



Georgia Department of Transportation

Reconstruction of SR 3 / US 19

Project No. NH-0001-04 (67)

Spalding County

P.I. No 332890

Value Engineering Study Report

Preliminary Design Submittal

November 2008

Design Consultant

Georgia Department of Transportation

Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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November 21, 2008

Ms. Lisa L. Myers
Design Review Engineering Manager/VE Coordinator
GA DOT - Engineering Services
One Georgia Center – 5th Floor
Atlanta, Georgia 30308

Re: Project Number NH-0001-4(62)
SR 3/US 19 Turn Lanes @ SR 16 in Griffin
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 that took place on November 3-6, 2008. The objective of the VE effort was to identify opportunities to reduce costs and enhance the value of the project.

This VE workshop identified and developed several ideas which provide GDOT opportunities to improve the value. Of particular interest are those alternatives related to the SR 16 Bridge and roadway typical sections, relocated Carver Road, and access to existing properties along old Carver Road as detailed in the Study Results Section of this report.

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.

A handwritten signature in black ink that reads "Stephen G. Havens". The signature is written in a cursive, flowing style.

Stephen Havens, PE, PMP, CVS
Sr. Project Manager

Attachment

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study is Project NH-0001-04(62), Reconstruction of SR 3/US 19 Turn Lanes @ SR 16 in Griffin (P.I. No. 332890), Spalding County, Georgia. The project is being planned for GDOT by a design team led by Columbia Engineering.

The VE workshop was conducted November 3-6, 2008 at GDOT's Atlanta Headquarters, One Georgia Center and followed the six-phase VE Job Plan:

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

PROJECT DESCRIPTION

This project is located in central Spalding County at the interchange of SR 16 and SR 3/US 19. The project corridor east of the interchange with SR 16 and SR 3/US 19 is located within the city limits of Griffin. The project length is 0.79 miles along SR 16 and 0.67 miles along the relocated southbound exit and entrance ramps.

The approved concept provides dual left turn lanes for westbound vehicles turning south at the entrance ramp and a single left turn lane for eastbound vehicles turning north at the entrance ramp onto SR 3/US 19. The southbound entrance ramp is also to be widened to two lanes to accommodate the dual left turns from SR 16, and the ramp and tapers are to be lengthened to meet the current road geometry standards. The approved concept also includes relocating Carver Road to intersect SR 16 approximately 400 feet to the west of its current location and the installation of three new traffic signals at both entrance ramps onto SR 3/US 19 and at Carver Road.

A revision to the approved concept report was submitted for approval on October 8, 2008 and includes replacement of the dual steel bridges on SR 16 with a longer, single concrete bridge which will accommodate four through lanes, dual left turn lanes, and a raised concrete median. The typical mainline section has also been revised to a four lane urban section with a 20-foot raised concrete median. The limits of the project have been extended eastward to Spalding Drive and westward to approximately 507 feet west of the Griffin High School driveway. Carver Road will be realigned approximately 590 feet to the west of its current location. The southbound entrance ramp onto SR 3/US 19 will be relocated to the west of its current location to provide additional stacking across the bridge for turning vehicles, as well as to provide 4:1 slopes in between the ramp and SR 3/US 19, which will allow for removal of the existing guardrail. The southbound exit ramp from SR 3/US 19 will be realigned to tie to the relocation

of the southbound entrance ramp from SR 16. Both ramps will be replaced with concrete pavement and be updated to meet the current design standards. Additional right-of-way will be required for construction of the road and ramp realignments, as well as for the roadway widening.

The anticipated cost of construction is \$13,808,887, which includes \$3,804,500 for right-of-way and \$15,000 for reimbursable utilities.

CONCERNS AND OBJECTIVES

Concerns

The project team summarized the following key design issues to the VE Team during the design overview:

- The scope of this project was further reduced in June 2008 by reducing the length of roadway construction on SR 16 and the northbound exit and entrance ramps on SR 3/US 19. Additional cost savings are being requested.
- Realignment of Carver Road will require providing access to be provided to three existing properties. New access designs have not yet been proposed.
- Existing bridge footings will likely require replacement due to the increased load and elevation requirements of the proposed new single bridge.

Objectives

The VE team was tasked with the following key objectives:

- Suggest cost reduction ideas
- Suggest existing property access ideas for the Carver Road realignment
- Identify ideas to add value by improving safety and circulation

To meet these important objectives, the VE team focused on the key functions associated with the project, paying particular attention to roadway and bridge design, drainage requirements, pedestrian traffic, and turn lane geometry.

RESULTS

The VE team developed 18 cost-saving alternatives and five design suggestions for consideration by GDOT and the design team. If the following list of recommended VE alternatives are accepted, a total present worth cost savings of \$1,487,387 could be realized.

Retain the existing curb and gutter on the northeast side of SR 16 to save \$16,874 (Alt. No. R-1, R-11).

- Eliminate the raised concrete median on the SR 16 bridge in order to widen the two SR 3/US 19 southbound left turn lanes to save \$4,632 (Alt. No. R-2)
- Retain the existing SR 3/US 19 southbound exit ramp and widen as needed in lieu of relocating 33 feet west to save \$249,667 total present value life-cycle cost savings (Alt. No. R-3).
- Eliminate curb and gutter and sidewalks on the northwest side of SR 16 to save \$34,159 (Alt. No. R-5).
- Use 12-foot in lieu of 16-foot-wide shoulders on SR 16 to save \$168,070 (Alt. No. R-6).

- Construct the intersection on SR 16/SR 3/US 19 southbound side using concrete to improve durability and reduce maintenance for an additional first cost of \$163,580 and a total present value life-cycle additional cost of \$12,544 as compared to asphalt concrete (Alt. No. R-7)
- Reduce the width of the SR 3/SR 19 southbound entrance ramp by four feet to save \$227,348 (Alt. No. R-13).
- Construct 11-foot-wide lanes in lieu of 12-foot-wide lanes on relocated Carver Road to save \$42,880 (Alt. No. R-15).
- Use 6" x 24" curb and gutter in lieu of 6" x 30" to save \$19,360 (Alt. No. R-17).
- Remove the sidewalk from the north side of the SR 16 bridge and retain a 5-foot shoulder to save \$18,911 (Alt. No. S-4).
- Eliminate the sidewalk on one side of relocated Carver Road to save \$25,780 (Alt. No. T-2).
- Keep the existing Carver Road open and make a right-in/right-out access to SR 16. In addition, tee-in the relocated Carver Road to existing in lieu of merging to save \$688,173 (Alt. No. T-3).

IMPLEMENTATION

This VE report is a formalization of the draft materials provided to the project team during the out-briefing discussion which occurred on November 6, 2008. The Summary of Value Engineering Alternatives worksheet following this narrative outlines all of the alternatives and the design suggestions 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 VALUE ENGINEERING ALTERNATIVES

PROJECT: **PI No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**

*Spalding County, Georgia
Georgia Department of Transportation, District 3
Design Development Phase*

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
ROADWAY (R)						
R-1 R-11	Retain the existing curb and gutter on the northeast side of SR 16.	\$16,874	\$0	\$16,874		\$16,874
R-2	Eliminate the raised concrete median on the SR 16 bridge in order to widen the two SR 3/US 19 southbound left turn lanes.	\$4,632	\$0	\$4,632		\$4,632
R-3	Retain the existing SR 3/US 19 southbound exit ramp and widen as needed in lieu of relocating 33 feet west.	\$596,490	\$191,710	\$404,780	(\$155,113)	\$249,667
R-4	Design a single access to the existing properties using Carver Road as a common access.	\$21,120	\$8,140	\$12,980		\$12,980
R-5	Eliminate curb and gutter and sidewalks on the northwest side of SR 16.	\$90,001	\$55,842	\$34,159		\$34,159
R-6	Use 12-foot-wide in lieu of 16-foot-wide shoulders on SR 16.	\$168,070	\$0	\$168,070		\$168,070
R-7	Construct the intersection on SR 16/SR 3/US 19 southbound side using concrete pavement.	\$184,420	\$348,000	(\$163,580)	\$151,036	(\$12,544)
R-8	Use grassed medians in lieu of concrete.	\$128,851	\$66,000	\$62,851		\$62,851
R-10	Redesign curve KC 131 for the super elevation transition length and drainage structure.	\$8,960	\$3,817	\$5,143		\$5,143
R-13	Reduce the width of the SR 3/SR 19 southbound entrance ramp by four feet.	\$227,348	\$0	\$227,348		\$227,348
R-14	Make the SR 3/SR 19 southbound entrance radius longer to improve left turn movement.	\$0	\$1,386	(\$1,386)		(\$1,386)
R-15	Use 11-foot-wide lanes in lieu of 12-foot-wide lanes on Carver Road.	\$42,880	\$0	\$42,880		\$42,880
R-17	Use 6" x 24" curb and gutter in lieu of 6" x 30".	\$179,177	\$159,817	\$19,360		\$19,360

STUDY RESULTS

INTRODUCTION

The results are the major feature of this value engineering study conducted on P.I. No. 332890, SR 3/US 19 Turn Lanes @ SR 16 in Griffin, since they portray the benefits that can be realized by GDOT, District 3, and Spalding County. The results will directly affect the project design and will require careful coordination between GDOT and Columbia Engineering, the project's design team leader, to determine the disposition of each alternative.

During the course of the study, many ideas for potential value enhancement were conceived and evaluated by the team for technical feasibility, applicability to the project, and the ability to meet the owner's project value objectives. Research performed on those ideas considered to have 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. These may be in the form of VE alternatives (accompanied by cost estimates) or design suggestions (without cost estimates). For each alternative developed the following information has been 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, if appropriate;
- A descriptive evaluation of the advantages and disadvantages of selecting 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 for each alternative use unit quantities from the Estimate Report for file "332890-Preliminary," prepared by District 3, State of Georgia Department of Transportation, dated October 9, 2008. If unit costs were not available, GDOT databases were consulted. A composite markup of 10.0%, as described in the Value Analysis and Conclusions section of the report, was used to generate the project cost for the construction items being compared.

Each design suggestion contains the same information as the VE alternatives, except that no cost information is included. Design suggestions are presented to bring attention to areas of the design that, in the opinion of the VE team, should be changed for reasons other than cost. Examples of these reasons may include improve circulation, reduce maintenance, improve durability, improve safety, and reduce project risk. In addition, some ideas cannot be quantified in terms of cost with the design information provided, these are also presented as design suggestions and are intended to improve the quality of the project.

Each alternative or design suggestion developed is identified with an alternative number (Alt. No.) that can be tracked through the value analysis process and facilitate referencing between the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of Value Engineering Alternatives table. The Alt. No. includes a prefix that refers to one of the major project elements:

PROJECT ELEMENT	RESULTS
Roadway	R
Structures	S
Traffic	T

Summaries of the alternatives are provided on the Summary of Value Engineering Alternatives table. The table is divided into project elements for the reviewer's convenience and is used to divide the Study Results section. The complete documentation of the developed alternatives and design suggestions follows the Summary of Value Engineering Alternatives tables.

KEY ISSUES

The project team summarized the following key design issues to the VE Team during the design overview:

- The scope of this project was further reduced in June 2008 by reducing the length of roadway construction on SR 16 and the northbound exit and entrance ramps on SR 3/US 19. Additional cost savings are desired.
- Realignment of Carver Road will require providing access to two existing properties. New access designs have not yet been proposed.
- Existing bridge footings will likely require replacement due to the increased load requirements of the proposed new single bridge.
- A design variance will be required to accommodate the proposed traffic signal at the intersection of SR 16 and the realigned Carver Road since it is only 660 feet from the traffic signal at the southbound ramp. GDOT Standard Specifications for Construction of Transportation Systems requires 1000 feet minimum between traffic signals.

STUDY OBJECTIVES

The VE team was tasked with the following key objectives:

- Suggest cost reduction ideas
- Suggest existing property access ideas for the Carver Road realignment
- Identify ideas to add value by improving safety and circulation

To meet these important objectives, the VE team focused on the key functions associated with the project, paying particular attention to roadway and bridge design, drainage requirements, pedestrian traffic, and turn lane geometry.

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of 18 alternatives and five design suggestions for consideration by GDOT and the project team. Several of the design suggestions have cost savings potential which should be easy to quantify as the project progresses. The greatest opportunity for cost reduction and added value centered on the roadway section and bridge section designs, sidewalks, curb and gutter, and traffic signaling requirements.

Each of the aforementioned alternatives should be given careful consideration for the potential cost savings and/or value improvement that they offer compared to the tradeoffs.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

When reviewing the study results, the reviewers should consider each part of an alternative or design suggestion 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 designer 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 of them 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.

The reviewers should evaluate all alternatives carefully 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 VALUE ENGINEERING ALTERNATIVES

PROJECT: **PI No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**

Spalding County, Georgia

Georgia Department of Transportation, District 3

Design Development Phase

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
ROADWAY (R)						
R-1 R-11	Retain the existing curb and gutter on the northeast side of SR 16.	\$16,874	\$0	\$16,874		\$16,874
R-2	Eliminate the raised concrete median on the SR 16 bridge in order to widen the two SR 3/US 19 southbound left turn lanes.	\$4,632	\$0	\$4,632		\$4,632
R-3	Retain the existing SR 3/US 19 southbound exit ramp and widen as needed in lieu of relocating 33 feet west.	\$596,490	\$191,710	\$404,780	(\$155,113)	\$249,667
R-4	Design a single access to the existing properties using Carver Road as a common access.	\$21,120	\$8,140	\$12,980		\$12,980
R-5	Eliminate curb and gutter and sidewalks on the northwest side of SR 16.	\$90,001	\$55,842	\$34,159		\$34,159
R-6	Use 12-foot-wide in lieu of 16-foot-wide shoulders on SR 16.	\$168,070	\$0	\$168,070		\$168,070
R-7	Construct the intersection on SR 16/SR 3/US 19 southbound side using concrete pavement.	\$184,420	\$348,000	(\$163,580)	\$151,036	(\$12,544)
R-8	Use grassed medians in lieu of concrete.	\$128,851	\$66,000	\$62,851		\$62,851
R-10	Redesign curve KC 131 for the super elevation transition length and drainage structure.	\$8,960	\$3,817	\$5,143		\$5,143
R-13	Reduce the width of the SR 3/SR 19 southbound entrance ramp by four feet.	\$227,348	\$0	\$227,348		\$227,348
R-14	Make the SR 3/SR 19 southbound entrance radius longer to improve left turn movement.	\$0	\$1,386	(\$1,386)		(\$1,386)
R-15	Use 11-foot-wide lanes in lieu of 12-foot-wide lanes on Carver Road.	\$42,880	\$0	\$42,880		\$42,880
R-17	Use 6" x 24" curb and gutter in lieu of 6" x 30".	\$179,177	\$159,817	\$19,360		\$19,360

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-1/R-11**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **RETAIN THE EXISTING CURB AND GUTTER ON THE** SHEET NO.: **1 of 4**
NORTHEAST SIDE OF SR 16

ORIGINAL DESIGN:

The original design calls for new curb and gutter on the northeast side of SR 16.

ALTERNATIVE: (sketch attached)

Retain the existing curb and gutter and concrete median (island) on the northeast side of SR 16.

