



*P. I. No. 220680: State Route 4 / 15th Street  
Improvements*  
Richmond County, Georgia

Value Engineering Study Report  
Preliminary Design Stage

February 2007

*Design Teams*



*Value Engineering Consultants*



**Lewis & Zimmerman Associates, Inc.**

February 22, 2007

Ms. Lisa L. Myers  
Design Review Engineer Manager  
State of Georgia Department of Transportation, General Office  
No. 2 Capitol Square, Room 266  
Atlanta, Georgia 30334-1002

Re: Project Number STP-043-1(57), P. I. No. 220680, State Route 15/4<sup>th</sup> Street Improvements in  
Richmond County, Georgia  
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to submit four hard copies and one CD-ROM of the referenced report.

Areas of concern include: (1) the proposed use of two different lane and median widths within the project limits in a distance of only 1.824 miles; (2) the multitude of driveways within the proposed historic district along 15<sup>th</sup> Street, and (3) right-in/right-out only cross streets and the use of "U" turn lanes; all of which could pose a continued accident rate that is higher than normal.

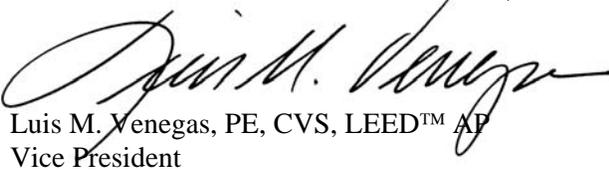
As such, the objective of the value engineering study was to identify opportunities to improve the value of the project in terms of fulfilling the basic functions of improving safety, increasing capacity and limiting access and, where logically possible and warranted, reducing capital cost.

We thank you and the State of Georgia Department of Transportation for your hospitality and for providing the information necessary for the VE team to generate creative, alternative solutions for this project.

We are available to answer any questions you may have as you review this report and determine implementation.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.



Luis M. Venegas, PE, CVS, LEED™ AP  
Vice President

Attachment

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## EXECUTIVE SUMMARY

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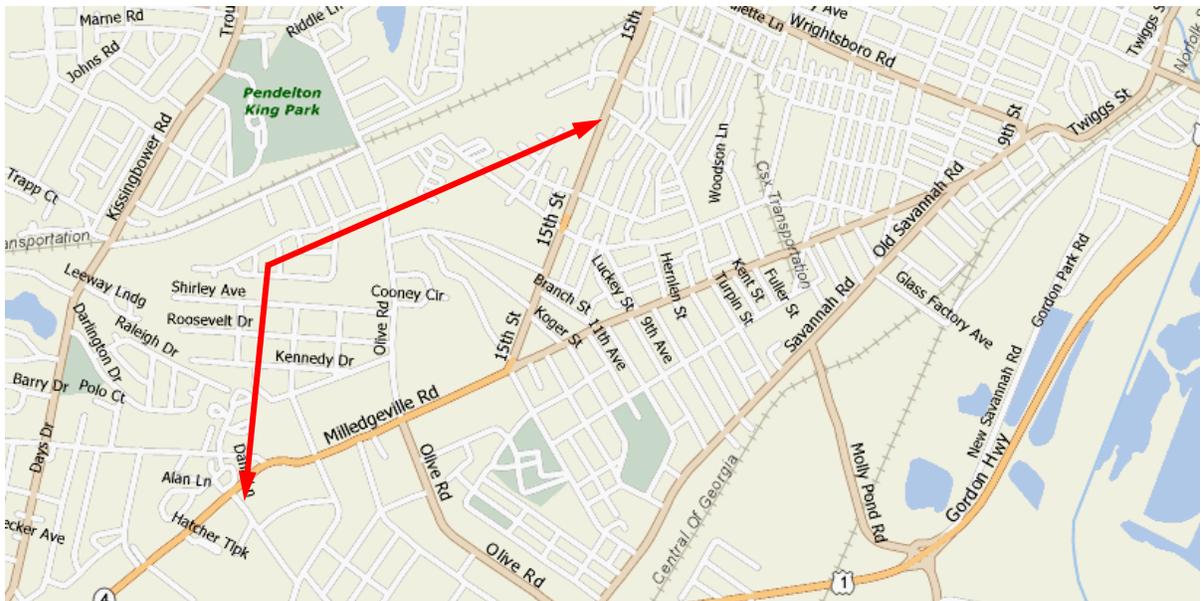
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### INTRODUCTION

This value engineering (VE) study report summarizes the events of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the State of Georgia Department of Transportation (GDOT), Atlanta, Georgia. The subject of the study was State Route 4/15<sup>th</sup> Street Improvements, STP-043-1(57), P. I. 220680, Richmond County, Georgia, being designed by GDOT.

### PROJECT DESCRIPTION

This project involves the widening and reconstruction of the State Route (SR) 4/15<sup>th</sup> Street/Martin Luther King, Jr. (MLK) Boulevard corridor from Milledgeville Road to Government Street in the City of Augusta. The total project length is 1.824 miles. Currently, SR 4/Milledgeville Road/MLK Boulevard consists of four, 12-foot travel lanes (two in each direction) with a 14-foot flush median, 5-foot sidewalks, and curb and gutter, with a posted speed of 40 miles per hour (mph). SR 4/15th Street consists of two, 12-foot to 18-foot lanes (one in each direction) with intermittent sidewalks and curb and gutter with a posted speed of 35 mph. The need exists to decrease vehicle accidents and injury rates, and provide satisfactory capacity on SR 4 between Milledgeville Road and Government Street to improve the level of service (LOS) and operational characteristics. Without the proposed improvements, the corridor will operate at a LOS “F” in 2030. With the proposed improvements, the corridor will operate at LOS “D.”



SR4/Milledgeville Road/MLK Boulevard - Proposed typical section(s): four 11-foot travel lanes (two in each direction), and an 18-foot raised median with a 12-foot left-turn lane at median openings. The existing curb and gutter and sidewalk are to be maintained wherever possible from Milledgeville Road to Olive Road. From Olive Road to 15<sup>th</sup> Avenue, the roadway will have 14-foot shoulders with an 8-foot shared-use path, and curb and gutter on both sides of the roadway.

SR 4/15<sup>th</sup> Street - Proposed typical section(s): four 12-foot travel lanes (two in each direction), and a 20-foot raised median with a 12-foot left-turn lane at median openings, 15-foot shoulders with an 8-foot

shared use path and curb and gutter on both sides of the roadway.

The probable cost of construction for this project is based on GDOT's cost estimate dated January 26, 2007 of \$11,425,039. This figure comprises: (1) Construction Subtotal at \$10,386,399, and (2) Engineering and Construction (10.00%) at \$1,038,640 with no inflation. However, during the opening discussion of the VE study, it was determined that inflation needs to be added to the project along with right-of-way costs.

GDOT provided an inflation rate of 8.00% per annum based on recent historical data. In addition, the Project Concept Report, dated September 9, 2004, indicates the inflation rate needs to be applied over a six-year period. This results in an inflation rate of 74.56%.

The right-of-way costs were taken from page 14 of the Project Concept Report and were noted to be: (1) Land at \$735,564, (2) Improvements at \$3,605,825, (3) Relocation at \$505,000, and (4) Damages 246,000, for a subtotal of \$5,092,389. To this figure, Scheduling Contingency at 55% (\$2,800,814), Administration/Court Costs at 60% (\$4,735,922) and Inflation Factor at 40% (\$5,051,650) were added amounting to \$12,587,364 for a grand total right-of-way cost of \$17,680,775. As such, the grand total for the project is now \$35,810,877. It is noted that utility relocation costs have not yet been calculated, and the right-of-way costs are expected to rise.

## **CONCERNS AND OBJECTIVES**

Although the project is a straight forward improvement endeavor to reduce the accident rate along this stretch of road, it does have areas of opportunity for functional evaluation. This is particularly true with regard to right-of-way takes – the reason the project fell into a higher cost category requiring a value engineering study.

Other areas of concern include the current use of two different lane and median widths within the project limits in a distance of only 1.824 miles. This change in physical attributes could lead to unanticipated drive expectations which could lead to confusion and potential accidents. Furthermore, a multitude of driveways within the proposed historic district along 15<sup>th</sup> Street could result in rear-end accidents from drivers entering and exiting these drives. Finally, several right-in/right-out only cross streets and the use of “U” turn lanes could pose continued driver frustration keeping the accident rate at a higher-than-normal rate.

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

## **HIGHLIGHTS OF THE STUDY**

Listed below are some of the ideas developed.

Within the project limits, numerous “right-in/right-out only” intersections need to be addressed in terms of improving safety as drivers have a proclivity to ignore cautious, safe vehicular movements merely to make a U-turn as soon as possible. This, in turn, slows traffic, reduces traffic flow, and ultimately recreates some of the same unsafe practices the project is supposed to improve. As such, Alternative No. 6 barricades access to SR 4/15<sup>th</sup> Street from the following streets: Tubman Home Road (north and south); 15<sup>th</sup> Avenue; Koger Street; Branch Street; Koger Road; Post Lane; Morgan Street; and Dewitt Road.

Although increasing the project's initial cost by about \$150,000, the gain in safe, crossing movements outweighs the additional cost and adds tremendous value to the project.

The Augusta Regional Transportation Study's Long Range Transportation Plan desires to have the continuous traffic flow proceed easterly onto Martin Luther King Jr. Boulevard vs. continuing along the more northerly SR 4 / 15<sup>th</sup> Street traffic flow. However, the demographic data does not support this desire. As such, Alt. Nos. 9 and 10 would improve the alignment of the SR 4/15<sup>th</sup> Street/Martin Luther King Jr. Boulevard/15<sup>th</sup> Avenue/Wooten Road intersection to permit the continuous traffic movement onto the SR 4/15<sup>th</sup> Street path. While increasing initial cost by about \$180,000, the added value associated with driver expectation of continuing along the anticipated major route allows for a "natural" flow while simultaneously reducing potential accidents at this 5-legged intersection. Furthermore, the bulk of the traffic "wants" to continue along the SR 4/15<sup>th</sup> Street route, as demonstrated by the provided traffic counts and demographic data.

As noted on Alt. No. 1, the current design constructs 8-foot wide multi-use paths on both sides of the SR 4/15<sup>th</sup> Street corridor from Olive Road to Government Street to accommodate pedestrian traffic and to assist in implementing the Augusta Bicycle and Pedestrian Plan. Helping to implement a non-state bicycle/pedestrian plan is commendable; but not mandatory and could be the allowance for the plan in the future by others. As such, this alternative changes the "mix" of the multiuse path/sidewalk by retaining the 8-foot wide multi-use path on the west side of the project and providing a 5-foot wide sidewalk on the east side between the aforementioned side roads. Initial savings of nearly \$471,000 is possible while still affording safe passage for bicyclists on the west side of the project and, more importantly, providing pedestrian mobility on both sides of the mainline. In a similar manner, Alt. No. 4 takes a more drastic approach and only provides for 5-foot wide sidewalks on both sides of the project from start to finish, not just between Olive Road and Government Street. Initial savings approach \$490,000 and still provides for safe pedestrian movement/passage on both sides of the project for the entire 1.824 miles.

The current design proposes 11-foot travel lanes from the beginning of the project at Dean' Bridge Road/Milledgeville Road/SR 4 intersection to the intersection with 15<sup>th</sup> Avenue, and then proposes 12-foot travel lanes on SR 4/15<sup>th</sup> Street from 15<sup>th</sup> Avenue to Government Street. Alt. No. 8 would continue the 11-foot travel lanes throughout the project from 15<sup>th</sup> Avenue to Government Street, thus simplifying construction, design and driver expectation, and delineating initial savings of about \$290,000.

The present design has an 18-foot raised median from the beginning of the project at Dean's Bridge Road/Milledgeville Road/SR 4 intersection to 15<sup>th</sup> Avenue; approximately half the project, and a 20-foot raised median from SR 4/15<sup>th</sup> Street to Government Street, the end of the project. Alt. No. 15 proposes a 16-foot raised median throughout the SR 4/15<sup>th</sup> Street project to provide median width continuity, simplify construction, reduce environmental impacts, and precludes driver confusion. Construction and right-of-way savings approaching \$480,000 are possible as noted in the alternative.

Finally, it appears the improvements to the Government Street / Carver Road intersection may not be needed. Since the intersection is already signalized and the traffic count is not out-of-line, the proposed realignment of Government Street to face Carver Road can be eliminated and the commercial property of the southwest corner of the intersection can be saved. It is acknowledged the secondary improvements to Poplar Street would also not be undertaken. Access to the Castleberry Food property is still maintained along 15<sup>th</sup> Street and on Government Street with no apparent adverse effect. This change is noted on Alt. 5 and calculates initial construction and right-of-way savings of almost \$550,000.

The Summary of Potential Cost Savings worksheet following this narrative outlines all of the alternatives and 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 worksheets in the Value Analysis and Conclusions section of this report.



# SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: <b>STP-043-1(57) STATE ROUTE 4/15TH STREET IMPROVEMENTS</b> <b>Richmond County, Georgia Department of Transportation, District 2</b> <i>Preliminary Design Stage</i>						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
1	Use an 8-foot wide multiuse lane on the west side and a 5-ft. wide sidewalk on the east side of the project from Olive Road to Government Street	\$470,818	\$0	\$470,818		\$470,818
4	Use 5 ft. sidewalks throughout the project	\$488,424	\$0	\$488,424		\$488,424
5	Do not construct improvements along Government Street	\$552,769	\$0	\$552,769		\$552,769
6	Selectively barricade side roads	\$0	\$145,147	(\$145,147)		(\$145,147)
8	Reduce the 12 ft. travel lanes to 11 ft. throughout	\$2,080,325	\$1,789,004	\$291,321		\$291,321
9 / 10	Improve the horizontal alignment to allow continuous movement along SR 4/15 <sup>th</sup> Street	\$20,051	\$199,164	(\$179,113)		(\$179,113)
11	Reevaluate improvements at the southern termini of the project - Milledgeville Road/SR 4	\$115,989	\$0	\$115,989		\$115,989
12	Use common residential drives along SR 4/15th Street in the proposed historic district	\$44,270	\$43,063	\$1,207		\$1,207
13	Use an auxiliary parking lane along the proposed 15 <sup>th</sup> Street historic district between Essie McIntyre Boulevard and the Castleberry Food's entrance	\$92,837	\$18,008	\$74,829		\$74,829
14	Reduce the 20-ft. median to 18 ft. throughout the project	\$167,990	\$40,615	\$127,375		\$127,375
15	Reduce the 20-ft. median to 16 ft. throughout the project	\$480,146	\$0	\$480,146		\$480,146
17	Use retaining walls to keep from impacting the YMCA complex	\$51,386	\$91,285	(\$39,899)		(\$39,899)
19	Realign drainage piping at Koger Street and Koger Road	\$45,450	\$32,567	\$12,883		\$12,883
21	Eliminate the two "U" turn "eyebrows" at Tubman Home Road	\$60,954	\$0	\$60,954		\$60,954
23	Do not signalize the Castleberry Food entrance	\$174,560	\$0	\$174,560		\$174,560
24	Use a single longitudinal drainage system versus a parallel system	<b>DESIGN SUGGESTION</b>				

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## **STUDY RESULTS**

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### **INTRODUCTION**

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

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

### **RESULTS OF THE STUDY**

The VE team generated 25 ideas for change during the Function Analysis and Creative Ideas phases of the VE Job Plan. The evaluation of these ideas was based upon their potential for capital cost savings, probability of acceptance, availability of information to properly develop an idea, compliance with perceived quality, adherence to universally-accepted standards and procedures, life cycle cost efficiency, safety, maintainability, constructibility and soundness of the idea.

Of the 25 ideas generated, 20 of them were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 16 alternatives for change with an impact on project costs and 1 design suggestion. These alternatives and design suggestion are presented in detail following this narrative and on the Summary of Potential Cost Savings worksheets.

### **EVALUATION OF ALTERNATIVES**

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

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

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



# SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: <b>STP-043-1(57) STATE ROUTE 4/15TH STREET IMPROVEMENTS</b> <b>Richmond County, Georgia Department of Transportation, District 2</b> <i>Preliminary Design Stage</i>						
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9 / 10	Improve the horizontal alignment to allow continuous movement along SR 4/15 <sup>th</sup> Street	\$20,051	\$199,164	(\$179,113)		(\$179,113)
11	Reevaluate improvements at the southern termini of the project - Milledgeville Road/SR 4	\$115,989	\$0	\$115,989		\$115,989
12	Use common residential drives along SR 4/15th Street in the proposed historic district	\$44,270	\$43,063	\$1,207		\$1,207
13	Use an auxiliary parking lane along the proposed 15 <sup>th</sup> Street historic district between Essie McIntyre Boulevard and the Castleberry Food's entrance	\$92,837	\$18,008	\$74,829		\$74,829
14	Reduce the 20-ft. median to 18 ft. throughout the project	\$167,990	\$40,615	\$127,375		\$127,375
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21	Eliminate the two "U" turn "eyebrows" at Tubman Home Road	\$60,954	\$0	\$60,954		\$60,954
23	Do not signalize the Castleberry Food entrance	\$174,560	\$0	\$174,560		\$174,560
24	Use a single longitudinal drainage system versus a parallel system	<b>DESIGN SUGGESTION</b>				

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**1**

DESCRIPTION: **USE AN 8-FT. WIDE MULTIUSE LANE ON THE WEST SIDE AND  
 A 5-Ft. WIDE SIDEWALK ON THE EAST OF THE PROJECT FROM  
 OLIVE ROAD TO GOVERNMENT STREET**

SHEET NO.: 1 of 4

**ORIGINAL DESIGN:** (Sketch attached)

The original design constructs 8-ft. sidewalks/multi-use paths on both sides of the mainline to accommodate pedestrian traffic and to assist in implementing the Augusta Bicycle and Pedestrian Plan.

**ALTERNATIVE:** (Sketch attached)

Retain the 8-ft. sidewalk/multi-use path on the west side of the project and provide a 5-ft. sidewalk on the east side of the mainline.

**ADVANTAGES:**

- Decreases initial cost
- Decreases ROW costs
- Maintains pedestrian mobility
- Consistent design and construction throughout the project
- Simplifies construction
- Partial implementation of Augusta Bicycle and Pedestrian Plan

**DISADVANTAGES:**

- Loss of amenity
- Bicycle riders are limited to the west side of the mainline only

**DISCUSSION:**

Acknowledging some loss of the proposed Augusta Bicycle and Pedestrian Plan, this alternative still affords safe passage for bicyclists on the west side of the mainline, while, more importantly, providing pedestrian mobility on both sides of the mainline.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 470,818	—	\$ 470,818
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 470,818	—	\$ 470,818



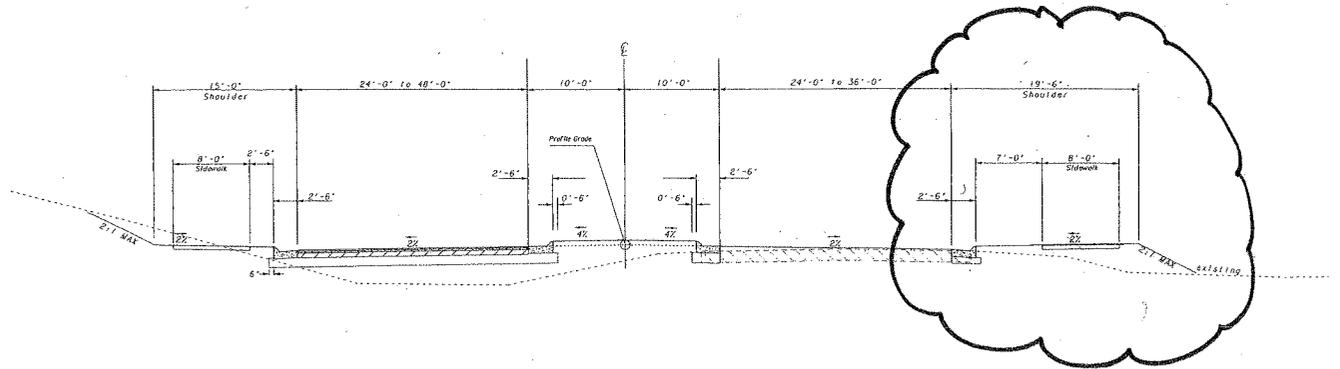
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

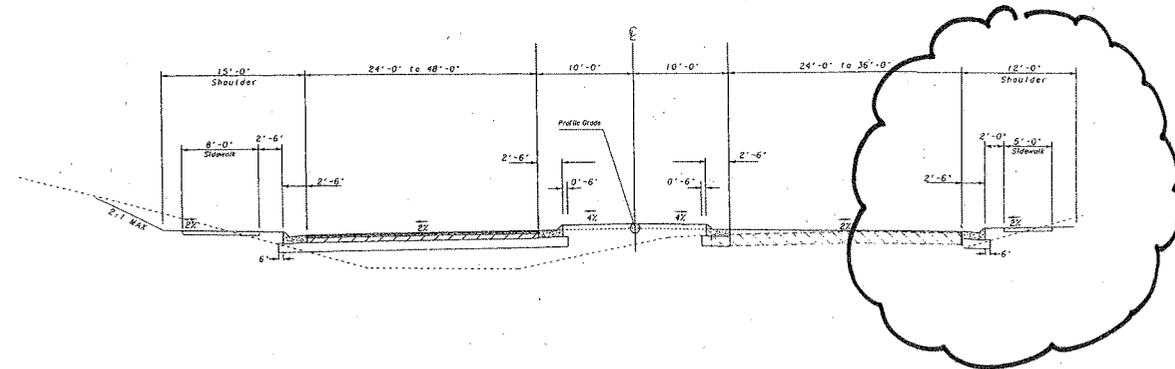
1

AS DESIGNED       ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED



ALTERNATIVE

# CALCULATIONS



PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
Richmond County, Georgia Department of Transportation, District 2  
*Preliminary Design Stage*

ALTERNATIVE NO.:

1

SHEET NO.: 3 of 4

## Quantities

Decrease in Sidewalk

$$\text{Sta } 127+20 \text{ to } 142+85 + 75\text{ft} = 1640\text{ft}$$

$$\text{Sta } 144+76 \text{ to } 150+31 + 75\text{ft} = 630\text{ft}$$

$$\text{Sta } 142+85 \text{ to } 245+30 = 10,245\text{ft}$$

$$L = 12,515\text{ft}$$

$$W = 3\text{ft}$$

$$\text{Area} = \underline{4172 \text{ SY}}$$

ROW (Land only)

$$A = 12,515\text{ft} \cdot 3\text{ft} = \underline{37,545 \text{ ft}^2}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

**4**

DESCRIPTION: **USE 5-FT. SIDEWALKS THROUGHOUT THE PROJECT**

SHEET NO.: 1 of 3

**ORIGINAL DESIGN:**

The original design uses a mix of 5-ft. and 8-ft. sidewalks/multi-use paths in various areas of the project.

