



# SR 1017/FLOWING WELLS ROAD

Project No. STP00-7062-00(001)

P.I. No. 250600

Columbia County, Georgia

## Value Engineering Study Report

Design Development Phase

June 2008

*Design Consultant*

**W.R. Toole Engineers, Inc.**

*Value Engineering Consultant*



**Lewis & Zimmerman Associates, Inc.**



**Lewis & Zimmerman Associates, Inc.**

*Taking the Chance out of Change*

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

June 19, 2008

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

re: Project No. STP00-7062-00(001), P.I. No. 250600, Columbia County  
SR 1017/Flowing Wells Road from I-20 Wheeler Road Interchange to SR 104/Washington Road  
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. (LZA) is pleased to submit the referenced value engineering study report. The objective of the VE effort was to identify opportunities to enhance the value and constructability of the project and reduce costs.

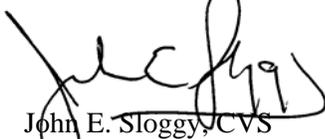
This project has the primary objective of widening and reconstructing Flowing Wells Road from two lanes to four lanes to accommodate the Augusta Regional Transportation Study Year 2015 Transportation Plan.

As with all widening and reconstruction projects, safety improvements are a major component of the process. The additional left-turn lanes provided by this project should contribute to a substantial reduction in accidents while the additional lanes will accommodate forecasted traffic demand.

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

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.



John E. Sloggy, CVS  
Consultant

Attachments

---

---

## **TABLE OF CONTENTS**

---

---

### **EXECUTIVE SUMMARY**

Introduction	2
Project Description	2
Concerns and Objectives	4
Results	4
Summary of VE Alternatives	6

### **STUDY RESULTS**

Introduction	8
Results	8
Evaluation of Alternatives	9
Value Engineering Alternatives	11

### **PROJECT DESCRIPTION**

Project Description	56
---------------------	----

### **VALUE ANALYSIS & CONCLUSIONS**

Introduction	59
Preparation Effort	59
Value Engineering Workshop Effort	61
Post-Study Procedures	64
Value Engineering Workshop Agenda	65
Value Engineering Workshop Participants	68
Economic Data	74
Cost Model	75
Function Analysis	77
Creative Idea Listing and Evaluation of Ideas	80

---

---

## EXECUTIVE SUMMARY

---

---

### INTRODUCTION

This report documents the events and results of the value engineering study (VE) conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was Project No. STP00-7062-00(001), P.I. No. 250600, Widening and Reconstruction of Flowing Wells Road in Columbia County. The project is being designed by W.R. Toole Engineers, Inc. The VE workshop was conducted June 3-6, 2008 at the GDOT Atlanta Headquarters using the design development documents.

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

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

### PROJECT DESCRIPTION

The project will widen Flowing Wells Road from two to four lanes to accommodate current and future vehicle traffic growth.

Located near the border of Columbia and Richmond Counties, Flowing Wells Road serves as an inter-radial connector to major radial transportation corridors. Existing land use along Flowing Wells Road is predominately residential with interspersed religious and educational institutions. Commercial land use characterizes the area near the northern terminus.

The proposed improvement is to widen Flowing Wells Road from two through lanes to four through lanes with turn lanes as needed. The proposed southern terminus is the I-20/Wheeler Road interchange. Proceeding northward, Flowing Wells Road intersects Wheeler road north of I-20 with a stop condition. To address existing and future travel demand, the intersection of Wheeler Road and Flowing Wells Road was realigned during construction of the I-20/Wheeler Road interchange.

Wheeler Road funnels traffic to Flowing Wells Road from I-520 and areas accessing Wheeler Road as it proceeds southeasterly to downtown Augusta. Rapid development of Columbia County has increased travel demand between Columbia County and other sections of the Augusta area. With the

construction of the new I-20/Wheeler road interchange and the realignment of Wheeler Road to provide through movement to Flowing Wells Road, travel demand along Flowing Wells will increase and can only exacerbate existing travel conditions.

The Augusta Regional Transportation Study identified the Flowing Wells corridor as experiencing existing and future transportation deficiencies. The proposed improvement is a component of the ARTS Year 2015 Transportation Plan, adopted by the ARTS Policy Committee on December 8, 1994. The transportation study is a comprehensive, cooperative and continuing transportation planning process conducted by the local governments, the Georgia and South Carolina Departments of Transportation, and the Federal Highway and Federal Transit Administrations. The proposed improvement is included in the current ARTS Transportation Improvement Program and the State Transportation Improvement Program.

**Description of the approved Concept**

The existing Flowing Wells Road is a rural two-lane facility (two 12-ft lanes) and variable width graded shoulders. A total of 173 accidents occurred within the project limits between the years 1993 and 1995. Of the 173 accidents, 74 were rear-end collisions and 80 were angle intersecting accidents. The base traffic (2001) for this project is 18,000 vehicles per day (VPD) and the design year traffic (2021) projection is 28,400 VPD. The proposed design speed is 43.5 mph (70km/h).

