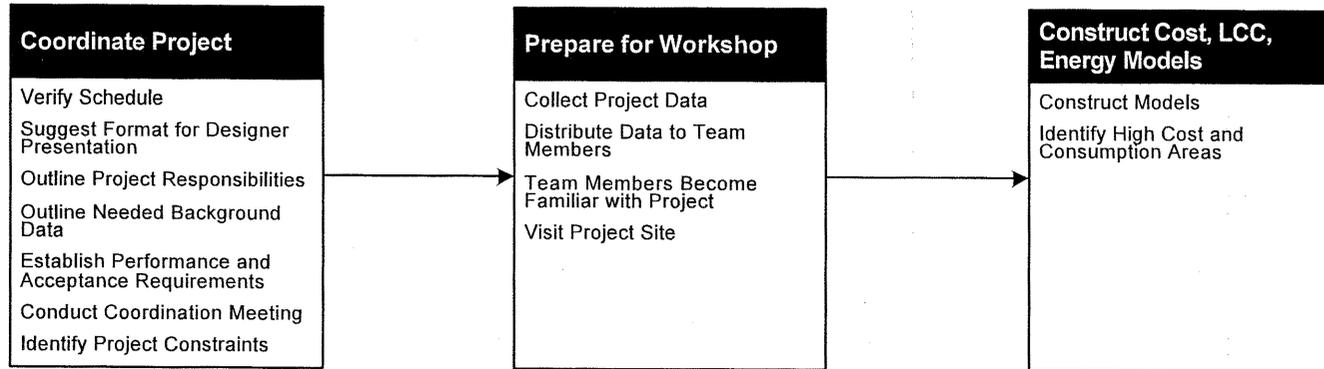
The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guides the search for high cost areas in the project and includes procedures for developing alternative solutions for consideration. It has six phases:

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

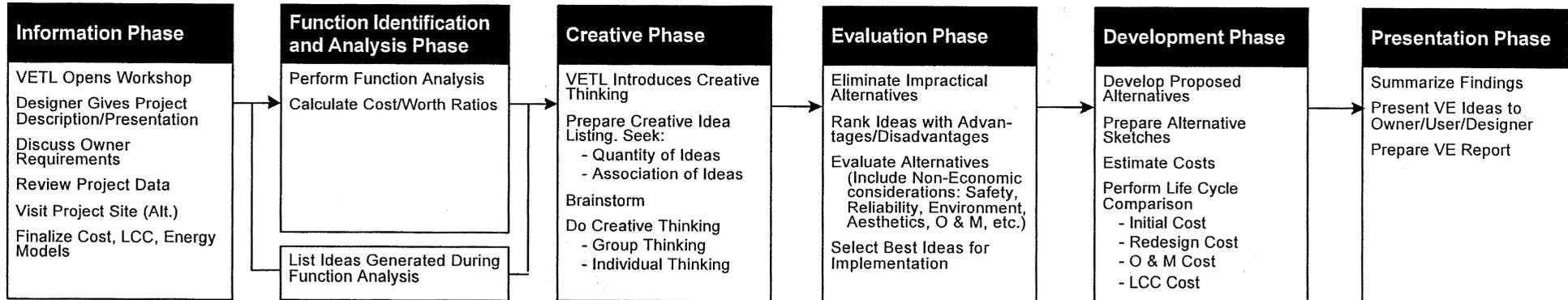


Value Engineering Study Task Flow Diagram

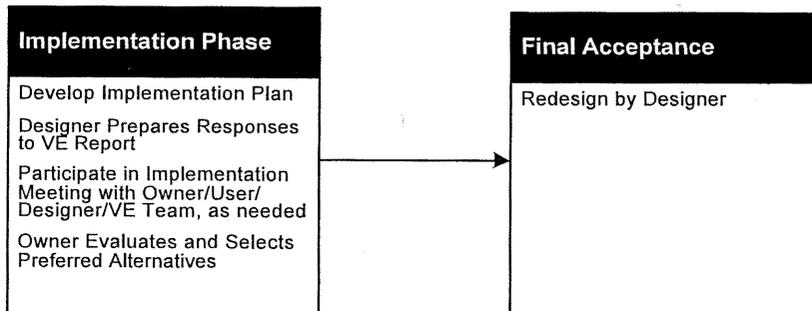
Preparation Effort



Workshop Effort



Post-Workshop Effort



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:

- Revised Project Concept Report, Department of Transportation, State of Georgia, Office of Preconstruction for EDS-545(38), Wilkes County, P. I. No. 222260; dated June 11,2002;
- Estimate Report for File “222260” for Project EDS-545(38); P. I. No. 222260; prepared by Jordan Jones & Goulding, for the State of Georgia Department of Transportation; dated October 16, 2007; revised November 2, 2007;
- Preliminary Right-of-Way Cost Estimate for Project EDS-545(38) Wilkes; P. I. No. 222260; prepared by the State of Georgia Department of Transportation Office of Right-of-Way; dated October 11, 2007;
- Half Size Construction Plans entitled Plan and Profile, State Route 17 Improvements, Wilkes County; Federal Aid Project EDS-545(38), State Route 17, GDOT P. I. No. 222260; prepared by Jordan Jones & Goulding for the State of Georgia Department of Transportation; run date October 3, 2007;
- Design Files CD for Project EDS-545(38); prepared by Jordan Jones & Goulding; undated;
- File Folder for EDS-545(38) containing: (1) Subject Revisions to Programmed Cost dated November 2, 2007, (2) Flexible Pavement Analysis dated March 6, 2006, (3) Revised Project Concept Report Approval dated June 11, 2002, and (4) Concept Report approval dated August 15, 1995;
- Revised Project Concept Report, Department of Transportation, State of Georgia, Office of Preconstruction for EDS-545(47), Wilkes County, P. I. No. 221740; dated October 1, 1996;
- Detailed Cost Estimate for Project 221740, EDS-545(47); prepared by District 2, State of Georgia Department of Transportation; dated June 24, 1999;
- Preliminary Right-of-Way Cost Estimate for Project EDS-545(47) Wilkes; P. I. No. 221740; prepared by the State of Georgia Department of Transportation Office of Right-of-Way; dated October 9, 2007;
- Utility Cost Estimate for Project EDS-545(47) Wilkes; P. I. No. 221740; prepared by the State of Georgia Department of Transportation Office, Office of Utility; dated July 19, 2007;
- Half Size Construction Plans entitled Plan and Profile of Proposed Widening and Reconstruction of the SR 17; Federal Aid Project EDS-545(47); Wilkes County; State Route No. 17; P. I. No. 221740; prepared by District 2, State of Georgia Department of Transportation; run date October 3, 2007;
- Updated Traffic Assignments for SR 17 FM MP 13.0-16.9/MP 23.2-26.3 INCL 3-CLVTS & BRDG; prepared by the Department of Transportation, State of Georgia, Office of Environmental/Location for EDS-545(47), Wilkes County, P. I. No. 221740; dated November 13, 2006;
- Revised Project Concept Report, Department of Transportation, State of Georgia, Office of Preconstruction for EDS-545(54), Wilkes-Elbert Counties, P. I. No. 222264; dated May 20, 2004;
- Estimate Report for File “GRIP 54 SR 17” for Project EDS-545(54); P. I. No. 222264; prepared by Jordan Jones & Goulding for the State of Georgia Department of Transportation; dated October 16, 2007; revised November 2, 2007;
- Preliminary Right-of-Way Cost Estimate for Project EDS-545(54) Elbert/Wilkes; P. I. No. 222264; prepared by the State of Georgia Department of Transportation Office of Right-of-Way; dated October 11, 2007;