**ALTERNATIVE:**

Reduce the 8-ft. sidewalk/multiuse path to 5 ft.

**ADVANTAGES:**

- Decreases initial cost
- Decreases ROW costs
- Maintains pedestrian mobility
- Consistent design and construction throughout the project
- Simplifies construction

**DISADVANTAGES:**

- Augusta Bicycle and Pedestrian Plan not implemented to the fullest extent
- Bicycle riders will have to use the widened travel lanes vs. wider sidewalks / multiuse path
- Reduces bicyclists' safety

**DISCUSSION:**

Constructing 5-ft. sidewalks on this project maintains the pedestrian access and decreases the cost by nearly \$500,000. It is noted that while the Augusta Bicycle and Pedestrian Plan runs down Olive Road and connects to the SR 4/15<sup>th</sup> Street project, the plan and subsequent original design only includes 5-ft. sidewalks on Olive Road. This contradicts the desire to have an 8-ft. wide multi-use path.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 488,424	—	\$ 488,424
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 488,424	—	\$ 488,424

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

SHEET NO.: 4  
 2 of 3

## Quantities

Decrease in Sidewalk:

From Alternative No 1, Area = 4172 SY

Additional Decrease in 8ft Sidewalks:

$$(Sta 146+00 to 150+68 \times 2) \cdot 3ft / 9 = 156SY$$

$$\underline{Area = 4,328 SY}$$

Right of Way (Land):

From Alternative No 1, Area = 37,545 SF

Additional

$$(Sta 146+00 to 150+68 \cdot 2) \cdot 3ft = 1404 SF$$

$$\underline{Area = 38,949 SF}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**5**

DESCRIPTION: **DO NOT CONSTRUCT IMPROVEMENTS ALONG GOVERNMENT STREET**

SHEET NO.: 1 of 5

**ORIGINAL DESIGN:** (Sketch attached)

The original design relocates Government Street to the south of the existing alignment to line up with Carver Drive.

**ALTERNATIVE:** (Sketch attached)

Eliminate the proposed realignment of Government Street and only implement the necessary widening along SR 4/15<sup>th</sup> Street. Access to the Castleberry Food complex is maintained.

**ADVANTAGES:**

- Eliminates a commercial displacement
- Reduces initial cost
- Reduces construction time
- Simplifies design and construction
- Simplifies the drainage system at this location

**DISADVANTAGES:**

- Does not align the Government Street/Carver Drive intersection
- Perceived loss of safety (this intersection is already signalized)
- Loss of amenity/desired improvement for Castleberry Food
- Loss of improvement to Poplar Street

**DISCUSSION:**

With the projected traffic volumes at this intersection, it is believed that in order to save the commercial property at the corner, realignment of the intersection can be avoided. It is acknowledged that secondary improvements to Poplar Street will not be undertaken.

If the skewed intersection is still deemed to be a safety concern, it may be prudent to cul-de-sac Carver Drive to avoid those concerns. Access to/from Carver Drive to the mainline can be achieved via Bleakly Street to either Swanee Quintet Boulevard or the continuation of Poplar Street on the east side of the mainline.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 552,769	—	\$ 552,769
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 552,769	—	\$ 552,769

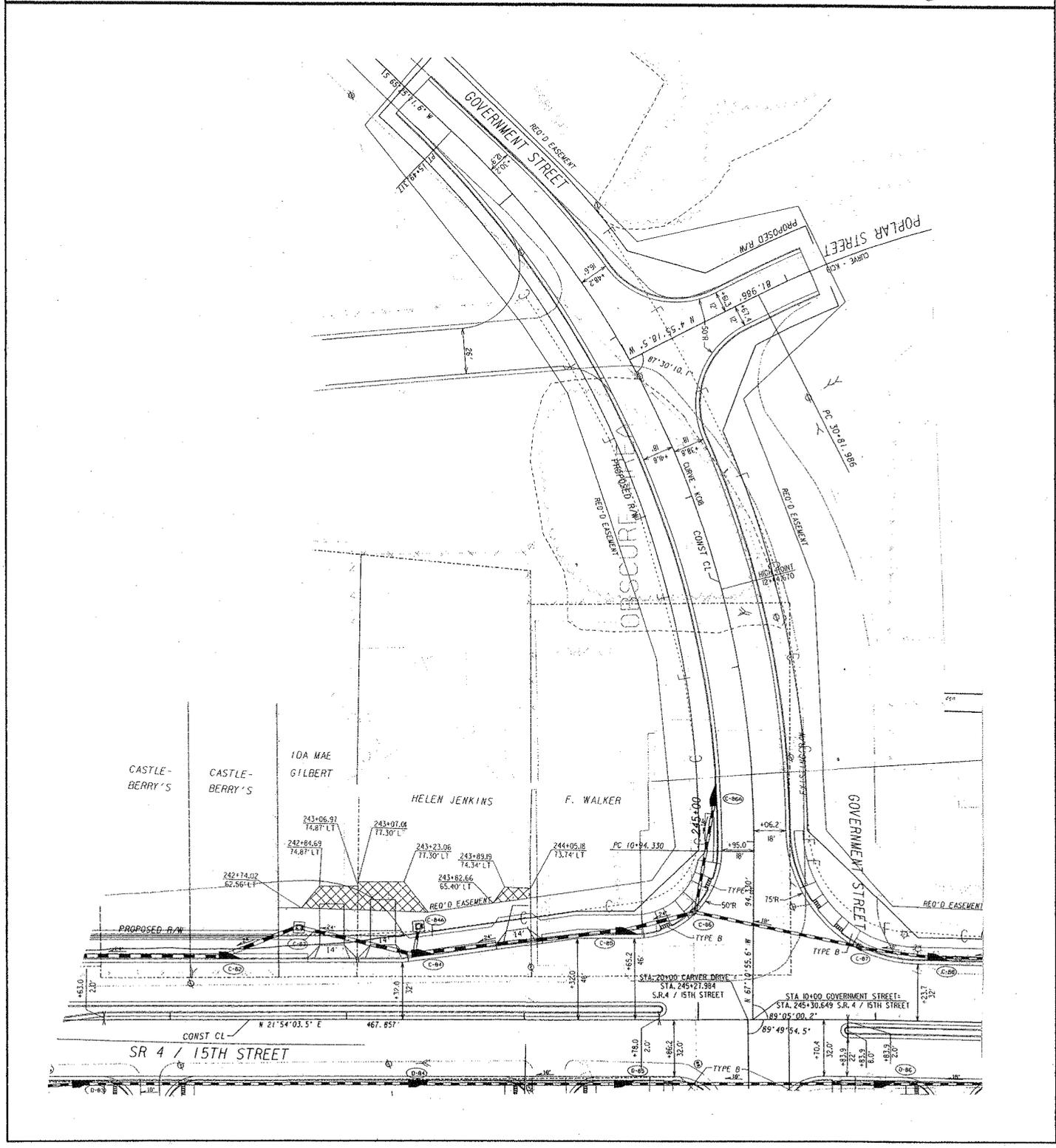
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
 Richmond County, Georgia Department of Transportation, District 2  
*Preliminary Design Stage*

ALTERNATIVE NO.:

5

AS DESIGNED     ALTERNATIVE

SHEET NO.: 2 of 5



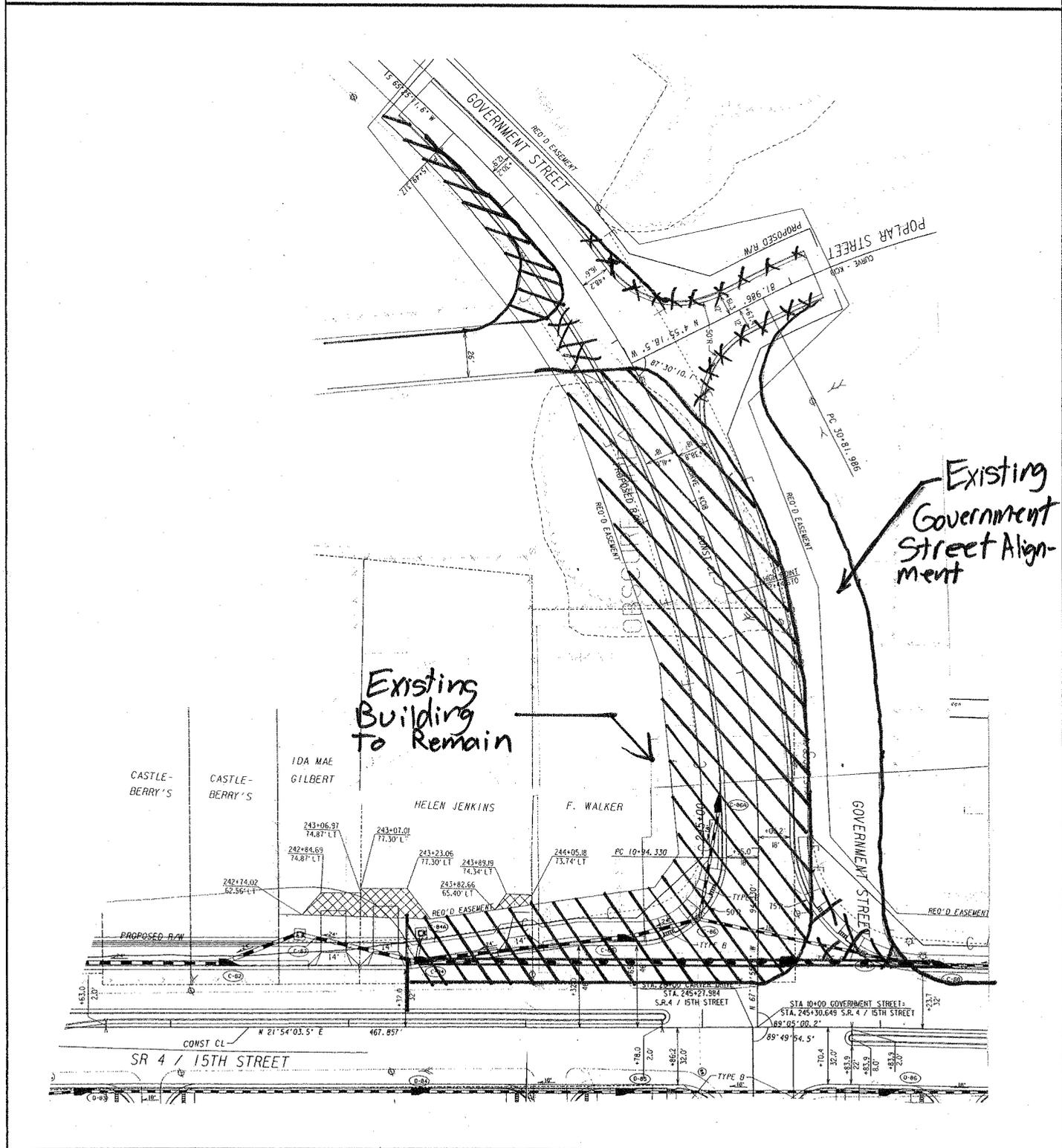
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 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

5

AS DESIGNED     ALTERNATIVE

SHEET NO.: 3 of 5



# CALCULATIONS



PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

5

SHEET NO.: 4 of 5

## Quantities

Roadway (AC)

$$36\text{ft} (15+49.32 - 10+94.33) / 9 = 1820 \text{ SY}$$

$$\text{Agg Base} : 1350 \text{ lb/SY} \cdot 1820 \text{ SY} \cdot \frac{1 \text{ TN}}{2000 \text{ lb}} = \underline{1229 \text{ TN}}$$

$$\text{Base} : 450 \text{ lb/SY} \cdot 1820 \text{ SY} \cdot \frac{1}{2000} = \underline{410 \text{ TN}}$$

$$\text{Binder} : 225 \text{ lb/SY} \cdot 1820 \cdot \frac{1}{2000} = \underline{205 \text{ TN}}$$

$$\text{Surface} : 169 \text{ lb/SY} \cdot 1820 \cdot \frac{1}{2000} = \underline{154 \text{ TN}}$$

Curb & Gutter :

$$Z\text{-Sta } 15+49.32 - 10+94.33 = \underline{910 \text{ LF}}$$

Drainage

65 LF, 18" RCP

L C-86A Catch Basin

$$90 \text{ LF Sidewalk} = 90 \text{ ft} \cdot 5 \text{ ft} = \underline{50 \text{ SY}}$$

Earthwork

Estimated at \$40,000

Right of Way

$$\begin{aligned} \text{Area} &= \left( \frac{1}{2} \cdot 180 \text{ ft} \cdot 25 \text{ ft} + \frac{1}{2} (45 \text{ ft} + 100 \text{ ft}) \cdot 235 \text{ ft} + \frac{1}{2} 50 \text{ ft} \cdot 40 \text{ ft} \right) \\ &= \underline{15,588 \text{ ft}^2} \end{aligned}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

**6**

DESCRIPTION: **SELECTIVELY BARRICADE SIDE ROADS**

SHEET NO.: 1 of 4

## ORIGINAL DESIGN:

The original design constructs a raised median along most of the route. All of the existing side road accesses are maintained with the exception of Wooten Road. In addition, some of the side roads have their conditions changed to right-in/right-out status.

## ALTERNATIVE:

The following streets/side roads are to be closed using permanent construction barricades:

- Tubman Home Road (north and south)
- 15<sup>th</sup> Avenue
- Koger Street
- Branch Street
- Koger Road
- Post Lane
- Morgan Street
- Dewitt Road

## ADVANTAGES:

- Greatly increases safety
- Enhances YMCA property at Tubman Home Road

## DISADVANTAGES:

- Increases initial cost
- Increases travel time for local residence

## DISCUSSION:

An analysis of the connectivity of side roads via various streets running parallel to SR 4/15<sup>th</sup> Street yields opportunities to close-off up to nine side roads. These closures would further enhance safety along the route.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 145,147	—	\$ 145,147
SAVINGS	\$ (145,147)	—	\$ (145,147)

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

6

SHEET NO.: 2 of 4

Analysis of mapping along this project indicates that the following streets could have their direct access to SR4 blocked with alternative access as noted:

• Tubman Home Rd

Access from the north can be eliminated with an alternative access provided via Cook Rd to the east to Olive.

Access from the south could be blocked. This roadway actually divides the YMCA property and blocking this road could actually enhance their facility. Access to the YMCA could be maintained via Kratha Drive.

• 15th Ave

Access could be eliminated with alternative access via either Nellieville Rd & Sullivan Rd, or Dyer St.

• Koger St. & Branch St

Access could be eliminated on ~~Koger St~~ from the south of SR4, with alternative access provided via MLK, Jr.

• Koger Rd.

Koger Rd. access could be cut off from SR4 with alternative access provided via Eagles Way / White Rd.

• Post Lane

Access can be eliminated with alternative access via Douglas St.

• Morgan St. & DeWitt

Access could be cut for both streets with alternative access provided via Emory St & Douglas St.

# CALCULATIONS



PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

6

SHEET NO.: 3 of 4

• Carver Drive

Cutting access to SR4 at Carver Dr. would allow for the elimination of the intersection realignment at Government Rd/Carver Dr./SR4. Alternative access on Carver Dr could be provided via Ramsey St & Swanee Quintet Blvd.

Assumed Cost of Barricades for street closings is \$350, including actual barricade and deadend signs.

Number of Barricades = 9



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**8**

DESCRIPTION: **REDUCE THE 12 FT. TRAVEL LANES TO ELEVEN FT.**  
**THROUGHOUT**

SHEET NO.: 1 of 4

**ORIGINAL DESIGN:** (Sketch attached)

The current design proposes 12-ft. travel lanes on SR 4/15<sup>th</sup> Street from 15<sup>th</sup> Avenue to Government Street.

**ALTERNATIVE:** (Sketch attached)

Use 11-ft. travel lanes and right turn lanes throughout the project. Retain the 12-ft. left turn lanes.

**ADVANTAGES:**

- Reduces additional ROW and easement
- Reduces construction cost
- Reduces environmental impacts
- Provides design and operational continuity throughout the project
- Simplifies construction

**DISADVANTAGES:**

- Does not meet the Department's desired 12-ft. wide travel lanes
- Perceived loss of safety

**DISCUSSION:**

The current design proposes 11-ft. travel lanes from the beginning of the project at the Dean's Bridge Road / Milledgeville Road/SR 4 intersection to the intersection with 15<sup>th</sup> Avenue. This alternative would continue the 11-ft. travel lanes throughout the project from 15<sup>th</sup> Avenue to Government Street; thus simplifying construction, design and driver expectation.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,080,325	—	\$ 2,080,325
ALTERNATIVE	\$ 1,789,004	—	\$ 1,789,004
SAVINGS	\$ 291,321	—	\$ 291,321



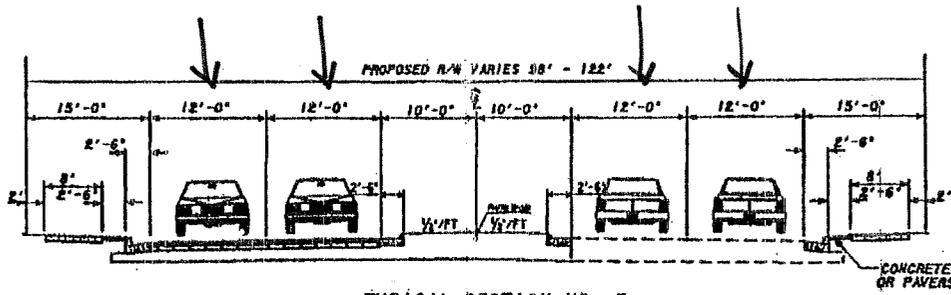
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
Richmond County, Georgia Department of Transportation, District 2  
*Preliminary Design Stage*

ALTERNATIVE NO.:

8

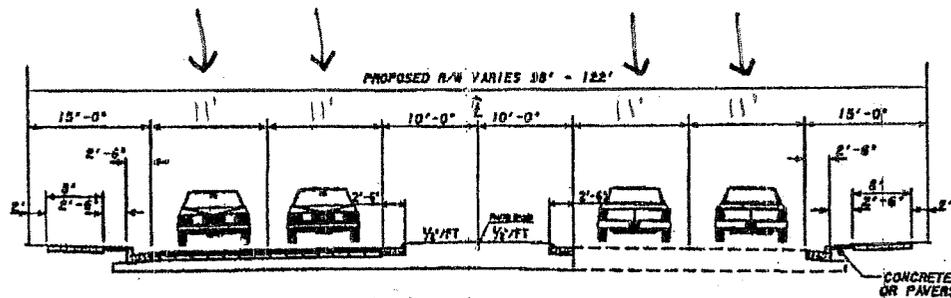
AS DESIGNED     ALTERNATIVE

SHEET NO.: 2 of 4



TYPICAL SECTION NO. 5  
SR 4/15TH STREET FROM 15TH AVENUE TO GOVERNMENT STREET  
PROPOSED 4 - 12' LANES WITH 20' MEDIAN

AS DESIGNED



TYPICAL SECTION NO. 5  
SR 4/15TH STREET FROM 15TH AVENUE TO GOVERNMENT STREET  
PROPOSED 4 - 11' LANES WITH 20' MEDIAN

ALTERNATIVE

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

8

SHEET NO.: 3 of 4

Length: STA. 201+00 → 246+00.00 = 4,500'  
 Pavement Section: 12.5mm / 65 lb/yd<sup>2</sup> - 1 1/2 in. - .125'  
 19mm - 220 lb/yd<sup>2</sup> - 2 in. - .167'  
 25mm - 360 lb/yd<sup>2</sup> - 3.273 - .273'  
 12' GAB - 1'

11' Lanes - 4 Lanes - Proposed

$$12.5 \text{ mm} / 44' \times 4,500' \times .125' \times \frac{0.078 \text{ T}}{\text{CF}} = 19,30 \text{ tons}$$

$$19 \text{ mm} / 44' \times 4,500' \times .167' \times \frac{0.078 \text{ T}}{\text{Den}} = 2,579 \text{ tons}$$

$$25 \text{ mm} / 44' \times 4,500' \times .273' \times .078 = 4,216 \text{ tons}$$

$$\text{GAB} / (44' \times 4,500') / 9 = 22,000 \text{ s.y.}$$

Original 12' Lanes - 4 lanes

$$12.5 \text{ mm} / 48' \times 4,500' \times .125' \times \frac{0.078 \text{ T}}{\text{CF}} = 2,106 \text{ tons}$$

$$19 \text{ mm} / 48' \times 4,500' \times .167' \times \frac{0.078 \text{ T}}{\text{CF}} = 2,814 \text{ tons}$$

$$25 \text{ mm} / 48' \times 4,500' \times .273' \times .078 = 4,600 \text{ tons}$$

$$\text{GAB} / (48' \times 4,500') / 9 = 24,000 \text{ s.y.}$$

SAUC 4' of R/W Length: Com. = 2,000 Res = 2,500

$$4' \times 2,000' = 8,000 \text{ SF (Com)}$$

$$4' \times 2,500' = 10,000 \text{ SF (Res)}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

**9/10**

DESCRIPTION: **IMPROVE THE HORIZONTAL ALIGNMENT TO ALLOW**  
**CONTINUOUS MOVEMENT ALONG SR 4/15<sup>TH</sup> STREET**

SHEET NO.: 1 of 6

**ORIGINAL DESIGN:**

The existing radius at the intersection of SR 4/Martin Luther King Jr. Boulevard and SR 4/15<sup>th</sup> Street is too small to allow a continuous through-movement on the mainline at this intersection at 35 miles per hour (mph). The through move is presently along SR 4/Martin Luther King Jr. Boulevard to Martin Luther King Jr. Boulevard.