The proposed construction will widen Flowing Wells Road to a four-lane divided urban section with a 20-ft. raised median (four 12-ft. through lanes) and a 4-ft. bicycle lane on each side of the roadway. The typical section will include a 12-ft. shoulder with a 5-ft. sidewalk on each side of the roadway. Traffic will be maintained at all times during construction. A five-lane alternative was considered. However, the median alternative is preferred for the safety of the motorist due to the heavy traffic volumes.

The project is classified as an Urban Minor Arterial Roadway.

The anticipated total project cost is \$33,118,192, which includes a total cost of construction of \$9,618,714, and \$23,499,479 for right-of-way. These figures are broken down as follows:

<b>Flowing Wells Road STP-7062(1) P.I. No. 250600</b>	
Construction Subtotal	\$ 8,512,136
E&I (5%)	425,607
Construction Contingencies (8%)	680,971
<b>Construction Total</b>	<b>\$ 9,618,714</b>
Right of Way Subtotal	13,761,775
Condemnation increase & Legal (50%)	6,880,888
Service fee & Appraisal	440,000
Condemnation Cost	60,500
Incidentals	220,000
ROW net	21,363,163
Inflation (10%)	2,136,316
<b>ROW total</b>	<b>\$ 23,499,479</b>
<b>Project Grand Total</b>	<b>\$ 33,118,192</b>

## CONCERNS AND OBJECTIVES

### Concerns

The VE team identified the following areas of concern:

- The drainage layout at the Augusta Preparatory Drive intersection crosses a 54-in. pipe diagonally across the intersection which may incur constructability issues that affect project phasing.
- Sediment basin cost and layout may not be optimal. The basin located at the Martinez Elementary School requires the relocation of a playground and volleyball court. Unused land may be available to the southwest of the existing location, behind the school parking lot, lowering the cost of installation. A drainage study to determine if the new location is adequate would be required.

### Objective

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

## RESULTS

The VE team developed the following alternatives for consideration by GDOT and the design team:

- Use 11-ft.-wide travel lanes from station 82+93 to 93+96 (Alternative Number [Alt. No.] RW-1.) The current design from Washington Road to Columbia Road indicates 13-ft.-wide travel lanes for this section. The design speed of this section, at 45 mph, does not dictate the use of the wider lanes. While this section is primarily commercial, analyzing the forecasted traffic flow reveals low truck traffic (3%) throughout the forecast period. A savings of \$42,202 associated with the reduction in pavement and \$219,576 associated with the corresponding reduction in right-of-way results in a total savings of \$261,778.
- Reduce the lane width from 12 ft. to 11 ft. for the entire length of the raised median, i.e., from the Wheeler Road intersection to the Columbia Road intersection (Alt. No. RW-2). This section is primarily residential with two schools that are accessed via Flowing Wells Road. A savings of \$166,872 associated with the reduction in pavement and \$97,160 associated with the corresponding reduction in right-of-way provides a total savings of \$264,032.
- The current design from Washington Road to Columbia Road indicates a 16-ft. flush two-way left-turn median from station 82+93 to 93+96. The truck percentage is 3% and the design speed is 45 mph. Using a 14-ft.-wide median (Alt. No. RW-5) will neither compromise safety nor reduce functionality but provide savings of \$6,324 in pavement and \$32,824 in right-of-way for a total savings of \$39,148.
- The original design footprint of the right-of-way lines contained an offset that was farther from the centerline than optimal. Alt. No. ROW-1 brings the right-of-way footprint in closer towards the centerline for a savings of \$89,295.
- The original design incorporates a 4-ft.-wide bicycle lane adjacent to the outermost travel lane with a 5-ft.-wide pedestrian sidewalk to the outside of curb and gutter construction. Alt. No. RW-

4 combines the pedestrian sidewalk with the bike lane for a combined multi-use trail. The associated savings is \$590,245.

- Reduce the maximum median width to 18 ft. between the Wheeler Road intersection and I-20 at station 21+60 (Alt. No. RW-3). Due to the length of turn-lane storage, the actual length of 20 ft. median used is minimal. A savings of \$3,904 can be realized.
- Reduce the proposed design commercial property slopes from their current 4:1 ratio to a 2:1 ratio, saving \$261,044 in reduced right-of-way (Alt. No. RW-7).

The Summary of VE Alternatives following this narrative outlines all of the alternatives and the design suggestions developed by the VE team. A full listing of all of the ideas considered by the VE team can be found on the Creative Idea Listing in the Value Analysis and Conclusions section of the report.



---

---

## STUDY RESULTS

---

---

### INTRODUCTION

The results of the VE study conducted on the Flowing Wells Road Widening and Reconstruction project represent the benefits that can be realized by GDOT, the design team, and the users of the corridor.

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

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

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

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

### RESULTS

The VE team generated 30 ideas for change and evaluated the ideas based on their potential for capital cost savings, probability of acceptance, availability of information to properly develop an idea, compliance with perceived quality, adherence to universally accepted standards and procedures, life cycle cost efficiency, safety, maintainability, constructability and soundness of the idea.

Of the ideas generated, 14 were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded seven alternatives with an impact on project costs. These

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

Highlighted below are the VE team's recommendations.