- Half Size Construction Plans entitled Plan and Profile of State Route 17 Improvements Wilkes/Elbert Counties; Federal Aid Project EDS-545(54); State Route 17, GDOT P. I. No. 222264; prepared by Jordan Jones & Goulding for the State of Georgia Department of Transportation; run date October 4, 2007;
- Design Files CD for Project EDS-545(54); prepared by Jordan Jones & Goulding; undated;
- Soil Survey Report; State Route 17 Improvements; GDOT Project No. EDS-545(54), P. I. No. 222264; Wilkes and Elbert Counties, Georgia; prepared by Willmer Engineering, Inc. for Jordan Jones & Goulding for the State of Georgia Department of Transportation; revised August 30, 2005;
- File Folder for EDS-545(54) containing: (1) Subject Revisions to Programmed Cost dated November 2, 2007, (2) Flexible Pavement Analysis dated March 6, 2006, and (3) Revised Project Concept Report Approval dated May 20, 2004;
- Project Concept Report, Department of Transportation, State of Georgia, Office of Preconstruction for EDS-545(55), Elbert County, P. I. No. 122840; dated June 24, 2004;
- Estimate Report for File “EDS-545(55)” for Project EDS-545(55); P. I. No. 122840; prepared by Jordan Jones & Goulding/Parsons for the State of Georgia Department of Transportation; dated October 17, 2007; revised November 1, 2007;
- Preliminary Right-of-Way Cost Estimate for Project EDS-545(55) Elbert; P. I. No. 122840; prepared by the State of Georgia Department of Transportation Office of Right-of-Way; dated October 11, 2007;
- Half Size Construction Plans entitled Plan and Profile of Proposed EDS-545(55), S.R. 17 Improvements, Elbert County; Federal Aid Project; GDOT No. 122840; State Route 17; prepared by Jordan Jones & Goulding/Parsons for the State of Georgia Department of Transportation; undated;
- Preliminary Bridge Layout for SR 17 over Dry Fork Creek; Elbert County; EDS-545(55); prepared by Jordan Jones & Goulding and Liou Engineering Company for the State of Georgia Department of Transportation, Preconstruction Division – Office of Bridge Design; dated November 2003;
- Soil Survey on the EDS-545(55), P. I. #122840; S.R. 17 Improvements, Elbert County, Georgia; prepared by United Consulting for Jordan Jones & Goulding for the State of Georgia Department of Transportation; revised August 18, 2004;
- File Folder for EDS-545(55) containing: (1) Subject Revisions to Programmed Cost dated November 1, 2007, (2) Revised Project Concept Report Approval dated June 28, 2004, and (3); Traffic Engineering Report for Jordan Jones & Goulding prepared by Parsons dated March 2003;
- Fact Sheets for EDS-545(38, 47, 54 and 55), P. I. Nos. 222260, 221740, 222264, and 122840;
- 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, Elbert 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 1984;
- General Highway Map, Wilkes 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 1987;
- 2006 Georgia Official Highway and Transportation Map; prepared by the Department of Transportation; dated 2006;
- Final Environmental Assessment (EA)/Finding of No Significant Impact (FONSI) for Projects EDS-545(38, 47, 54 and 55), P. I. Nos. 222260, 221740, 222264, and 122840; prepared by the Department of Transportation; dated June 2007;

- Standards and Construction Details Binder; prepared by the Department of Transportation, State of Georgia; undated;
- Standard Specifications Construction of Transportation Systems; prepared by the Department of Transportation, State of Georgia; 2001 Edition;
- Design Policy Manual; A Georgia Department of Transportation Publication; Version 2.0; revised June 1, 2007; and
- A Policy on Geometric Design of Highway and Streets; prepared by the American Association of State Highway and Transportation Officials; dated 2004.

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 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.

Creative 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.

GDOT and the design team 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 creative 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.

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 zero to five, with the best ideas rated five. 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 Study Results section.

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 and design team representatives during an informal presentation on the last day of the workshop. 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 report. Personnel from GDOT and the design team 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.

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 36-hour Value Engineering (VE) study on the following projects: EDS-545(38, 47, 54, and 55), P. I. Nos. 222260, 221740, 222264, and 122840, Widening and Reconstruction of State Route 17. The projects are located in Wilkes and Elbert Counties, Georgia. It is expected the owner, the Georgia Department of Transportation (GDOT) and the design consultants, Jordan Jones & Goulding, Inc. (JJG) and GDOT District 2 (D2), 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 November 5 - 9, 2007, in the Engineering Service's Conference Room, Room 274B 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, November 5th

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, JJG, and D2 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**

Monday, November 5th (cont)

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, November 6th

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, November 7th

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, November 8th

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, November 9th

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 unique 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.
Broderick D. Keown, EIT	Roadway Engineer	Delon Hampton and Associates
Scott H. Jordan, PE	Roadway Engineer	HNTB
Luis M. Venegas, PE, CVS LEED® AP, FSAVE	VE Team Leader	Lewis & Zimmerman Associates

OWNER/DESIGNER PRESENTATION

Representatives from GDOT, Jordan Jones & Goulding and Parsons presented an overview of the project on Monday, November 5, 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 PRESENTATION

The VE team conducted an informal presentation on Friday, November 9, 2007 to GDOT and the design team. Copies of the draft Summary of Potential Cost Savings worksheets were provided for interim use.

A copy of the meeting participants is attached for reference.

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: EDS-545(38), WILKES, P.I. NO.: 222260 VE STUDY WIDENING AND RECONSTRUCTION SR 17 <i>Wilkes and Elbert Counties, GDOT, Districts 1 and 2</i>		DATE: November 5 - 9, 2007 SHEET: 1 of 3
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Babs Abubakari, PE GDOT Employee No.: em: babs.abubakari@dot.state.ga.us	Organization: Georgia Department of Transportation (GDOT), Office of Program Delivery and Consultant Design (OPDCD) Title: State Consultant Design and Program Delivery Engineer	ph: 404-463-6133 cell: fx: 404-657-0653
Name: Otis Clark GDOT Employee No.: em: otis.clark@dot.state.ga.us	Organization: GDOT, OPDCD Title: Design Group Manager	ph: 404-463-6265 cell: fx: 404-657-0653
Name: Paul F. Condit GDOT Employee No.: em: paul.condit@dot.state.ga.us	Organization: GDOT, Office Environmental / Location (OEL) Title: Transportation Environmental Planner	ph: 404-699-4413 cell: 678-656-9440 fx: 404-699-4440
Name: Foster Grimes GDOT Employee No.: em: foster.grimes@dot.state.ga.us	Organization: GDOT, District 2, Design Title: District Design Squad Leader	ph: 478-552-4643 cell: fx: 478-552-4677
Name: Jennifer Harris-Durham GDOT Employee No.: em: jennifer.harris@dot.state.ga.us	Organization: GDOT, Office of Bridge Design Title: Bridge Design Engineer III	ph: 404-656-5198 cell: fx: 404-651-7076
Name: Stanley Hill GDOT Employee No.: em: stanley.hill@dot.state.ga.us	Organization: GDOT, OPDCD Title: Transportation Engineer Assistant Administrator	ph: 404-656-6109 cell: fx: 404-657-0653
Name: Todd Long, PE GDOT Employee No.: em: todd.long@dot.state.ga.us	Organization: GDOT, Preconstruction Division Title: Director of Preconstruction	ph: 404-656-5187 cell: fx: 404-463-7071
Name: Richard C. Marshall GDOT Employee No.: em: richard.marshall@dot.state.ga.us	Organization: GDOT, Office of Construction Title: Construction Liaison Engineer	ph: 404-656-5306 cell: fx: 404-657-0783
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: Alan Smith GDOT Employee No.: em: alan.smith@dot.state.ga.us	Organization: GDOT, District 2 Title: District Design Engineer	ph: 478-552-4642 cell: fx: 478-552-4677