ADVANTAGES:

- Reduces construction costs
- No additional encroachment on wetlands

DISADVANTAGES:

- None identified

DISCUSSION:

It appears that the existing curb and gutter on the east side of SR 16 can be retained and still provide the required four-lane typical section without additional encroachment on wetlands.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 16,874	—	\$ 16,874
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 16,874	—	\$ 16,874

CALCULATIONS



PROJECT:

P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.:

R-1/2-11

SHEET NO.:

3

of 4

Curb & Gutter

$$468' + 142' \Rightarrow 610 \text{ ft}$$

(Northside 13-06 & 13-07)

Concrete Islands

$$\frac{1}{2}(45 \times 40) = 900 \text{ sf} \Rightarrow 100 \text{ sy}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-2**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **ELIMINATE THE RAISED CONCRETE MEDIAN ON THE SR 16 BRIDGE IN ORDER TO WIDEN THE TWO SR 3/US 19 SOUTHBOUND LEFT TURN LANES** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The original design includes a single bridge with an 8-foot-wide raised concrete median and two, 12-foot-wide left turn lanes for westbound SR 16 traffic entering the SR 3/US 19 southbound entrance ramp.

ALTERNATIVE:

Use a 2-foot-wide striped median in lieu of the 8-foot-wide raised concrete median. This will enable the two left turn lanes to be widened to 15 feet.

ADVANTAGES:

- Three feet wider turn lanes for trucks which represent 17% of the overall traffic
- Safer turning movement
- Reduces construction costs

DISADVANTAGES:

- None identified

DISCUSSION:

Widening the turning lanes to 15 feet creates a safer turning movement for trucks which represent 17% of the overall traffic at this location.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,632	—	\$ 4,632
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 4,632	—	\$ 4,632



PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: R-2

ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.:

2 of 3

4' BRIDGE MEDIAN COST (6" Raised)

$$4' \times 234' = 936 \text{ SF} = 104 \text{ SY}$$

$$\Rightarrow 104 \text{ SY} \times \$40.49/\text{SY} = \underline{\underline{\$4,211 \text{ Reduction}}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-3**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **RETAIN THE EXISTING SR 3/US 19 SOUTHBOUND EXIT RAMP AND WIDEN AS NEEDED IN LIEU OF RELOCATING 33 FEET WEST** SHEET NO.: **1 of 6**

ORIGINAL DESIGN:

The original design calls for relocating and building a new SR 3/US 19 southbound exit ramp with concrete pavement approximately 33 feet west of the current location.

ALTERNATIVE: (sketch attached)

Reconstruct the existing SR 3/US 19 southbound exit ramp and widen the ramp along the same alignment with a ten-foot-wide shoulder (full depth pavement) and asphaltic concrete. Use full depth pavement section at the grade change transitioning to overlay.

ADVANTAGES:

- Reduces construction time
- Reduces construction cost
- Reduces maintenance-traffic requirements

DISADVANTAGES:

- Increases roadway maintenance due to using asphalt in lieu of concrete pavement

DISCUSSION:

The existing ramp is in good condition and can be retained, widened and paved using asphalt concrete pavement while meeting the necessary alignment and safety requirements. Additionally, the cost savings in earthwork fill embankment would eliminate the need for borrow material. The additional full depth (10 foot) shoulder will allow for stage construction of the reconstructed asphalt ramp.

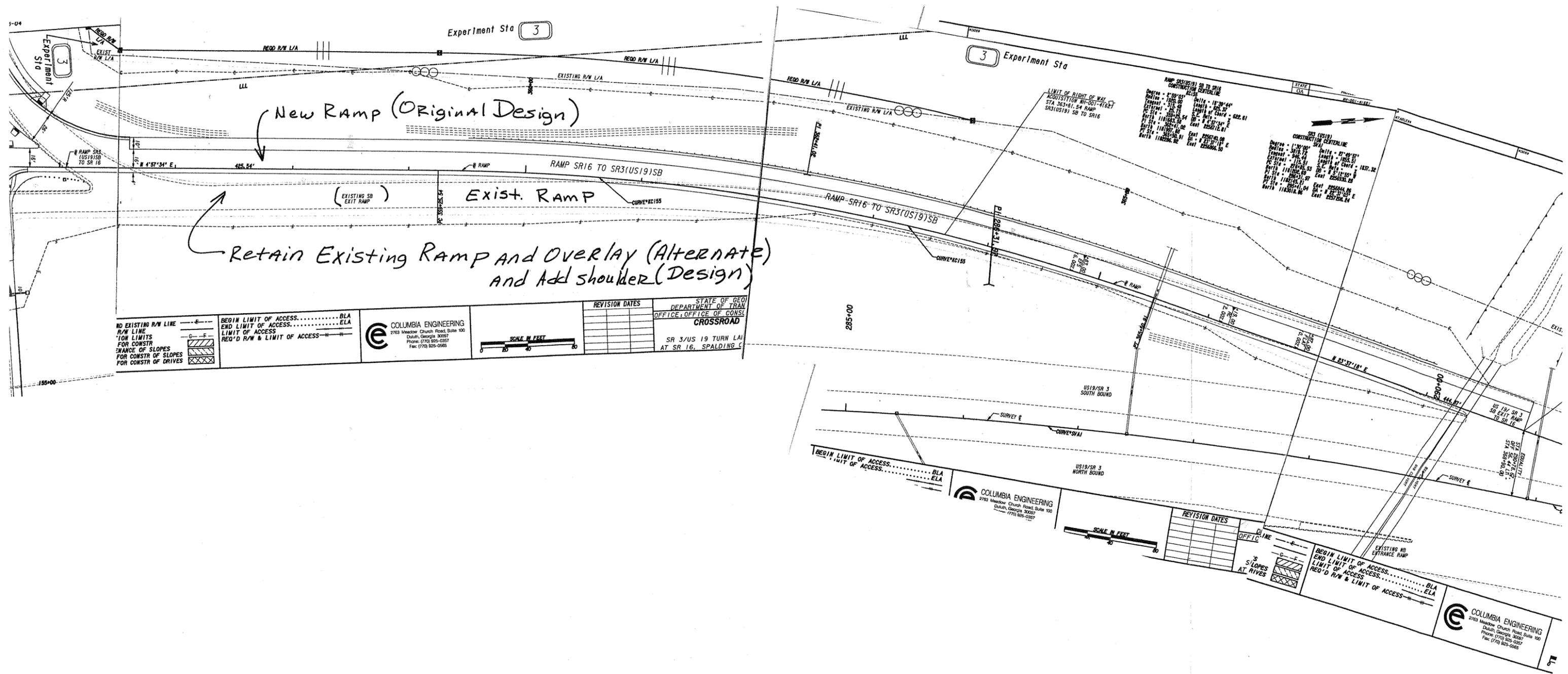
A life-cycle cost analysis has been included in the present worth cost to reflect the impact of the added maintenance requirement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 596,490	\$ 0	\$ 596,490
ALTERNATIVE	\$ 288,958	\$ 155,113	\$ 444,071
SAVINGS (Original minus Alternative)	\$ 307,532	\$ (155,113)	\$ 152,419

Sketch

- ORIGINAL
- ALTERNATE

ALT. NO.
R-3
Sht. 2 of 6



New Ramp (Original Design)

Retain Existing Ramp and Overlay (Alternate) and Add shoulder (Design)

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CALCULATIONS



PROJECT:

P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.:

R-3

SHEET NO.:

3 of 6

Original Design Cost for Relocated/new Ramp (SB Exit)

Area of Full Depth Concrete Pavement & Base =

$$\frac{1,350' \times (10' + 16' + 14')}{9 \text{ sf/sy}} = 4,500 \text{ sy}$$

Add'l Earthwork/Grading for Original/new Ramp (SB Exit)

$$(1000' \text{ (Relocated portion)}) \times (22' \text{ (Avg. Ramp width)}) \times (15' \text{ (Height from x-sections)}) = 330,000 \text{ cf}$$

$$\frac{330,000 \text{ cf}}{27 \text{ cf/cy}} = 12,220 \pm \text{ c.y.}$$

Alternate Design (Keep Existing Ramp)

Overlay Area =
$$\frac{20' \times 1350'}{9 \text{ sf/sy}} = 3,000 \text{ sy}$$

Add'l shldr 10' outside shoulder:

$$\frac{1,220' \times 10'}{9 \text{ sf/sy}} = 1,355 \text{ sy}$$

Earthwork for new shldr:
$$\frac{1,220' \times 10' \times 15'}{27 \text{ cf/sy}} = 6,780 \text{ cy}$$

CALCULATIONS



PROJECT:

P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.:

R-3

SHEET NO.:

4 of 6

Maintenance to Asphalt Ramp for
Life Cycle Calculations.

Overlay 3" Asph. Conc. and Patches Required
every 8 YEARS.

Patching Area $\dot{=} 3,000 \text{ s.y.} \times .10 = 300 \text{ sy}$

use \$100/sy for Patching

COST WORKSHEET



PROJECT: **P.I. No. 332890,**
SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
Spalding County, Georgia, GDOT District 3
Design Development Stage

ALTERNATIVE NO.: R-3
 SHEET NO.: 5 of 6

PROJECT ITEM		ORIGINAL ESTIMATE			(A.H.) PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
conc Pavem't # Base	SY	4500	\$99.05	445,725			
EARTHWORK (save Borrow)	CY	12220	\$7.90	96,538			
AH. Overlay Exist. Ramp (3")	SY				3000	\$13.20	\$39,600
Full depth Pavem't sect. for 10' shldr	SY				1355	\$52.49	\$71,124
Add'l Earthwork for 10' shldr	CY				6780	\$7.90	\$53,562
Patching if Req'd	SY.				100	\$100	\$10,000
Subtotal				\$542,263			174,286
Markup (%) at 10%				\$54,227			17,424
TOTAL				\$596,490			191,710

LIFE CYCLE COST WORKSHEET



PROJECT:		P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN <i>Georgia Department of Transportation, District 3</i> <i>Design Development Stage</i>			ALTERNATIVE NO.: R-3		SHEET NO.: 6 of 6		
LIFE CYCLE PERIOD: <u>35</u> years					ORIGINAL	PROPOSED			
INTEREST RATE: <u>3.20%</u>		INFLATION RATE: <u>0.00%</u>							
A. INITIAL COST					596,490	191,710			
Useful Life (Years)									
INITIAL COST SAVINGS						404,780			
B. RECURRENT COSTS (Annual Expenditures)									
1. Maintenance									
2. Operating									
3.									
4.									
5.									
6.									
Total Annual Costs					-	-			
Present Worth Factor					20.8733	20.8733			
Present Worth of RECURRENT COSTS					-	-			
C. SINGLE EXPENDITURES					Year	Amount	PW factor	Present Worth	Present Worth
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)							
	x	1. Overlay with asphalt pavement (includes asphalt patching)	8	70,000	0.7773	-	54,408		
	x	2. Overlay with asphalt pavement (includes asphalt patching)	16	70,000	0.6041	-	42,289		
	x	3. Overlay with asphalt pavement (includes asphalt patching)	24	70,000	0.4696	-	32,869		
	x	4. Overlay with asphalt pavement (includes asphalt patching)	32	70,000	0.3650	-	25,547		
D. SALVAGE VALUE			Year	Amount	PW factor	Present Worth	Present Worth		
		1.			(1.0000)	-	-		
		2.			(1.0000)	-	-		
Present Worth of SINGLE EXPENDITURES					-	-	155,113		
E. Total Recurrent Costs & Single Expenditures (B + C + D)					-	-	155,113		
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS						(155,113)			
TOTAL PRESENT WORTH COST (A + E)					596,490	346,823			
TOTAL LIFE CYCLE SAVINGS						249,667			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-4**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **DESIGN A SINGLE ACCESS TO THE EXISTING PROPERTIES USING CARVER ROAD AS A COMMON ACCESS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design does not address access to properties along the portion of Carver Road proposed to be abandoned. However, the present “thought” is to extend the existing driveways to the relocated Carver Road.

ALTERNATIVE: (sketch attached)

Retain a portion of the original Carver Road to provide access to properties in this area.

ADVANTAGES:

- Reduces construction cost
- Fewer driveways accessing the relocated Carver Road
- Safer traffic operations

DISADVANTAGES:

- None identified

DISCUSSION:

The alternative design would provide one access point to the relocated Carver Road for three driveways which would result in safer traffic operations.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 21,120	—	\$ 21,120
ALTERNATIVE	\$ 8,140	—	\$ 8,140
SAVINGS (Original minus Alternative)	\$ 12,980	—	\$ 12,980

CALCULATIONS



PROJECT:

P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.:

R-4

SHEET NO.:

3 of 4

Items of Cost for ^{the} Original Design:

Excavation to obliterate the abandoned portion of CARVER Rd.

$$\frac{500' \times 2' \times (22' + 4')}{27 \frac{\text{cf}}{\text{cy}}} \approx 1,000 \text{ c.y.}$$

$$\text{Grassing Area} = \frac{500' \times 80'}{43,560 \frac{\text{SF}}{\text{AC}}} = 0.92 \text{ ac} \approx 1.0 \text{ AC}$$

Drives Required for Properties Access if CARVER Rd is abandoned.

$$\frac{250' \times 18'}{9 \frac{\text{sf}}{\text{sy}}} = 500 \text{ sy. (Pavement Area)}$$

↑
Drives Length

unit cost for Drive Pavement:
($1\frac{1}{2}'' + 2'' = 3\frac{1}{2}''$ Asph. Conc.) + 6" G.A.B.

$$\text{Asph. Conc.} = \frac{385\#}{\text{sy}} \times \frac{1}{2000\#} \times \frac{\$80}{\text{sy}} = \$15.40$$

$$6'' \text{ G.A.B.} = \$9.80$$

$$\text{Drive Pavement Pav Cost} = \$25.20$$

$$\text{Alt. Pavement Area: } \frac{(90' \times 20') + (18' \times 45')}{9 \frac{\text{sf}}{\text{sy}}} = 290 \text{ sy.}$$

Grading is minimal since the surrounding Ground is

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-5**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **ELIMINATE CURB AND GUTTER AND SIDEWALKS ON** SHEET NO.: **1 of 4**
THE NORTHWEST SIDE OF SR 16

ORIGINAL DESIGN: (sketch attached)

The original design typical section includes curb and gutter and sidewalks on the northwest side of SR 16.

ALTERNATIVE: (sketch attached)

Modify the typical section for the northwest side of SR 16 by providing a 6-foot-wide paved shoulder in lieu of new curb and gutter and sidewalk.