- Use 11-ft.-wide travel lanes from station 82+93 to 93+96 (Alternative Number [Alt. No.] RW-1.) The current design from Washington Road to Columbia Road indicates 13-ft.-wide travel lanes for this section. The design speed of this section, at 45 mph, does not dictate the use of the wider lanes. While this section is primarily commercial, analyzing the forecasted traffic flow reveals low truck traffic (3%) throughout the forecast period. A savings of \$42,202 associated with the reduction in pavement and \$219,576 associated with the corresponding reduction in right-of-way results in a total savings of \$261,778.
- Reduce the lane width from 12 ft. to 11 ft. for the entire length of the raised median, i.e., from the Wheeler Road intersection to the Columbia Road intersection (Alt. No. RW-2). This section is primarily residential with two schools that are accessed via Flowing Wells Road. A savings of \$166,872 associated with the reduction in pavement and \$97,160 associated with the corresponding reduction in right-of-way provides a total savings of \$264,032.
- The current design from Washington Road to Columbia Road indicates a 16-ft. flush two-way left-turn median from station 82+93 to 93+96. The truck percentage is 3% and the design speed is 45 mph. Using a 14-ft.-wide median (Alt. No. RW-5) will neither compromise safety nor reduce functionality but provide savings of \$6,324 in pavement and \$32,824 in right-of-way for a total savings of \$39,148.
- The original design footprint of the right-of-way lines contained an offset that was farther from the centerline than optimal. Alt. No. ROW-1 brings the right-of-way footprint in closer towards the centerline for a savings of \$89,295.
- The original design incorporates a 4-ft.-wide bicycle lane adjacent to the outermost travel lane with a 5-ft.-wide pedestrian sidewalk to the outside of curb and gutter construction. Alt. No. RW-4 combines the pedestrian sidewalk with the bike lane for a combined multi-use trail. The associated savings is \$590,245.
- Reduce the maximum median width to 18 ft. between the Wheeler Road intersection and I-20 at station 21+60 (Alt. No. RW-3). Due to the length of turn-lane storage, the actual length of 20 ft. median used is minimal. A savings of \$3,904 can be realized.
- Reduce the proposed design commercial property slopes from their current 4:1 ratio to a 2:1 ratio, saving \$261,044 in reduced right-of-way (Alt. No. RW-7).

## **EVALUATION OF ALTERNATIVES**

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

All alternatives and design suggestions were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some are mutually exclusive, so

acceptance of one may preclude the acceptance of another. In addition, some of the alternatives may be interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative. Design suggestions could also be interrelated, thus precluding a part of one or more suggestions from being implemented if another design suggestion is also implemented.

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



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County*

ALTERNATIVE NO.: **RW-1**

DESCRIPTION: **REDUCE TRAVEL LANE WIDTHS FROM STATIONS 82+93 TO 93+96 TO 11 FT.**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The current design indicates 13-ft.-wide travel lanes for stations 82+93 to 93+96.

**ALTERNATIVE:**

Use 11-ft.-wide travel lanes for stations 82+93 to 93+96.

**ADVANTAGES:**

- Reduces initial cost
- Reduces right-of-way requirements including land cost
- Reduces right-of-way improvement cost, damages to land and structures, and other specialty cost
- Reduces quantity of pavement
- Eases impacts to commercial businesses including parking lots

**DISADVANTAGES:**

- Narrows travel lanes for any future increased design speed

**DISCUSSION:**

The truck percentage is 3% and the design speed is 45 mph. Using 11-ft.-wide travel lanes will neither compromise safety nor reduce functionality.

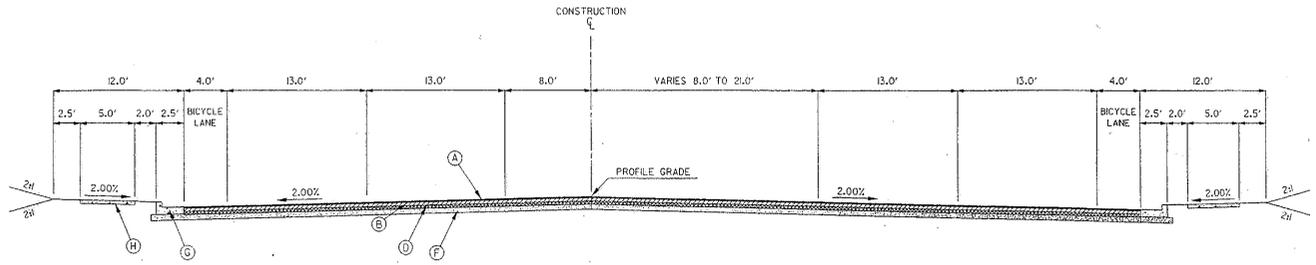
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 261,778	—	\$ 261,778
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 261,778	—	\$ 261,778