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: EDS-545(38), WILKES, P.I. No.: 222260 VE STUDY WIDENING AND RECONSTRUCTION SR 17 <i>Wilkes and Elbert Counties, GDOT, Districts 1 and 2</i>		DATE: November 5 - 9, 2007 SHEET: 2 of 3
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Brian K. Summers, PE GDOT Employee No.: em: brian.summers@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Project Review Engineer	ph: 404-656-6846 cell: fx: 404-463-6131
Name: Ken Werho GDOT Employee No.: em: ken.weho@dot.state.ga.com	Organization: GDOT, Office of Traffic Safety and Design (OTSD) Title: Design Review Engineer	ph: 404-635-8144 cell: fx: 404-635-8116
Name: Ron Wishon GDOT Employee No.: em: ron.wishin@dot.state.ga.com	Organization: GDOT, Engineering Services Title: Assistant Project Review Engineer	ph: 404-651-7470 cell: fx: 404-463-6131
Name: Todd Wood GDOT Employee No.: em: todd.wood@dot.state.ga.com	Organization: GDOT, District 1, Area 2 Title: Area Engineer	ph: 770-531-6049 cell: 706-410-5786 fx: 770-384-3911
Name: Kenneth (Ken) L. Anderson, PE GDOT Employee No.: em: kanderson@jjg.com	Organization: Jordan Jones & Goulding Title: Senior Vice President, Transportation Services Leader	ph: 678-333-0642 cell: 404-313-1859 fx: 678-333-0324
Name: Darrell Church, PE GDOT Employee No.: em: dchurch@jjg.com	Organization: Jordan Jones & Goulding Title: Transportation Engineer	ph: 678-333-0496 cell: 770-856-2691 fx: 678-333-0324
Name: Alan E. Hunley GDOT Employee No.: em: alan.hunley@parsons.com	Organization: Parsons Title: Senior Project Manager	ph: 678-969-2304 cell: fx: 770-446-4910
Name: S. Sajid Iqbal, PE GDOT Employee No.: em: sajid.iqbal@parsons.com	Organization: Parsons Title: Senior Project Manager	ph: 678-969-2368 cell: fx: 770-446-4910
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: 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

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: EDS-545(38), WILKES, P.I. No.: 222260 VE STUDY WIDENING AND RECONSTRUCTION SR 17 <i>Wilkes and Elbert Counties, GDOT, Districts 1 and 2</i>		DATE: November 5 - 9, 2007 SHEET: 3 of 3
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Broderick D. Keown, EIT GDOT Employee No.: em: bkeown@delonhampton.com	Organization: Delon Hampton & Associates, Chartered Title: Project Engineer / Roadway Design	ph: 404-524-8030 cell: fx: 404-524-2575
Name: Scott H. Jordan, PE GDOT Employee No.: em: sjordan@hntb.com	Organization: HNTB Title: Roadway Engineer	ph: 404-946-5737 cell: fx: 404-841-2820
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:
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ECONOMIC DATA

The VE team developed economic criteria used for evaluation with information gathered from the State of Georgia Department of Transportation, Jordan Jones & Goulding (JJ&G), Parsons (Parsons) and District 2 (D2). 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:	Long Range
Construction Duration:	±30 Months (JJ&G)
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:	3.00% for EDS-454(38) (Per JJ&G) 5.00% for EDS-454(47) (Per D2) 3.00% for EDS-454(54) (Per JJ&G) 0.00% for EDS-454(55) (Per Parsons)
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 (<i>Industry Norms</i>):	
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 Construction Mark-Up for EDS-545(38): (Composed of: Engineering and Construction at 10.00% and Escalation at 15.93% based on 3.00% per annum for 5.00 years.)	27.52% (1.2752)
Composite Construction Mark-Up for EDS-545(47): (Composed of: Engineering and Construction at 10.00% and Escalation at 33.98% based on 5.00% per annum for 6.00 years.)	47.41% (1.4741)
Composite Construction Mark-Up for EDS-545(54): (Composed of: Engineering and Construction at 10.00% and Escalation at 15.76% based on 5.00% per annum for 3.00 years.)	27.34% (1.2734)
Composite Construction Mark-Up for EDS-545(55): (Composed of: Engineering and Construction at 10.00%.)	10.00% (1.1000)
Composite Mark-Up (Right-of-Way): (Composed of: Scheduling Contingency at 55.00%; Administration/Court Costs at 60.00%; and Inflation Factor at 40.00 %.)	247.20% (3.4720)

COST ESTIMATE SUMMARY AND COST HISTOGRAMS

The VE team prepared the attached cost models for the project prior to the workshop. The cost models are arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas. 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
- Minimize Median Openings
- Bicycle Lane Improvements
- Right-of-Way Reductions

It is noted these updated estimates, with the exception of the one provided by the District, were given to the VE team on the first of the study; albeit, the only changes being the deletion of the inflation factors.