ADVANTAGES:

- Reduces construction costs
- Reduces risk of water resting on the roadway

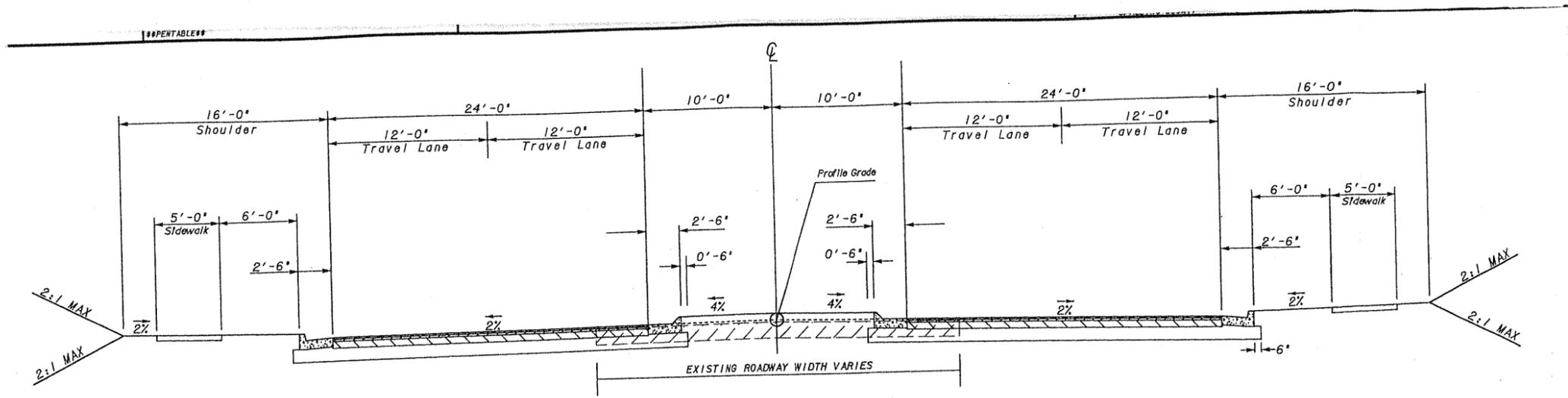
DISADVANTAGES:

- No pedestrian access to the northwest side of SR 16

DISCUSSION:

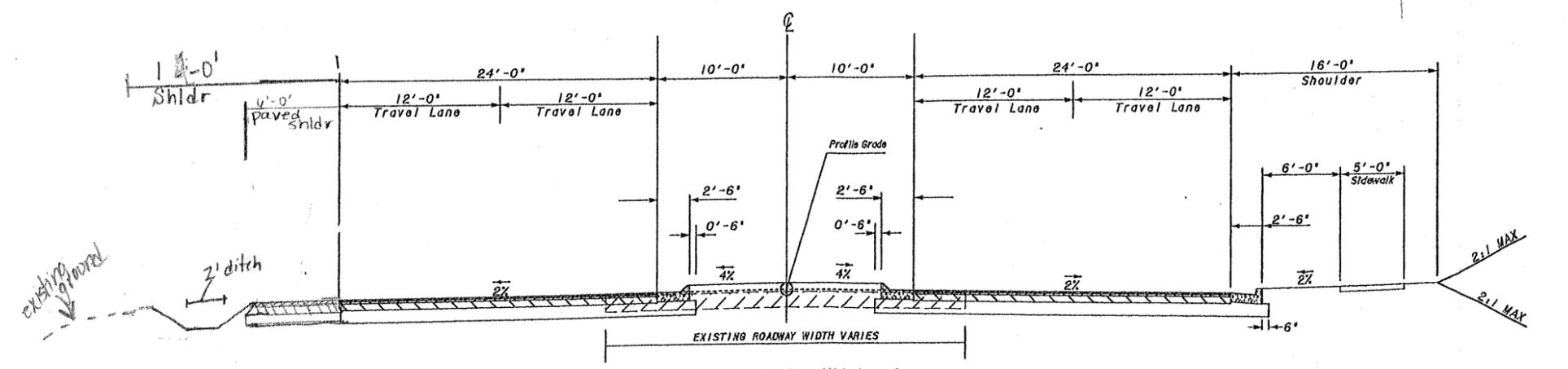
It does not appear that there is a need for pedestrians to access the northwest side of SR 16. Therefore, new curb and gutter and sidewalks should not be required.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 90,001	—	\$ 90,001
ALTERNATIVE	\$ 55,842	—	\$ 55,842
SAVINGS (Original minus Alternative)	\$ 34,159	—	\$ 34,159



Symmetric Widening
4 Lanes With a 20' Raised Median
SR 16

(Original)



Symmetric Widening
4 Lanes With a 20' Raised Median
SR 16

(Alternate)

CALCULATIONS



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.: R-5

SHEET NO.: 3 of 4

Sidewalk

(13-03) $450 \text{ ft} (5 \text{ ft}) = 2250 \text{ ft}^2$

(13-04) $550 \text{ ft} (5 \text{ ft}) = 2750 \text{ ft}^2$

(13-05) $134 \text{ ft} (5 \text{ ft}) = 670 \text{ ft}^2$

(13-02) $459 \text{ ft} (5 \text{ ft}) = 2295 \text{ ft}^2$

(14-02) $590 \text{ ft} (5 \text{ ft}) = 2950 \text{ ft}^2$

$10,915 \text{ ft}^2 / 9 = 1213 \text{ sy}$

Curbs & Gutter

(13-02) 459 ft

(13-03) 450 ft

(13-04) 550 ft

(13-05) 134 ft

1593 ft

Drainage

(13-04) 252 ft / 18" pipe

1- FE Section

2- CB's

Added Shoulder

(13-03) 450 ft

(13-04) 550 ft

(13-05) 134 ft

(13-02) 459 ft

(14-02) 590 ft

$2183 \text{ ft} (6 \text{ ft}) = 13098 \text{ ft}^2$

$13098 \text{ ft}^2 / 9 = 1455 \text{ sy}$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN <i>Spalding County, Georgia Department of Transportation, District 3 Design Development Stage</i>	ALTERNATIVE NO.:	R-6
DESCRIPTION:	USE 12-FOOT-WIDE IN LIEU OF 16-FOOT-WIDE SHOULDERS ON SR 16	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (sketch attached)

The original design includes a 16-foot-wide urban shoulder with a 6-foot-wide grass strip between the back of curb and sidewalk on SR 16.

ALTERNATIVE: (sketch attached)

Use a 12-foot-wide urban shoulder with a 2-foot-wide grass strip between the back of curb and sidewalk on SR 16.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way easement

DISADVANTAGES:

- If valley gutter driveways are added, sidewalks would need to be rebuilt through the drives

DISCUSSION:

The alternative design would reduce the urban shoulder width requirement along SR 16 from 16 feet to 12 feet by reducing the 6-foot-wide grass strip to 2 feet. The 16-foot-wide shoulder is desirable with an urban shoulder when there are valley gutter (“dust pan”) driveways to locate the sidewalk out of the valley gutter to meet desired ADA standards. However, since there are currently no valley gutter type driveways along SR 16, it is highly unlikely that they would be added in the future based upon the characteristics of the development of the surrounding properties.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 168,070	—	\$ 168,070
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 168,070	—	\$ 168,070

PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.:

R-6

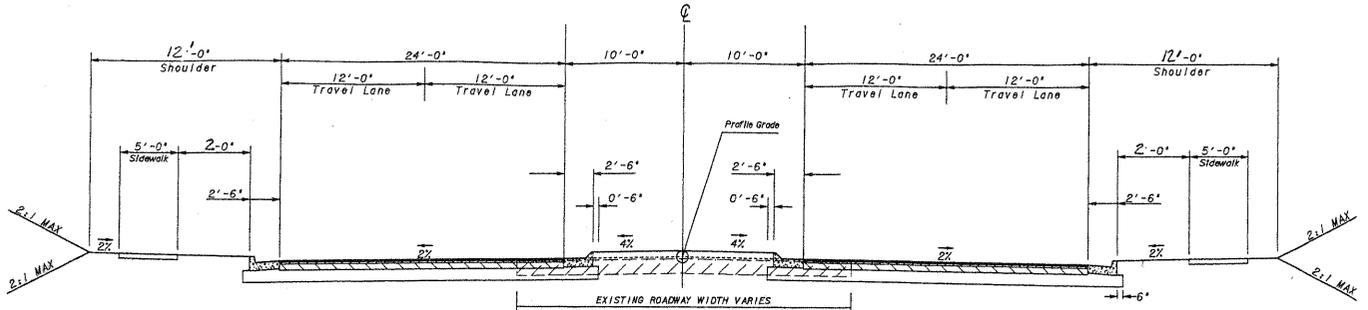
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

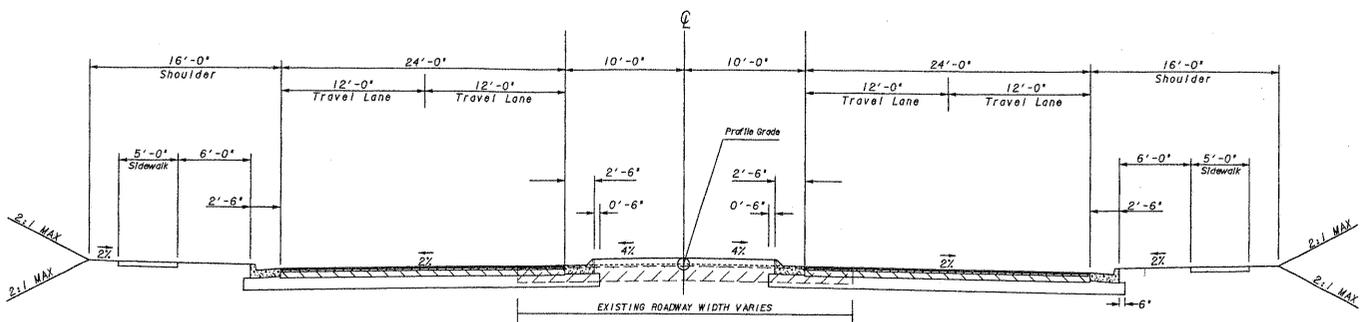
SHEET NO.: **2** of **4**

Alternate w/ 12' shoulders



Symmetric Widening
 4 Lanes With a 20' Raised Median
 SR 16
 N.T.S.

Original w/ 16' shoulders



Symmetric Widening
 4 Lanes With a 20' Raised Median
 SR 16
 N.T.S.

CALCULATIONS



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.:

R-6

SHEET NO.:

3 of 4

Original Costs that would be saved w/ Alt. design

→ Earthwork Savings: $(4,707 - 600') \times 4' \times 16' \text{ Avg.} \approx 10,000 \text{ cy.}$
 $\frac{27 \text{ ccf} / \text{cy}}$

Grassing Constr. Limits Savings: $\frac{4' \times 4,707'}{43,560 \text{ sf} / \text{AC}} = 0.432 \text{ AC}$

Length of proposed 16' shoulder on SR16:

STA 127+93 Rt. to STA. 147+75 Rt. = 1982'

STA. 132+50 Lt. to STA. 147+75 Lt. = 1,525'

STA. 153+25 Rt. to STA. 159+00 Rt. = 575'

STA. 153+25 Lt. to STA. 159+50 Lt. = 625'

Total Length = 4,707'
 of shoulder

R/W Savings:

(STA 127+93 Lt. to 144+00 Lt.) = 1,607'

(STA 141+00 Rt. to 144+80 Rt.) = 380'

(STA 157+00 Rt. to 158+50 Rt.) = 150'

2,137'

2,137' x 4' = 8,548 sf use: \$5/sf from GDOT
 R/W Estimate

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-7**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **CONSTRUCT THE INTERSECTION ON SR 16/SR 3/US 19 SOUTHBOUND SIDE USING CONCRETE PAVEMENT** SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The original design typical sections call for the intersection of SR 16 and SR 3/US 19 southbound ramps to be constructed using asphalt concrete pavement.

ALTERNATIVE: (sketch attached)

Build this same intersection using concrete pavement.

ADVANTAGES:

- Reduces future maintenance requirements
- Pavement material would be the same as the proposed new SR 3/US 19 southbound ramps

DISADVANTAGES:

- Increases first costs.

DISCUSSION:

It is common construction practice in Georgia to build freeway exit intersections with concrete pavement to reduce future maintenance requirements including maintenance of traffic. This is especially true for intersections with a high percentage of trucks (typically > 10%). Since this freeway exit has 17% truck traffic, it is recommended that concrete pavement be used.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 184,420	\$ 151,036	\$ 335,456
ALTERNATIVE	\$ 348,000	\$ 0	\$ 348,000
SAVINGS (Original minus Alternative)	\$ (163,580)	\$ 151,036	\$ (12,544)

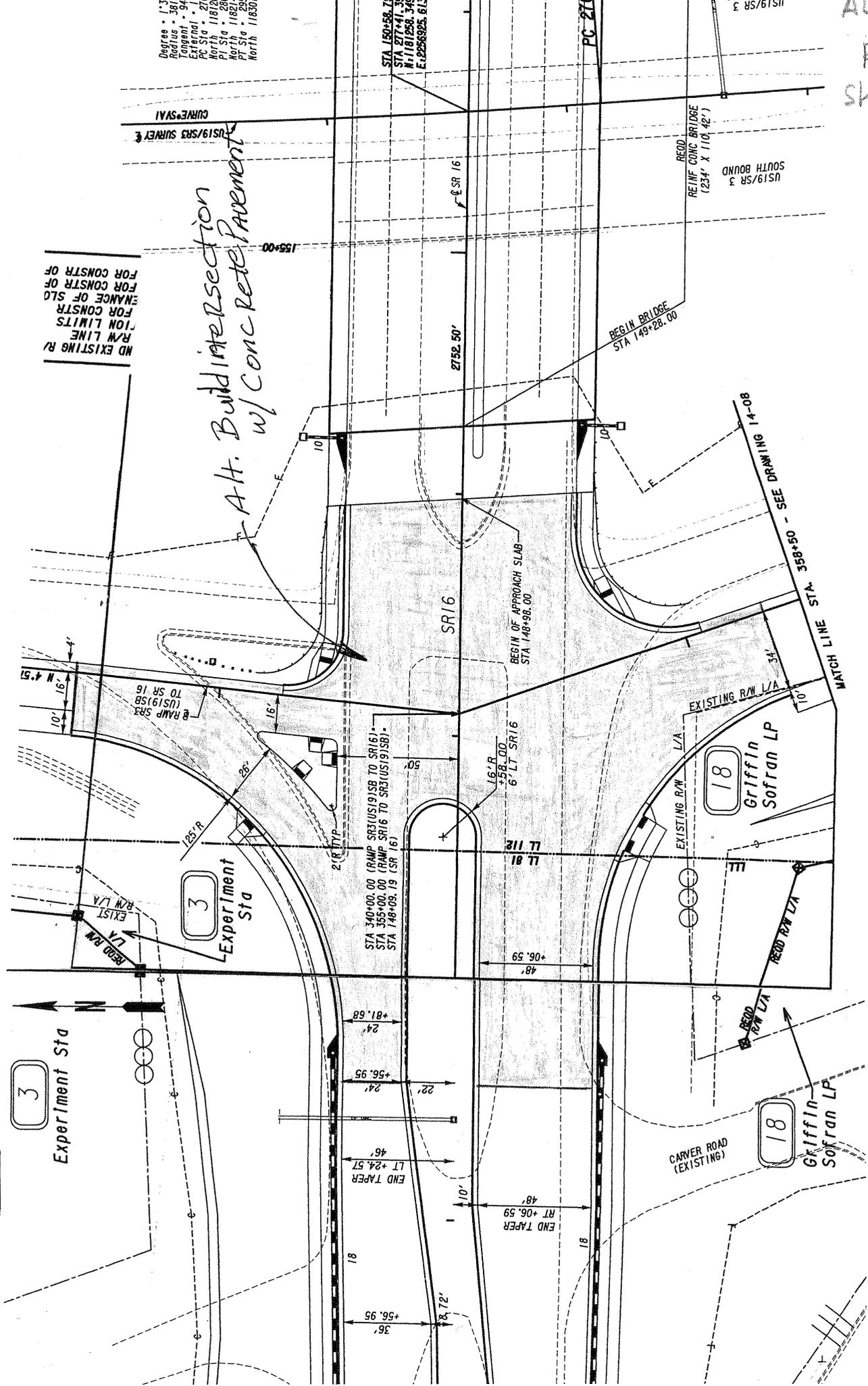
ACT. NO.
R-7
Sht. 2 of 5

Degree = 1.37
Radius = 591
Tangent = 94
PC STA = 27
PVI STA = 181.9
PT STA = 286.2
North = 1182.1
PI STA = 299.9
PT STA = 318.30

STA 150+58.7
STA 171+41.4
STA 181+28.2
ELEVATIONS 228.42, 217.12

HD EXISTING R/W LINE
FOR CONSTR
ION LIMITS
RANGE OF SLO
FOR CONSTR
FOR CONSTR OF
FOR CONSTR OF

A.H. Build Inter Section
w/ Conc Rete Pavement



CALCULATIONS



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.:

R-17

SHEET NO.:

3 of 5

Intersection Pavement Area:

$$\left[(130' \times 90') + (110' \times 72') + (34' \times 80') + (30' \times 100') + \left(\frac{40}{2} \times 80'\right) + \left(\frac{40}{2} \times 90'\right) \right] / 95 \text{ ft/sy} = 3,194 \text{ sy}$$

Overlay for life cycle

$$(2'') \quad 3,200 \text{ sy} \times \$ 8.80/\text{sy} = \$ 28,160$$

$$\text{Patching: } 300 \text{ sy} \times \$ 100/\text{sy} = \$ 30,000$$

$$\text{for L.C.C.} = \underline{\$ 58,160}$$

every 8 years

Traffic Control: \$ 10,000 / overlay (for LCC)
 for M.O.T.