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County, Georgia*

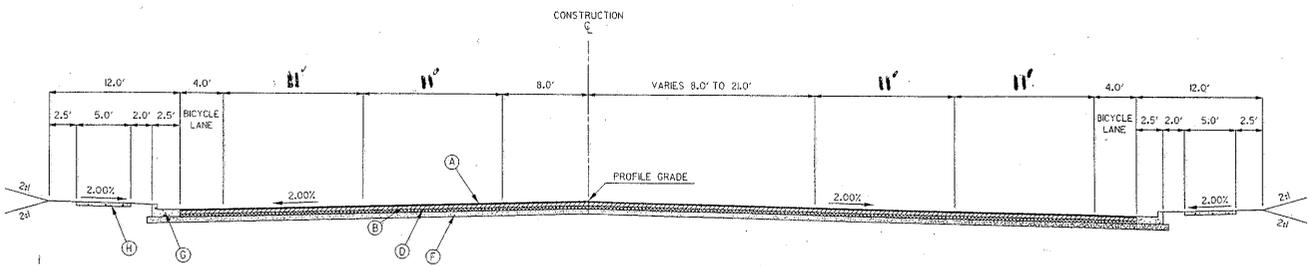
ALTERNATIVE NO.: **Rw-1**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **2 of 4**



ORIGINAL DESIGN



ALTERNATIVE DESIGN

# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: RW-1

SHEET NO.: 3 of 4

- TOTAL PROJECT LENGTH = 1.677 mi
- STA. RANGE OF REDUCED PAVEMENT WIDTH: STA 82+93 to 93+96  
COLUMBIA RD TO WASHINGTON RD.
- NET PAVEMENT LENGTH = 1103 FT

• REDUCTION IN PAVEMENT AREA FROM 13 FT TO 11 FT =

$$(1103 \text{ FT}) \left( \frac{\Delta \text{WIDTH}}{\text{LANE}} \right) \left( \frac{\text{LANES}}{4} \right) = 8824 \text{ SF} \times \frac{104}{95 \text{ SF}} = \underline{\underline{98154}}$$

• UNIT COST OF PAVEMENT USE:

Ⓐ 12.5 mm -  $165 \frac{\text{lb}}{\text{SY}} \times \frac{1 \text{ TON}}{2000 \text{ lb}} \times \$75/\text{TON} = \$6.19/\text{SY}$

Ⓑ 19 mm -  $220 \frac{\text{lb}}{\text{SY}} \times \frac{1 \text{ TON}}{2000 \text{ lb}} \times \$75/\text{TON} = \$8.25/\text{SY}$

Ⓒ 25 mm -  $330 \frac{\text{lb}}{\text{SY}} \times \frac{1 \text{ TON}}{2000 \text{ lb}} \times \$75/\text{TON} = \$12.38/\text{SY}$

Ⓓ GAB  $\frac{10''}{12''} \times \frac{150 \text{ lb}}{\text{ft}^3} \times \frac{1 \text{ TON}}{2000 \text{ lb}} \times \frac{9 \text{ ft}^2}{154} \times \$20/\text{TON} = \$11.25/\text{SY}$

TOTAL:

$(A+B+D+F) = \$38.07/\text{SY}$

• ROW SAVED

- ASSUME R/W LINE MOVE INWARD TOWARDS  $\ominus$  EQUALLY TO LANE REDUCTION.

$98154 \times \frac{1 \text{ AC}}{4840.019 \text{ SY}} = 0.2027 \text{ AC}$

- MOST OF COST SAVINGS WILL BE FROM SPECIALTY COST

- ASSUME NO CHANGE IN COST OF DRAINAGE ALTHOUGH PIPE WILL BE REDUCED IN WIDTH



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County*

ALTERNATIVE NO.: **RW-5**

DESCRIPTION: **USE A 14-FT-WIDE FLUSH TWO-WAY LEFT-TURN  
MEDIAN FROM STATIONS 82+93 TO 93+96**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The current design indicates a 16-ft.-wide, flush, two-way left-turn median for stations 82+93 to 93+96.

**ALTERNATIVE:**

Use a 14-ft.-wide, flush, two-way left-turn median for stations 82+93 to 93+96.

**ADVANTAGES:**

- Reduces initial cost
- Reduces right-of-way requirements including land cost
- Reduces right-of-way improvement cost, damages to land and structures, and other specialty cost
- Reduces quantity of pavement
- Eases impacts to commercial businesses including parking lots

**DISADVANTAGES:**

- Narrows median widths
- Increases perceived loss of safety

**DISCUSSION:**

The truck percentage is 3% and the design speed is 45 mph. Using a 14-ft.-wide median will neither compromise safety nor reduce functionality but provides substantial savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 39,148	—	\$ 39,148
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 39,148	—	\$ 39,148