**ALTERNATIVE:** (Sketch attached)

Improve the radius to 371± feet (e = 4.0% max) at the SR 4/ Martin Luther King Jr. Boulevard and SR 4/15<sup>th</sup> Street intersection to provide for a continuous through movement at 35 mph realigning Martin Luther King Jr. Boulevard to at least a 75° intersecting angle.

**ADVANTAGES:**

- The through movement would be along the roadways with the highest traffic volumes
- Improves the LOS of the intersection
- Improves safety

**DISADVANTAGES:**

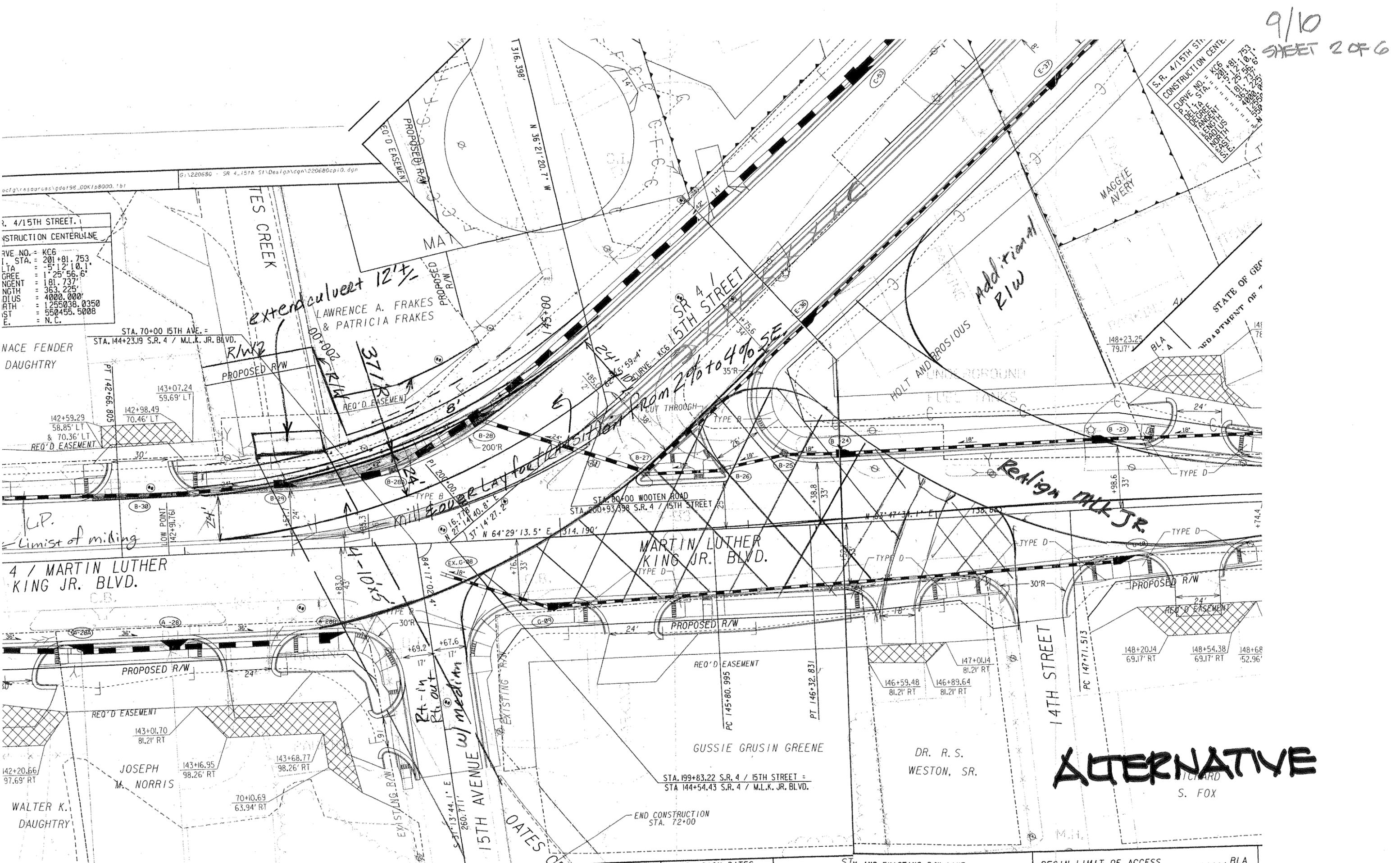
- Increases initial cost
- Possible 404 Permit impacts

**DISCUSSION:**

The intersection of SR 4/Martin Luther King Jr. Boulevard and SR 4/15<sup>th</sup> Street and Martin Luther King Jr. Boulevard would operate most efficiently if the continuous movement were to be along the SR 4/Martin Luther King Jr. Boulevard to SR 4/15<sup>th</sup> Street route. To improve the alignment to meet a 35-mph design, the radius would have to be improved. The existing grade/profile through the intersection along SR 4 is a sag; therefore, it would be easy to provide 4% super elevation by milling and overlaying for the two west bound (24-ft.) lanes.

With this alternative, SR 4 is the continuous through movement and requires Martin Luther King Jr. Boulevard to be realigned to at least a 75° intersection with the mainline creating an improved intersection. This causes 15<sup>th</sup> Avenue to be separated from the new intersection and must be converted to a right-in/right-out only street prohibiting left turns from 15<sup>th</sup> Avenue onto the mainline. An alternative to the right-in/right-out only street would be to block-off or cul-de-sac 15<sup>th</sup> Avenue and have traffic rerouted long Dyer Street to 14<sup>th</sup>, 13<sup>th</sup>, 12<sup>th</sup>, 11<sup>th</sup>, Avenues, etc. to access Martin Luther King Jr. Boulevard.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 20,051	—	\$ 20,051
ALTERNATIVE	\$ 199,164	—	\$ 199,164
SAVINGS	\$ (179,113)	—	\$ (179,113)



S. R. 4 / 15TH ST.  
CONSTRUCTION CENTER  
CURVE NO. = KCS  
DEL. STA. = 201+81.753  
DEGREE = 20.15  
RADIUS = 150.00  
TANGENT = 33.00  
CHORD = 66.00  
AREA = 1039.50  
PERIMETER = 1039.50

S. R. 4 / 15TH STREET.  
CONSTRUCTION CENTERLINE  
CURVE NO. = KCS  
DEL. STA. = 201+81.753  
DEGREE = 20.15  
RADIUS = 150.00  
TANGENT = 33.00  
CHORD = 66.00  
AREA = 1039.50  
PERIMETER = 1039.50

extend culvert 12' 1/2  
LAWRENCE A. FRAKES & PATRICIA FRAKES

from 2% to 4% SE  
CUT THROUGH

Realign M.L.K. JR.

**ALTERNATIVE**

UP.  
Limit of milling

4 / MARTIN LUTHER KING JR. BLVD.

MARTIN LUTHER KING JR. BLVD.

PROPOSED R/W

STA. 199+83.22 S.R. 4 / 15TH STREET =  
STA. 144+54.43 S.R. 4 / M.L.K. JR. BLVD.

END CONSTRUCTION STA. 72+00

BEGIN LIMIT OF ACCESS.....BLA  
END LIMIT OF ACCESS.....ELA

STATE OF GEORGIA

REVISION DATES

STY AND EXISTING R/W LINE  
DEPARTMENTED R/W LINE  
OFFICE: URBAN  
LIMITS  
MAT FOR CONSTR  
TENANCE OF SLOPES

BEGIN LIMIT OF ACCESS.....BLA  
END LIMIT OF ACCESS.....ELA  
LIMIT OF ACCESS  
R/W AND LIMIT OF ACCESS

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

9/10

SHEET NO.: 3 of 6

35 mph;  $R_{min} = 371'$ ; USE S.E. = 4%  
 $e_{max} = 4%$

Full depth pavement:  $L = 220'$

12.5 mm:  $220' \times (\text{Avg. width } 5') \times .078 \times .125 = 11 \text{ tons}$

19 mm:  $220' \times (\text{avg. width } 5') \times .078 \times .167 = 15 \text{ tons}$

25 mm:  $220' \times (5') \times .078 \times .273 = 24 \text{ tons}$

GAB 12"  $\left( \frac{220' \times 5'}{9} \right) = 123 \text{ s.y.}$

mill & overlay section

mill AREA  $\frac{220' \times (12' - 5') + (120' \times 12')}{9} \approx 340 \text{ s.y.}$

overlay for transition from 2% to 4% S.E.

Asph Conc. leveling  $(400' \times 67') = 26,800 \text{ SF}$

\* 7060 sf x  
 (12) 12' 4% proposed  
 200' East. ← leveling -3" ±  
 ← 6" ± Exist.  
 Mill 3" ±

$(26,800 \text{ sf} \times .125' \times .08) = 270 \text{ tons}$   
 ASPH. Conc Leveling

extend 4 barrel 10' x 5' culvert - 10' extension  
 \$400/L.F. for 10' x 5' barrel  
 \$400/L.F. x 4 barrels = \$1,600/L.F. for 10' x 5' culvert

RES. addition R/W  $(10' \times 60') + (5 \times 30') + \left( \frac{40 \times 10'}{2} \right) \approx 1000 \text{ s.f.}$   
 For SR4 @ culvert

FOR REALIGNMENT OF MLKJR.  $\left( \frac{120' + 20'}{2} \right) \times 130' = (9100 \text{ s.f. Comm.})$   
 SAOE R/W Along MLKJR.  $(155' \times 10') + (55' \times 10') = (2100 \text{ s.f.})$

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

9/10

SHEET NO.: 4 of 6

Quantities for MLK Jr.  
 Realignment of

Full depth pavement.

$$100' \times 36' = 3600 \text{ sf}$$

Will use same amount of 12.5 mm either way.

$$19 \text{ mm} : 3600 \text{ sf} \times .167 \times .078 \frac{\text{J}}{\text{CF}} = 47 \text{ tons}$$

$$25 \text{ mm} : 3600 \text{ sf} \times .273 \times .078 = 77 \text{ tons}$$

$$\text{GAB } 12" \frac{3600 \text{ sf}}{9} = 400 \text{ s.y.}$$



PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

9/10

SHEET NO.: 5 of 6

GEOMETRIC DESIGN OF HIGHWAYS AND STREETS

AKSHATO

PAGE 167

### METRIC

e (%)	V <sub>d</sub> = 20 km/h		V <sub>d</sub> = 30 km/h		V <sub>d</sub> = 40 km/h		V <sub>d</sub> = 50 km/h		V <sub>d</sub> = 60 km/h		V <sub>d</sub> = 70 km/h		V <sub>d</sub> = 80 km/h		V <sub>d</sub> = 90 km/h		V <sub>d</sub> = 100 km/h	
	R (m)	R (ft)	R (m)	R (ft)														
1.5	163	371	679	951	1310	1740	2170	2640	3250	4130	4940	5790	6640	7540	8440	9340	10240	11140
2.0	102	237	441	632	877	1180	1490	1830	2260	2860	3460	4060	4660	5260	5860	6460	7060	7660
2.2	75	187	363	534	749	1020	1290	1590	1980	2580	3180	3780	4380	4980	5580	6180	6780	7380
2.4	51	132	273	435	626	865	1110	1390	1730	2330	2930	3530	4130	4730	5330	5930	6530	7130
2.6	38	99	209	345	508	720	944	1200	1510	2110	2710	3310	3910	4510	5110	5710	6310	6910
2.8	30	79	167	283	422	605	802	1030	1320	1820	2420	3020	3620	4220	4820	5420	6020	6620
3.0	24	64	137	236	356	516	699	933	1230	1730	2330	2930	3530	4130	4730	5330	5930	6530
3.2	20	54	114	199	303	443	597	779	1070	1470	1970	2570	3170	3770	4370	4970	5570	6170
3.4	17	45	96	170	260	382	518	680	910	1260	1710	2260	2810	3360	3910	4460	5010	5560
3.6	14	38	81	144	222	329	448	591	790	1090	1490	1990	2590	3190	3790	4390	4990	5590
3.8	12	31	67	121	187	278	381	505	678	926	1260	1710	2260	2810	3360	3910	4460	5010
4.0	8	22	47	86	135	203	280	375	492	660	926	1260	1710	2260	2810	3360	3910	4460

Note: Use of e<sub>max</sub> = 4% should be limited to urban conditions.

Exhibit 3-25. Minimum Radii for Design Superelevation Rates, Design Speeds, and e<sub>max</sub> = 4%

### US CUSTOMARY

e (%)	V <sub>d</sub> = 15 mph		V <sub>d</sub> = 20 mph		V <sub>d</sub> = 25 mph		V <sub>d</sub> = 30 mph		V <sub>d</sub> = 35 mph		V <sub>d</sub> = 40 mph		V <sub>d</sub> = 45 mph		V <sub>d</sub> = 50 mph		V <sub>d</sub> = 55 mph		V <sub>d</sub> = 60 mph	
	R (ft)	R (ft)																		
1.5	796	1410	2050	2830	3730	4770	5930	7220	8650	10300	12200	14200	16400	18800	21400	24200	27200	30400	33800	37400
2.0	506	902	1340	1880	2490	3220	4040	4940	5950	7080	8320	9680	11160	12760	14480	16320	18280	20460	22860	25480
2.2	399	723	1110	1580	2120	2760	3480	4280	5180	6190	7320	8580	9960	11460	13080	14820	16680	18760	21060	23580
2.4	271	513	838	1270	1760	2340	2980	3690	4500	5410	6420	7540	8780	10140	11620	13220	14940	16880	19040	21420
2.6	201	388	650	1000	1420	1930	2490	3130	3870	4700	5610	6620	7740	8980	10340	11820	13420	15140	17080	19240
2.8	157	308	524	817	1170	1620	2100	2660	3310	4060	4910	5860	6920	8080	9340	10720	12220	13840	15580	17440
3.0	127	251	433	681	982	1370	1800	2290	2860	3530	4300	5180	6160	7240	8420	9700	11100	12620	14260	16020
3.2	105	209	363	576	835	1190	1550	1980	2490	3090	3780	4560	5440	6420	7500	8680	9960	11360	12880	14520
3.4	88	175	307	490	714	1010	1340	1720	2170	2700	3320	4020	4800	5680	6660	7740	8920	10220	11640	13180
3.6	73	147	259	416	610	865	1150	1480	1880	2350	2900	3520	4200	4940	5740	6620	7600	8680	9860	11160
3.8	61	122	215	348	542	730	970	1260	1600	2010	2480	3020	3620	4280	4980	5720	6520	7400	8380	9460
4.0	42	86	154	250	371	533	711	926	1190	1500	1860	2280	2760	3300	3900	4560	5260	6000	6820	7720

Note: Use of e<sub>max</sub> = 4% should be limited to urban conditions.

Exhibit 3-25. Minimum Radii for Design Superelevation Rates, Design Speeds, and e<sub>max</sub> = 4%

# COST WORKSHEET



**PROJECT: STP-043-1(57) SR 4 / 15TH ST IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO:

9 / 10

SHEET NO.: 6 of 6

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
<b>SR 4</b>							
12.5 mm Asphaltic Concrete	TN				11	77.05	848
19 mm Asphaltic Concrete	TN				15	69.70	1,046
25 mm Asphaltic Concrete	TN				24	63.60	1,526
12" Aggregate Base	SY				123	19.49	2,397
Asphaltic Concrete Leveling	TN				270	72.20	19,494
Milling Variable	SY				340	2.52	857
Extend 4- 10' x 5" Culvert	LF				12	1,600.00	19,200
<b>MLK JR</b>							
19 mm Asphaltic Concrete	TN				47	69.70	3,276
25 mm Asphaltic Concrete	TN				77	63.60	4,897
12" Aggregate Base	SY				400	19.49	7,796
Construction Subtotal							61,337
Construction Markup @ 74.56%							45,733
<b>Construction Total</b>							<b>107,069</b>
<b>Right of Way</b>							
Residential	SF				1,000	1.50	1,500
Commercial	SF	2,100	2.75	5,775	9,100	2.75	25,025
ROW Subtotal							5,775
ROW @ 247.20%							14,276
<b>ROW Total</b>							<b>20,051</b>
				20,051			199,164
Mark-up at				INCL			INCL
<b>TOTAL</b>				20,051			199,164

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**11**

DESCRIPTION: **REEVALUATE IMPROVEMENTS AT THE SOUTHERN TERMINI**  
**OF THE PROJECT – MILLEDGEVILLE ROAD/SR 4**

SHEET NO.: 1 of 5

**ORIGINAL DESIGN:** (Sketch attached)

The original design modifies the intersection to improve safety, and reconstructs sidewalks and curb and gutter along the north side of Milledgeville Road.

**ALTERNATIVE:** (Sketch attached)

Eliminate the reconstruction of the sidewalks and curb and gutter along the north side of Milledgeville Road only.

**ADVANTAGES:**

- Eliminates easement
- Reduces construction cost
- Reduces environmental impacts
- Apparently not needed
- Simplifies design and construction
- Reduces construction time

**DISADVANTAGES:**

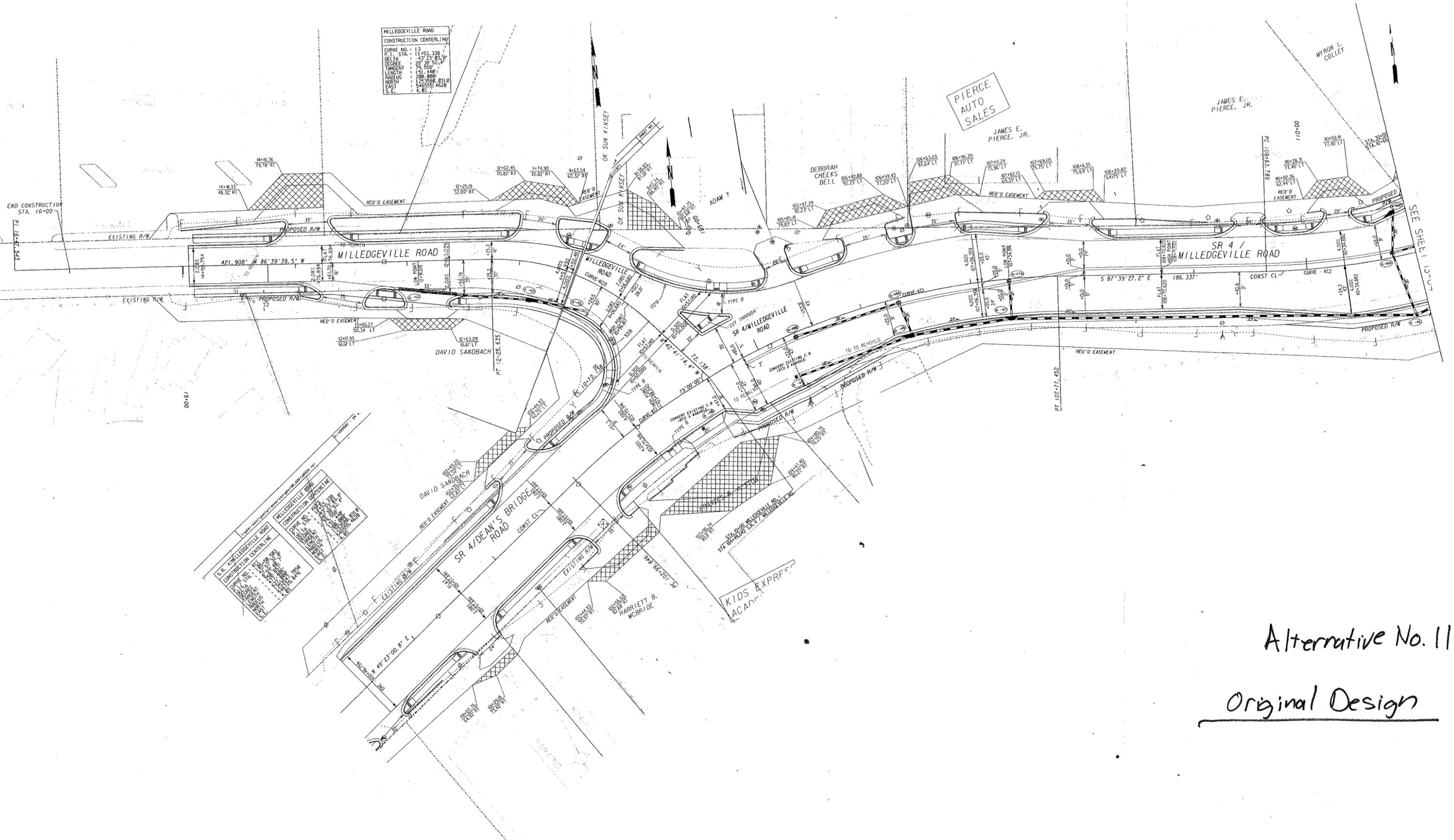
- If the existing sidewalks and curb and gutters are damaged, they would not be repaired under this contract
- Loss of amenities – new sidewalks and curb and gutters

**DISCUSSION:**

Reconstruction of the existing sidewalks, islands and curbs and gutters does not appear to be warranted. Savings approaching \$116,000 and shortening of the construction effort at this location – the convergences of two heavily traveled roads, Milledgeville Road and Dean’s Bridge Road/SR 4 are possible.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 115,989	—	\$ 115,989
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 115,989	—	\$ 115,989