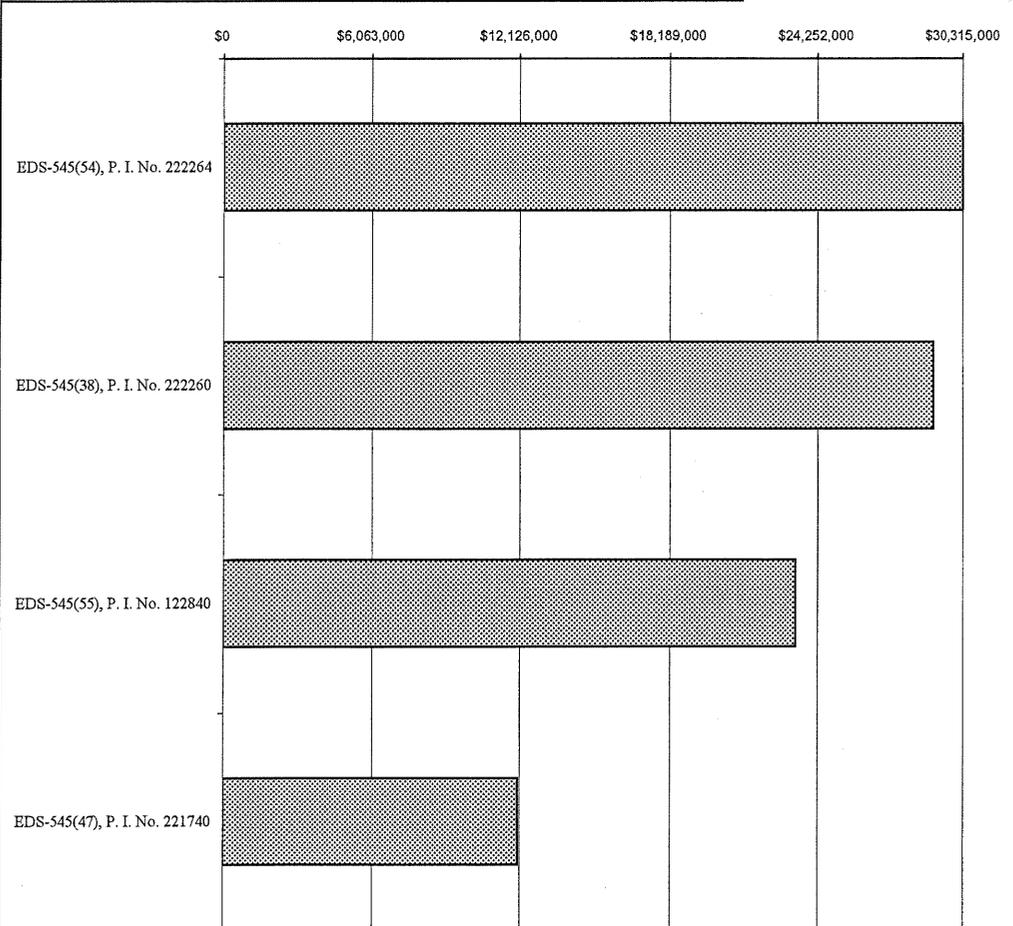
In order to facilitate the cost developments of the selected ideas, the VE team generated numerous “unit” prices for specific roadway costs that are noted below:

EDS-545-Unit	Mainline Unit Cost	Shoulder Unit Cost Per Square Yard	Side Road Unit Cost
38	\$47.62	\$24.25	\$44.88
47	\$20.74	\$14.44	\$14.44
54	\$51.45	\$25.37	\$51.45
55	\$51.45	\$22.63	\$29.51

COST HISTOGRAM

Project: EDS-545(38, 47, 54 and 55)
WIDENING AND RECONSTRUCTION OF SR 17
 Wilkes and Elbert Counties, Georgia Department of Transportation, Districts 1 and 2
Design Development Stage

TOTAL PROJECT	COST	PERCENT	CUM. PERCENT
EDS-545(54), P. I. No. 222264	30,314,507	32.00%	32.00%
EDS-545(38), P. I. No. 222260	29,008,295	30.62%	62.62%
EDS-545(55), P. I. No. 122840	23,345,946	24.64%	87.26%
EDS-545(47), P. I. No. 221740	12,066,093	12.74%	100.00%
Construction Subtotal	\$ 94,734,841	100.00%	
Engineering and Construction at 10.00%	\$ 9,886,875		
Inflation Based on 0.00% per annum for 8.00 Years (38) 15.93%	\$ -		
Inflation Based on 5.00% per annum for 6.00 Years (47) 34.01%	\$ 4,100,000		
Inflation Based on 0.00% per annum for 0.00 Years (54) 15.76%	\$ -		
Inflation Based on 0.00% per annum for 0.00 Years (55) 0.00%	\$ -		
Construction Total	\$ 108,721,716		
		Construction Mark-Up:	14.76%
Right-of-Way Costs; EDS-545(38), P. I. No. 222260	\$ 3,546,914		
Right-of-Way Costs; EDS-545(47), P. I. No. 221740	\$ 1,219,800		
Right-of-Way Costs; EDS-545(54), P. I. No. 222264	\$ 1,635,210		
Right-of-Way Costs; EDS-545(55), P. I. No. 122840	\$ 6,716,512		
Right-of-Way Subtotal	\$ 13,118,436		
Scheduling Contingency 55.00%	\$ 7,215,140		
Administration / Court Costs 60.00%	\$ 12,200,145		
Inflation Factor 40.00%	\$ 13,013,489		
Right-of-Way Total	\$ 45,547,210		
		ROW Mark-Up:	247.20%
Reimbursable Utilities Costs; EDS-545(38), P. I. No. 222260	\$ 850,000		
Reimbursable Utilities Costs; EDS-545(47), P. I. No. 221740	\$ 231,500		
Reimbursable Utilities Costs; EDS-545(54), P. I. No. 222264	\$ 161,166		
Reimbursable Utilities Costs; EDS-545(55), P. I. No. 122840	\$ -		
Reimbursable Utilities Subtotal	\$ 1,242,666		
GRAND TOTAL	\$ 155,511,592		



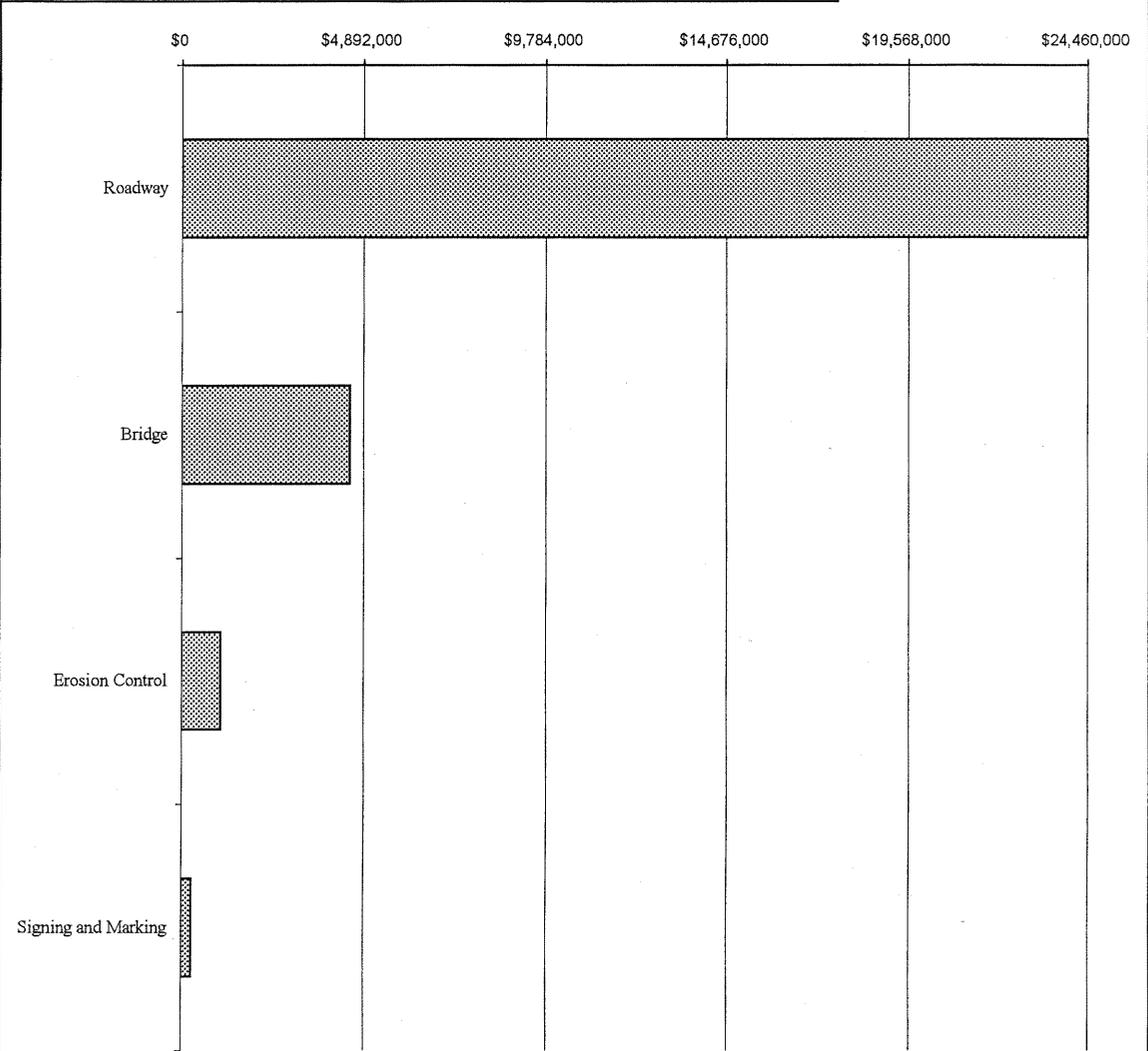
Costs in graph are not marked-up.