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

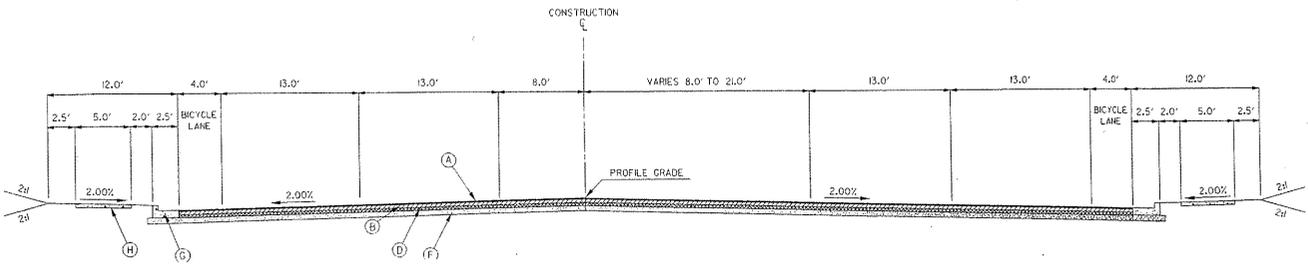
ALTERNATIVE NO.: **RW-5**

ORIGINAL DESIGN

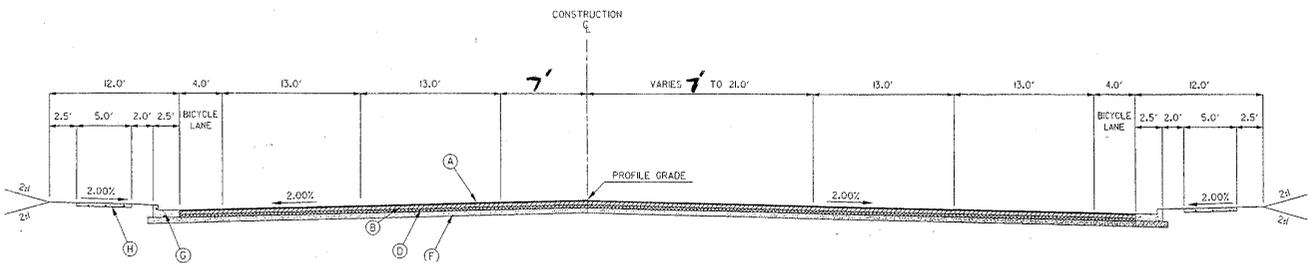
ALTERNATIVE DESIGN

BOTH

SHEET NO.: **2 of 4**



ORIGINAL DESIGN



ALTERNATIVE DESIGN

# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **RW-5**

SHEET NO.: **3 of 4**

- STA. RANGE OF REDUCED WIDTH OF MEDIAN: STA 82+93-693+96
- NET PAVEMENT LENGTH:

LEFT OF C

STA. 86+10 to 91+30

L = 520' @ 1' REDUCTION

RIGHT OF C

STA 86+00 to 94+00

L = 800' @ 1' REDUCTION

$$L_{TOT} = 1320 \text{ ft} @ 1' \text{ REDUCTION, SO, } 1320 \text{ SF} \times \frac{1 \text{ SY}}{9 \text{ SF}} = \underline{147 \text{ SY}}$$

• ROW SAVED

- ASSUME R/W LINE MOVED INWARD TOWARDS C EQUALLY TO LANE REDUCTION

$$147 \text{ SY} \times \frac{1 \text{ AC}}{4840.019 \text{ SY}} = 0.0303 \text{ AC}$$

- MOST OF COST SAVINGS WILL BE FROM SPECIALTY COST

- ASSUME NO CHANGE IN COST OF DRAINAGE ALTHOUGH PIPE WILL BE REDUCED



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County*

ALTERNATIVE NO.: **RW-2**

DESCRIPTION: **REDUCE TRAVEL LANE WIDTHS TO 11 FT.**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:**

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

**ALTERNATIVE:**

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

**ADVANTAGES:**

- Reduces pavement cost
- Reduces right-of way cost

**DISADVANTAGES:**

- Narrows lanes

**DISCUSSION:**

Using 11-ft.-wide lanes will reduce the right-of-way improvement and damages costs. Safety will not be an issue because there is little truck traffic on this road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 264,032	—	\$ 264,032
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 264,032	—	\$ 264,032

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County, Georgia*

ALTERNATIVE NO.: **Rw-2**

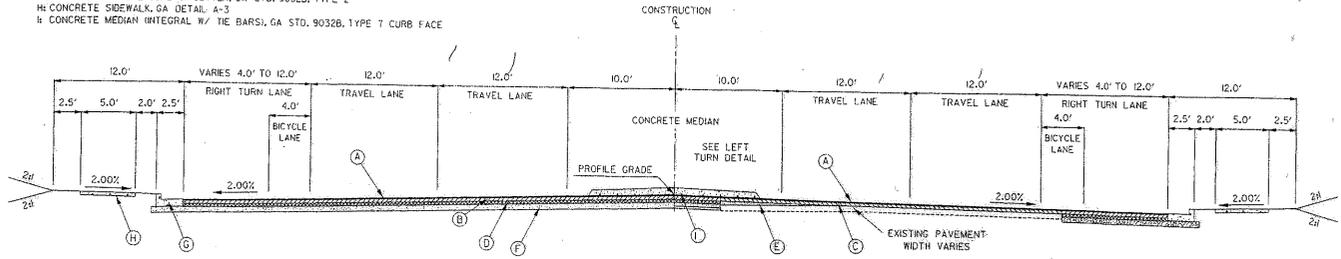
ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **2 of 5**