11  
2015



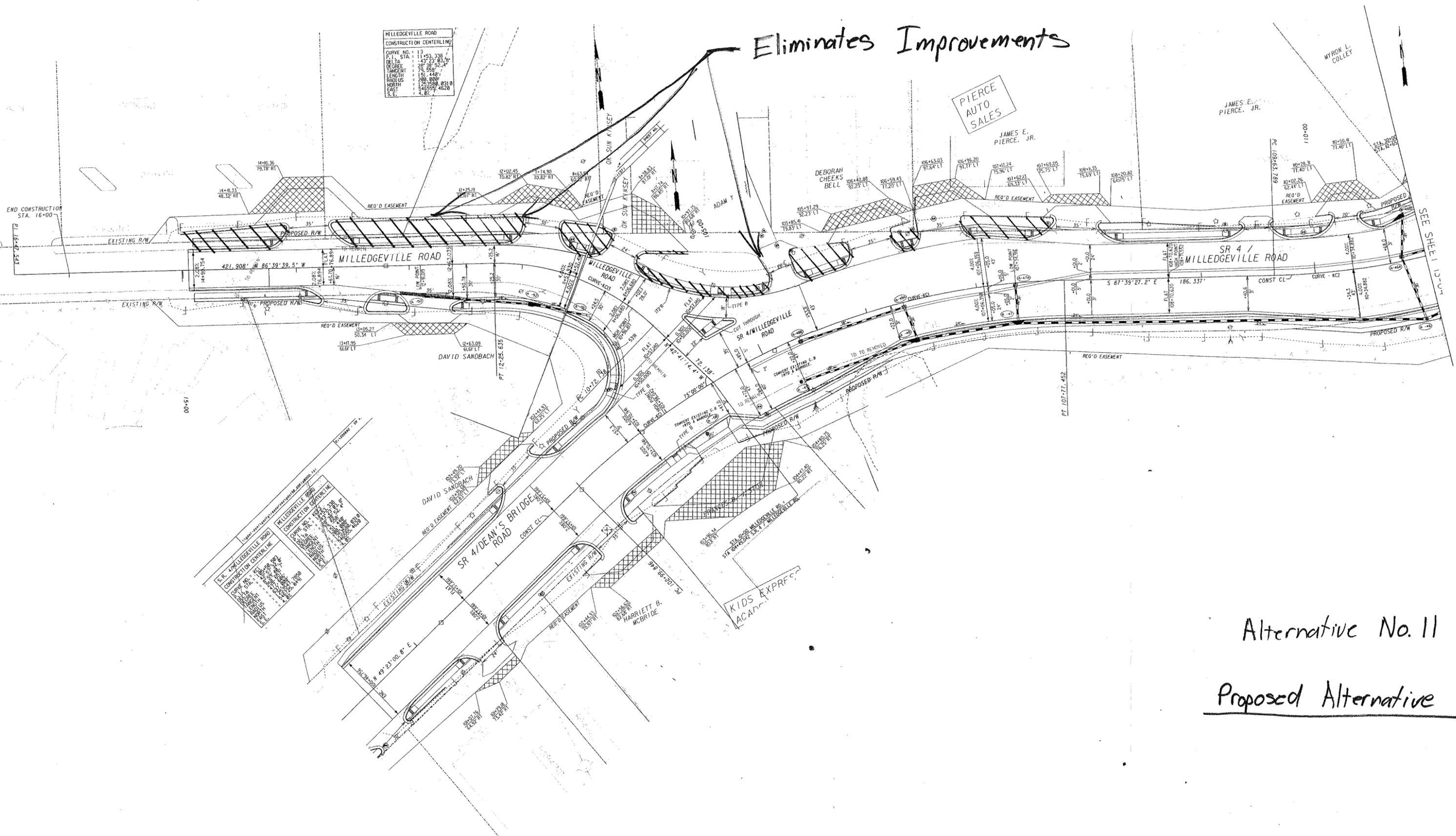
MILLEDGEVILLE ROAD	
CONSTRUCTION CENTERLINE	
CURVE NO.	13
P.I. STA.	11+53.336
DELTA	43° 23' 03.8"
ANGLE	25° 39' 52.4"
TANGENT	74.556'
LENGTH	151.448'
RADIUS	288.800'
NORTH	12° 25' 58.831°
EAST	4.82'

SR 4/DEAN'S BRIDGE	
CONSTRUCTION CENTERLINE	
CURVE NO.	14
P.I. STA.	11+53.336
DELTA	43° 23' 03.8"
ANGLE	25° 39' 52.4"
TANGENT	74.556'
LENGTH	151.448'
RADIUS	288.800'
NORTH	12° 25' 58.831°
EAST	4.82'

Alternative No. 11

Original Design

Eliminates Improvements



MILLEDGEVILLE ROAD	
CONSTRUCTION CENTERLINE	
CURVE NO.	13
P.I. STA.	11+53.338
DELTA	42° 23' 05.45"
DEGREE	28° 58' 05.45"
TANGENT	75.558'
LENGTH	151.448'
RADIUS	280.808'
NORTH EAST	1.75258° 831.0
S.E.	4.82

SR 4/MILLEDGEVILLE ROAD	
CONSTRUCTION CENTERLINE	
CURVE NO.	14
P.I. STA.	11+53.338
DELTA	42° 23' 05.45"
DEGREE	28° 58' 05.45"
TANGENT	75.558'
LENGTH	151.448'
RADIUS	280.808'
NORTH EAST	1.75258° 831.0
S.E.	4.82

Alternative No. 11  
Proposed Alternative

# CALCULATIONS



PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

SHEET NO.: 11  
4 of 5

## Quantities

Sidewalk

$$L = 671 \text{ ft}$$

$$\text{Area} = 671 \text{ ft} \cdot 5 \text{ ft}^{\text{1st}} / 9 \text{ ft}^2 = 373 \text{ SY}$$

Curb & Gutter

$$\begin{aligned} L = & 190 \text{ ft} + 170 \text{ ft} + 130 \text{ ft} + 30 \text{ ft} + 30 \text{ ft} + 70 \text{ ft} \\ & + 45 \text{ ft} + 40 \text{ ft} + 110 \text{ ft} + 20 \text{ ft} + 30 \text{ ft} + 40 \text{ ft} \\ & + 20 \text{ ft} + 30 \text{ ft} + 15 \text{ ft} + 50 \text{ ft} + 35 \text{ ft} + 45 \text{ ft} \\ & + 80 \text{ ft} = \underline{1280 \text{ ft}} \end{aligned}$$

Easements

$$\begin{aligned} \text{Area} = & (390 \text{ ft} + 150 \text{ ft} + 420 \text{ ft}) 10 \text{ ft} \\ = & \underline{9600 \text{ ft}^2} \end{aligned}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**12**

DESCRIPTION: **USE COMMON RESIDENTIAL DRIVES ALONG SR 4/15<sup>TH</sup> STREET**  
**IN THE PROPOSED HISTORIC DISTRICT**

SHEET NO.: 1 of 5

**ORIGINAL DESIGN:** (Sketch attached)

The original design replaces residential driveways one-for-one in the proposed historic area along SR 4/15<sup>th</sup> Street.

**ALTERNATIVE:** (Sketch attached)

Have residents share driveways along the proposed historic district.

**ADVANTAGES:**

- Eliminates backing out into traffic
- Improves safety
- Provides for a “greener” streetscape
- Slight reduction in initial cost

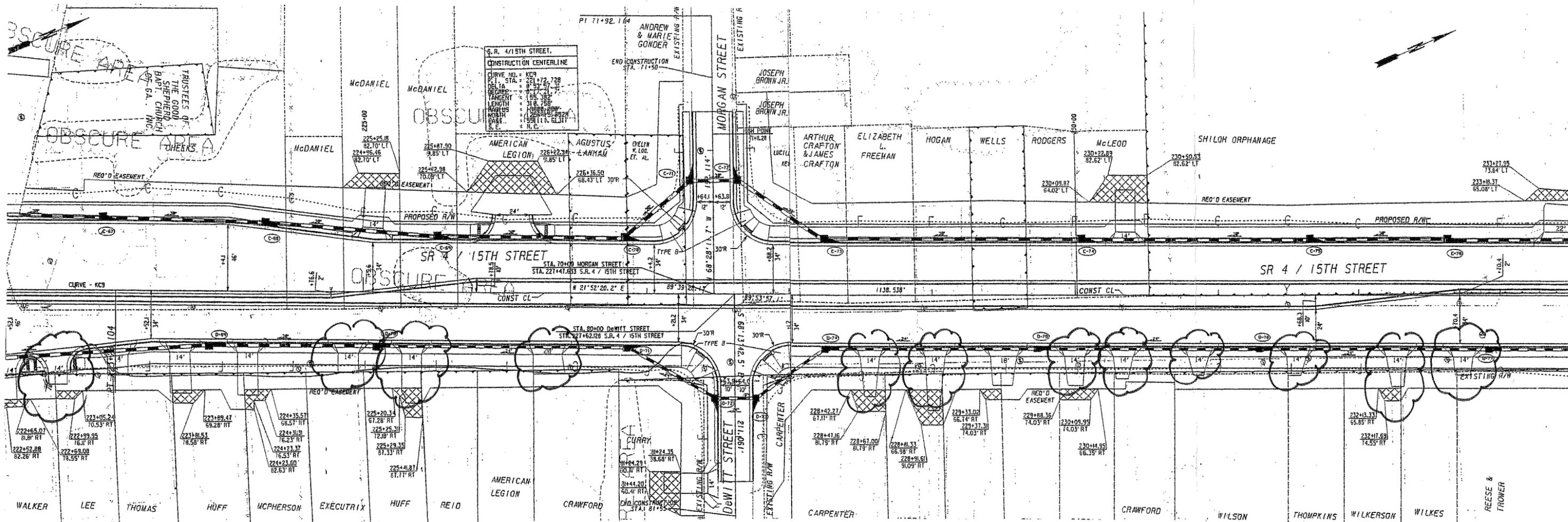
**DISADVANTAGES:**

- Residents may not like combining driveways
- Residents may not like sharing driveways

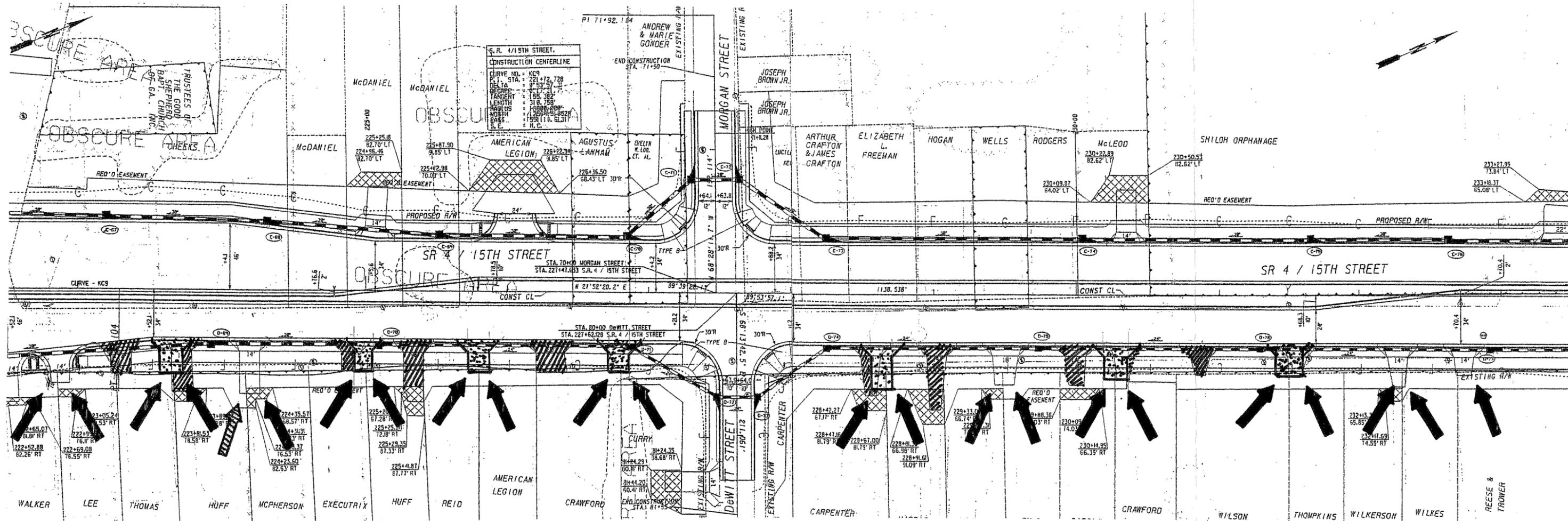
**DISCUSSION:**

Although residents may not like the sharing concept, the improved safety aspects of this alternative need to be further explored. Backing into two lanes of traffic is not a safe or easy maneuver, and if the number of backing-up locations can be minimized, safety will be improved.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 44,270	—	\$ 44,270
ALTERNATIVE	\$ 43,063	—	\$ 43,063
SAVINGS	\$ 1,207	—	\$ 1,207



AS DESIGNED



ALTERNATIVE

# CALCULATIONS



PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
Richmond County, Georgia Department of Transportation, District 2  
*Preliminary Design Stage*

ALTERNATIVE NO.:

12

SHEET NO.: 4 of 5

## QUANTITIES:

### ORIGINAL DRIVES:

$$13 @ 14' \times 25' = 4,550 \text{ SF}$$

$$1 @ 20' \times 25' = 500 \text{ SF}$$

$$1 @ 18' \times 25' = 450 \text{ SF}$$

$$\underline{5,500 \text{ SF}}$$

$$\therefore 5,500 \text{ SF} / 9 \text{ SF/SY} = 611.11 \text{ SY}$$

### PROPOSED DRIVES:

$$4 @ 14' \times 25' = 1,400 \text{ SF}$$

$$1 @ 18' \times 25' = 450 \text{ SF}$$

$$7 @ 20' \times 25' = 3,500 \text{ SF}$$

$$\underline{5,350 \text{ SF}}$$

$$\therefore 5,350 \text{ SF} / 9 \text{ SF/SY} = 594.44$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

**13**

DESCRIPTION: **USE AN AUXILIARY PARKING LANE ALONG THE PROPOSED**  
**15<sup>TH</sup> STREET HISTORIC DISTRICT BETWEEN ESSIE MCINTYRE**  
**BOULEVARD AND THE CASTLEBERRY FOOD'S ENTRANCE**

SHEET NO.: 1 of 6

**ORIGINAL DESIGN:** (Sketch attached)

The original design relocates the SR 4/15<sup>th</sup> Street mainline to the west so that the edge of the pavement is 11 to 22 ft. west of the existing edge of pavement. In this condition, the existing high number of driveways (spaced approximately 40 ft. apart) would remain, forcing residents to back-out from their driveways into a stream of traffic on the mainline. Ten to 11 ft. of pavement is to be removed.

**ALTERNATIVE: :** (Sketch attached)

Using the space created in front of the historic house and the existing pavement that was originally proposed to be removed, provide an auxiliary parking lane for parallel parking in front of the houses.

**ADVANTAGES:**

- Eliminates backing out into traffic
- Improves safety
- Creates more opportunity for streetscape elements
- Maintains existing right-of-way
- Uses the existing pavement section
- Reduces initial cost

**DISADVANTAGES:**

- Eliminates the clear area created in the front of the houses in the original design
- Each house does not have a dedicated driveway/parking spot

**DISCUSSION:**

In lieu of creating large setbacks in front of the existing historic houses, creating a lane for parallel parking improves safety and decreases the cost to the project.

This alternative includes milling and resurfacing of the existing pavement and the elimination of pavement removal.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 92,837	—	\$ 92,837
ALTERNATIVE	\$ 18,008	—	\$ 18,008
SAVINGS	\$ 74,829	—	\$ 74,829

# SKETCHES



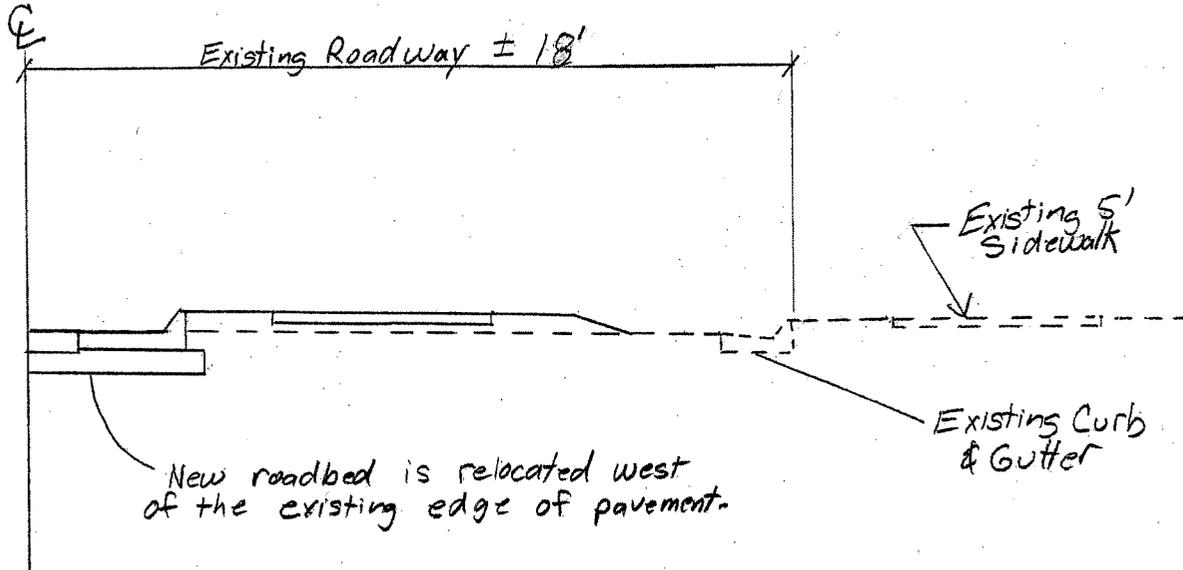
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
Richmond County, Georgia Department of Transportation, District 2  
*Preliminary Design Stage*

ALTERNATIVE NO.:

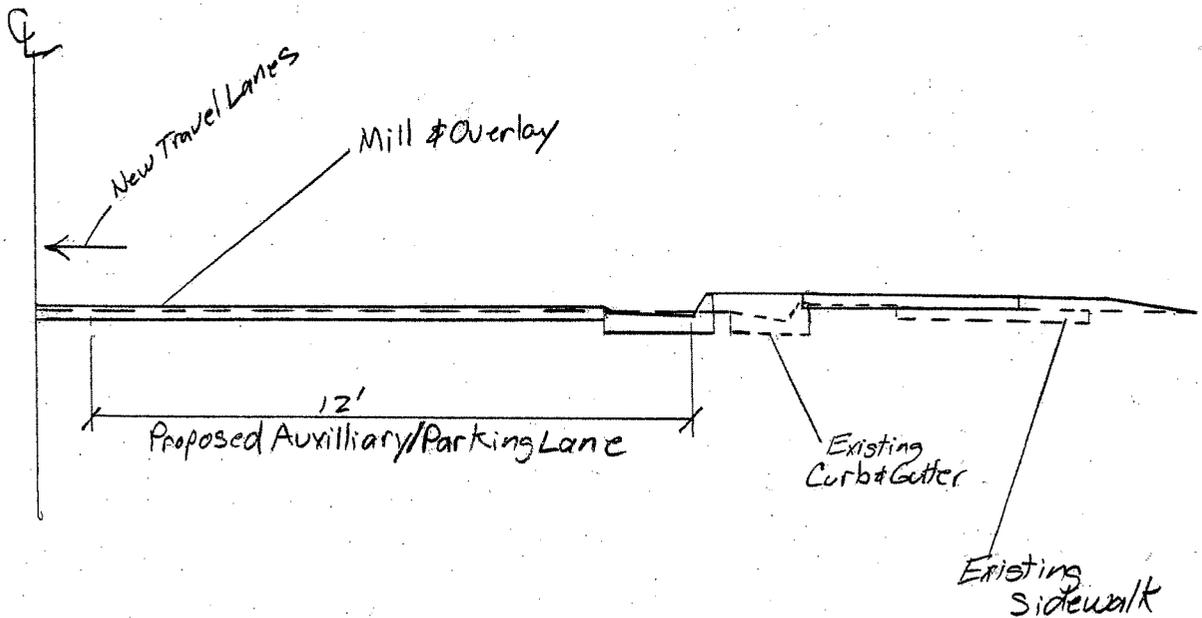
13

AS DESIGNED       ALTERNATIVE

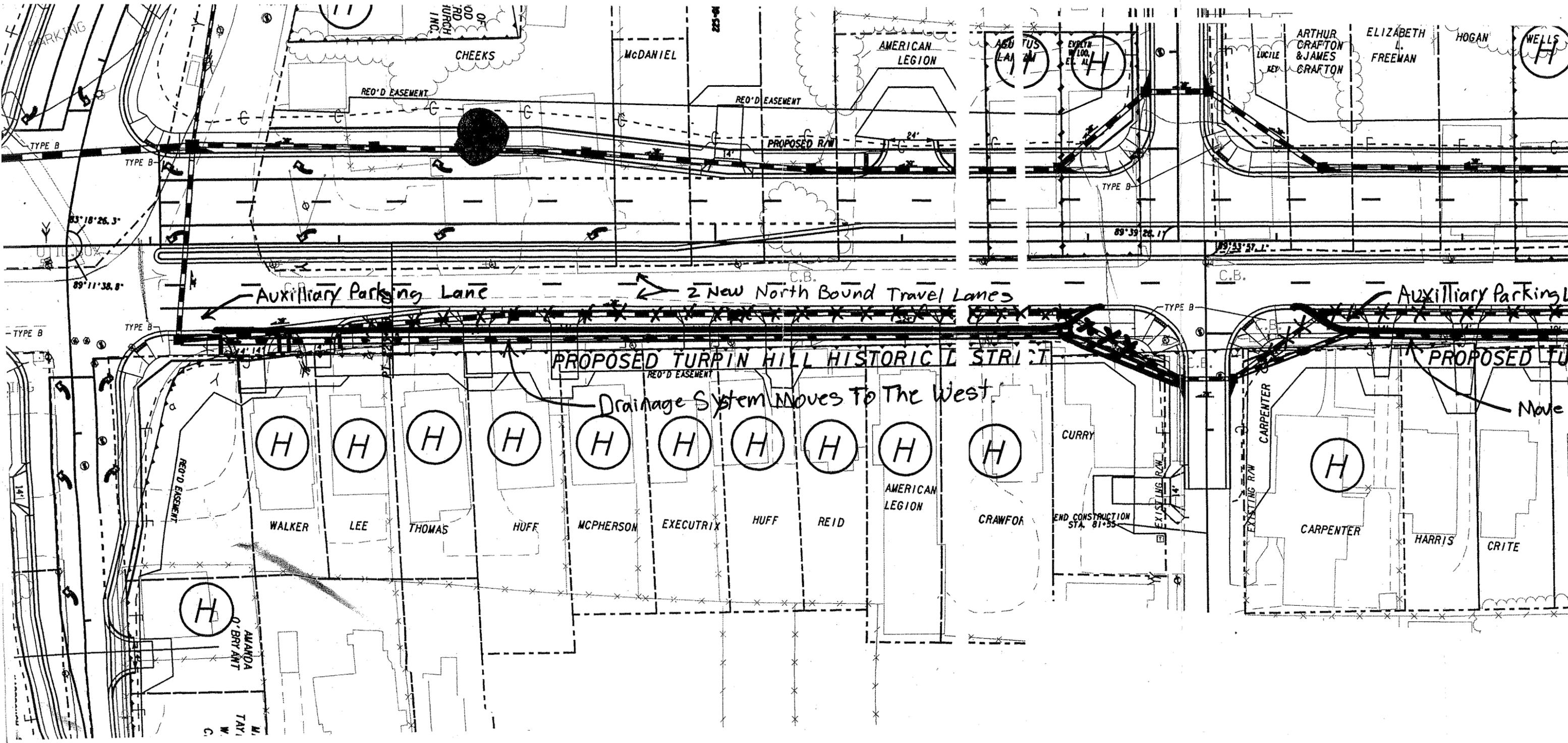
SHEET NO.: 2 of 6



AS DESIGNED



ALTERNATIVE





# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

13

SHEET NO.: 5 of 6

With this alternative the additional cost is the milling and resurfacing of the 12 ft of existing pavement that will be utilized for the auxiliary parking lane. There will be a cost reduction associated with the elimination of the need for the pavement removal, grading of the area, and grassing.