COST HISTOGRAM



Project: **EDS-545(38, 47, 54 and 55)**
WIDENING AND RECONSTRUCTION OF SR 17
 Wilkes and Elbert Counties, Georgia Department of Transportation, Districts 1 and 2
Design Development Stage

EDS-545(54), P. I. No. 222264	COST	PERCENT	CUM. PERCENT
Roadway	24,452,657	80.66%	80.66%
Bridge	4,537,500	14.97%	95.63%
Erosion Control	1,048,169	3.46%	99.09%
Signing and Marking	276,181	0.91%	100.00%
Construction Subtotal	\$ 30,314,507	100.00%	
Engineering and Construction at 10.00%	\$ 3,031,451		
Inflation Based on 0.00% per annum for 0.00 Years (54) at 0.00%	\$ -		
Construction Total	\$ 33,345,958		
Right-of-Way Costs; EDS-545(54), P. I. No. 222264	\$ 1,635,210		
Right-of-Way Subtotal	\$ 1,635,210		
Scheduling Contingency 55.00%	\$ 899,366		
Administration / Court Costs 60.00%	\$ 1,520,745		
Inflation Factor 40.00%	\$ 1,622,128		
Right-of-Way Total	\$ 5,677,400		
Reimbursable Utilities Costs; EDS-545(31), P. I. No. 222160	\$ 161,166		
Reimbursable Utilities Subtotal	\$ 161,166		
GRAND TOTAL	\$ 39,184,524		



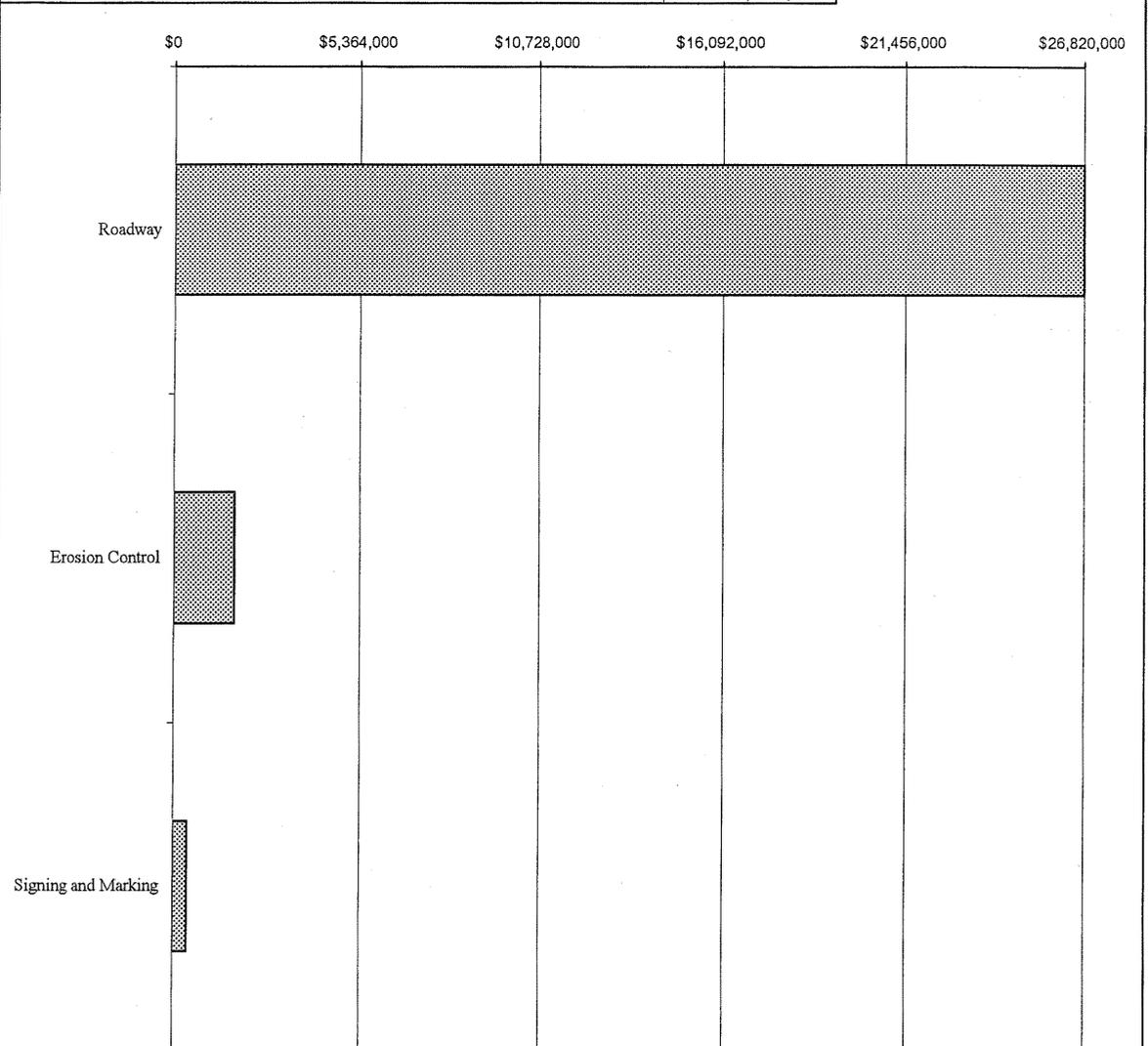
Costs in graph are not marked-up.