## ORIGINAL DESIGN

- PAVEMENT DESIGN**
- A: 1165 lb./sq. yd.) ASPHALTIC CONCRETE, 12.5mm SUPERPAVE
  - B: 1220 lb./sq. yd.) ASPHALTIC CONCRETE, 19mm SUPERPAVE
  - C: 1330 lb./sq. yd.) ASPHALTIC CONCRETE, 19mm SUPERPAVE
  - D: 1330 lb./sq. yd.) ASPHALTIC CONCRETE, 25mm SUPERPAVE
  - E: ASPHALTIC CONCRETE LEVELING
  - F: 10" GRADED AGGREGATE BASE
  - G: 8" X 30" CONCRETE CURB & GUTTER, GA STD. 9032B, TYPE 2
  - H: CONCRETE SIDEWALK, GA DETAIL: A-3
  - I: CONCRETE MEDIAN (INTEGRAL W/ TIE BARS), GA STD. 9032B, TYPE T CURB FACE

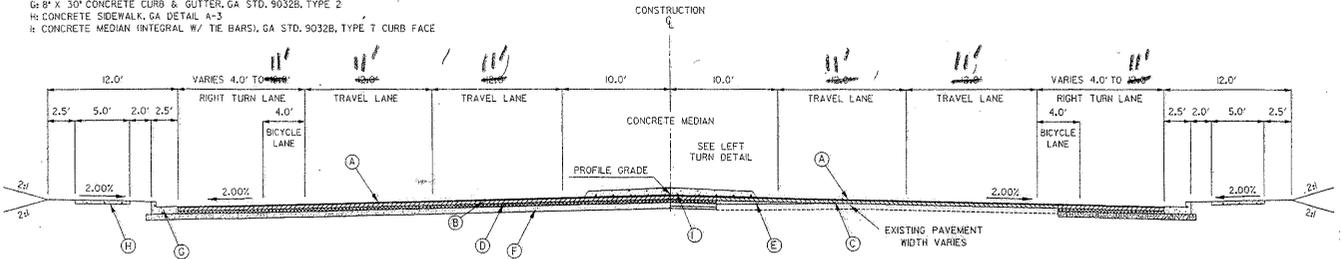
TYPICAL SECTION NO. 4  
 FLOWING WELLS ROAD  
 STA: 26+57 TO 73+77



## ALTERNATIVE DESIGN

- PAVEMENT DESIGN**
- A: 1165 lb./sq. yd.) ASPHALTIC CONCRETE, 12.5mm SUPERPAVE
  - B: 1220 lb./sq. yd.) ASPHALTIC CONCRETE, 19mm SUPERPAVE
  - C: 1330 lb./sq. yd.) ASPHALTIC CONCRETE, 19mm SUPERPAVE
  - D: 1330 lb./sq. yd.) ASPHALTIC CONCRETE, 25mm SUPERPAVE
  - E: ASPHALTIC CONCRETE LEVELING
  - F: 10" GRADED AGGREGATE BASE
  - G: 8" X 30" CONCRETE CURB & GUTTER, GA STD. 9032B, TYPE 2
  - H: CONCRETE SIDEWALK, GA DETAIL: A-3
  - I: CONCRETE MEDIAN (INTEGRAL W/ TIE BARS), GA STD. 9032B, TYPE T CURB FACE

TYPICAL SECTION NO. 4  
 FLOWING WELLS ROAD  
 STA: 26+57 TO 73+77



# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-2**

**PAVEMENT REDUCTION MAINLINE**

SHEET NO.: **3 of 5**

STA

$$10+80 - 12+00 \quad 120 \text{ FT} \times 5 \text{ FT} = 600 \text{ SF} = 600 \text{ SF}/9 = 66.67 \text{ SY}$$

$$12+00 - 13+46 : 146 \text{ FT} \times 4 \text{ FT} = 584 \text{ SF} \quad 584 \text{ SF}/9 = 64.89 \text{ SY}$$

$$13+46 - 16+74 \quad 328 \text{ FT} \times 4 \text{ FT} = 1312 \text{ SF} \quad 1312 \text{ SF}/9 = 145.78 \text{ SY}$$

$$16+74 - 26+57 : 983 \text{ FT} \times 4 \text{ FT} = 3932 \text{ SF} \quad 3932/9 = 436.89 \text{ SY}$$

$$26+57 - 73+77 = 4720 \text{ FT} \times 4 \text{ FT} = 18880 \text{ SF} \quad 18880 \text{ SF}/9 = 2097.78 \text{ SY}$$

$$73+77 - 82+93 = 916 \text{ FT} \times 4 \text{ FT} = 3664 \text{ SF} \quad 3664 \text{ SF}/9 = 407.11 \text{ SY}$$

TURNING LANES

$$5936 \text{ FT} \times 1 \text{ FT} = 5936 \text{ SF} \quad 5936 \text{ SF}/9 = 659.56 \text{ SY}$$

$$3879 \text{ SY} \times \$38.07/\text{SY} = \$147,661.35$$

ASSUME NO CHANGE IN COST OF DRAINAGE ALTHOUGH PIPE WILL BE REDUCED

# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-2**

**PAVEMENT REDUCTION R/W**

SHEET NO.: **4 of 5**

$$3878.68 \text{ SY} \times 9 = 34908.12 \text{ SF}$$

$$34908.12 \text{ SF} / 43,560 = .80 \text{ ACRES}$$

$$.80 \text{ ACRES} \times 135,000 / \text{ACRES} = \underline{\underline{\underline{\$28,000}}}$$