COST WORKSHEET



PROJECT:	P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN Spalding County, Georgia, GDOT District 3 Design Development Stage	ALTERNATIVE NO.: R-7 SHEET NO.: 4 of 5
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PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Conc. Pavement & Base	S.Y.				3,194	99.05	316,366
Current Design Asphalt Pavement & Base	S.Y.	3,194	\$52.49	\$167,653			
Subtotal				\$167,653			\$316,366
Markup (%) at Const. 10%				\$16,767			\$31,634
TOTAL				184,420			348,000

LIFE CYCLE COST WORKSHEET



PROJECT:		P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN <i>Georgia Department of Transportation, District 3</i> <i>Design Development Stage</i>				ALTERNATIVE NO.: R-7		SHEET NO.: 5 of 5	
LIFE CYCLE PERIOD: <u>35</u> years		INTEREST RATE: <u>3.20%</u>		INFLATION RATE: <u>0.00%</u>		ORIGINAL	PROPOSED		
A. INITIAL COST						184,420	348,000		
Useful Life (Years)									
INITIAL COST SAVINGS							(163,580)		
B. RECURRENT COSTS (Annual Expenditures)									
1. Maintenance									
2. Operating									
3.									
4.									
5.									
6.									
Total Annual Costs						-	-		
Present Worth Factor						20.8733	20.8733		
Present Worth of RECURRENT COSTS						-	-		
C. SINGLE EXPENDITURES		Year	Amount	PW factor	Present Worth	Present Worth			
<small>ORIG</small>	<small>PROP</small>	<small>< Put "x" in appropriate box (original design or proposed design)</small>							
x		1. Overlay with asphalt pavement (includes asphalt patching)	8	68,160	0.7773	52,978	-		
x		2. Overlay with asphalt pavement (includes asphalt patching)	16	68,160	0.6041	41,177	-		
x		3. Overlay with asphalt pavement (includes asphalt patching)	24	68,160	0.4696	32,005	-		
x		4. Overlay with asphalt pavement (includes asphalt patching)	32	68,160	0.3650	24,876	-		
D. SALVAGE VALUE		Year	Amount	PW factor	Present Worth	Present Worth			
		1.			(1.0000)	-	-		
		2.			(1.0000)	-	-		
Present Worth of SINGLE EXPENDITURES						151,036	-		
E. Total Recurrent Costs & Single Expenditures (B + C + D)						151,036	-		
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS							151,036		
TOTAL PRESENT WORTH COST (A + E)						335,456	348,000		
TOTAL LIFE CYCLE SAVINGS							(12,544)		

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-8**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **USE GRASSED MEDIANS IN LIEU OF CONCRETE** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The SR 16 typical section includes 20-foot-wide raised concrete medians throughout the project. Some medians vary in width where turn lanes are required.

ALTERNATIVE:

Use grassed medians in lieu of concrete throughout the project.

ADVANTAGES:

- Reduces construction costs
- Improves drainage
- Reduces heat island effect
- Aesthetically more appealing when properly maintained

DISADVANTAGES:

- Maintenance of grassed areas is required

DISCUSSION:

Since it appears that existing grass is already being maintained in the area, the cost of grass maintenance medians should be negligible compared to the cost savings. Also, grassed medians help improve drainage and reduce heat island effect.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 128,851	—	\$ 128,851
ALTERNATIVE	\$ 66,000	—	\$ 66,000
SAVINGS (Original minus Alternative)	\$ 62,851	—	\$ 62,851

CALCULATIONS



PROJECT:

P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.: R-8

SHEET NO.: 2 of 3

Median Areas

$\frac{ft^2}{43560}$
 \$10400 per/acre

Sht 13-03

$$\frac{1}{2} \pi r^2 = 28 ft^2$$

$$69' \times 4' = 276 ft^2$$

304 ft²

Sht 13-04

① 26' x 8' = 488 ft ²	⑥ 51' x 21' = 1071 ft ²
② 43' x 12' = 756 ft ²	⑦ 49' x 21' = 1029 ft ²
③ 83' x 15' = 1245 ft ²	⑧ $\frac{1}{2}(52 \times 21) = 546 ft^2$
④ 125' x 19' = 2375 ft ²	⑨ $\frac{1}{2}(51 \times 27) = 689 ft^2$
	⑩ 41.5' x 27' = 1121 ft ²

1235 ft²

9520 ft²

Sht 13-05

$$60' \times 27' = 1620 ft^2$$

(nose) $\frac{1}{2} \pi r^2$

$$\frac{1}{2} (3.14 \times 16)^2 = 402 ft^2$$

2022 ft²

Sht 13-06

(nose) $\frac{1}{2} \pi r^2$	⑥ 23' x 23' = 529 ft ²
$\frac{1}{2} (3.14 \times 16)^2 = 402 ft^2$	⑦ 22' x 22' = 484 ft ²
① 265' x 27' = 7155 ft ²	⑧ 21' x 35' = 735 ft ²
② 91' x 27' = 243 ft ²	⑨ 16' x 20' = 320 ft ²
③ 15' x 26' = 390 ft ²	⑩ 16' x 19' = 304 ft ²
④ 22' x 25' = 550 ft ²	⑪ 30' x 18' = 540 ft ²
⑤ 32' x 24' = 760 ft ²	

12412 ft²

Area's grazing
 $\frac{26033 ft^2}{43560}$
 .60 acre

Sht 13-07

① 29' x 17' = 493 ft ²	④ 21' x 14' = 294 ft ²
② 23' x 16' = 368 ft ²	⑤ 16' x 13' = 208 ft ²
③ 20' x 15' = 300 ft ²	(nose) $\frac{1}{2} \pi r^2$
	$(3.14 \times 8.4)^2 = 112 ft^2$

1775 ft²

$\frac{26033 ft^2}{97}$
 269354

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-10**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **RECONFIGURE CURVE KC131 FOR SUPER ELEVATION** SHEET NO.: **1 of 4**
TRANSITION LENGTH AND DRAINAGE STRUCTURE

ORIGINAL DESIGN: (sketch attached)

The original design layout is shown on plan sheets 13-03 & 14-02 for relocated Carver Road.

ALTERNATIVE: (sketch attached)

Reconfigure a portion of the drainage layout for curve KC131 as shown on the attached sketch.

ADVANTAGES:

- Reduced construction cost

DISADVANTAGES:

- None identified

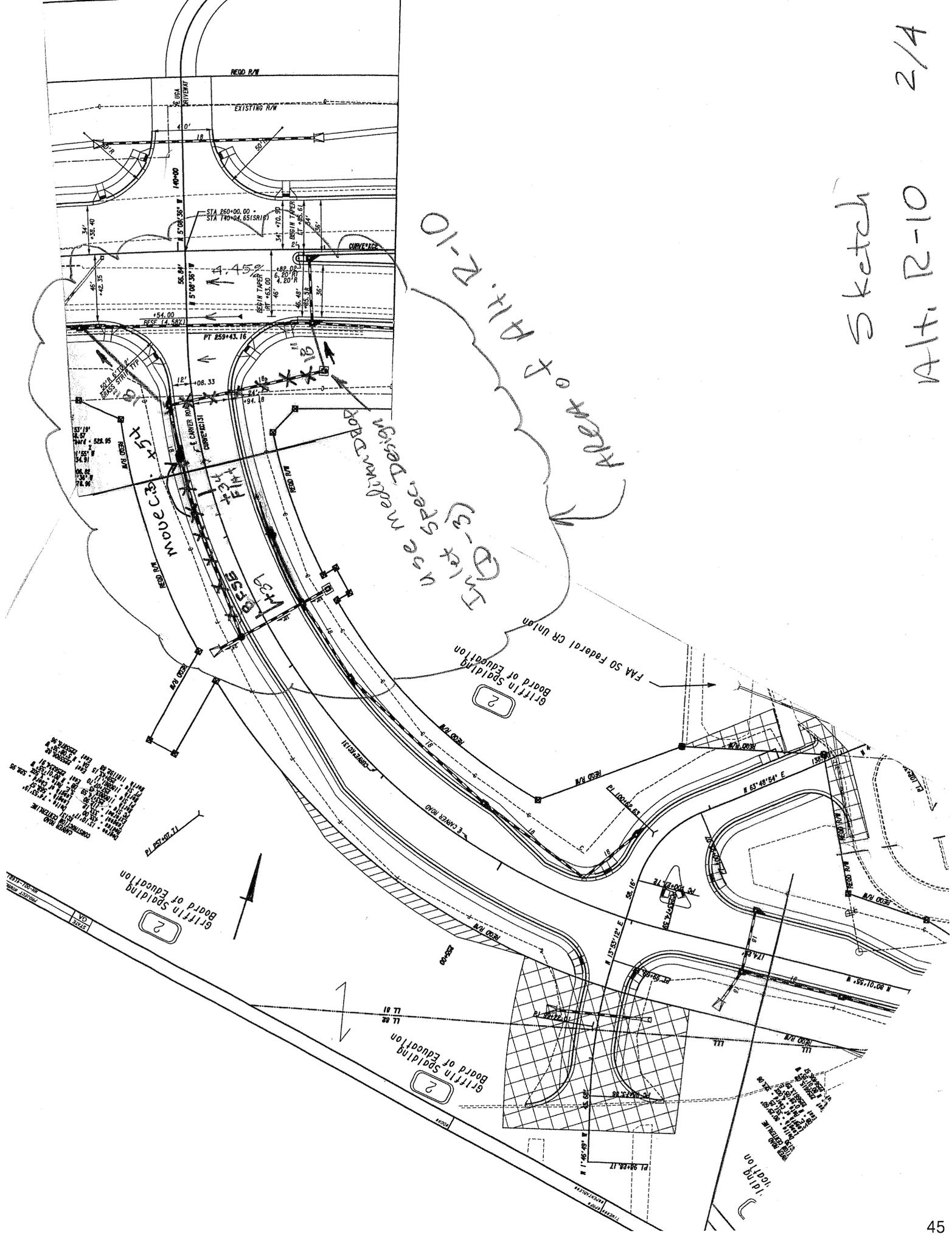
DISCUSSION:

It appears that the current design has a catch basin located on Carver Road at 257 + 25Lt. that is located on the high side of a super elevation of the roadway and should be moved beyond the "flat" area on Carver Road. The drainage pipe layout could be reconfigured to save 132 linear feet of 18-in.-diameter storm drainage pipe. The alternative drainage design may need to use a Median Drop Special Design (Construction Detail D-3) to get drainage outfall from the Ditch Drop Inlet at Sta. 261 + 00 Rt. to the catch basin at SR 16 Sta. 259 + 90 Rt.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,960	—	\$ 8,960
ALTERNATIVE	\$ 3,817	—	\$ 3,817
SAVINGS (Original minus Alternative)	\$ 5,143	—	\$ 5,143

Sketch
ALT. R-10

Area of Alt. R-10
In 9 Spec. Design
Use Medium Box
D-15



CALCULATIONS



PROJECT: P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.:

R-10

SHEET NO.:

3 of 4

Original Required 18" pipe to be
 SAVED (see attached sketch)

$$122' + 108' = 230'$$

versus Pipe Required for Alt. Design

$$80' + 18' = 98'$$

Alternate R-10 would save:

$$230' - 98' = 132' \text{ of } 18" \text{ storm drain pipe}$$

(30mph) Calculations for S.E. transition length
 (from Flat (0.00%) to full S.E. (3.5%))

$$TL = \frac{(3.5\%) \times 12' (\text{Lane Width}) \times 2 (\text{No. of Lanes}) \times 0.75 \text{ Adjustment Factor}}{(\text{Max. Relative gradient}) 0.66}$$

$$TL = 95'$$

Length of Transition from 4.45% to Flat.

$$TL = \frac{4.45\%}{3.5\%} \times 95' = 120'$$

COST WORKSHEET



PROJECT: P.I. No. 332890,
 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
 Spalding County, Georgia, GDOT District 3
 Design Development Stage

ALTERNATIVE NO.: R-10
SHEET NO.: 4 of 4

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Original Design 18" Storm Dr. Pipe	L.F.	230	\$35.41	\$8,145			
Alt. Design 18" Storm Dr. Pipe	L.F.				98	\$35.41	\$3,470
Subtotal				\$8,145			\$3,470
Markup (%) at 10%				\$815			\$347
TOTAL				\$8,960			\$3,817

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-13**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **REDUCE THE WIDTH OF THE SR 3/US 19 SOUTHBOUND ENTRANCE RAMP BY 4 FEET** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original ramp SR 16 to SR 3/US 19 southbound section includes a 20-foot-wide travel lane and a 14-foot-wide travel lane at the entrance.