COST HISTOGRAM



Project: **EDS-545(38, 47, 54 and 55)**
WIDENING AND RECONSTRUCTION OF SR 17
Wilkes and Elbert Counties, Georgia Department of Transportation, Districts 1 and 2
Design Development Stage

EDS-545(38), P. I. No. 222260	COST	PERCENT	CUM. PERCENT
Roadway	26,818,076	92.45%	92.45%
Erosion Control	1,768,346	6.10%	98.55%
Signing and Marking	421,873	1.45%	100.00%
Construction Subtotal	\$ 29,008,295	100.00%	
Engineering and Construction at 10.00%	\$ 2,900,830		
Inflation Based on 0.00% per annum for 0.00 Years (38) at 0.00%	\$ -		
Construction Total	\$ 31,909,125	Construction	
Right-of-Way Costs; EDS-545(38), P. I. No. 222260	\$ 3,546,914	Mark-Up:	10.00%
Right-of-Way Subtotal	\$ 3,546,914		
Scheduling Contingency 55.00%	\$ 1,950,803		
Administration / Court Costs 60.00%	\$ 3,298,630		
Inflation Factor 40.00%	\$ 3,518,539	ROW	
Right-of-Way Total	\$ 12,314,900	Mark-Up:	247.20%
Reimbursable Utilities Costs; EDS-545(38), P. I. No. 222260	\$ 850,000		
Reimbursable Utilities Subtotal	\$ 850,000		
GRAND TOTAL	\$ 45,074,025		



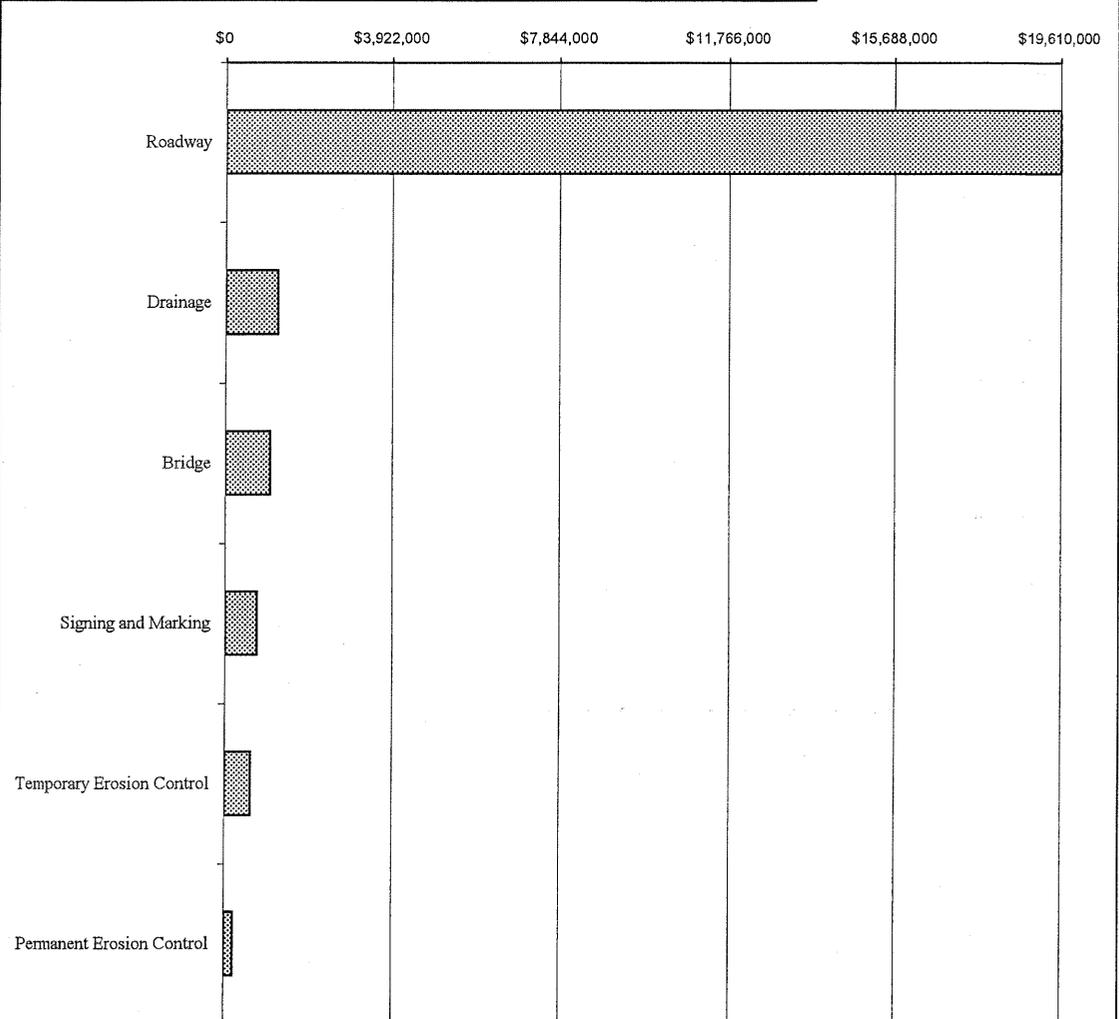
Costs in graph are not marked-up.

COST HISTOGRAM



Project: **EDS-545(38, 47, 54 and 55)**
WIDENING AND RECONSTRUCTION OF SR 17
 Wilkes and Elbert Counties, Georgia Department of Transportation, Districts 1 and 2
Design Development Stage

EDS-545(55), P. I. No. 122840	COST	PERCENT	CUM. PERCENT
Roadway	19,609,817	84.00%	84.00%
Drainage	1,201,541	5.15%	89.14%
Bridge	1,024,803	4.39%	93.53%
Signing and Marking	733,378	3.14%	96.67%
Temporary Erosion Control	587,440	2.52%	99.19%
Permanent Erosion Control	188,967	0.81%	100.00%
Construction Subtotal	\$ 23,345,946	100.00%	
Engineering and Construction at 10.00%	\$ 2,334,595		
Inflation Based on 0.00% per annum for 0.00 Years (55) at 0.00%	\$ -		
Construction Total	\$ 25,680,541	Construction	
Right-of-Way Costs; EDS-545(55), P. I. No. 122840	\$ 6,716,512	Mark-Up:	10.00%
Right-of-Way Subtotal	\$ 6,716,512		
Scheduling Contingency 55.00%	\$ 3,694,082		
Administration / Court Costs 60.00%	\$ 6,246,356		
Inflation Factor 40.00%	\$ 6,662,780	ROW	
Right-of-Way Total	\$ 23,319,700	Mark-Up:	247.20%
Reimbursable Utilities Costs; EDS-545(32), P. I. No. 222170	\$ -		
Reimbursable Utilities Subtotal	\$ -		
GRAND TOTAL	\$ 49,000,241		