# COST WORKSHEET



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-2**

**PAVEMENT REDUCTION**

SHEET NO.: **5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
PAVEMENT REDUCTION	SY	3879	\$38.07	\$147,674.00			
ESI RATE @ 5%				\$7,384			
CONSTRUCTION CONT @ 8%				\$11,814			
<b>TOTAL</b>				<b>\$166,872</b>			
RIGHT-OF-WAY REDUCED	AC	.80	\$35,000	\$28,000			
RIW MV @ 247%				\$69,160			
<b>TOTAL</b>				<b>\$97,160</b>			
<b>Subtotal</b>							
Markup (%) at		15%					
<b>TOTAL</b>							<b>\$264,032</b>

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County*

ALTERNATIVE NO.: **RW-3**

DESCRIPTION: **REDUCE MEDIAN WIDTH AT STATIONS 19 +88 TO 22+80 TO 18 FT.**

SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:**

The current design uses 20-ft.-wide medians at stations 19+88 to 22+80.

**ALTERNATIVE:**

Reduce the median from stations 19+88 to 22+80 to 18 ft.

**ADVANTAGES:**

- Reduces pavement cost
- Reduces right-of-way

**DISADVANTAGES:**

- None apparent

**DISCUSSION:**

Reducing the median width would reduce pavement costs. The length required for traffic storage results in a minimal amount of median that is actually the full 20 ft., hence the small savings for this project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,904	—	\$ 3,904
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 3,904	—	\$ 3,904

REDUCED MEDIAN

SKETCH



PROJECT: SR 1017/FLOWING WELLS ROAD  
Columbia County, Georgia

ALTERNATIVE NO.: Rw-3

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: 2 of 3

RIGHT OF WAY

$$64.89 \text{ SY} \times 9 / 43560 \text{ SF} = .013 \text{ AC}$$

<sup>REDUCTION</sup>  
 $292 \text{ FT} \times 2 \text{ FT} = 584 \text{ SF}$        $584 \text{ SF} / 9 = 64.89 \text{ SY}$

$$64.89 \text{ SY} \times 31.64 = \$ 2053.12$$

# COST WORKSHEET

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **RW-3**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
PAVEMENT REDUCED	SY	65	\$31.64	\$2057			
E.I. RATE @ 5%				\$103			
CONST CONT @ 8%				\$165			
TOTAL				\$2325.00			
RIGHT OF WAY	ACCESS	.013	\$35,000	\$455			
R/W MV @ 2.77%				1124			
TOTAL				\$1579.00			
Subtotal							
Markup (%) at				15%			
TOTAL							

~~\$2826.00~~  
**\$3904.00**

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County*

ALTERNATIVE NO.: **RW-4**

DESCRIPTION: **ELIMINATE BIKE LANES AND BUILD AN 8-FT-WIDE  
MULTI-USE TRAIL**

SHEET NO.: **1 of 7**

**ORIGINAL DESIGN:** (Sketch attached)

The current design has 4-ft.-wide bike lanes and a 5-ft.-wide pedestrian sidewalk.

**ALTERNATIVE:** (Sketch attached)

Eliminate the bike lanes and build an 8-ft-wide multi-use trail.

**ADVANTAGES:**

- Reduces cost
- Provides a more flexible surface for bicyclists and pedestrians
- Reduces right-of-way

**DISADVANTAGES:**

- None apparent

**DISCUSSION:**

Eliminating the bike lanes and using multi-use trails will reduce the overall right-of-way cost. The multi-use trail will be more conducive to bike and pedestrian traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 590,245	—	\$ 590,245
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 590,245	—	\$ 590,245

# ELIMINATING BIKE LANE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-4**

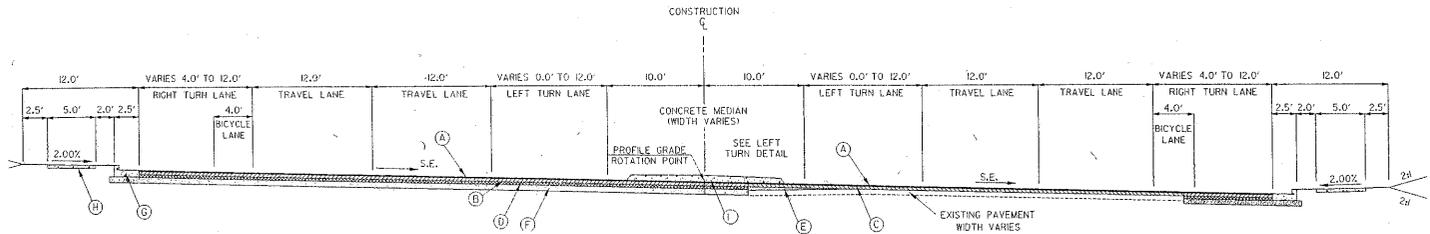
ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **Z of 7**