• Milling

$$Q = 900\text{ft} \cdot 12\text{ft} \cdot \frac{1\text{SY}}{(3\text{ft})^2} = \underline{1200\text{SY}}$$

• Roadway Removal

To Estimate Total Removal of the roadway we will double the price of Milling to get an estimated unit cost of \$5.04/SY.

$$Q = \underline{1200\text{SY}}$$

• Grading

Est. at \$1,000,000 for entire project, 1.8mi. Estimate grading area for entire project =

$$1.8\text{mi} \cdot \frac{5280\text{ft}}{1\text{mi}} \cdot 20\text{ft} \cdot \frac{1\text{Acre}}{43,560\text{ft}^2} = 4.4\text{Acre}$$

$$\text{Grading Area for this alternate} = 900\text{ft} \cdot 10\text{ft} \cdot \frac{1\text{Acre}}{43,560\text{ft}^2} = 0.2\text{Acre}$$

$$\text{Cost} = \frac{0.2\text{Acre}}{4.4\text{Acre}} \cdot \$1\text{M} = \$46,957$$

• Grassing

0.2 Acre

• AC Leveling

$$Q = 1200\text{SY} \cdot 169\text{lb/SY} \cdot \frac{1\text{TN}}{2000\text{lb}}$$

$$= \underline{101\text{TN}}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

**14**

DESCRIPTION: **REDUCE THE 20 FT. MEDIAN TO 18 FT. THROUGHOUT THE PROJECT**

SHEET NO.: 1 of 4

**ORIGINAL DESIGN:** (Sketch attached)

The present design has an 18 ft. raised median from the beginning of the project at Dean's Bridge Road/Milledgeville Road/SR 4 intersection to 15<sup>th</sup> Avenue, approximately half the project, and a 20 ft. raised median from SR 4/15<sup>th</sup> Street to Government Street, the end of the project.

**ALTERNATIVE:** (Sketch attached)

Use an 18-ft. raised median throughout the SR 4/15<sup>th</sup> Street project to provide median width continuity.

**ADVANTAGES:**

- Reduces construction costs
- Reduces right-of-way costs
- Provides median with continuity
- Simplifies construction
- Reduces environmental impacts
- Precludes driver confusion/expectation

**DISADVANTAGES:**

- Reduces size/area of safe haven within the median for pedestrians
- Challenges the Department's preferred 20 ft. median width

**DISCUSSION:**

As presently designed, the project uses both 20-ft. and 18 ft. raised medians on SR 4/15<sup>th</sup> Street. This alternative uses an 18 ft. raised median throughout the project to save 2 ft. of median and right-of-way impacts/costs.

The 18 ft. raised median is desirable for urban streets in accordance with the "A Policy on Geometric Design of Highways and Streets – 2004" by the American Association of State Highway and Transportation Officials (AASHTO).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 167,990	—	\$ 167,990
ALTERNATIVE	\$ 40,615	—	\$ 40,615
SAVINGS	\$ 127,375	—	\$ 127,375



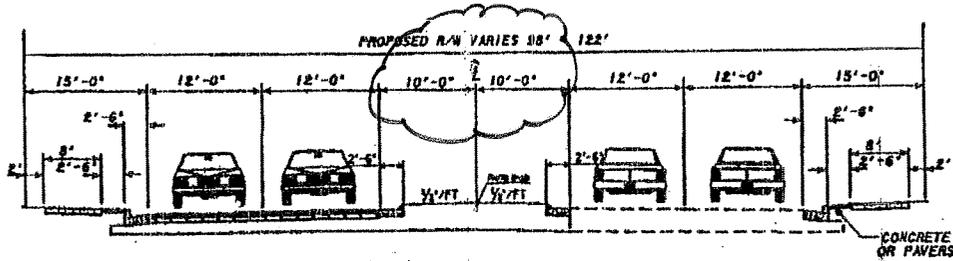
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
 Richmond County, Georgia Department of Transportation, District 2  
*Preliminary Design Stage*

ALTERNATIVE NO.:

14

AS DESIGNED       ALTERNATIVE

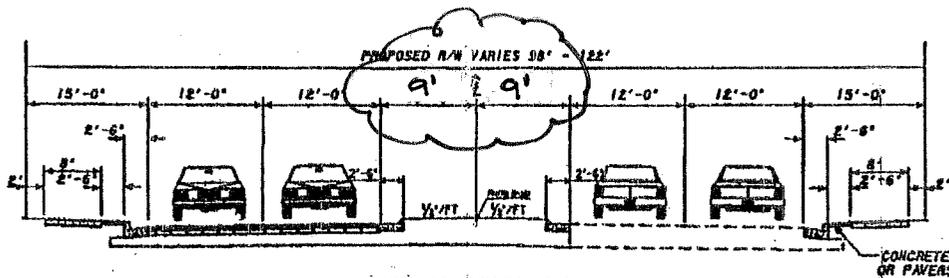
SHEET NO.: 2 of 4



TYPICAL SECTION NO. 5  
 SR 4/15TH STREET FROM 15TH AVENUE TO GOVERNMENT STREET  
 PROPOSED 4 - 12' LANES WITH 20' MEDIAN



AS DESIGNED



TYPICAL SECTION NO. 5  
 SR 4/15TH STREET FROM 15TH AVENUE TO GOVERNMENT STREET  
 PROPOSED 4 - 12' LANES WITH 18' MEDIAN



ALTERNATIVE

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.: 14

SHEET NO.: 3 of 4

20' median / raised - Length = 4,300'  
 Portion: 16' wide grassed median = 1,100'  
 Portion 4' wide conc. med. = 3,200'  
 $(1,100' \times 16') / 9 = 1,960 \text{ s.y.} - \text{grassed median}$   
 $(3,200' \times 4') / 9 = 1,420 \text{ s.y.} - 4" \text{ Conc. Median}$

Proposed 18' median / raised Length 4,300'  
 $[1,100 \times (16'-2')] / 9 = 1,710 \text{ s.y.} - \text{grassed median}$   
 $[3,200' \times (4'-2')] / 9 = 710 \text{ s.y.} - 4" \text{ Conc. median}$

Grassing  $(\$18,000) / 12 \text{ in} \times 43,560 \text{ sf} = \$.035 / \text{s.f.}$   
 $\$.035 / \text{s.f.} \times \frac{9 \text{ sf}}{\text{sy}} = \$0.32 / \text{s.y.}$

Earthwork  $\text{EXCAV: } 18,500 \text{ c.y.} \times (2' / 16') = 385 \text{ c.y.}$   
 $385 \text{ c.y.} \times \$25 / \text{cy} = \$9,625$   
 $\frac{\$1,000,000 \text{ (Grading Complete)}}{40,000 \text{ c.y. (EXCAV.)}} = \$25 / \text{c.y.} - \text{use for unit cost}$

12.5mm	2' x 360' x .125' x .078 =	7 tons
19mm	2' x 360' x .167' x .078 =	10 tons
25mm	2' x 360' x .273' x .078 =	15 tons
GAB	(2' x 360') / 9 =	80 sy



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**15**

DESCRIPTION: **REDUCE THE 20 FT. RAISED MEDIAN TO 16 FT. THROUGHOUT**  
**THE WHOLE PROJECT**

SHEET NO.: 1 of 6

**ORIGINAL DESIGN:** (Sketch attached)

The present design has an 18-ft. raised median from the beginning of the project at Dean's Bridge Road/Milledgeville Road/SR 4 intersection to 15<sup>th</sup> Avenue, approximately half the project, and a 20-ft. raised median from SR 4/15<sup>th</sup> Street to Government Street, the end of the project.

**ALTERNATIVE:** (Sketch attached)

Use a 16-ft. raised median throughout the SR 4/15<sup>th</sup> Street project to provide median width continuity.

**ADVANTAGES:**

- Reduces construction costs
- Reduces right-of-way costs
- Provides median with continuity
- Simplifies construction
- Reduces environmental impacts
- Precludes driver confusion/expectation

**DISADVANTAGES:**

- Reduces size/area of safe haven within the median for pedestrians
- Challenges the Department's preferred 20-foot median width

**DISCUSSION:**

As presently designed, the project uses both 20-foot and 18-foot raised medians on SR 4/15<sup>th</sup> Street. This alternative uses a 16-ft. raised median throughout the project to save two ft. and four ft. of median and right-of-way impacts/costs. It also saves two ft. of full depth pavement structure at selected areas, two-ft. in each direction. However, the asphalt surface course is the same as long as the lane widths do not change.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 480,146	—	\$ 480,146
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 480,146	—	\$ 480,146



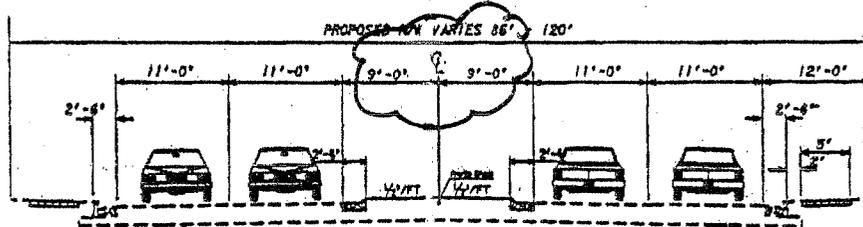
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

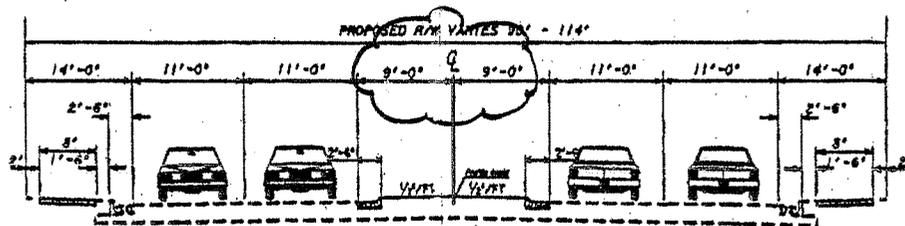
15

AS DESIGNED     ALTERNATIVE

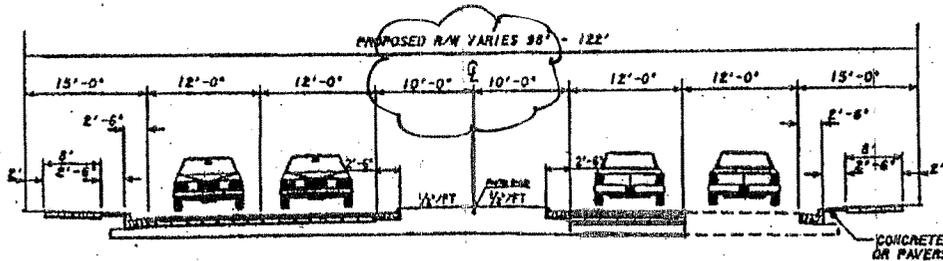
SHEET NO.: 2 of 6



TYPICAL SECTION NO. 3  
 SR 4/MILLEDGEVILLE ROAD FROM MILLEDGEVILLE ROAD TO OLIVE ROAD  
 PROPOSED 4 - 11' LANES WITH 18' MEDIAN



TYPICAL SECTION NO. 4  
 SR 4/MLK JR. BLVD FROM OLIVE ROAD TO 15TH AVENUE  
 PROPOSED 4 - 11' LANES WITH 18' MEDIAN



TYPICAL SECTION NO. 5  
 SR 4/15TH STREET FROM 15TH AVENUE TO GOVERNMENT STREET  
 PROPOSED 4 - 12' LANES WITH 20' MEDIAN

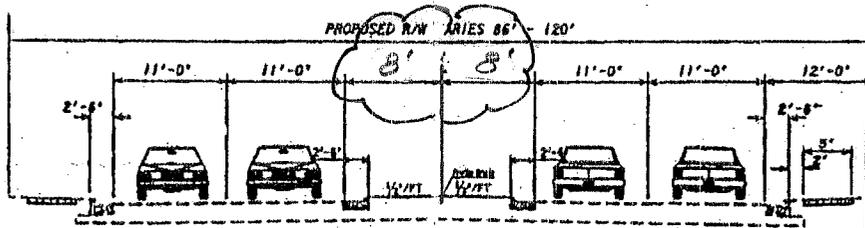
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
 Richmond County, Georgia Department of Transportation, District 2  
*Preliminary Design Stage*

ALTERNATIVE NO.:

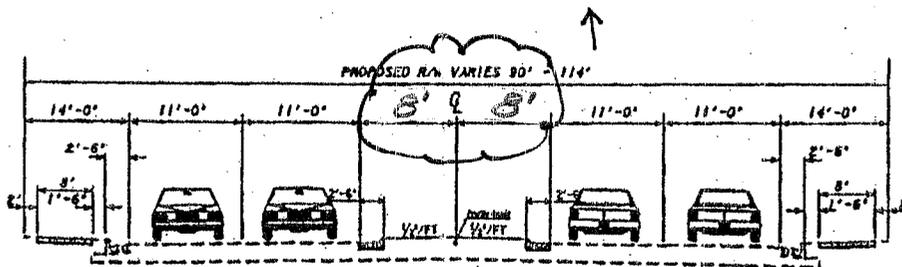
15

AS DESIGNED     ALTERNATIVE

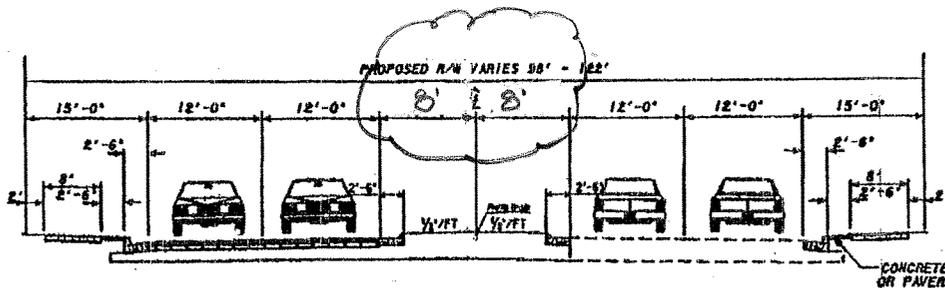
SHEET NO.: 3 of 6



TYPICAL SECTION NO. 3  
 SR 4/MILLEDGEVILLE ROAD FROM MILLEDGEVILLE ROAD TO OLIVE ROAD  
 PROPOSED 4 - 11' LANES WITH 6' MEDIAN



TYPICAL SECTION NO. 4  
 SR 4/MLK JR. BLVD FROM OLIVE ROAD TO 15TH AVENUE  
 PROPOSED 4 - 11' LANES WITH 6' MEDIAN



TYPICAL SECTION NO. 5  
 SR 4/15TH STREET FROM 15TH AVENUE TO GOVERNMENT STREET  
 PROPOSED 4 - 12' LANES WITH 6' MEDIAN

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.: 15

SHEET NO.: 4 of 6

SAVES 2' of full depth pavement at selected AREAS by moving the travel lanes in over more existing pavement. (surf. course same.)

SR4 - from Milledgeville Rd. to MLK JR. / 15<sup>th</sup> St.

$$19\text{mm}: 2' \times (1900') \times .167 \times .078 \frac{T}{CF} = 50 \text{ tons}$$

$$25\text{mm}: 2' \times (1900') \times .273 \times .078 \frac{T}{CF} = 81 \text{ tons}$$

$$\text{GAB } 12' \left( \frac{2' \times 1900'}{9} \right) = 4235.5 \text{ y.}$$

1900' - includes both sides of road ways

The second half of the project will not save full depth pavement since one direction is full depth with both "is-designed" and this alternative.

4' of median conc. pavement - SAVINGS

Median Length = 8,300' (consists of 1,100' grassed

$$\text{PAVE med: } \frac{7200' \times 4'}{9} = 3,200.5 \text{ y. (Conc. med. SAVINGS)}$$

$$\text{Grass med: } \frac{1,100' \times 4'}{9} \approx 500 \text{ y. (Grassed med. savings)}$$

$$\text{Grassing } 500 \text{ y. - cost } \$0.32/\text{y.}$$

$$\text{Earth work } \frac{4''}{196} \times 38,000 \text{ cy.} = 1,590 \text{ y.}$$

$$12.5\text{mm } 4' \times 200' \times .125 \times .078 = 8 \text{ tons}$$

$$\text{Median openings } 19\text{mm}: 4' \times 200' \times .167 \times .078 = 1.1 \text{ tons}$$

$$25\text{mm}: 4' \times 200' \times .273 \times .078 = 17 \text{ tons}$$

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
Richmond County, Georgia Department of Transportation, District 2  
Preliminary Design Stage

ALTERNATIVE NO.:

15

SHEET NO.: 5 of 6

R/W Savings

Comm.  $1200' \times 4' = 4,800 SF$   
Comm  $2800' \times 4' = 11,200 SF$   
Comm = 16,000 SF

Res  $600' \times 4' = 2,400 SF$

Res  $1400' \times 4' = 5,600 SF$

---

Res = 8,000 SF

# COST WORKSHEET



PROJECT:	<b>STP-043-1(57) SR 4 / 15TH ST IMPROVEMENTS</b> <b>Richmond County, Georgia Department of Transportation, District 2</b> <i>Preliminary Design Stage</i>	ALTERNATIVE NO: <span style="font-size: 2em; font-weight: bold;">15</span> SHEET NO.: 6 of 6
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Save Full Depth Pavement							
19mm Asphaltic Concrete	TN	50	69.50	3,475			
25mm Asphaltic Concrete	TN	81	63.90	5,176			
12" GAB	SY	423	19.49	8,244			
Save 4' of Median							
Concrete Median	SY	3,200	32.00	102,400			
Grassing	SY	500	0.32	160			
Earthwork	CY	1,600	25.00	40,000			
Saving Pavement @ Median Opening							
12.5mm Asphaltic Concrete	TN	8	77.05	616			
19mm Asphaltic Concrete	TN	11	69.50	765			
25mm Asphaltic Concrete	TN	17	63.90	1,086			
12" GAB	SY	90	19.49	1,754			
Construction Subtotal				163,676			
Construction Markup at 74.56%				122,037			
Construction Total				285,714			
Right of Way							
Commercial	SF	16,000	2.75	44,000			
Residential	SF	8,000	1.50	12,000			
ROW Subtotal				56,000			
ROW Markup at 247.20%				138,432			
ROW Total				194,432			
<b>Sub-total</b>				480,146			
<b>Mark-up at</b>				INCL			INCL
<b>TOTAL</b>				480,146			

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**17**

DESCRIPTION: **USE RETAINING WALLS TO KEEP FROM IMPACTING THE**  
**YOUNG MEN'S CHRISTIAN ASSOCIATION COMPLEX**

SHEET NO.: 1 of 5

**ORIGINAL DESIGN:** (Sketch attached)

In the current design, the fill slopes (construction limits) encroach on the Young Men's Christian Association's (YMCA) ball fields and fence from Station (STA) 109+75 Right (RT) to STA 112+00 RT. The fill slopes also encroach on YMCA's parking lot from STA 113+10 RT to STA 114+25 RT at the Tubman Home Road intersection with SR 4/15<sup>th</sup> Street.

**ALTERNATIVE:** (Sketch attached)

Use a concrete retaining wall to "pull back" the SR 4/15<sup>th</sup> Street slopes at the aforementioned two separate locations to move the construction limits off the YMCA ball fields and parking lot.