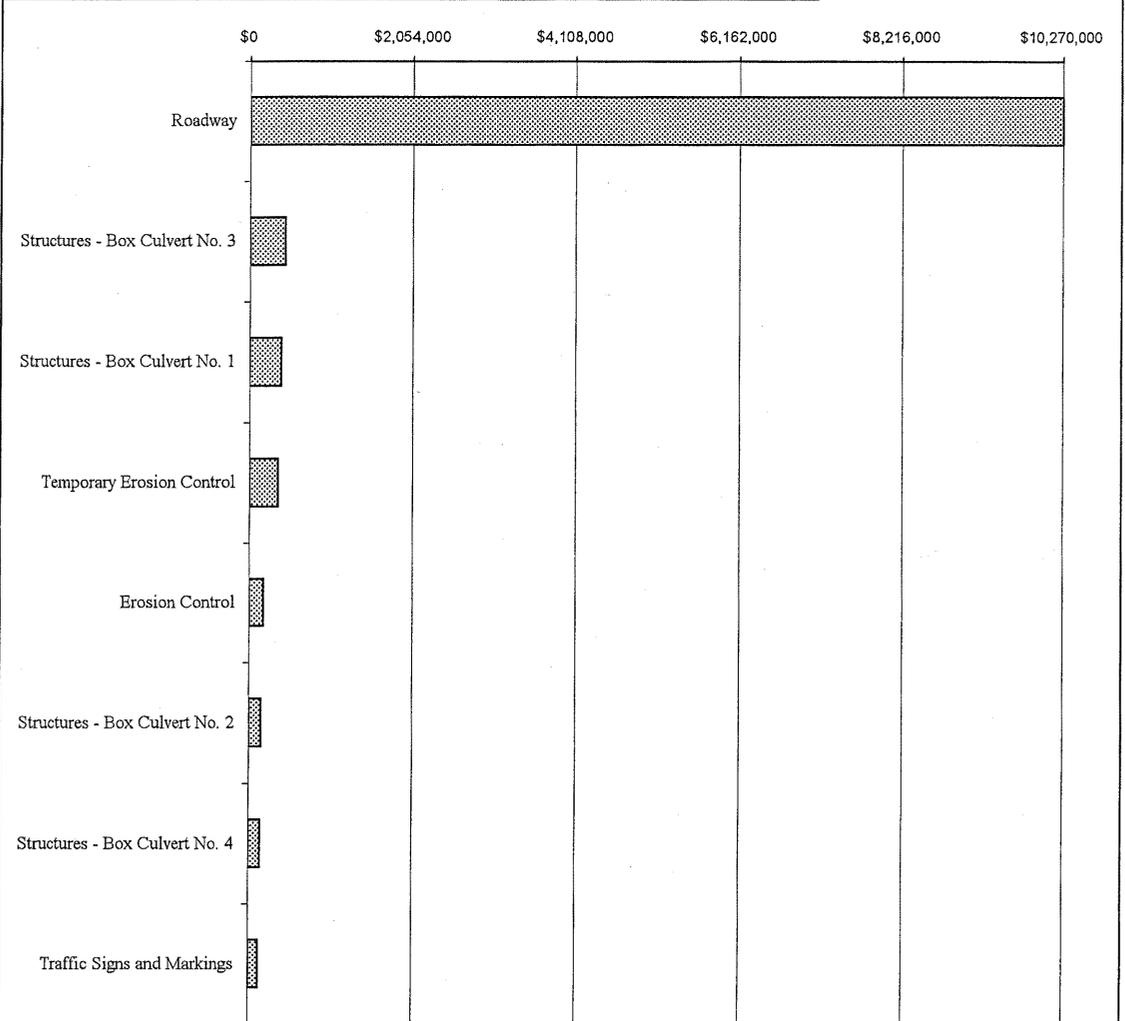
Costs in graph are not marked-up.

COST HISTOGRAM



PROJECT: **EDS-545(38), WILKES, P.I. NO: 222260 VE STUDY**
WIDENING AND RECONSTRUCTION SR 17
Wilkes and Elbert Counties, GDOT, Districts 1 and 2

	COST	PERCENT	CUM. PERCENT
Roadway	10,268,456	85.10%	85.10%
Structures - Box Culvert No. 3	449,409	3.72%	88.83%
Structures - Box Culvert No. 1	398,025	3.30%	92.13%
Temporary Erosion Control	362,500	3.00%	95.13%
Erosion Control	174,500	1.45%	96.58%
Structures - Box Culvert No. 2	154,318	1.28%	97.85%
Structures - Box Culvert No. 4	142,885	1.18%	99.04%
Traffic Signs and Markings	116,000	0.96%	100.00%
Construction Subtotal	\$ 12,066,093	100.00%	
Inflation Based on 5.00% per annum for 6.00 Years (47) at 33.98%	\$ 4,100,000		
Engineering and Construction at 10.02%	\$ 1,620,000	Construction	
Construction Total	\$ 17,786,094	Mark-Up:	47.41%
Right-of-Way Costs; EDS-545(47), P. I. No. 221740	\$ 1,219,800		
Right-of-Way Subtotal	\$ 1,219,800		
Scheduling Contingency 55.00%	\$ 670,890		
Administration / Court Costs 60.00%	\$ 1,134,414		
Inflation Factor 40.00%	\$ 1,210,042	ROW	
Right-of-Way Total	\$ 4,235,100	Mark-Up:	247.20%
Reimbursable Utilities Costs; EDS-545(47), P. I. No. 221740	\$ 231,500		
Reimbursable Utilities Subtotal	\$ 231,500		
GRAND TOTAL	\$ 22,252,694		



Costs in graph are not marked-up.

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 functions 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 there are disproportionate amounts of money 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 VE Team Leader worked with members of the study team to develop a Function Analysis System Technique (F.A.S.T.) diagram for each phase. The F.A.S.T. diagram was used to show the flow of function within the phases. It helped confirm that the design addresses those issues that have been voiced by the owner as being important. The diagram was 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 project's basic functions as Promoting/Growth and Promoting/Economic Development by Increasing/Capacity and Improving/Geometry.