ALTERNATIVE: (sketch attached)

Reduce construction costs by reducing the width of the 20-foot-wide travel lane to 16 feet wide and retaining everything else.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way requirements
- Better alignment with left turn lane widths on SR 16 bridge

DISADVANTAGES:

- None identified

DISCUSSION:

It appears that the SR 3/US 19 entrance ramp can be made 4 feet narrower. This will reduce the construction cost, provide better alignment with the left turn lanes, and require less right-of-way.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 227,348	—	\$ 227,348
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 227,348	—	\$ 227,348



PROJECT:

P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.: R-13

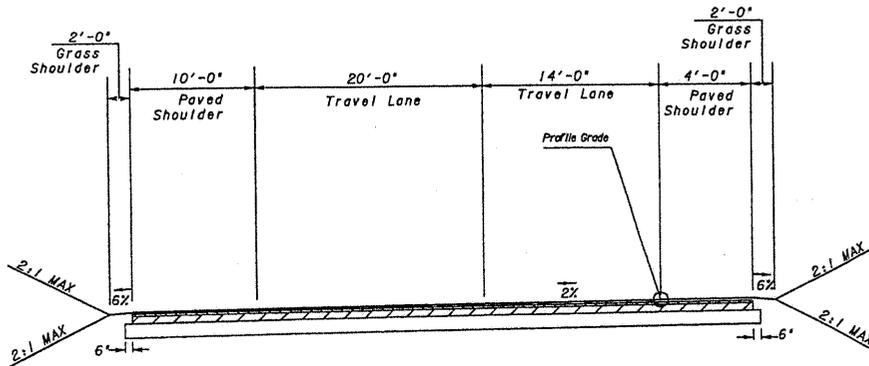
ORIGINAL DESIGN

ALTERNATIVE DESIGN

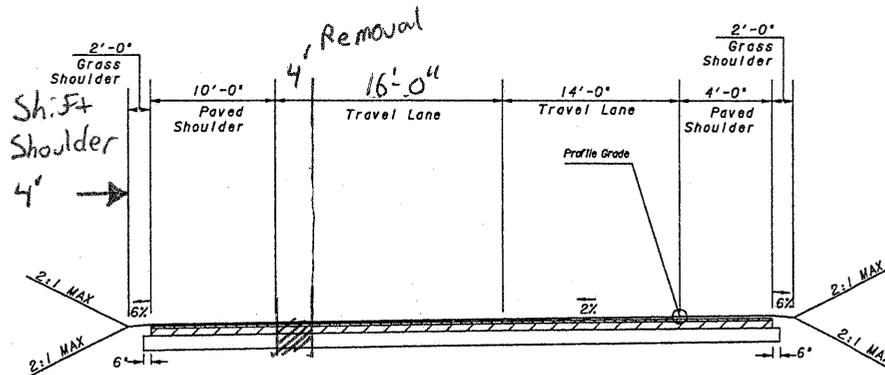
BOTH

SHEET NO.:

2 of 4



RAMP SR16 TO SR3(US19) SOUTHBOUND
 PROPOSED



RAMP SR16 TO SR3(US19) SOUTHBOUND
 ALTERNATE

CALCULATIONS



PROJECT:

P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: R-13

SHEET NO.: 3 of 4

RAMP SR16 TO SR3 (US19) SB

Begin Sta. 353+70(±) }
End Sta. 330+50(±) } 2320' Long Ramp

Remove 4' width of Concrete Ramp Say \$99/SY

$$\Rightarrow 2320' \times 4' (w) = 9280 \text{ SF} = 1031 \text{ SY}$$

$$\Rightarrow 1031 \text{ SY} \times \$99/\text{SY} = \underline{\underline{\$102,069}}$$

Remove 4' width of R/W Say \$5/SF

$$\Rightarrow 2320' \times 4' (w) = 9280 \text{ SF}$$

$$\Rightarrow 9280 \text{ SF} \times \$5/\text{SF} = \underline{\underline{\$46,400}}$$

$$\text{Total 4' Removal} = \$102,069 + \$46,400 = \underline{\underline{\$148,469}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-14**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **MAKE THE SR 3/US 19 SOUTHBOUND ENTRANCE RADIUS LONGER** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design includes a 50-foot radius curve for the SR 3/US 19 southbound entrance.

ALTERNATIVE: (sketch attached)

Use a 60-foot radius curve for the SR 3/US 19 southbound entrance.

ADVANTAGES:

- Improves left turn movement

DISADVANTAGES:

- None identified

DISCUSSION:

Due to the high percentage of truck traffic (17%), the longer radius curve will create a softer turning movement for trucks traveling southbound at a very little cost increase.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 1,386	—	\$ 1,386
SAVINGS (Original minus Alternative)	\$ (1,386)	—	\$ (1,386)

CALCULATIONS



PROJECT: P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.: R-14

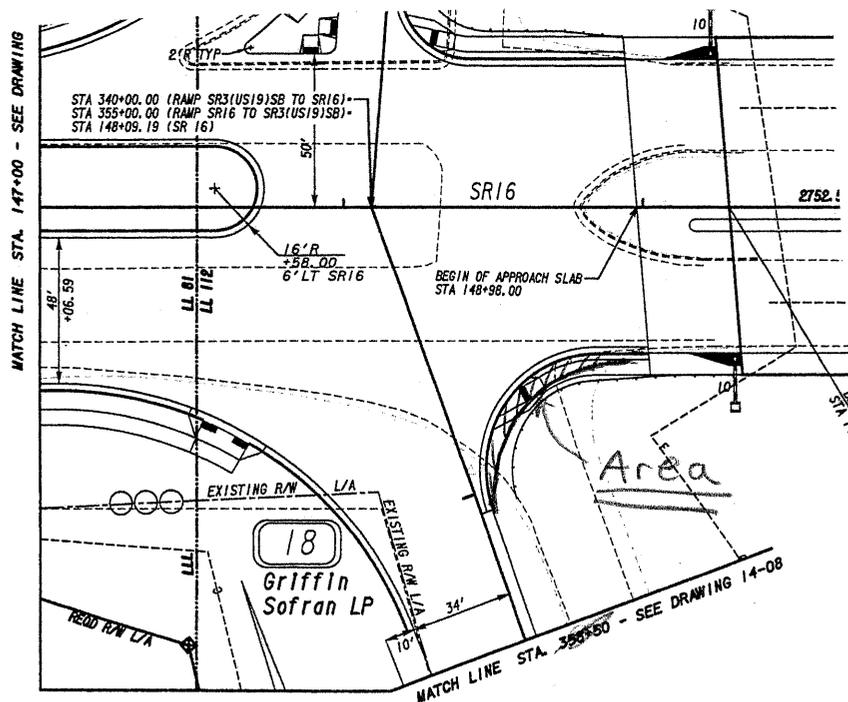
SHEET NO.: 3 of 4

Calculate area of asphalt between the radius:

Assume have a $\frac{1}{4}$ Circle. $r_1 = 30'$ $r_2 = 25'$ Asphalt = \$52.49/sy

$$\text{Area} = \frac{\pi(30')^2}{4} - \frac{\pi(25')^2}{4} = 707 \text{ ft}^2 - 491 \text{ ft}^2 = 216 \text{ ft}^2 = 24 \text{ sy}$$

$$\Rightarrow 24 \text{ sy} \times \$52.49/\text{sy} = \underline{\underline{\$1260}}$$



VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-15**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **USE 11-FOOT-WIDE LANES IN LIEU OF 12-FOOT-WIDE LANES ON CARVER ROAD** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The original design calls for new Carver Road to have 12-foot-wide lanes with curb and gutter on each side.

ALTERNATIVE:

Provide 11-foot-wide lanes in lieu of 12-foot-wide lanes.

ADVANTAGES:

- Reduces construction costs
- Reduces right-of-way requirements

DISADVANTAGES:

- Greater risk of side-swipes between larger vehicles

DISCUSSION:

Since Carver Road is mainly residential with the exception of access to student parking, 11 foot-wide lanes will provide adequate circulation along this route.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 42,880	—	\$ 42,880
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 42,880	—	\$ 42,880

CALCULATIONS



PROJECT:

P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: R-15

SHEET NO.: 2 of 3

Pavement
Reduction

$$\begin{array}{l} \text{rdwy} \\ \text{length} \end{array} 1140' \begin{array}{l} (2') \\ \text{feet} \\ \text{off} \end{array} = 2280 \text{ ft}^2 \\ \hline 9 = 253 \text{ sy}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **R-17**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **USE 6" X 24" CURB AND GUTTER IN LIEU OF 6" X 30"** SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The original design calls for a 6" x 30" curb and gutter section throughout the project.

ALTERNATIVE:

Use 6" x 24" curb and gutter section in lieu of 6" x 30" section.

ADVANTAGES:

- Reduces construction costs

DISADVANTAGES:

- None identified

DISCUSSION:

Using a 6" x 24" curb and gutter section will reduce construction costs with no change in the required function.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 179,177	—	\$ 179,177
ALTERNATIVE	\$ 159,817	—	\$ 159,817
SAVINGS (Original minus Alternative)	\$ 19,360	—	\$ 19,360

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **S-1**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **REDUCE THE WIDTH OF THE SR 16 BRIDGE BY REDUCING THE MEDIAN WIDTH** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The original design calls for a 4-foot-wide raised median with 2 feet from median to the lane line on each side of the median for a total median width of 8 feet on the new SR16 bridge.

ALTERNATIVE:

Reduce the required SR 16 bridge width by 6 feet by removing the proposed raised median and providing a 2 foot striped median.

ADVANTAGES:

- Reduces construction cost

DISADVANTAGES:

- Requires beam design and spacing revisions.

DISCUSSION:

The SR 16 bridge width can be reduced by 6 feet by eliminating the proposed median and providing a 2-foot-wide striped median. This design has been implemented previously on I-75 at SR 20 in Henry County.

COST-SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,135,000	—	\$ 3,135,000
ALTERNATIVE	\$ 2,968,206	—	\$ 2,968,206
SAVINGS (Original minus Alternative)	\$ 166,794	—	\$ 166,794



PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.: **S-1**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 3**

WIDTH REDUCTION COST

$$234' \times 6' \times \$105/SF = \underline{\underline{\$147,420 \text{ Reduction}}}$$

4' BRIDGE MEDIAN COST (6" Raised)

$$4' \times 234' = 936 SF = 104 SY$$

$$\Rightarrow 104 SY \times \$40.49/SY = \underline{\underline{\$4,211 \text{ Reduction}}}$$

$$\text{Total Reduction} = \$147,420 + \$4,211 = \underline{\underline{\$151,631}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **S-4**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **REMOVE THE SIDEWALK FROM THE NORTH SIDE OF THE SR 16 BRIDGE AND RETAIN A 6-FOOT-WIDE SHOULDER** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design calls for a 6-foot-wide sidewalk on both the north and south sides of the SR 16 Bridge.

ALTERNATIVE: (sketch attached)

Remove the 6-foot-wide sidewalk from the north side of the SR 16 Bridge and use as a 6-foot-wide shoulder.

ADVANTAGES:

- Reduces construction cost

DISADVANTAGES:

- Pedestrians must cross from south side of SR 16 bridge

DISCUSSION:

It does not appear that there is a need for pedestrians to access the north side of SR 16. Therefore, a sidewalk should not be required on the north side of SR 16.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 18,911	—	\$ 18,911
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 18,911	—	\$ 18,911

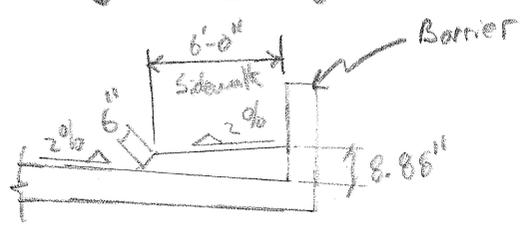
PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: S-4

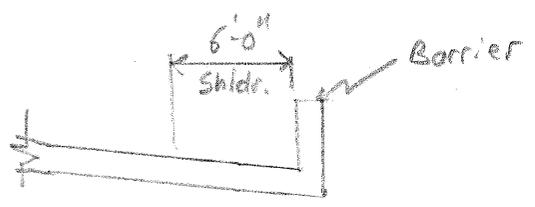
ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 2 of 4

Original Design



Alternate Design





PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

ALTERNATIVE NO.: S-4

ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.:

3 of 4

SIDEWALK REMOVAL COST

6" thick @ curb Class AA Concrete

2% cross-slope

$$\Rightarrow 6' \times 2\% = 1.44''$$

Sidewalk thickness @ Barrier:

$$\Rightarrow 6'' + 1.44'' (2\% \text{ down}) + 1.44'' (2\% \text{ up}) = 8.88''$$

Average Sidewalk thickness:

$$\frac{6'' + 8.88''}{2} = 7.44'' \text{ thick}$$

Sidewalk Volume:

$$\Rightarrow 6' \times \frac{7.44''}{12} \times 234' = 870.48 \text{ CF} = 32.24 \text{ CY}$$

$$\Rightarrow 32.24 \text{ CY} \times \$533.26/\text{CY} = \underline{\underline{\$17,192}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **T-1**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **ELIMINATE THE SIDEWALK ALONG THE ENTIRE NORTH SIDE OF SR 16** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The original design includes new sidewalk on both sides of SR 16 along its entire length.

ALTERNATIVE:

Eliminate the sidewalk along the north side of SR 16 and construct a sidewalk on the south side only.

ADVANTAGES:

- Reduces construction costs

DISADVANTAGES:

- Limited pedestrian access along the north side of SR 16

DISCUSSION:

There does not appear to be a need for pedestrian traffic to access anything along the north side of SR 16. Therefore, it is recommended that sidewalk be provided along the south side only in order to save construction costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 51,435	—	\$ 51,435
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 51,435	—	\$ 51,435

CALCULATIONS



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: T-1

SHEET NO.: 2 of 3

Sidewalk

$$(13-02) \quad 460' \times 5' = 2300 \text{ ft}^2$$

$$(13-03) \quad 396' \times 5' = 1980 \text{ ft}^2$$

$$(13-04) \quad 550' \times 5' = 2750 \text{ ft}^2$$

$$(13-05) \quad 196' \times 5' = 980 \text{ ft}^2$$

$$(13-06) \quad 479' \times 5' = 2395 \text{ ft}^2$$

$$13-07) \quad 145' \times 5' = 725 \text{ ft}^2$$

$$\frac{11,130 \text{ ft}^2}{9}$$

$$\Rightarrow 1236.67 \text{ sy}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **T-2**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **ELIMINATE THE SIDEWALK FROM ONE SIDE OF RELOCATED CARVER ROAD** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The original design includes a new sidewalk on both sides of relocated Carver Road.

ALTERNATIVE:

Provide a sidewalk on the southwest side of relocated Carver Road only. Retain all curb and gutter.

ADVANTAGES:

- Reduces construction costs

DISADVANTAGES:

- No sidewalk along the northeast side of relocated Carver Road

DISCUSSION:

Relocated Carver Road will provide access to the student parking lot and local properties. There does not appear to be a need for pedestrian walkways on both sides of the relocated section of Carver Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 25,780	—	\$ 25,780
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 25,780	—	\$ 25,780

CALCULATIONS



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: T-2

SHEET NO.: 2 of 3

Carver Rd Sidewalk
Elimination

$$\begin{array}{l} (13-03) \quad 100' \times 5' = 500 \text{ ft}^2 \\ (14-02) \quad 516' \times 5' = 2580 \text{ ft}^2 \\ (14-01) \quad 500' \times 5' = 2500 \text{ ft}^2 \end{array}$$

$$\frac{5580 \text{ ft}^2}{9} \Rightarrow (620.44)$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** ALTERNATIVE NO.: **T-3**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION: **KEEP THE EXISTING CARVER ROAD AS A RIGHT-IN/RIGHT-OUT ACCESS TO SR 16 AND SHOW THE RELOCATED CARVER ROAD TEEING INTO THE EXISTING CARVER ROAD** SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (sketch attached)

The original design calls for closing the existing access to Carver Road from SR 16 and relocating Carver Road west of the Federal Credit Union.