**ADVANTAGES:**

- Improve the Department's "good neighbor" image by minimizing the impacts on the YMCA
- Reduces easement requirements
- Saves YMCA parking spaces

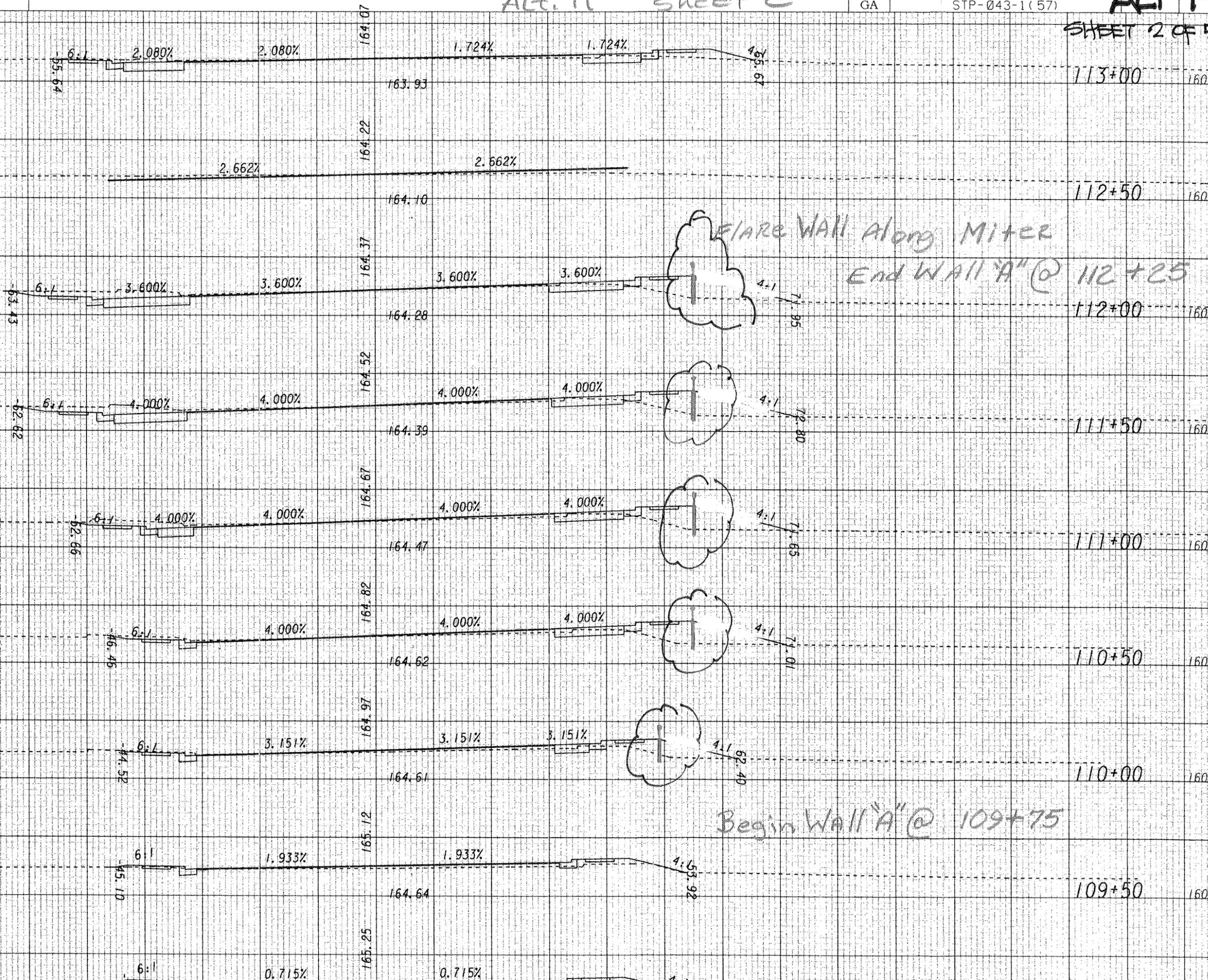
**DISADVANTAGES:**

- Increases initial construction cost

**DISCUSSION:**

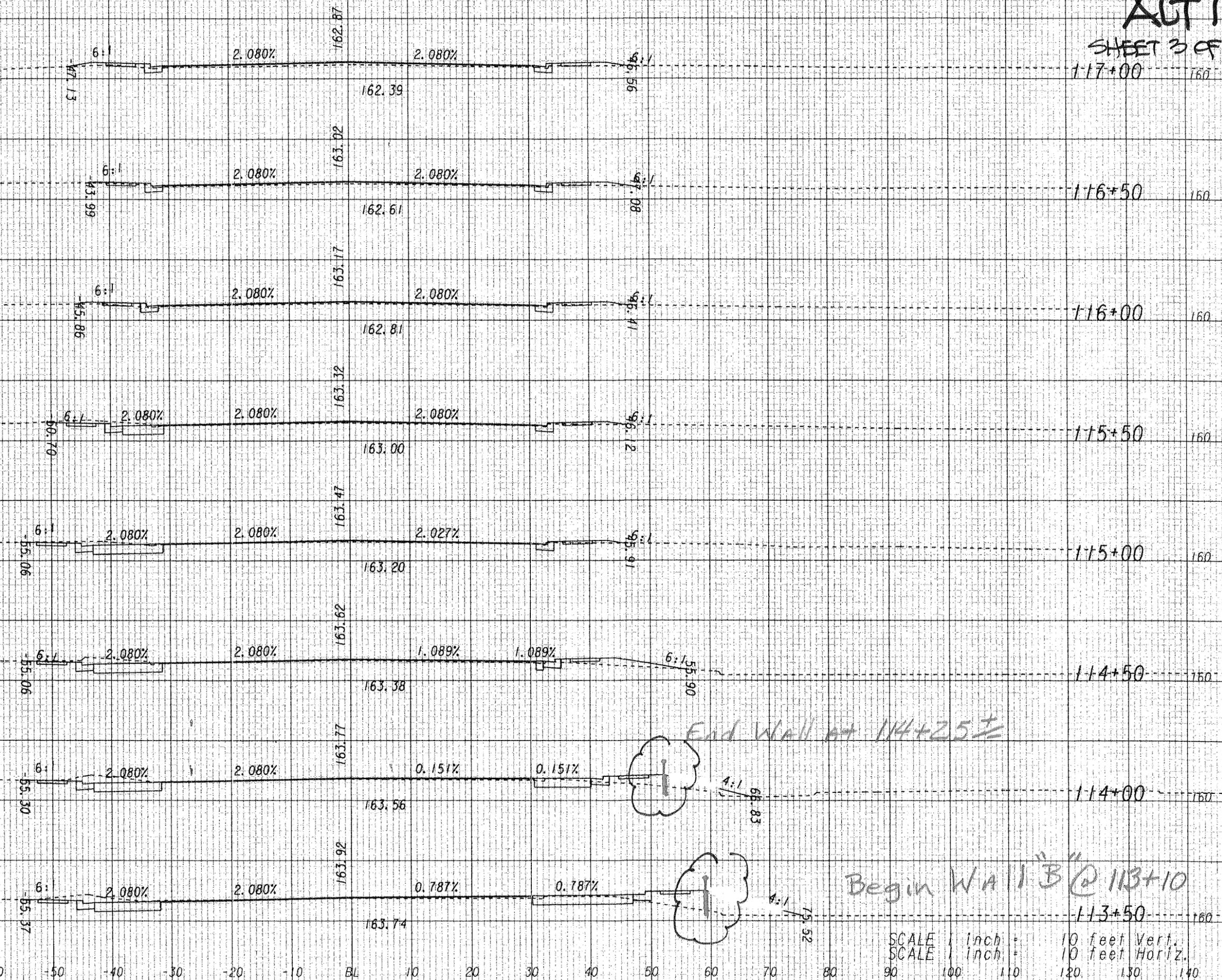
As presently designed the construction limits (fill slopes) impact the YMCA complex at both the ball fields and the parking lot at Tubman Home Road. Two concrete retaining walls at STA 109+75 RT to 112+00 STA and at STA 113+10 RT to 114+25 RT would eliminate the impacts on the YMCA at these locations.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 51,386	—	\$ 51,386
ALTERNATIVE	\$ 91,285	—	\$ 91,285
SAVINGS	\$ (39,899)	—	\$ (39,899)



ALT 17

SHEET 3 OF 5



117+00 160

116+50 160

116+00 160

115+50 160

115+00 160

114+50 160

114+00 160

113+50 160

End Wall at 114+25±

Begin Wall B @ 113+10

SCALE 1 inch = 10 feet Vert.  
SCALE 1 inch = 10 feet Horiz.

Alt. 17 sheet

STATE OF GEORGIA

1 INCH = 10 FEET VERT

REVISION DATES

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: URBAN DESIGN

# CALCULATIONS



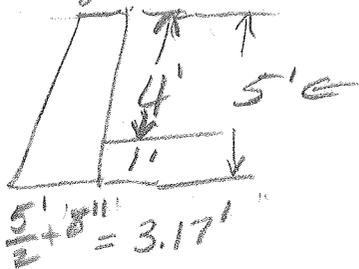
PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

17

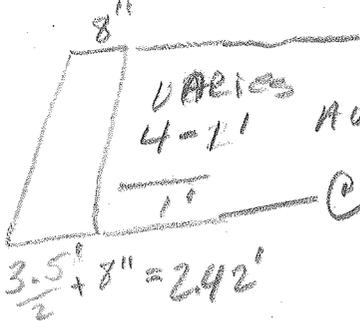
SHEET NO.: 4 of 5

## Retaining Wall "A" (Gravity Wall)



from sta. 110+00 → 112+00'

$$\left[ 200' \times 5' \times \left( \frac{3.17' + 6.7'}{2} \right) \right] / 27 = 71 \text{ c.y.}$$



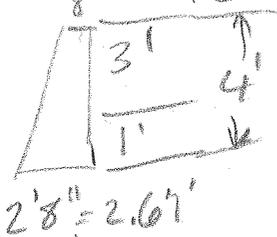
$$\left[ (254+25') \times 3.5' \times \left( \frac{2.42' + 6.7'}{2} \right) \right] / 27 = 10 \text{ c.y.}$$

81 c.y.

@ 109+75 → 110+00 & 112+25'

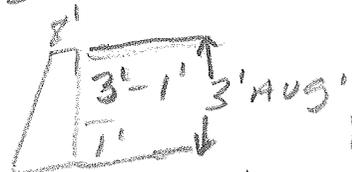
CLASS "B" CONC. FOR WALL "A"

## Retaining Wall B



113+35 to 114+00

$$\left[ 65' \times 4' \times \left( \frac{2.67' + 6.7'}{2} \right) \right] / 27 = 16 \text{ c.y.}$$



113+10 to 114+25

$$\left[ (25' + 25') \times 3' \times \left( \frac{2.17' + 6.7'}{2} \right) \right] / 27 = \frac{8 \text{ c.y.}}{24 \text{ c.y.}}$$

CLASS "B" CONC. FOR WALL "B"



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**19**

DESCRIPTION: **REALIGN DRAINAGE PIPING ON KOGER STREET AND KOGER ROAD**

SHEET NO.: 1 of 4

**ORIGINAL DESIGN:** (Sketch attached)

The current design provides for a new, parallel drainage system along SR 4/15<sup>th</sup> Street. At the Koger Street/Koger Road intersection, the drainage piping deviates from the mainline to tie into a catch basin and a drop inlet, respectively.

**ALTERNATIVE:** (Sketch attached)

Realign the drainage system to have the conduit main stay on SR 4/15<sup>th</sup> Street at Koger Street and Koger Road. Using small diameter pipe, collect the side roads' storm drainage into the proposed catch basin and drop inlet and reconnect to the main.

**ADVANTAGES:**

- Reduces the amount of larger diameter piping
- Provides for better storm water flow
- Simplifies construction
- Reduces initial cost

**DISADVANTAGES:**

- Hydraulic calculations unavailable to determine feasibility of realignment

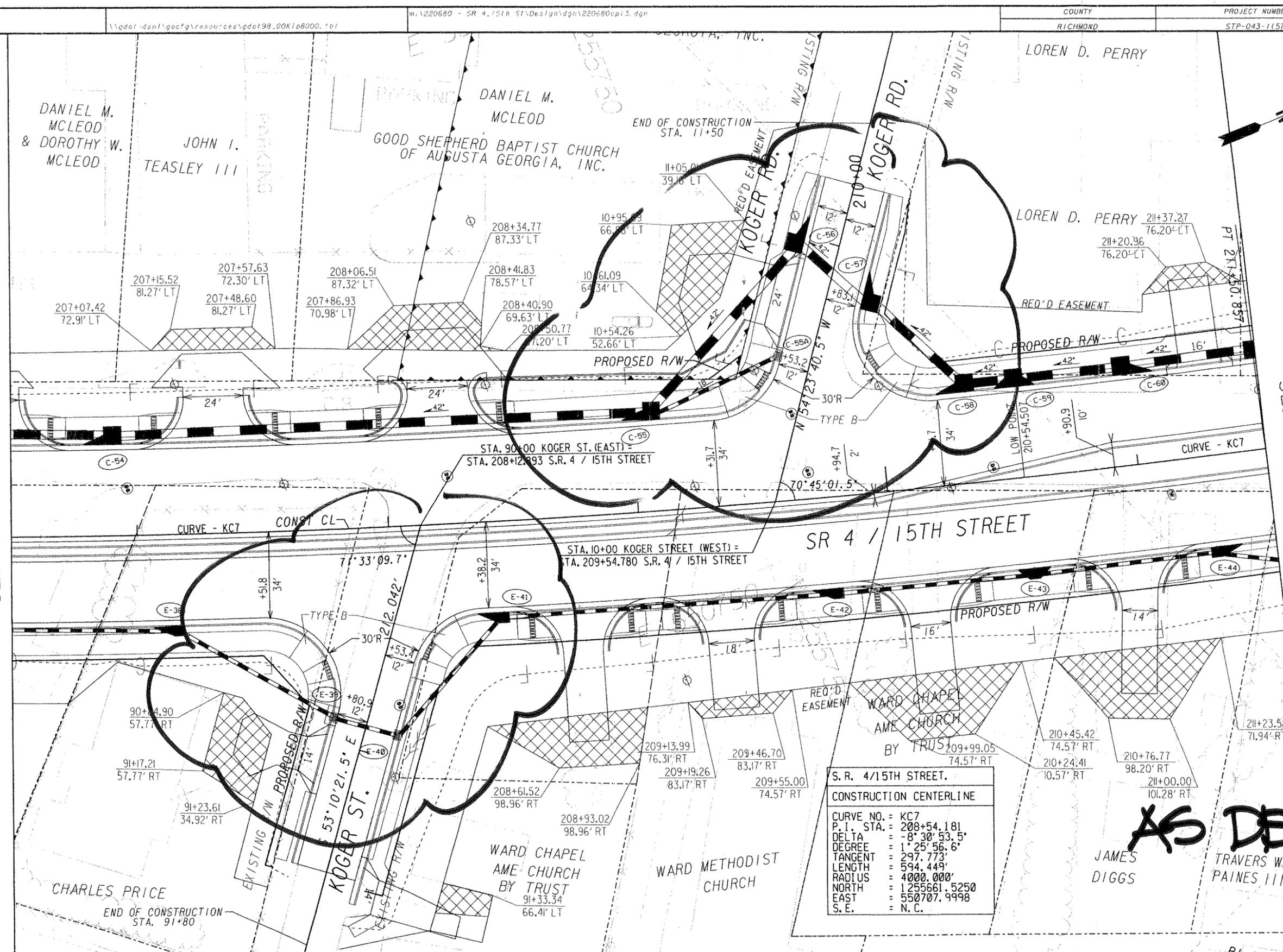
**DISCUSSION:**

Although appearing to minimize piping while improving storm water flow, calculations were not available to determine the feasibility of the proposed change. In plan view, the changed system at these locations is deemed plausible.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 45,450	—	\$ 45,450
ALTERNATIVE	\$ 32,567	—	\$ 32,567
SAVINGS	\$ 12,883	—	\$ 12,883

MATCHLINE STA 206+50  
SEE SHEET 13-12

MATCHLINE STA 211+50  
SEE SHEET 13-14



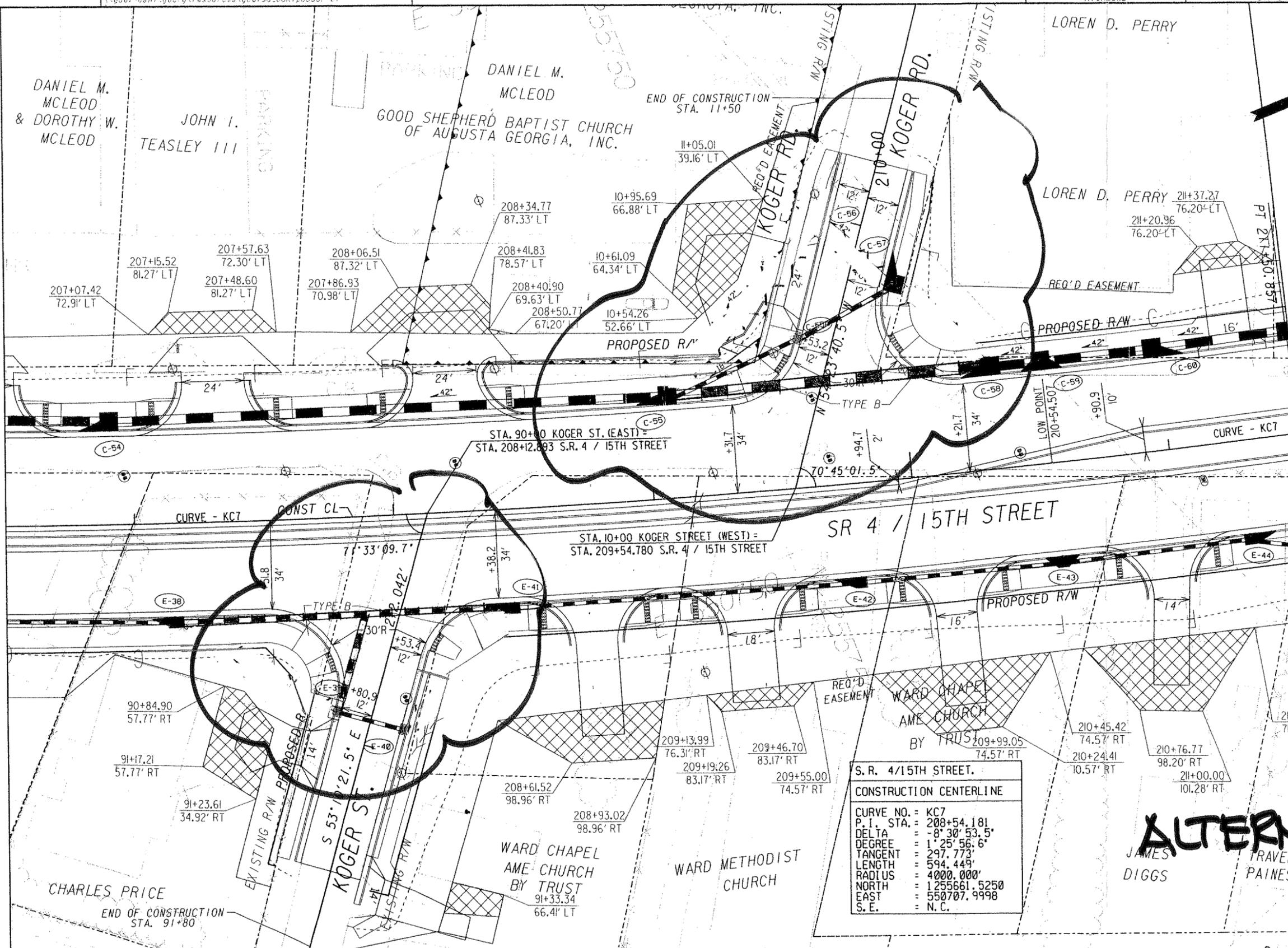
**AS DESIGNED**

<p>PROPERTY AND EXISTING R/W LINE REQUIRED R/W LINE CONSTRUCTION LIMITS EASEMENT FOR CONSTR MAINTENANCE OF ACCESS</p>	<p>BEGIN LIMIT OF ACCESS.....BLA END LIMIT OF ACCESS.....ELA LIMIT OF ACCESS R/W AND LIMIT OF ACCESS</p>	<p>STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION</p>	<p>REVISION DATES</p>	<p>STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: URBAN DESIGN MAINLINE PLAN</p>
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MATCHLINE STA 206+50  
SEE SHEET 13-12

MATCHLINE STA 211+50  
SEE SHEET 13-14



S. R. 4/15TH STREET.  
CONSTRUCTION CENTERLINE

CURVE NO. =	KC7
P. I. STA. =	208+54.181
DELTA =	-8°30'53.5"
DEGREE =	1°25'56.6"
TANGENT =	297.773'
LENGTH =	594.449'
RADIUS =	4000.000'
NORTH =	1255661.5250
EAST =	550707.9998
S. E. =	N. C.

**ALTERNATIVE**

PROPERTY AND EXISTING R/W LINE	-----	BEGIN LIMIT OF ACCESS.....	BLA
REQUIRED R/W LINE	=====	END LIMIT OF ACCESS.....	ELA
CONSTRUCTION LIMITS	---G---F---	LIMIT OF ACCESS	-----
EASEMENT FOR CONSTR		R/W AND LIMIT OF ACCESS	

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION

REVISION DATES	

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: URBAN DESIGN  
**MAINLINE PLAN**



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**21**

DESCRIPTION: **ELIMINATE THE TWO “U” TURN “EYEBROWS” AT TUBMAN HOME ROAD**

SHEET NO.: 1 of 4

**ORIGINAL DESIGN:** (Sketch attached)

The present design has two “eyebrows” at Tubman Home Road to facilitate permissible “U” turns on the mainline, SR 4/15<sup>th</sup> Street.

**ALTERNATIVE:** (Sketch attached)

Eliminate the two “U” turn “eyebrows” at the Tubman Home Rod intersection with SR 4/15<sup>th</sup> Street since the same traffic could negotiate a “U” turn at the Milledgeville Road intersection on the west end and Olive Road further to the east.

**ADVANTAGES:**

- Improves safety
- Reduces the number of conflicting movements
- Reduces right-of-way costs
- Reduces initial cost

**DISADVANTAGES:**

- Consolidates “U” turns at two locations
- Longer distance for residents to reverse their travel after departing their residences

**DISCUSSION:**

The Milledgeville Road and Tubman Home Road intersections are close together, so one “U” turn location would function satisfactorily. The Milledgeville Road intersection is a “T” intersection, therefore, there would not be right turns conflicting with the “U” turns.