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

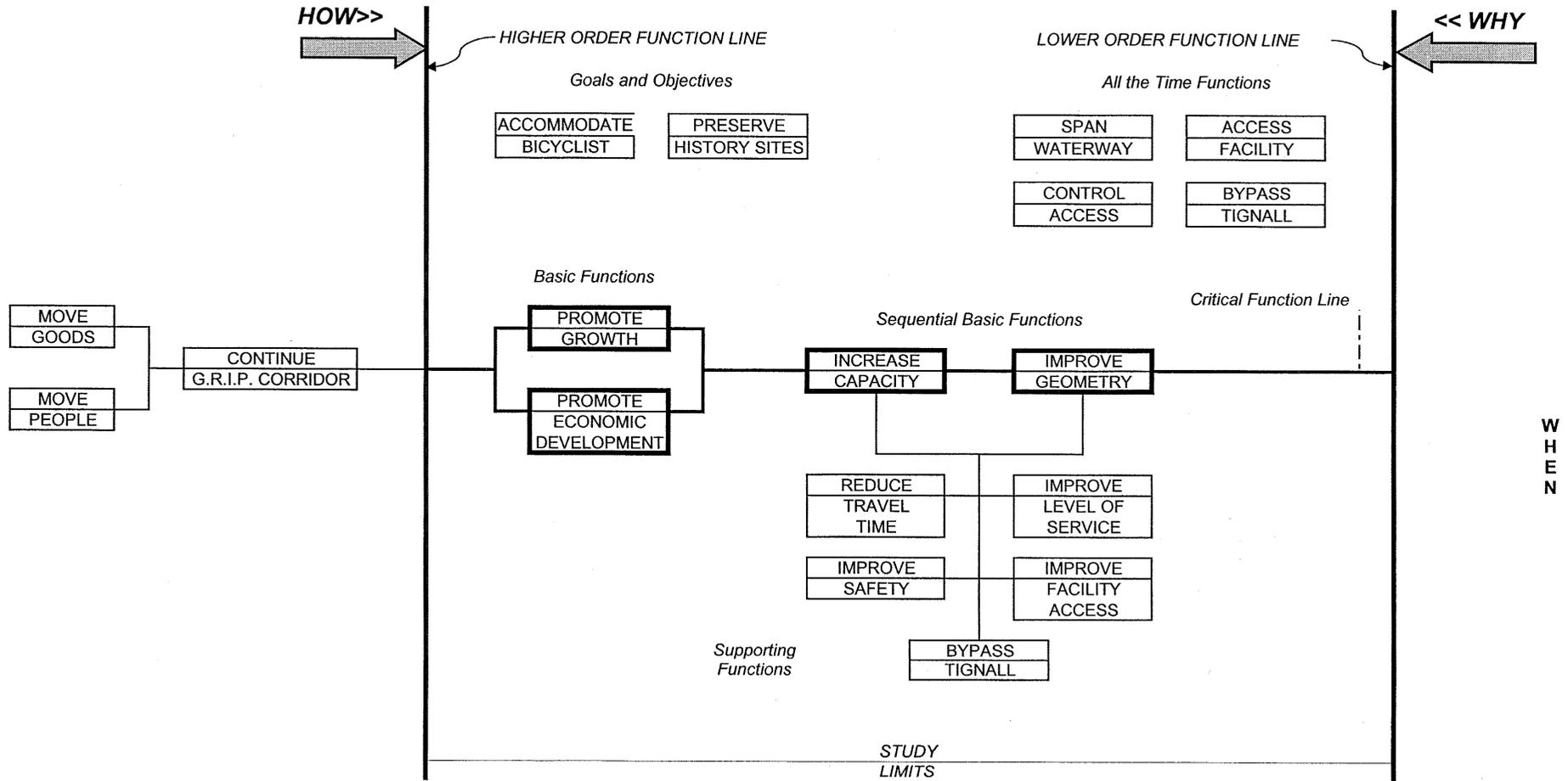


Widening and Reconstruction of SR 17

EDS-545(38, 47, 54, and 55)

P. I. Nos. 222260, 221740, 222264, and 122840

Georgia Department of Transportation, Districts 1 and 2
Wilkes and Elbert Counties, Georgia



CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the Creative Phase, numerous ideas, alternative proposals and/or recommendations were generated using conventional brainstorming techniques as recorded on the following pages.

The ideas were discussed and the advantages/disadvantages of each listed. The VE design team compared each of the ideas 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 design team believed the idea met necessary criteria and program needs. The higher rated ideas were then developed into formal alternatives and included in the VE report. 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 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 worksheets since they may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING



PROJECT:	EDS-545(38, 47, 54, 55), WILKES, P.I. No.: 222260, ETC. VE STUDY SR 17 WIDENING AND RECONSTRUCTION <i>Wilkes and Elbert Counties</i>	SHEET NO.: 1 of 3
NO.	IDEA DESCRIPTION	RATING
	EDS-545(38) (38-x)	
38-1	Use a 32-ft. wide median throughout	4
38-2	Reduce outside shoulders to 6-ft. paved shoulders	4
38-3	Use 11-ft. lanes throughout	4
38-4	Design for 55 miles per hour (mph) vs. 65 mph	3
38-5	Upgrade for two lanes only	2
38-6	Upgrade for two lanes only but purchase right-of-way (ROW) for four lanes	2
38-7	Perform all grading today but only pave for two lanes	2
38-8	Use a five-lane section throughout	3
38-9	Use existing ROW from Station (STA) 105+00 to STA 175+00	4
38-10	Realign new location closer to the existing ROW between STAs 180+00 and 260+00	5
38-11	Eliminate the bridge at Pristine Creek	3
38-12	Maintain Church Street alignment with mainline	4
38-13	Realign mainline at Delhi Road to avoid wetlands	4
38-14	Reconfigure Old SR 17 with new location between STAs 420+00 and 440+00	4
38-15	Reconfigure new location meeting existing SR 17 (north side)	2
	EDS-545(47) (47-x)	
47-1	Use a 32-ft. wide median throughout	4
47-2	Reduce outside shoulders to 6-ft. paved shoulders	4
47-3	Use 11-ft. lanes throughout	4
47-4	Design for 55 miles per hour (mph) vs. 65 mph	3
47-5	Retain existing alignment between STAs 105+00 and 140+00	4
47-6	Retain existing alignment between STAs 160+00 and 205+00	4
47-7	Eliminate median opening at STA 190+00	4
47-8	Upgrade for two lanes only	2
47-9	Upgrade for two lanes only but purchase ROW for four lanes	2

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

CREATIVE IDEA LISTING



PROJECT:	EDS-545(38, 47, 54, 55), WILKES, P.I. No.: 222260, ETC. VE STUDY SR 17 WIDENING AND RECONSTRUCTION <i>Wilkes and Elbert Counties</i>	SHEET NO.: 2 of 3
NO.	IDEA DESCRIPTION	RATING
	EDS-545(47) (47-x) (continued)	
47-10	Perform all grading today but only pave for two lanes	2
47-11	Keep Boyd Road on current alignment	5
47-12	Use a common intersection at Norman Road (Combine with Alt. No. 47-17)	4
47-13	Close median at STA 438+00	4
47-14	Use only one median opening at STA 493+00	4
47-15	Shift alignment further west between STAs 460+00 and 520+00 to avoid a sliver of ROW	4
47-16	Use a five-lane section throughout	3
47-17	Tie Norman Road to mainline sooner on west side (Combine with Alt. No. 47-12)	4
	EDS-545(54) (54-x)	
54-1	Use a 32-ft. wide median throughout where feasible	4
54-2	Reduce outside shoulders to 6-ft. paved shoulders	4
54-3	Use 11-ft. lanes throughout	4
54-4	Design for 55 miles per hour (mph) vs. 65 mph	3
54-5	Upgrade for two lanes only	2
54-6	Upgrade for two lanes only but purchase ROW for four lanes	2
54-7	Perform all grading today but only pave for two lanes	2
54-8	Use a five-lane section throughout where feasible	4
54-9	Eliminate median opening at STA 147+00	4
54-10	Retaining existing bridges and building two new parallel bridges	4
54-11	Retain River Road alignment with the mainline	4
54-12	Stay on existing alignment between STAs 300+00 and 400+00	5
54-13	Eliminate Old SR 17 tie-in at STA 385+00	4
54-14	Eliminate right-turn lanes	4
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		