ALTERNATIVE: (sketch attached)

Allow existing Carver Road to remain as a right-in/right-out access only. Eliminate the new Federal Credit Union entrance drive and tee new Carver Road into existing Carver Road sooner.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way cost
- Improves good will with local property owners

DISADVANTAGES:

- Adds a second right-in/right-out access to SR 16

DISCUSSION:

Allowing the existing Carver Road to remain open will retain the current Federal Credit Union access and therefore eliminate the need for the new access driveway. Additionally, this option saves several properties and the inconvenience associated with relocating driveways for homes.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 688,173	—	\$ 688,173
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 688,173	—	\$ 688,173

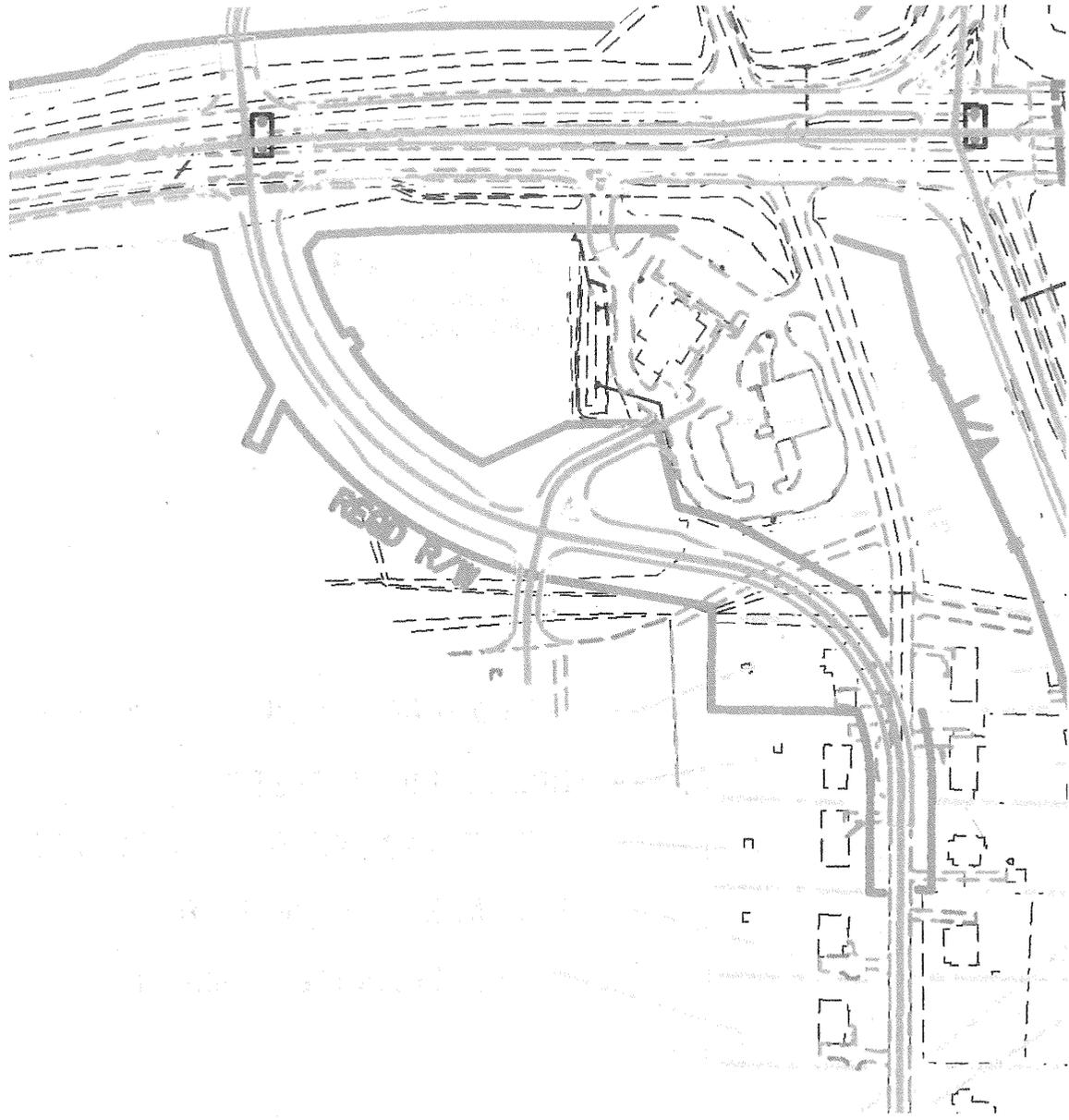
SKETCH

PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: **T-3**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 6**

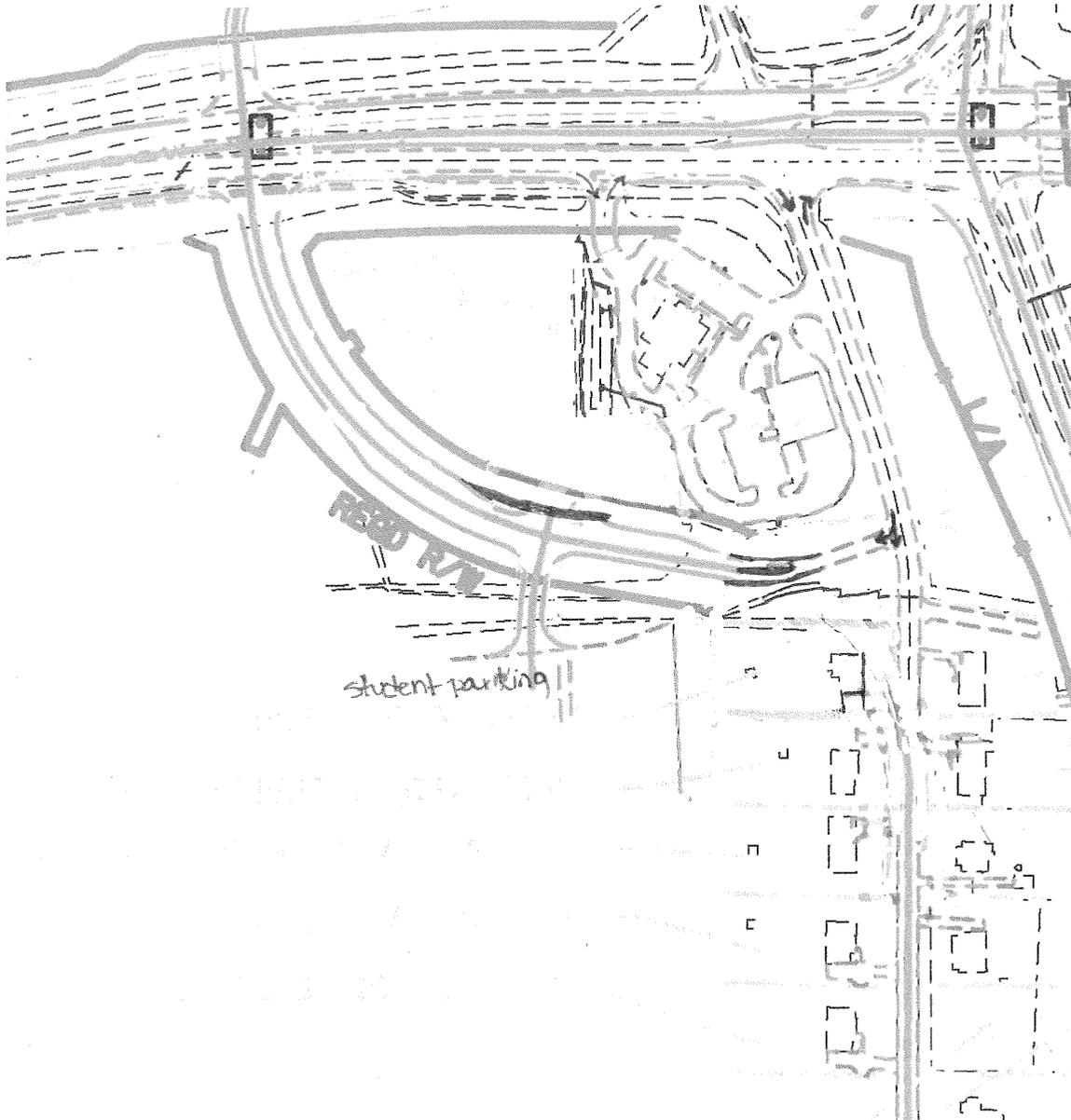


PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: **T-3**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **3 of 6**



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: **T-3**

SHEET NO.: **4 of 6**

Carver Rd savings

Credit Union Entrance

Pavement $160' \times 24' = \underline{3840 \text{ ft}^2} / 9 \Rightarrow \textcircled{427 \text{ sy}}$

Sidewalk $139' \times 5' = 695 \text{ ft}^2$
 $140' \times 5' = 700 \text{ ft}^2 \Rightarrow \underline{1395 \text{ ft}^2} / 9 \Rightarrow \textcircled{155 \text{ sy}}$

C+g $160 \text{ ft} + 155 \text{ ft} = \underline{315 \text{ ft}}$

concrete island

$\frac{1}{2}bh$
 $\frac{1}{2}(20')(26) = \underline{260 \text{ ft}^2} / 9 \Rightarrow \textcircled{29 \text{ sy}}$

Tie in sooner

pvt $340' \times 24' = \underline{8160 \text{ ft}^2} / 9 \Rightarrow \textcircled{907 \text{ sy}}$

Sidewalk $340'(2) \overset{\text{both sides}}{=} 680'(5) = \underline{3400 \text{ ft}^2} / 9 \Rightarrow \textcircled{378 \text{ sy}}$

curb and gutter

$340'(2) = \underline{680 \text{ ft}}$

R/W

parcel 10 $197' \times 105' = \textcircled{20685 \text{ ft}^2}$

parcel 6 $100' \times 15' = \textcircled{1500 \text{ ft}^2}$

parcel 8 $55' \times 15' = 825 \text{ ft}^2$
 $(\frac{1}{2})17' \times 48' = 408 \text{ ft}^2$
 $(\frac{1}{2})50' \times 30' = 750 \text{ ft}^2$
 $\textcircled{1983 \text{ ft}^2}$

parcel 7 $100' \times 15' = \textcircled{1500 \text{ ft}^2}$

parcel 9 $1500 \text{ ft}^2 - (\frac{1}{2}9' \times 43') = \textcircled{1307 \text{ ft}^2}$

parcel 11 $\frac{1}{2}(10' \times 3) = 15 \text{ ft}^2$

parcel 2 $\frac{31}{2} \times 10 = 310 \text{ ft}^2$
 $90 \times 30 = 2700 \text{ ft}^2$
 $\frac{1}{2}(15 \times 90) = 517.5 \text{ ft}^2$
 $\frac{1}{2}(31 \times 15) = 233 \text{ ft}^2$

$\textcircled{8418 \text{ ft}^2}$

(continued)

CALCULATIONS



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: T-3

SHEET NO.: 5 of 6

$$\text{Parcel 2} - \frac{1}{2}(90 \times 60) = 2700 \text{ ft}^2$$

$$(90 \times 60) = 5400 \text{ ft}^2$$

$$\frac{1}{2}(40 \times 80) = 1600 \text{ ft}^2$$

$$\frac{1}{2}(90 \times 15) = 675 \text{ ft}^2$$

} 10,375 ft²

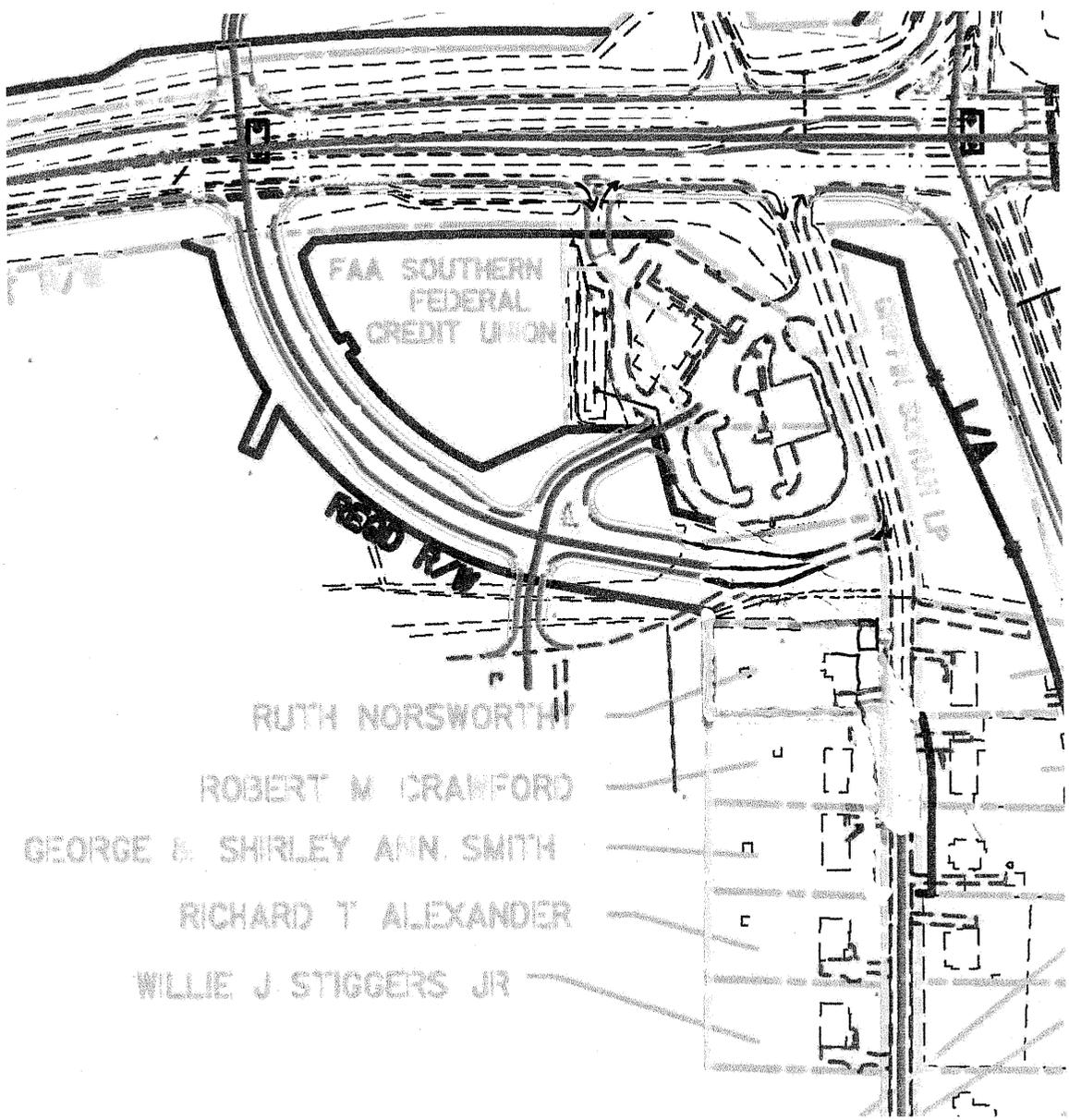
$$\text{Total RIW} \rightarrow 45,768 \text{ ft}^2$$

PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

ALTERNATIVE NO.: **R-16**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 3**



SKETCH



PROJECT: **P.I. No. 332890 SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

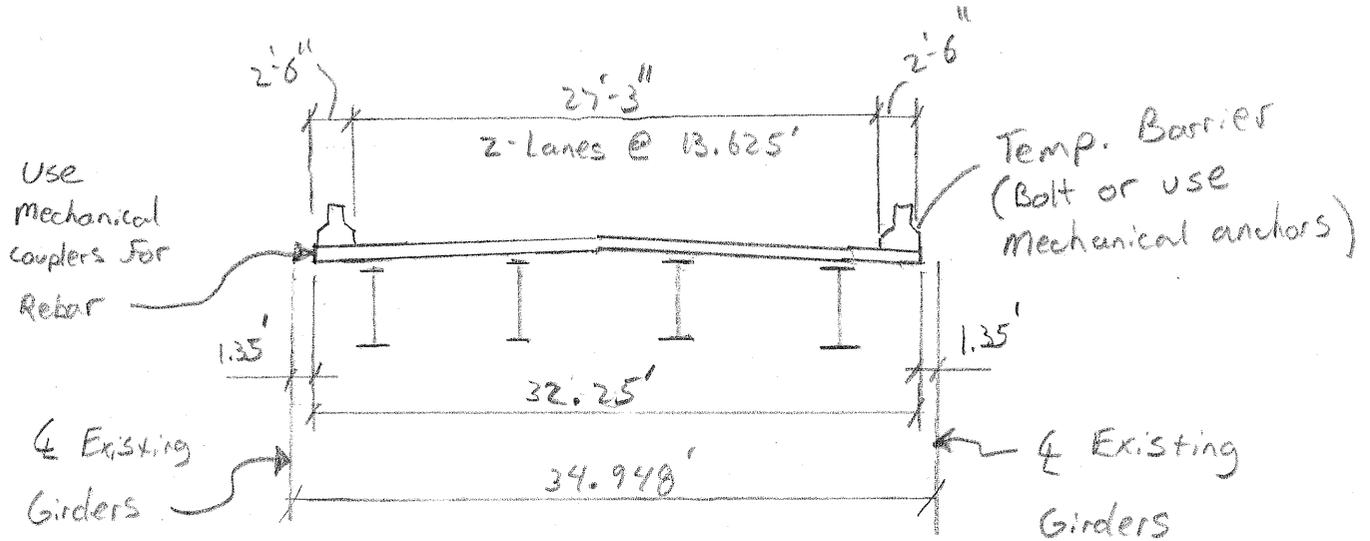
ALTERNATIVE NO.: **S-3**

ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.: **3 of 3**



PROJECT DESCRIPTION

NEED AND PURPOSE

The purpose of P. I. No. 332890 is to improve safety and circulation and increase capacity by widening a section of roadway and the bridge(s) at SR 16 in order to provide exclusive turn lanes for east and west bound vehicles and by realigning Carver Road to intersect SR 16 approximately 590 feet west of its current location. In 2004, 2005, and 2006 accident and injury rates either exceeded or far exceeded statewide averages for a roadway of this type; see Table 1. Additionally, future design traffic on SR 16 is projected to nearly double from a maximum of 15,930 ADT to 30,800 ADT by 2030. This will significantly reduce Level of Service delays caused by vehicles waiting to make left turns during times when traffic volumes are peak. Implementation of this project will alleviate traffic congestion on both the east and west bound lanes of SR 16 and improve safety on SR 16 and Carver Road.

TABLE 1: ACCIDENT DATA

Collisions per 100 MVM	SR 16						Carver Road					
	Statewide			Corridor			Statewide			Corridor		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Total Accidents	509	554	548	634	681	459	467	388	382	5501	2272	2295
Total Injuries	127	140	137	376	441	320	105	90	85	5501	1136	765
Total Fatalities	1.33	1.54	1.43	23.49	0	0	1.05	0.95	1.06	0	0	0

PROJECT LOCATION

This project is located in central Spalding County at the interchange of SR 16 and SR 3/US 19. The project corridor east of the interchange with SR 16 and SR 3/US 19 is located within the city limits of Griffin. The project length is 0.79 miles along SR 16 and 0.67 miles along the relocated southbound exit and entrance ramps.

APPROVED CONCEPT (REVISED)

The approved concept provides dual left turn lanes for westbound vehicles turning south at the entrance ramp and a single left turn lane for eastbound vehicles turning north at the entrance ramp onto SR 3/US 19. The southbound entrance ramp is also to be widened to two lanes to accommodate the dual left turns from SR 16, and the ramp and tapers are to be lengthened to meet current road geometry standards. The approved concept also includes relocating Carver Road to intersect SR 16 approximately 400 feet to the west of its current location and the installation of three new traffic signals at both entrance ramps onto SR 3/US 19 and at Carver Road.

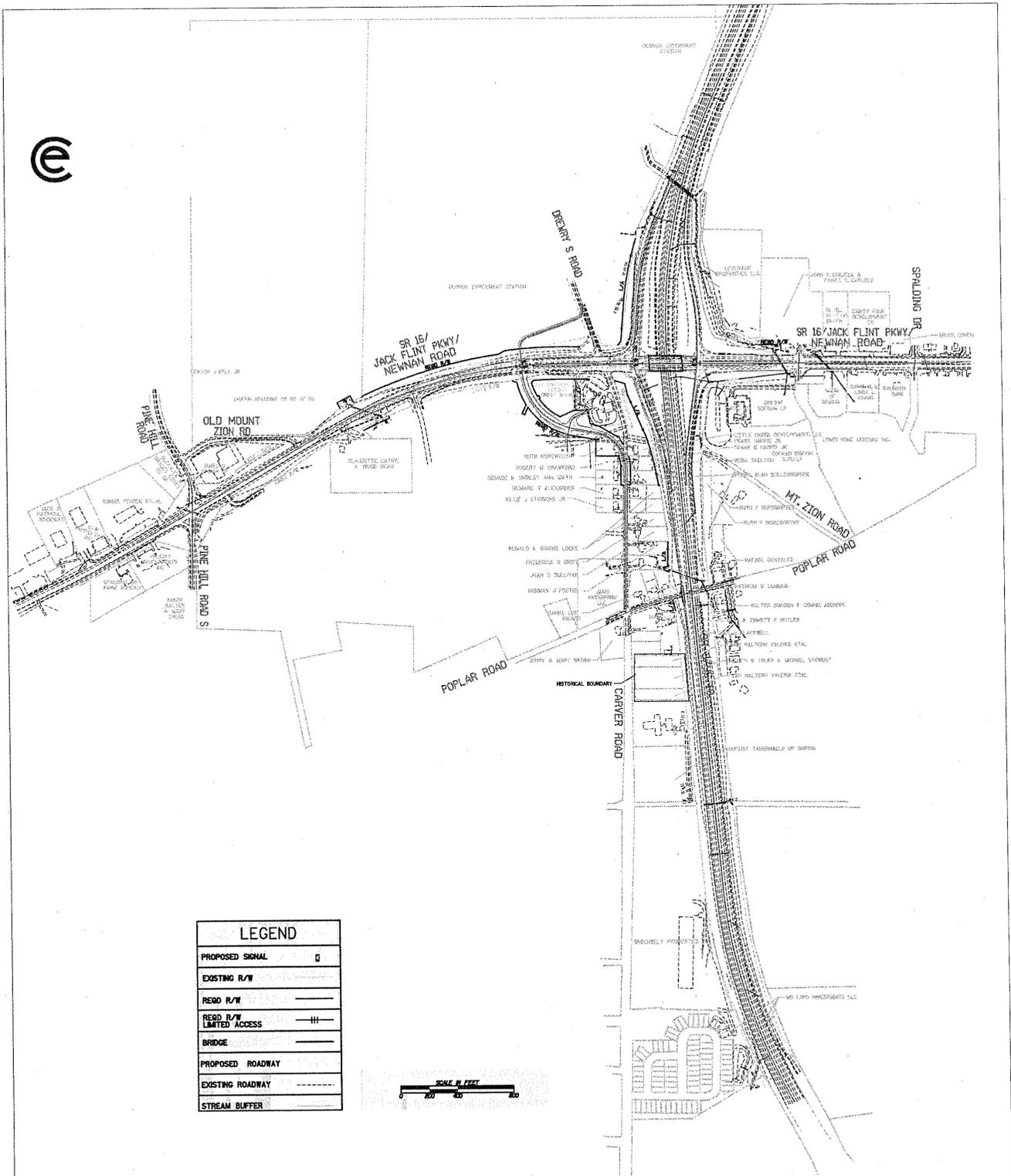


FIGURE 1: P.I. No. 332890 PROPOSED DESIGN

A revision to the approved concept report was submitted for approval on October 8, 2008 and includes replacement of the dual steel bridges on SR 16 with a longer, single concrete bridge which will accommodate four through lanes, dual left turn lanes, and a raised concrete median. The typical mainline section has also been revised to a four-lane urban section with a 20-foot-wide raised concrete median. The limits of the project have been extended eastward to Spalding Drive and

westward to approximately 507 feet west of the Griffin High School driveway. Carver Road will be realigned approximately 590 feet to the west of its current location. The southbound entrance ramp onto SR 3/US 19 will be relocated to the west of its current location to provide additional stacking across the bridge for turning vehicles, as well as to provide 4:1 slopes between the ramp and SR 3/US 19. This will allow for removal of the existing guardrail. The southbound exit ramp from SR 3/US 19 will be realigned to tie to the relocation of the southbound entrance ramp from SR 16. Both ramps will be replaced with concrete pavement and be updated to meet current design standards. Additional right-of-way will be required for construction of the road and ramp realignments, as well as for the roadway widening.

CONSTRUCTION COSTS

The anticipated cost of construction is \$13,808,887, which includes \$3,804,500 for right-of-way and \$15,000 for reimbursable utilities. The numbers include the following markups:

Construction:

- Engineering and Construction - 10.00%
- Zero Inflation (per GDOT)

Right-of-Way:

- Scheduling Contingency - 55.00%
- Administration/Court Costs - 60.00%
- Zero Inflation (per GDOT)

Non-reimbursable utilities (\$165,000) are not 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 Model
- Function Analysis
- Creative Idea Listing and Evaluation 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 WORKSHOP AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 4-day Value Engineering (VE) workshop on Project PI 332890, SR 3/US 19 Turn Lanes @ SR 16 in Griffin. The project is located 100% in Spalding County, Georgia. The workshop will be held November 3-6, 2008 at the following location:

Georgia Department of Transportation
One Georgia Center (OGC)
4th Floor, Room 406
600 West Peachtree Street
Atlanta, Georgia 30308

The point-of-contact is Ms. Lisa L. Myers, Design Review Engineer Manager, and Value Engineering Coordinator, who can be reached at 404-631-1770.

It is expected the owner, Georgia Department of Transportation (GDOT) including representatives from GDOT District 3 (D3), and the design consultants from Columbia Engineering will provide an overview of the project at the beginning of the workshop and be available to answer questions during the VE study effort.

AGENDA

Monday, November 3, 2008

8:30 am - 9:00 am **VE Team Gathers for Introductions**

9:00 am - 9:15 am **Introduction to the Workshop**

- Welcome and opening remarks by GDOT, D3 and Columbia Engineering Representatives
- Team member introductions and VE Team Leader comments
- VE process, workshop organization and agenda
- Objectives of the workshop

9:15 am - 11:15 am **Designer's Overview**

GDOT, D3, and Columbia Engineering will provide an overview of the project. After the overview, the design team will answer VE team questions.

11:15 am - 12:00 pm **Function Analysis Phase**

The VE team will perform function analysis by defining the function of each project element or system in the cost model, selecting the primary or basic functions, and determining the worth, or least cost, to provide the function. The goal is to identify those functions or project elements which offer the greatest opportunity for cost reduction or value improvement.



- 12:00 pm - 1:00 pm **Lunch**
- 1:00 pm - 2:00 pm **Conclude Function Analysis Phase**
- 2:00 pm – 5:00 pm **Creative Phase**

The 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. The VE Team Leader will be responsible for developing an idea listing for the team.

Tuesday, November 4, 2008

- 8:00 am – 10:00 am **Conclude Creative Phase**
- 10:00 am - 11:00 am **Evaluation Phase**

The VE team will analyze the ideas listed in the creative phase and select the best ideas based on project criteria obtained during the design overview and a discussion of the ideas advantages and disadvantages. This will be accomplished by assigning each idea a *Gut Feel Index* rating between 1 and 5, with 5 being the best, based on the team's consensus of how well the idea meets the noted criteria.

The team selects the highly rated ideas for research and development.

- 11:00 am - 12:00 pm **Development Phase**

The VE team will develop creative ideas into alternate designs. Initial and life cycle cost estimates comparing original and proposed alternatives will be prepared. Selected alternatives will be developed and supported with sketches, calculations and substantiation for change. Suppliers of materials and equipment will be contacted and specialists consulted.

- 12:00 noon - 1:00 pm **Lunch**
- 1:00 pm - 5:00 pm **Continue Development Phase**

Wednesday, November 5, 2008

- 8:00 am - 8:30 am **Review Status and Progress of the Team**

The VE team will assess its status and plan for completion of the alternatives development.

- 8:30 am - 12:00 noon **Continue Development Phase**
- 12:00 noon - 1:00 pm **Lunch**



1:00 pm - 3:00 pm

Continue Development Phase

3:00 pm - 5:00 pm

Completion of Development Phase

The VE team will wrap up and complete the development effort. The VE Team Leader will be responsible for reviewing each developed idea for completion and preparing a summary of the VE alternatives in preparation for the out-briefing presentation.

Thursday, November 6, 2008

8:00 am - 9:00 am

Preparation for Presentation Phase

The VE team will finalize a summary of the VE alternatives with descriptions and initial and life cycle costs for a verbal presentation to interested parties. Summary of Potential Cost Saving worksheets will be copied for distribution to VE presentation attendees.

9:00 am – 10:45 am

Presentation Phase

The VE team will present its alternatives to GDOT, D3, and Columbia Engineering 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.

10:45 am – 11:00 am

Workshop “Post Mortem” and Closing Remarks

11:00 am

Adjourn

Value Engineering Study Task Flow Diagram



Preparation Effort

Coordination Project
 Verify Schedule
 Suggest Format for Designer Presentation
 Outline Project Responsibilities
 Outline Needed Background Data
 Define Project Value Objectives
 Identify Project Constraints

Prepare for Workshop
 Collect Project Data
 Distribute Data to Team Members
 Team Members Become Familiar with Project

Construct Cost Models
 Construct Cost Models
 Construct Graphic Function Analysis
 Outline High Cost Areas

LCC Model
 Roadway
 Bridges
 MOT
 Energy
 User Impact

Workshop Effort

Information Phase
 Introduction by VETL
 Project Description and Presentation by Designer
 Outline Owner Requirements
 Review Project Data
 Visit Project Site (Alt.)