The Tubman Home Road and Olive Road intersections are also close enough where Olive Road could accommodate the “U” turns.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 60,954	—	\$ 60,954
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 60,954	—	\$ 60,954

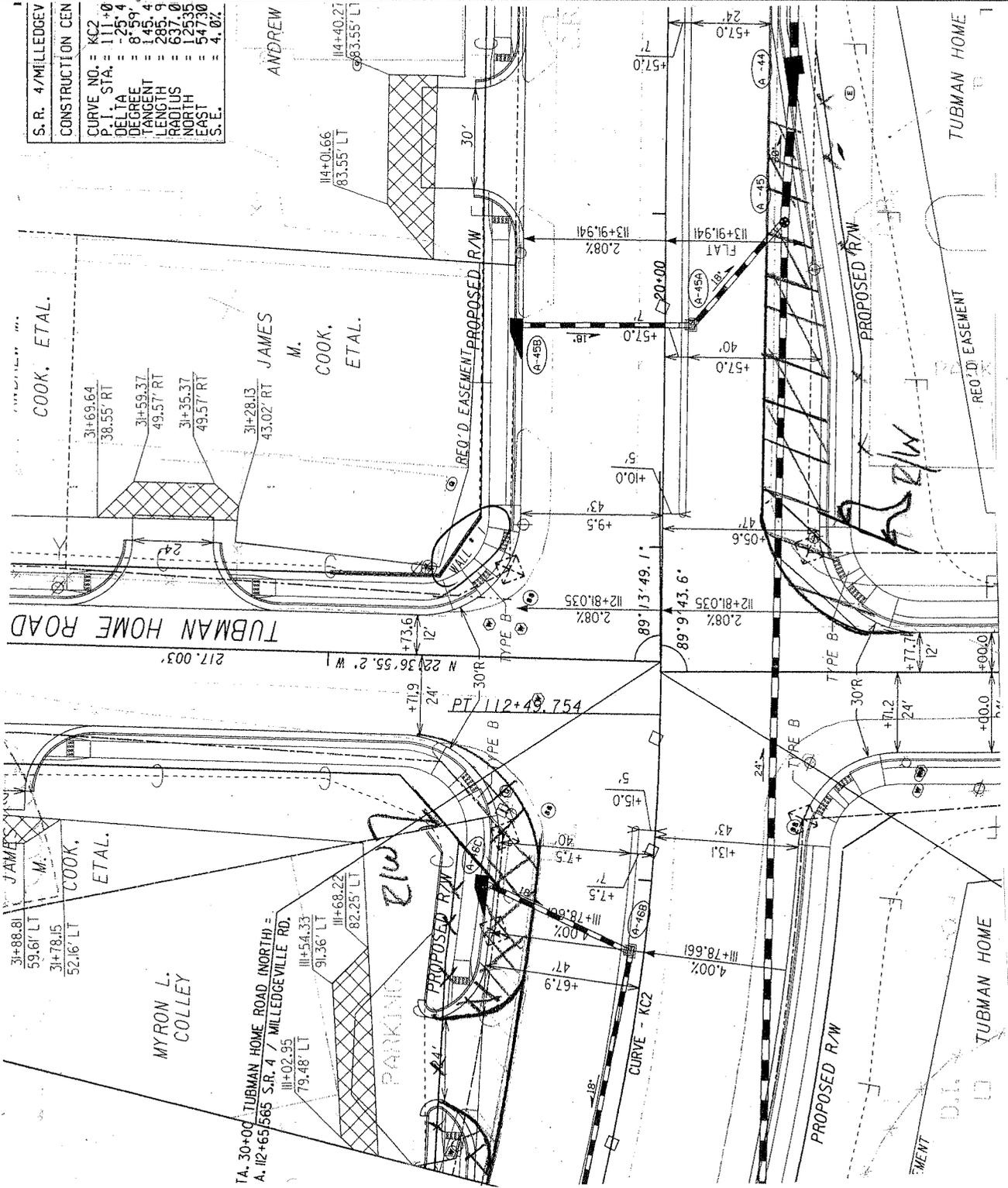


PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
**Preliminary Design Stage**

ALTERNATIVE NO.: **21**

AS DESIGNED      ALTERNATIVE

SHEET NO.: **2 of 4**



S. R. 4/MILLEDGEV	CONSTRUCTION CEN
CURVE NO. = KC2	P. I. STA. = 111+00
DELTA = 25.4	DEGREE = 85.9
TANGENT = 145.4	LENGTH = 267.0
RADIUS = 627.0	NORTH = 12535
EAST = 54730	S. E. = 4.0%

TA. 30+00 TUBMAN HOME ROAD (NORTH) =  
 A. 112+65/565 S.R. 4 / MILLEDGEVILLE RD.  
 III+02.95 79.48' LT  
 III+54.33 91.36' LT  
 III+68.22 82.25' LT

# CALCULATIONS



PROJECT: STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

21

SHEET NO.: 3 of 4

Eliminate U-Turns

Pavement Savings in SE Quadrant

12.5mm	$[(51' \times 16') + (100' \times \frac{16'}{2})]$	$\times .125 \times .078$	$= 16 \text{ tons}$
19mm	1616 SF	$\times .167' \times .078$	$= 21 \text{ tons}$
25mm	1616 SF	$\times .273' \times .078$	$= 35 \text{ tons}$
GAB 12"	$1616 \text{ SF} / 9$		$= 180 \text{ sy}$

Pavement Savings in NW Quadrant

12.5mm	$[(16' \times 40') + (100' \times \frac{16'}{2})]$	$\times .125 \times .078$	$= 14 \text{ tons}$
19mm	1,440 SF	$\times .167 \times .078$	$= 19 \text{ tons}$
25mm	1,440 SF	$\times .273 \times .078$	$= 31 \text{ tons}$
GAB-12"	$1,440 \text{ SF} / 9$		$= 160 \text{ sy}$

R/W Savings

$$\text{Comm} = [(60' \times 15') + (90' \times \frac{15'}{2})] = 1,575 \text{ SF (SE Quad)}$$

$$\text{(NW Quad) Comm} = [40 \times 12] + 8 \times \frac{12'}{2} = 528 \text{ SF}$$

Earthwork for both U-Turns

$$\frac{2 \text{ EA} \times (25 \times 16' \times 2')}{27} = 300 \text{ c.y.}$$

# COST WORKSHEET



<b>PROJECT:</b>	<b>STP-043-1(57) SR 4 / 15TH ST IMPROVEMENTS</b> <b>Richmond County, Georgia Department of Transportation, District 2</b> <i>Preliminary Design Stage</i>	ALTERNATIVE NO: <div style="font-size: 2em; font-weight: bold; text-align: center;">21</div> SHEET NO.: 4 of 4
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Pavement Savings in SE Quadrant							
12.5mm Asphalt	TN	16	77.05	1,233			
19mm Asphalt	TN	21	69.50	1,460			
25mm Asphalt	TN	35	63.60	2,226			
GAB 12"	SY	180	19.49	3,508			
Pavement Savings in NW Quadrant							
12.5mm Asphalt	TN	14	77.05	1,079			
19mm Asphalt	TN	19	69.50	1,321			
25mm Asphalt	TN	31	63.60	1,972			
GAB 12"	SY	160	19.49	3,118			
Total Earthwork	CY	300	25.00	7,500			
Construction Subtotal				23,416			
Construction Markup at 74.56%				17,459			
Construction Total				40,874			
Right of Way							
SE Quadrant	SF	1,575	2.75	4,331			
NW Quadrant	SF	528	2.75	1,452			
ROW Subtotal				5,783			
ROW Markup at 247.20%				14,296			
ROW Total				20,079			
<b>Sub-total</b>				60,954			
<b>Mark-up at</b>				INCL			INCL
<b>TOTAL</b>				60,954			

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**23**

DESCRIPTION: **DO NOT SIGNALIZE THE CASTLEBERRY FOOD ENTRANCE**

SHEET NO.: 1 of 3

**ORIGINAL DESIGN:** (Sketch attached)

Although not indicated on the as-design drawings, the intersection on SR 4/15<sup>th</sup> Street at the Castleberry Food/Williams Memorial Christian Methodist Episcopal Church driveways is to be signalized.

**ALTERNATIVE:**

Eliminate signaling the intersection on SR 4/15<sup>th</sup> Street at the Castleberry Food/Williams Memorial Christian Methodist Episcopal Church driveways.

**ADVANTAGES:**

- One less signal within the project limits, i.e., six vs. seven
- Improves traffic flow on mainline
- Reduces driver frustration
- Avoids three signals within 2,375 LF
- Reduces initial cost
- Reduces maintenance costs

**DISADVANTAGES:**

- Potentially more difficult to cross SR 4/15<sup>th</sup> Street on Sundays and during religious activities to enter and exit Williams Memorial Christian Methodist Episcopal Church
- Potentially more difficult to cross SR 4/15<sup>th</sup> St. on weekdays to enter/exit Castleberry Food complex
- Perceived loss of safety

**DISCUSSION:**

Although acknowledging a “nice to have” signal, the need is not apparent as signals exist at the Essie McIntyre Boulevard intersection (1,475 linear feet (LF) to the south) and at the Government Street/Carver Drive intersection (900 LF to the north). Natural traffic gaps will occur when these signals are functioning properly, allowing for safe and easy crossing movements.

The concern associated with Castleberry Food’s truck traffic creating problems is ameliorated by the signal at Government Street where access to the Castleberry Food complex is easily attainable from the west side of their property – a traffic pattern that already exists.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 174,560	—	\$ 174,560
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 174,560	—	\$ 174,560

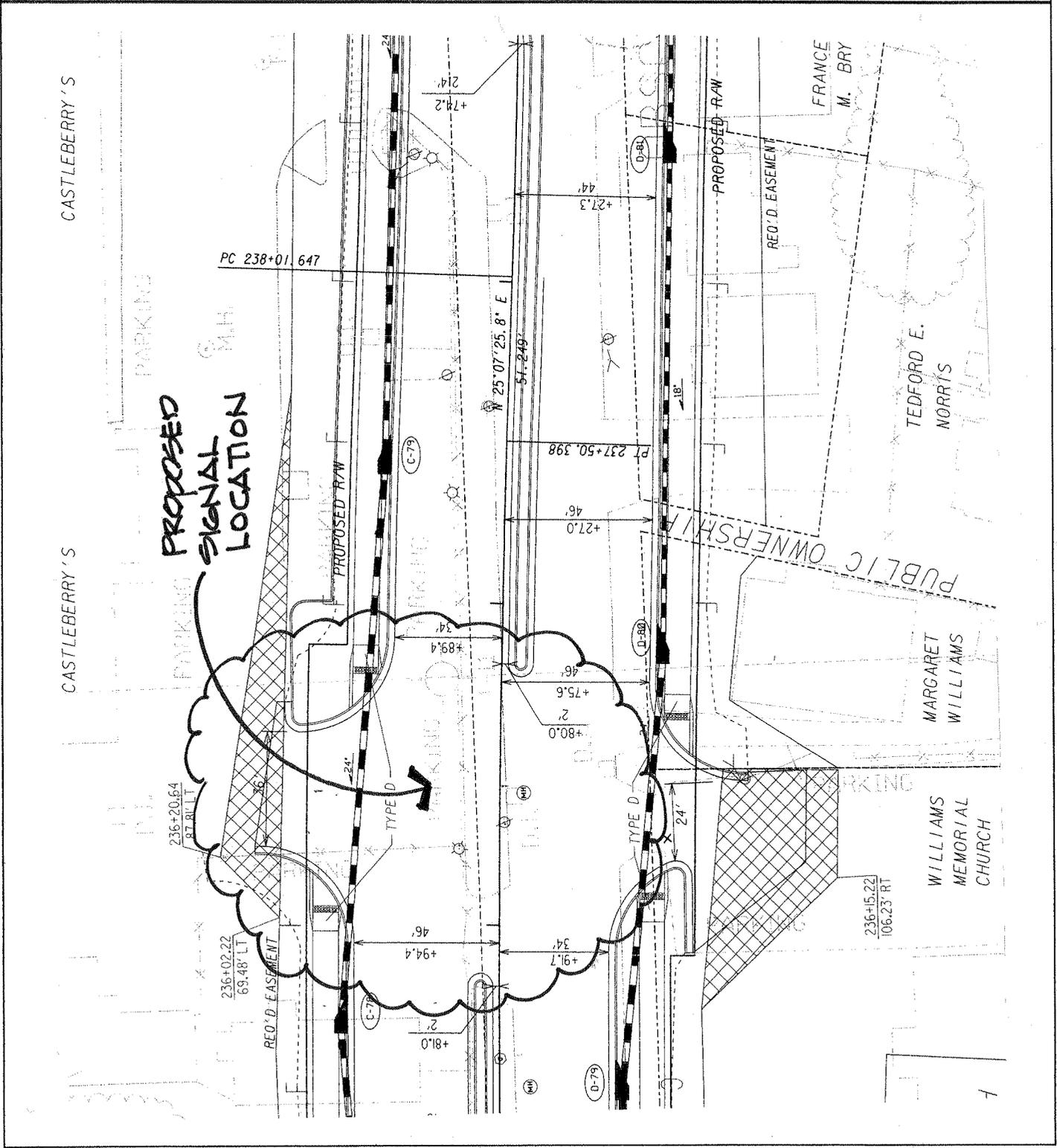
PROJECT: **STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS**  
 Richmond County, Georgia Department of Transportation, District 2  
 Preliminary Design Stage

ALTERNATIVE NO.:

**23**

AS DESIGNED     ALTERNATIVE

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





# VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-043-1(57) STATE ROUTE 4/15<sup>TH</sup> STREET IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**24**

DESCRIPTION: **USE A SINGLE LONGITUDINAL DRAINAGE SYSTEM VERSUS A  
 PARALLEL SYSTEM**

SHEET NO.: 1 of 1

**ORIGINAL DESIGN:**

The current design provides for a new, parallel storm water drainage system running the entire length of the project along the mainline.

**ALTERNATIVE:**

Provide for a single longitudinal storm water drainage system along the mainline with appropriate crossovers to capture the run-off.

**ADVANTAGES:**

- Reduces simultaneous disruptions on both sides of the mainline
- Reduces construction time
- Reduces the quantity of piping material
- Common practice
- Reduces initial cost
- Less disruption to home/property owners and reduces user frustration
- Improves safety

**DISADVANTAGES:**

- May require additional maintenance cost to assure drainage is properly maintained
- Drainage pipe may increase in size
- Requires crossover cuts on the mainline

**DISCUSSION:**

The less disruption afforded the general public and users of this mainline, the better. Constructing a storm water system on both sides of the mainline tends to create extended delays and disrupts properties for longer periods of time. This, in turn, creates higher animosity and frustration for users and property owners that could exacerbate the current safety problems on the mainline.

Single drainage systems, although slightly harder to maintain, allow for speedier construction albeit with larger capacity piping requiring closer attention to flow characteristics.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	<b>DESIGN SUGGESTION</b>		
ALTERNATIVE			
SAVINGS			

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## PROJECT DESCRIPTION

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### BACKGROUND AND HISTORY

Project STP-043-1(57) is the improvement of the SR 4/15th Street/Martin Luther King Junior (MLK) Boulevard corridor from Milledgeville Road to Government Street (functionally classified as an Urban Principal Arterial). The land use along this route is a mixture of residential, industrial and commercial and is peppered with numerous historic structures.

In October 1982, the widening of SR 4 was added to the Augusta Regional Transportation Study's (ARTS) Long Range Transportation Plan by the ARTS Policy Committee. The project, justified based on traffic volumes and travel demand model runs, was added to the ARTS Transportation Improvement Program in the late-1980s and Preliminary Engineering began in the early 1990s.

The improved facility will be multi-modal in nature. Pedestrians, motorists, transit users, bicyclists, and others will benefit by the upgraded SR 4. The reconstructed SR 4 will improve access to and from the Augusta Medical Center, downtown Augusta, employment centers, residences, schools, churches and community gathering places.

#### Projects in the Area:

The following projects are located within the area and are programmed in the State of Georgia Department of Transportation's (GDOT) Construction Work Program and Long Range Program:

Project Number	Project Description	Project Schedule
P. I. No. 0003790	<b>SR 4 / 15<sup>th</sup> Street at CR [County Road] 2207 / Central Avenue – Intersection Improvements</b>	PE 2003 ROW LOCL CST LUMP
P. I. No. 262750	<b>St. Sebastian / Greene Street Extension / SR 28 near CSX Railroad and 15<sup>th</sup> Street – Roadway Project</b>	PE 2003 ROW LOCL CST 2006

#### Vehicular Accident Data:

The additional capacity, turning lanes, improved geometrics and other improvements to SR 4 will provide a safer and more efficient environment for both regional and local motorists. For the years 2000 through 2002, the most recent years for which complete accident data is available, the accident rate on this section of SR 4 exceeded the statewide average by approximately 239% to 334%. Between 2000 and 2002 the injury rate on this section of SR 4 exceeded the statewide average by approximately 220% to 357%.

Presently, 55% of all accidents on this section of SR 4 are rear-end collisions. The addition of turning lanes will help reduce the opportunity for rear-end collisions by removing turning vehicles from the through lanes. Additional capacity will also help reduce rear-end collisions by decreasing the lengths of queues in terms of time and size.

Twenty nine percent of collisions are angle-intersection collisions. This type of accident occurs when a vehicle is struck while turning in front of an on-coming vehicle. The addition of a raised median will reduce the opportunity for motorists to turn in front of on-coming vehicles, thus reducing the opportunity

for angle-intersection collisions.

The following table illustrates the SR 4 accident rate in relation to the statewide rate for a similar facility (please note accident rates are expressed per 100 Million Vehicle Miles Traveled):

	2000		2001		2002	
	SR 4 / 15 <sup>th</sup>	State	SR 4 / 15 <sup>th</sup>	State	SR 4 / 15 <sup>th</sup>	State
Accidents	206		205		167	
Accident Rate	1,645	493	1,765	560	1,405	588
Injuries	76		92		61	
Injury Rate	607	199	792	222	513	233
Fatalities	0		0		0	
Fatality Rate	0	1.47	0	1.48	0	1.75

Pedestrians:

Pedestrian mobility is an important component of the SR 4 reconstruction. Presently, the route has virtually no sidewalks, and where sidewalks do exist, they are in poor condition and in need of repair. The improved SR 4 will include sidewalks, accessible for all users, along the entire route. In addition to sidewalks, improved crosswalks will be provided at intersections. New sidewalks and crosswalks will provide a safer environment for neighborhood children walking to and from school. Improved access to and from transit facilities (bus stops) and providing a sidewalk on which transit patrons can stand while waiting for the bus will be an important benefit derived from the SR 4 reconstruction.

The new crosswalks will be more visible to motorists and should result in a safer environment for pedestrians. A raised median will provide a refuge for pedestrians while crossing the street. The sidewalks, raised median and improved crosswalks will result in a safer street for pedestrians. The addition/improvement of sidewalks and well marked crosswalks will accommodate travelers who select walking as their mode of choice and hopefully encourage others to walk as well.

Traffic Congestion and Level of Service (LOS):

LOS is defined as a qualitative measure describing operational conditions within a traffic stream. There are six identified LOS at which a roadway can operate. Each of the six LOS are identified by a letter “A” through “F.” LOS “A” represents the best operating conditions and LOS “F” represents the worst. LOS “C” is the point at which travel begins to deteriorate for the motorist, and LOS “E” represents a facility which is operating at capacity.

This section of SR 4 experienced an Annual Average Daily Traffic (AADT) volume of approximately 18,000 in the year 2000. Based on the ARTS Travel Demand Model, traffic volumes on SR 4 are expected to rise to between 35,000 and 46,000 by the year 2030. Traffic volumes this high result in intense congestion and can contribute to accidents along the route.

Presently, ARTS is updating the 2025 Long Rang Transportation Plan (LRTP) to the year 2030. During the LRTP update, the ARTS Travel Demand Model is being updated to the year 2030, as well. Since the 2030 LRTP, once adopted, will not include any additional projects for their area than what is found in the current 2025 LRTP, it is reasonably expected the 2030 volumes and LOS along this section of SR 4 will remain close to the 2025 estimates.

A problem created by intense congestion is the fact that motorists often find other routes, many times

through residential neighborhoods, on which to drive. Improving SR 4 will help reduce congestion on the roadway and thus reduce drivers' propensity for using unacceptable cut-through routes in surrounding residential areas.

Truck traffic represents 5.6% of the vehicle mix flowing along SR 4 between Dean's Bridge Road and Government Street. Thus, over 1,000 heavy trucks travel on SR 4 daily. Trucks accelerate, decelerate and negotiate turning movements with greater difficulty than passenger cars, which exacerbates congestion. An improved SR 4 will facilitate a more uniform flow of traffic. Since trucks generate increased noise while accelerating, the improved SR 4 will not require trucks to experience stop and go traffic as often and thus should decrease the noise which they generate.

#### Improved Community:

Enhancing community cohesion will be an important benefit generated by the reconstruction of SR 4. The reconstructed SR 4 will improve access to local schools, churches, community centers, places of employment and other community gathering places. The improved access will benefit all travelers in the community including: motorists, pedestrians and transit users.

A reconstructed SR 4 is an important component of maintaining a healthy and cohesive community. The improved facility will serve to showcase the area as a vibrant and livable community for all.

#### Project Need and Purpose:

The need exists to decrease vehicle accident and injury rates and provide satisfactory capacity on SR 4 between Milledgeville Road and Government Street in order to improve the route's LOS and operational characteristics. Many additional benefits will also be gained as a result of improving SR 4, such as; the addition of sidewalks, improved crosswalks, improved access to and from churches, schools, and community centers and enhancement of a growing and livable community. This project will efficiently and effectively address the identified needs in support of economic development in a manner that is environmentally sensitive and responsible.