Function Identification and Analysis Phase
 Analyze Project Costs and Energy Usage
 Perform Function Analysis and FAST Diagram
 Identify High Cost and Energy Areas
 Calculate Cost/Worth Ratios
 Identify Paradigms
 List Ideas Generated During Function Analysis

Speculation Phase
 Introduction by VETL
 Creative Idea Listing:
 - Quantity of Ideas
 - Association of Ideas
 Brainstorm
 Do Creative Thinking
 - Group Thinking
 - Individual Thinking
 Use Checklist for Ideas

Evaluation Phase
 Eliminate Impractical Ideas
 Rank Ideas with Advantages/Disadvantages
 Evaluate Alternatives (Include Non-Economic considerations: Safety, Reliability, Environment, Aesthetics, O&M, etc.)
 Select Best Ideas for Implementation

Development Phase
 Develop Proposed Alternatives
 Prepare Alternative Design Sketches
 Estimate Costs
 Perform Life Cycle Comparison
 - Initial Cost
 - Redesign Cost
 - O&M Cost
 - LCC Cost

Presentation Phase
 Summarize Findings
 Present VE Ideas to Owner/User/Designer
 Oral Presentation

Post-Workshop Effort

VE Study Report
 Develop Implementation VE Report
 Designer Prepares Responses to VE Report
 Owner Evaluates Recommendations

Implementation Phase
 Participate in Implementation Meeting with Owner/User/Designer/VE Team, as needed
 Prepare Final VE Report

Final Acceptance
 Redesign by Designer

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 design team 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:

- Half Size Construction Plans entitled Plan and Profile of Proposed SR3/US19 Turn Lanes at SR16 in Griffin; Spalding County, Project Number NH-0001-4(62), P. I. No. 332890, prepared by Columbia Engineering for the State of Georgia Department of Transportation, dated 03 October, 2008.
- Preliminary Right-of-Way Cost Estimate for Project Number NH-0001-4(62) Spalding, P.I. No. 332890, prepared by the State of Georgia Department of Transportation Office of Right-of-Way; dated October 3, 2008;
- Revised Project Concept Report, Department of Transportation, State of Georgia, Office of Preconstruction for NH-0001-04(62), Spalding County, P. I. No. 332890; dated October 8, 2008;
- Estimate Report for file “332890-Preliminary”, prepared by District 3, State of Georgia Department of Transportation; dated July 3, 2007;
- Utility Cost Estimate for Project NH-0001-04(62), Spalding County, P. I. No. 332890; prepared by the State of Georgia Department of Transportation Office, Office of Utility; dated July 19, 2007;
- Bridge and Structures Design Policy Manual, prepared by the Georgia Department of Transportation, Office of Bridge and Structural Design, dated October 2005, revised April 2007;
- Item Mean Summary for 07/2007 to 06/2008 compiled by the State of Georgia Department of Transportation; dated June 26, 2008;
- 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.

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 4 or 5. Only those ideas rated 4 or 5 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. It is recommended that personnel from GDOT and the design team 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 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.
Michael Moilanen, PE	Senior Structural Engineer	ARCADIS U.S., Inc.
Vinique Word, PE	Transportation Engineer	Delon Hampton & Associates
Stephen Havens, PE, PMP, CVS	VE Team Leader	Lewis & Zimmerman Associates

OWNER/DESIGNER PRESENTATION

Representatives from GDOT and Columbia Engineering presented an overview of the project on Monday, November 3, 2008. 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 Thursday, November 6, 2008 to GDOT and Columbia Engineering. 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.

ECONOMIC DATA

The VE team developed economic criteria used for evaluation with information gathered from the State of Georgia Department of Transportation, Columbia Engineering, and District 3 (D3). 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:	2008
Construction Start-Up:	Long Range
Construction Duration:	±24 Months (Columbia Engineering)
Economic Planning Life:	35 years for Pavement
Economic Planning Life:	50 years for Bridges
Discount Rate/Interest:	3.20% (Per GDOT)
Inflation/Escalation Rate:	0.00% (Per GDOT)
Cost	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	10.0% (1.10)
(Composed of: Engineering and Construction at 10.00%)	

COST ESTIMATE SUMMARY AND COST MODEL

The VE team prepared the attached cost model for the project prior to the workshop. The cost model is 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 and shoulder reductions
- Median Width Reduction on Bridge only
- Sidewalk, curb & gutter reductions
- Right-of-Way Reductions

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:

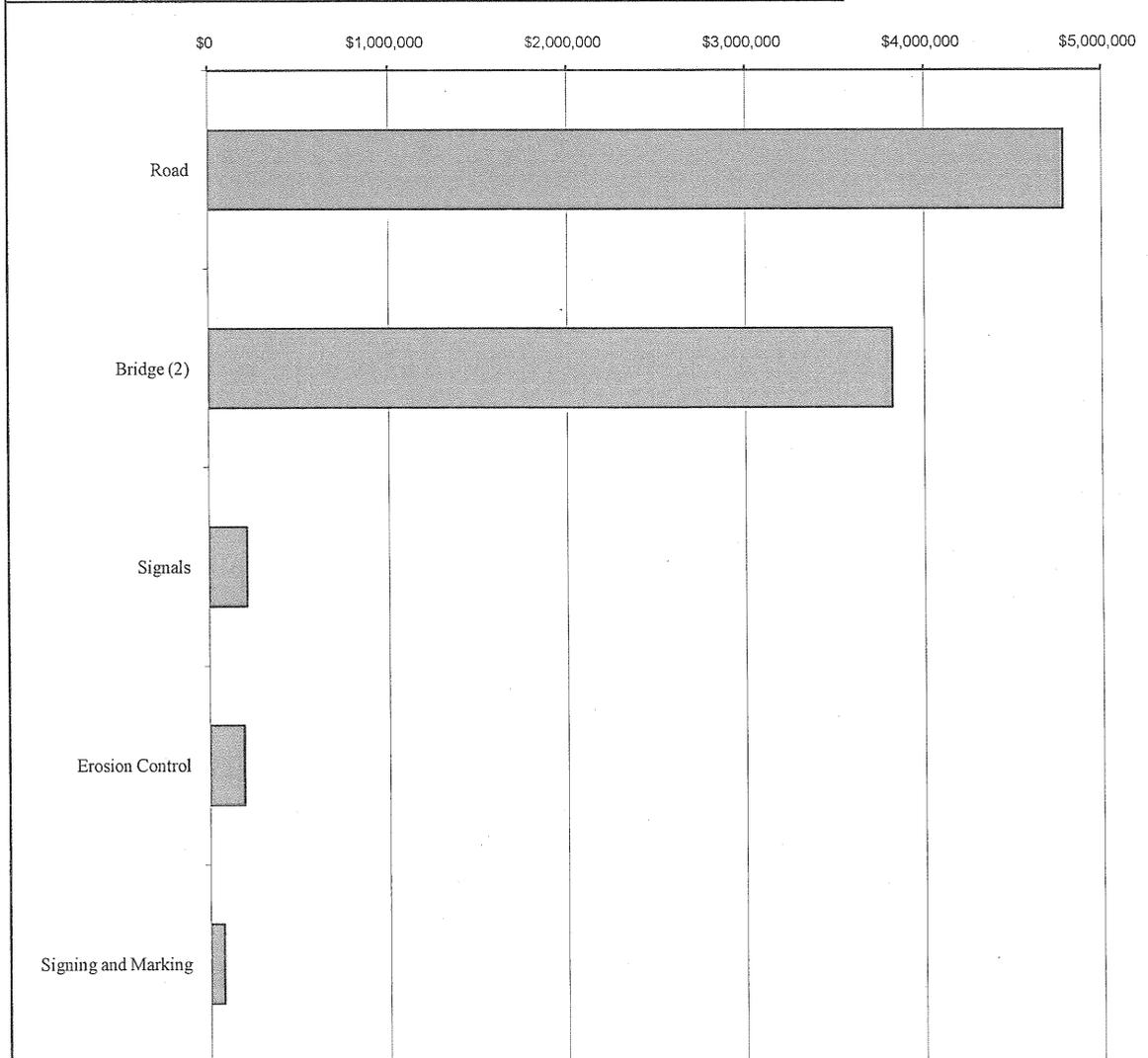
NH-0001-04(62)	Asphalt Overlay	Asphalt Full Depth Per Square Yard	Concrete Section Full Depth
P.I. No. 332890	\$6.60	\$52.49	\$99.05

COST HISTOGRAM



Project: SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN
 Spalding County, Georgia Department of Transportation, District 3
 Design Development Stage

P. I. No. 332890		COST	PERCENT	CUM. PERCENT
Road		4,786,030	52.70%	52.70%
Bridge (2)		3,819,760	42.06%	94.76%
Signals		210,000	2.31%	97.08%
Erosion Control		189,439	2.09%	99.16%
Signing and Marking		76,032	0.84%	100.00%
Construction Subtotal		\$ 9,081,261	100.00%	
Engineering and Construction at 10.00%		\$ 908,126		
Inflation Based on 0.00% per annum for 0.00 Years (54) at 0.00%		\$ -		
Construction Total		\$ 9,989,387	Construction	10.00%
Right-of-Way Costs		\$ 1,534,067		
Right-of-Way Subtotal		\$ 1,534,067		
Scheduling Contingency 55.00%		\$ 843,737		
Administration / Court Costs 60.00%		\$ 1,426,682		
Inflation Factor 0.00%		\$ -		
Right-of-Way Total		\$ 3,804,500	ROW	148.00%
Reimbursable Utilities Costs		\$ 15,000		
Reimbursable Utilities Subtotal		\$ 15,000		
GRAND TOTAL		\$ 13,808,887		



Costs in graph are not marked-up.

FUNCTION ANALYSIS

A random function analysis was performed to (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic functions needed to attain the given project purpose and need, (4) identify other goals, and (5) identify secondary functions that should be addressed by the VE team. The Random Function Analysis worksheet completed by the team for the project in its entirety and the various elements follow.

The key opportunity areas for potential cost reduction established during the function analysis session (including input from the design team during the design overview) includes the following:

- Roadway
 - Improve Geometry
 - Medians
 - Turning Lanes
 - Turning Radius
 - Sidewalks
 - Drainage
 - Curb & Gutter Requirements
 - Drainage Piping
- Structures
 - Improve Durability
 - Pavement
 - Improve Geometry
 - Medians
 - Turning Lanes
- Traffic
 - Reduce Delays
 - Traffic Signals
 - Crosswalks

RANDOM FUNCTION ANALYSIS



PROJECT: **P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN** SHEET NO.: **1 of 2**
Spalding County, Georgia Department of Transportation, District 3
Design Development Stage

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
PROJECT	Improve	Circulation	B
	Improve	Geometry	RS
	Improve	Safety	B
	Accommodate	Pedestrian Traffic	S
	Increase	Capacity	G
	Improve	Convenience	G
	Control	Access (Left Turns)	RS
	Improve	Level of Service	HO
	Protect	Environment	G
	Prevent	Flooding	RS
	Improve	Aesthetics	G
	Meet	Urban Arterial Requirements	G
	Reduce	Maintenance	G
	Meet	Code Requirements	RS
ROADWAY	Move	Earth	RS
	Add	Left Turn Lanes	RS
	Add	Medians	RS
	Control	Stormwater	RS
	Transfer	Stormwater	RS
	Store	Stormwater	RS
	Improve	Durability	G
	Add	Sidewalks	S

Function defined as:	Action Verb	Kind:	B = Basic	HO = Higher Order
	Measurable Noun		S = Secondary	LO = Lower Order
			RS = Required Secondary	

CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

During the Creativity Phase, numerous ideas were generated using conventional brainstorming techniques. These ideas were recorded and are shown with their corresponding ranking on the attached Creative Idea Listing Worksheets. For the convenience of tracking an idea through the VA process, the ideas were grouped according to the following categories and numbered in the order in which they were conceived. The following letter prefixes were used to identify the categories.

PROJECT CLEMENT	PREFIX
Roadway	R
Structures	S
Traffic	T

Creative Idea Evaluation

After discussing each idea, the team evaluated the ideas by consensus. This effort produced 18 ideas rated 4 or 5 to research and develop into formal VE alternatives and 5 ideas to develop as design suggestions to be included in the Study Results section of the report. Ideas that were not developed further may have been combined with another related idea or discarded as a result of additional research indicating the concept as not being cost effective or technically feasible. The project team is encouraged to review the Creative Idea Listing and Evaluation worksheet since it may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING



PROJECT: P.I. No. 332890, SR 3/US 19 TURN LANES @ SR 16 IN GRIFFIN <i>Spalding County, Georgia Department of Transportation, District 3</i> <i>Design Development Stage</i>	SHEET NO.:	1 of 2
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NO.	IDEA DESCRIPTION	RATING
	ROADWAY (R)	
R-1	Keep the existing southeast quadrant as is with exception of the left turn and median.	Combine with R-11
R-2	Reduce the median width on the SR 16 bridge in order to increase the two left turn lane widths feeding onto SR 3/US 19 South.	5
R-3	Retain the existing southbound exit ramp and widen as needed in lieu of shifting the centerline of the ramp.	4
R-4	Design a single access to the existing properties utilizing Carver Road as a common access.	4
R-5	Eliminate curb and gutter in the northwest quadrant and sheet flow directly into the proposed ditch.	4
R-6	Use 12-foot in lieu of 16-foot shoulders on SR 16.	4
R-7	Construct the intersection on SR 16/SR 3/US 19 southbound side from concrete to improve durability and reduce maintenance.	4
R-8	Make the raised medians grass in lieu of concrete.	5
R-9	Use 3:1 slopes in lieu of 2:1 where possible on the south side of SR 16.	4
R-10	Reconfigure curve KC131 for the super elevation and drainage structure requirements.	4
R-11	Retain more of the existing curb and gutter on both sides of SR 16 east of SR 3/SR 19.	4
R-12	Reduce the quantity of catch basins by increasing the spacing where possible throughout the length of SR 16.	2
R-13	Reduce the width of the SR 3/SR 19 southbound entrance ramp by four feet.	4
R-14	Make the SR 3/SR 19 southbound entrance radius longer to improve left turn movement.	4
R-15	Use 11-foot lanes in lieu of 12-foot lanes on Carver Road.	4
R-16	Keep the existing Carver Road as a right-in/right out access to the bank, school parking, and existing properties and remove the current right-in/right-out to the bank entrance.	DS
R-17	Use 6 inch by 24 inch curb & gutter in lieu of 6 inch by 30 inch.	DS
R-18	Start the second left turn lane before the traffic signal on the east side of the SR 16 Bridge.	DS
	STRUCTURES (S)	
S-1	Provide a 2-foot median in lieu of an 8-foot median to reduce the bridge width by 6 feet.	4
S-2	Minimize the intermediate pier piling conflicts with the existing piles.	DS

Rating: 1→2 = Not to be developed 3→4 = Varying degrees of development potential 5 = Most likely to be developed DS = Design suggestion ABD = Already being done
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