#### Environmental Concerns:

Archaeological / Historical: In accordance with Section 106 of the National Historic Preservation Act of 1966 and amendments thereto, the project corridor was surveyed for archaeological and historical resources. A total of 67 properties fifty years or older were identified within the project's area of potential effect. Of these 67 properties, only one, the Shiloh Orphanage, is currently listed in the National Register of Historic Places. 20 properties were identified as eligible for listing, and 20 additional properties are included in the Turpin Hill Historic District. The proposed National Register boundary for the Turpin Hill Historic District is bounded on the north by the legal property line of Resource #5, on the west by the public right-of-way along 15<sup>th</sup> Street, on the south by the public right-of-way on Sunset Avenue and on the east by Roosevelt Street. 30 properties that were inventoried have been recommended as not-eligible for listing in the National Register.

Utility involvements / relocations: Georgia Power, City of Augusta Water and Sewer, Bellsouth, Atlanta Gas Light Co., KMC Power.

## **PROJECT DESCRIPTION**

This project is the widening and reconstruction of the State route (SR) 4/15<sup>th</sup> Street/Martin Luther King Jr.

(MLK) Boulevard corridor from Milledgeville Road to Government Street in the City of Augusta. The total project length is 1.824 miles. Currently, SR 4 / Milledgeville Road / MLK Boulevard consist of four, 12-ft. travel lanes (two in each direction) with a 14-ft. flush median, 5-ft. sidewalks, and curb and gutter with a posted speed of 40 miles per hour (mph). SR 4/15th Street consists of two, 12-ft. to 18-ft. lanes (one in each direction) with intermittent sidewalks and curb and gutter with a posted speed of 35 mph. The accident rate on this section of SR 4 exceeded the statewide average by approximately 239% to 334% for the years 2000 through 2002. The injury rate for the project corridor exceeded the statewide average by approximately 220% to 357%. The projected traffic for the project corridor is 33,525 vehicles per day (VPD) and 44,950 VPD in the years 2010 and 2030, respectively. The need exists to decrease vehicle accidents, injury rates and provide satisfactory capacity on SR 4 between Milledgeville Road and Government Street to improve the level of service (LOS) and operational characteristics. Without the proposed improvements, the corridor will operate at a LOS "F" in 2030 and with the proposed improvements, the corridor will operate at LOS "D."

Construction is proposed as follows:

SR4/Milledgeville Road/MLK Boulevard - Proposed typical section(s): four, 11-ft. travel lanes (two in each direction), and an 18-ft. raised median with a 12-ft. left turn lane at median openings. The existing curb and gutter and sidewalk are to be maintained wherever possible from Milledgeville Road to Olive Road. From Olive Road to 15<sup>th</sup> Avenue, the roadway will have 14-ft. shoulders with an 8-foot shared use path and curb and gutter on both sides of the roadway.

SR 4/15<sup>th</sup> Street - Proposed typical section(s): four, 12-ft. travel lanes (two in each direction), and a 20-ft. raised median with a 12-ft. left turn lane at median openings, 15-ft. shoulders with an 8-ft. shared use path and curb and gutter on both sides of the roadway.

## **CONSTRUCTION COSTS**

The probable cost of construction for this project is based on GDOT's cost estimate dated January 26, 2007 of \$11,425,039. This figure comprises: (1) Construction Subtotal at \$10,386,399, and (2) Engineering and Construction (10.00%) at \$1,038,640 with no inflation. However, during the opening discussion of the VE study, it was determined that inflation needs to be added to the project along with right-of-way costs.

GDOT provided an inflation rate of 8.00% per annum based on recent historical data. In addition, the Project Concept Report, dated September 9, 2004, indicates the inflation rate needs to be applied over a six-year period. This results in an inflation rate of 74.56%.

The right-of-way costs were taken from page 14 of the Project Concept Report and were noted to be: (1) Land at \$735,564, (2) Improvements at \$3,605,825, (3) Relocation at \$505,000, and (4) Damages 246,000, for a subtotal of \$5,092,389. To this figure, Scheduling Contingency at 55% (\$2,800,814), Administration/Court Costs at 60% (\$4,735,922) and Inflation Factor at 40% (\$5,051,650) were added amounting to \$12,587,364 for a grand total right-of-way cost of \$17,680,775. As such, the grand total for the project is now \$35,810,877. It is noted that utility relocation costs have not yet been calculated, and the right-of-way costs are expected to rise.

As such, the grand total for the project is now \$35,810,877. It is noted that utility relocation costs have not yet been calculated and the right-of-way costs are expected to rise.

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# VALUE ANALYSIS AND CONCLUSIONS

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## GENERAL

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

- Value Engineering Study Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Histograms
- Function Analysis
- Creative Idea Listing and 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 guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It included six phases:

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

### Information Phase

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

- *Project Concept Report* prepared by the Department of Transportation, State of Georgia, Office of Preconstruction for P. I. No. 220680, Richmond County, Project Number STP-043-1(57), SR 4 / 15<sup>TH</sup> street Improvements; dated October 25, 2004;
- *Half Size Drawings of Plan and Profile* entitled Plan and Profile of Proposed SR 5 / 15<sup>th</sup> Street; Federal Aid Project (None Provided); Georgia DOT P. I. No. 220680; Federal Route No. N/A; State Route No. 4; prepared by the State of Georgia Department of Transportation, dated January 24, 2007 (run date);
- *General Highway Map*, Douglas County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, dated 1982;
- *Traffic Count Drawings*, Richmond County, Georgia; prepared by the Department of Transportation, Office of Environmental / Location for STP-043-1(57), P. I. #220680, SR 4 / 15<sup>th</sup> St. - 6 Sheets; dated February 2, 2007 (run date);
- *Compact Disc*, VE Study Files; P. I. 220680; dated February 5, 2007;
- *Preliminary Right of Way Cost Estimate* for project STP-043-1-(57), Richmond County, P. I. 220680, prepared by the State of Georgia Department of Transportation; dated January 2, 2004;
- *Augusta / Richmond County Land Sales Spreadsheet*; unknown preparer and undated;
- *Accident rate Calculations for Years 2003, 2004, 2005*, Richmond County, SR 4 from Milledgeville Road (CR [County Road] 1614) to Government Road (CR 2285) – 5 Sheets; unknown preparer and undated; and
- *Engineer Service Let Status* for 220680; prepared by the State of Georgia Department of Transportation; dated December 14, 2006 (run date).

### **Function Identification and Analysis Phase**

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

### **Speculation Phase**

This VE study phase involved the creation and listing of ideas. Creative idea worksheets were organized by project element. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower cost to GDOT, 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 representatives may wish to review the creative list since it may contain ideas that can be further evaluated for potential use in the design.

### **Evaluation Phase**

During this phase of the workshop, the VE team judged the ideas generated during the 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.

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

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

### **Development Phase**

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

### **Presentation Phase**

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

### **POST-WORKSHOP EFFORT**

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

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# VALUE ENGINEERING STUDY AGENDA

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Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 28-hour Value Engineering (VE) study on the following project: **STP-043-1(57), P. I. No. 220680, State Route 4 / 15<sup>th</sup> Street / Martin Luther King Boulevard Improvements** from Milledgeville Road to Government Street. The project is located in the City of Augusta, Richmond County, Georgia. It is expected the owner / designer, the Georgia Department of Transportation (GDOT) will be available to make a formal presentation concerning the project at the beginning of the workshop and be available to answer questions during the VE study effort.

## VE Study Agenda

The VE study will follow the outline described below and be conducted February 6 – 9, 2007. The study will be conducted in the Engineering Services' Conference Room, Room 264 of GDOT's General Office located at No. 2 Capitol Square Street, Atlanta, Georgia 30334. The point-of-contact is Ms. Lisa L. Myers, Design Review Engineer Manager, who can be reached at 404-651-7468.

### Tuesday, February 6<sup>th</sup>

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

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

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

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

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

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

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

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

### **Wednesday, February 7<sup>th</sup>**

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

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

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

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

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

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

### **Thursday, February 8<sup>th</sup>**

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

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

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

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

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

### **Friday, February 9<sup>th</sup>**

8:00 am - 9:00 am                    **Finalize Summary Worksheets and Prepare for Oral Presentation Strategies**

9:00 am – 10:30 am                    **Informal Oral Presentation**

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

10:30 am                                **Adjourn**

# VALUE ENGINEERING WORKSHOP PARTICIPANTS

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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	Transportation Engineer	ARCADIS-US, Inc.
Jeffery G. Dingle, PE	Construction Specialist / Transportation Engineer	Delon Hampton and Associates
Luis M. Venegas, PE, CVS-Life, LEED® AP	Value Engineering Facilitator	Lewis & Zimmerman Assoc., Inc.

## **GDOT / DESIGNER PRESENTATION**

GDOT and the designer presented an overview of the project on Tuesday, February 6, 2007. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team “up-to-speed” regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

## **VALUE ENGINEERING TEAM FINAL PRESENTATION**

The VE team conducted an informal presentation on Friday, February 9, 2007 to GDOT representatives where copies of the draft Summary of Potential Cost Savings worksheets were provided for interim use by GDOT personnel.

A copy of the meeting participants is attached for reference.

# VALUE ENGINEERING ATTENDEES

## MEETING PARTICIPANTS



PROJECT: <b>STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS</b> <b>Richmond County, Georgia Department of Transportation, District 2</b> <i>Preliminary Design Stage</i>		Date: <b>February</b> <b>6 – 9, 2007</b>
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Jill Franks, PE GDOT Employee No.:  em: jill.franks@dot.state.ga.us	Organization: State of Georgia, Department of Transportation (GDOT), Office of Urban Design  Title: Assistant Design Group Manager	ph: 404-656-5442 cell:  fx: 404-657-7921
Name: Charles A. Hasty, PE GDOT Employee No.:  em: charles.hasty@dot.state.ga.us	Organization: GDOT, Office of Urban Design  Title: Transportation Engineer Assistant Administrator	ph: 404-656-5454 cell:  fx: 404-657-7921
Name: Richard C. Marshall GDOT Employee No.:  em: richard.marshall@dot.state.ga.us	Organization: GDOT, Office of Construction  Title: Construction Liaison Engineer	ph: 404-656-5306 cell:  fx: 404-657-0783
Name: Gerald (Jerry) A. Milligan GDOT Employee No.:  em: jerry.milligan@dot.state.ga.us	Organization: GDOT, Office of Right of Way  Title: Supervisor Appraisal Estimator	ph: 770-986-1541 cell:  fx: 770-986-1558
Name: Lisa L. Myers GDOT Employee No.:  em: lisa.myers@dot.state.ga.us	Organization: GDOT, Engineering Services  Title: Design Review Engineer Manager, Value Engineering Coordinator	ph: 404-651-7468 cell:  fx: 404-463-6131
Name: Melanie Nable GDOT Employee No.:  em: melanie.nable@dot.state.ga.us	Organization: GDOT, Office of Environmental / Location  Title: Environmental Transportation Planner Associate	ph: 404-699-4432 cell:  fx: 404-699-4440
Name: Neal O'Brien GDOT Employee No.:  em: neal.obrien@dot.state.ga.us	Organization: GDOT, Office of Urban Design  Title: Design Group Manager	ph: 404-656-5442 cell:  fx: 404-657-7921
Name: M. Nabil Raad GDOT Employee No.:  em: m.nabil.raad@dot.state.ga.us	Organization: GDOT, Office of Traffic Safety and Design  Title: Transportation Engineer 2	ph: 404-635-8216 cell:  fx: 404-635-8116
Name: Brian K. Summers, PE GDOT Employee No.:  em: brian.summers@dot.state.ga.us	Organization: GDOT, Engineering Services  Title: Project Review Engineer	ph: 404-656-6846 cell:  fx: 404-463-6131
Name: Ron Wishon GDOT Employee No.:  em: ron.wishon@dot.state.ga.us	Organization: GDOT, Engineering Services  Title: Assistant Project Review Engineer	ph: 404-651-7470 cell:  fx: 404-463-6131



# ECONOMIC DATA

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

Year of Analysis:	2007
Construction Start Up:	±2013
Construction Duration:	±36 Months (2016)
Economic Planning Life:	35 years for Pavement
Economic Planning Life:	50 years for Bridges
Discount Rate / Interest:	2.65% (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2007)
Inflation / Escalation Rate:	8.00% (Per GDOT)
Uniform Present Worth (UPW) Factor:	22.6284 for 35 years 27.5310 for 50 years
Cost of Power:	\$0.07 / kWhr (kilowatt hour) (assumed)
Operation and Maintenance Costs ( <i>Industry Norms</i> ):	
Equipment - With Many Moving Parts	5.00%-5.50%+ of Capital Cost
Equipment - With Minimal Moving Parts	3.50%-4.00% of Capital Cost
Equipment - Electronic	3.00% of Capital Cost
Structural	1.00%-2.00% (or less) of Capital Cost
Composite Mark-Up for Construction: (Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 6 years) at 58.69%.)	74.56% (1.7456)
Composite Mark-Up (Right-of-Way): (Composed of: Scheduling Contingency at 55.00%; Administration / Court Costs at 60.00%; and Inflation Factor at 40.00 %.)	247.20% (2.4720)

# **COST ESTIMATE SUMMARY AND COST HISTOGRAMS**

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The VE team prepared several cost models for the project that are included following this page. The cost models are arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas and are based on *Estimate Report for file "220680"* which was prepared by GDOT. 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:

- Right-of-Way
- Roadway Items
  - Aggregate Base Course
  - Recycled Asphaltic Concrete
  - Grading Complete
- Drainage
  - Storm Piping
  - Drop Inlets
- Signals

## **DESIGNER'S COST ESTIMATE**

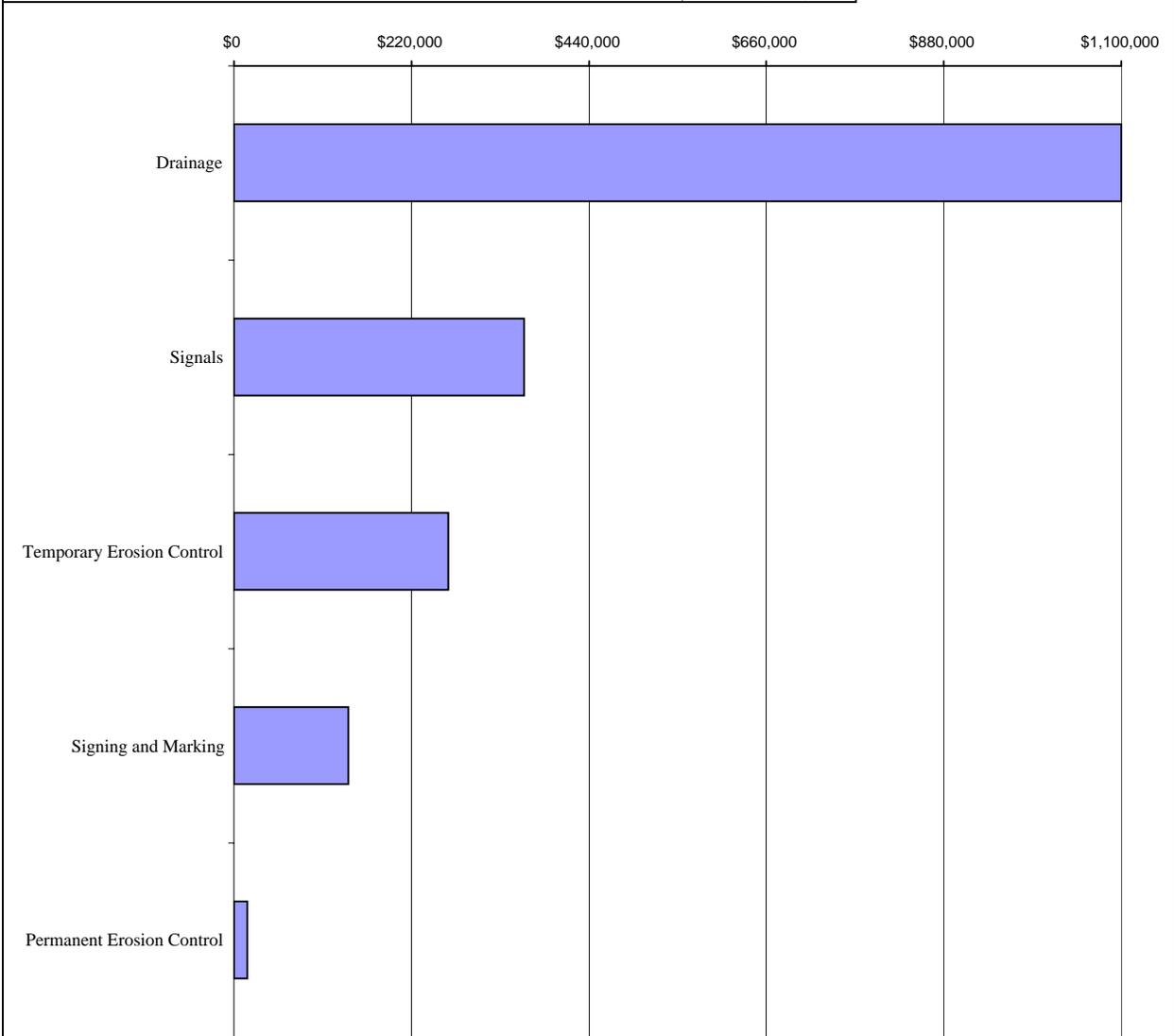
The cost estimate, as described above, did contain sufficiently detailed information to perform a VE study when considering the current pre-final, field review, level of design.

# COST HISTOGRAM



Project: **STP-043-1(57) SR 4 / 15TH ST IMPROVEMENTS**  
**Richmond County, Georgia Department of Transportation, District 2**  
*Preliminary Design Stage*

<b>TOTAL PROJECT - SR 4 / 15th STREET IMPROVEMENTS</b>	COST	PERCENT	CUM. PERCENT
<b>Roadway Items</b>	8,502,432	81.86%	81.86%
Drainage	1,099,958	10.59%	92.45%
Signals	360,000	3.47%	95.92%
Temporary Erosion Control	265,715	2.56%	98.48%
Signing and Marking	141,700	1.36%	99.84%
Permanent Erosion Control	16,595	0.16%	100.00%
<b>Construction Subtotal</b>	<b>\$ 10,386,400</b>	<b>100.00%</b>	
Engineering and Construction at 10.00%	\$ 1,038,640		
Inflation Based on 8.00% per annum for Six Years 58.69%	\$ 6,705,063	<b>Construction</b>	
<b>Construction Total</b>	<b>\$ 18,130,103</b>	Mark-Up:	74.56%
Right-of-Way Costs	\$ 5,092,389		
Scheduling Contingency 55.00%	\$ 2,800,814		
Administration / Court Costs 60.00%	\$ 4,735,922		
Inflation Factor 40.00%	\$ 5,051,650	<b>ROW</b>	
<b>Right-of-Way Total</b>	<b>\$ 17,680,775</b>	Mark-Up:	247.20%
<b>GRAND TOTAL</b>	<b>\$ 35,810,877</b>		



Costs in graph are not marked-up and does not include "Roadway Items."

# FUNCTION ANALYSIS

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Function Analysis was performed to: (1) define the requirements for each project element, and (2) to ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain a given requirement. Random Function Analysis worksheets for the project are attached. This part of the Function Analysis stimulated the VE team members to think in terms of the areas in which to channel their creative idea development.

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



# CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

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

These ideas were then discussed and the advantages/disadvantages of each listed. The VE design team compared each of the ideas with the concept solution determining whether it improved value, was equal in value, or lessened the value of the solution.

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

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

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

# CREATIVE IDEA LISTING



PROJECT:	<b>STP-043-1(57) STATE ROUTE 4 / 15<sup>TH</sup> STREET IMPROVEMENTS</b> <b>Richmond County, Georgia Department of Transportation, District 2</b> <i>Preliminary Design Stage</i>	SHEET NO.: 1 of 2
NO.	IDEA DESCRIPTION	RATING
1	Use an 8-ft. wide multiuse lane on the west side and a 5-ft. wide sidewalk on the east of the project from Olive Road to Government Street	4
2	Use a 10-ft. wide multiuse lane on the west side and no sidewalk on the east of the project from Olive Road to Government Street	3
3	Use an 8-ft. wide multiuse lane on the west side and a 5-ft. wide sidewalk on the east of the project from Olive Road to Essie McIntyre Boulevard, then switch the 8-ft. multiuse lane to the east side and no sidewalk on the west side from Essie McIntyre Boulevard to Government Street.	2
4	Use 5-ft. sidewalks throughout	4
5	Do not improve the west side of Government Street except what is needed for the mainline improvements	5
6	Selectively cul-de-sac some side roads; e.g., Dewitt Street, Swanee Quintet Boulevard, Morgan Street, Post Lane, Branch Street, Koger Street, Kratha Drive, and Carver Drive	4
7	Use a 35-mph design speed throughout	1
8	Use 11-ft. lanes throughout	5
9	Minimize improvements to the east side of Martin Luther King Jr. Boulevard east of the intersection with 15 <sup>th</sup> Avenue	4
10	Use continuous movement for SR 4/15 <sup>th</sup> Street	5
11	Reevaluate improvements at the start of the project: Milledgeville Road/SR 4 – Dean’s Bridge Road intersection	4
12	Use common residential drives along the 15 <sup>th</sup> Street proposed Historic District	4
13	Use an auxiliary parking lane along the 15 <sup>th</sup> Street proposed Historic District between Essie McIntyre Boulevard and Castleberry Food’s entrance	5
14	Use an 18-ft. median throughout	5
15	Use a 16-ft. median throughout	3
16	Minimize the improvements on the east side of Essie McIntyre Boulevard	4
17	Selectively use more retaining walls to reduce right-of-way takes	4
18	Use a 2:1 slope on shoulders to reduce right-of-way takes from the 15 <sup>th</sup> Street intersection at Oates Creek to the end of the project beyond the Government Street/Carver Drive intersection	4
19	Realign drainage piping on both sides of Koger Street	4
20	Reevaluate drainage piping at Olive Road and at Morgan Street/Dewitt Street	4
Rating: 1 → 2 = Not to be Developed;      3 – 4 = Varying Degree of Development Potential;      5 = Most Likely to be Developed; ABD = Already Being Done;      N/A = Not Applicable		