ORIGINAL DESIGN

TYPICAL SECTION NO. 3  
WHEELER ROAD  
STA: 13+46 TO 16+74  
FLOWING WELLS ROAD  
STA: 16+74 TO 26+57  
(SUPERELEVATED)

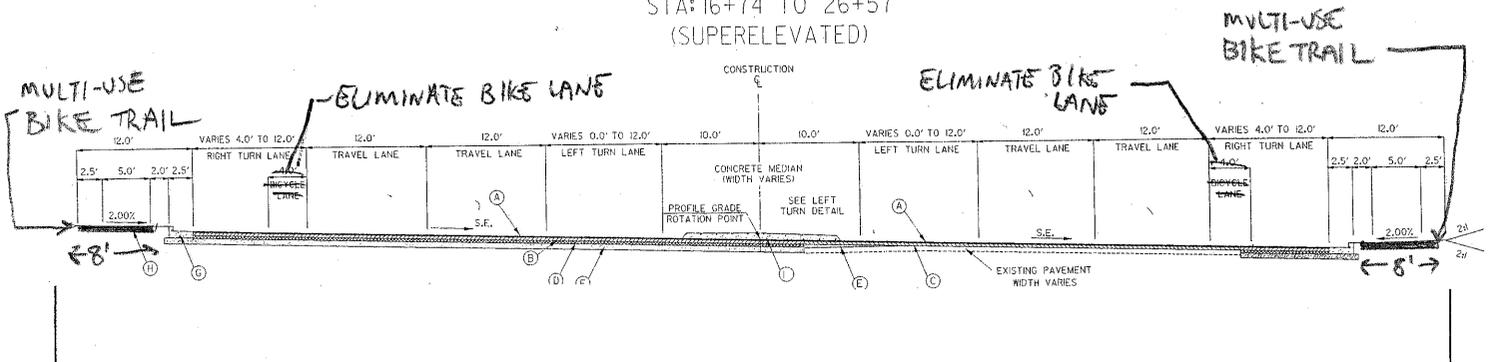
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	STP00-7062-001(001)	6	6



ALTERNATIVE DESIGN

TYPICAL SECTION NO. 3  
WHEELER ROAD  
STA: 13+46 TO 16+74  
FLOWING WELLS ROAD  
STA: 16+74 TO 26+57  
(SUPERELEVATED)

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	STP00-7062-001(001)	6	6





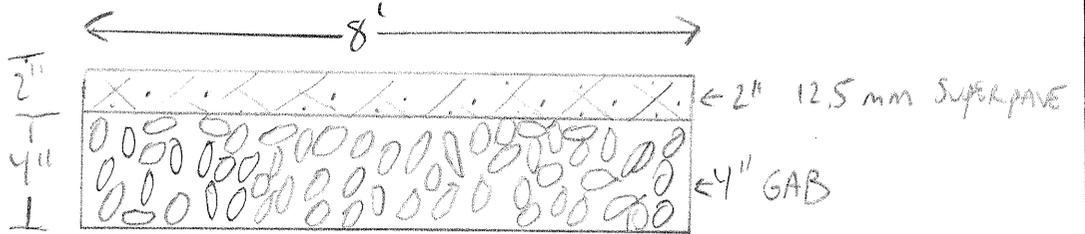
PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **RW-4**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **3 of 7**

ASPHALT MULTI-USE TRAIL



# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **RW-4**

**ELIMINATE BIKE LANES**

SHEET NO.: **4 of 7**

57A

$$10+80 - 12+00 \quad 120 \text{ FT} \times 4 \text{ FT} = 480 \text{ SF} \quad 480 \text{ SF}/9 = 53.33 \text{ SY}$$

$$12+00 - 13+46 \quad 146 \text{ FT} \times 4 \text{ FT} = 584 \text{ SF} \quad 584 \text{ SF}/9 = 64.89 \text{ SY}$$

$$13+46 - 16+74 \quad 328 \text{ FT} \times 4 \text{ FT} \times 2 = 2624 \text{ SF} \quad 2624 \text{ SF}/9 = 291.56 \text{ SY}$$

$$16+74 - 26+57 \quad 983 \text{ FT} \times 4 \text{ FT} \times 2 = 7864 \text{ SF} \quad 7864 \text{ SF}/9 = 873.78 \text{ SY}$$

$$26+57 - 73+77 \quad 4720 \text{ FT} \times 4 \text{ FT} \times 2 = 37760 \text{ SF} \quad 37760 \text{ SF}/9 = 4195.56 \text{ SY}$$

$$73+77 - 82+93 \quad 916 \text{ FT} \times 4 \text{ FT} \times 2 = 7328 \text{ SF} \quad 7328 \text{ SF}/9 = 814.22 \text{ SY}$$

$$82+93 - 84+84 \quad 191 \text{ FT} \times 4 \text{ FT} \times 2 = 1528 \text{ SF} \quad 1528 \text{ SF}/9 = 169.78 \text{ SY}$$

$$84+84 - 93+96 \quad 912 \text{ FT} \times 4 \text{ FT} \times 2 = 7296 \text{ SF} \quad 7296 \text{ SF}/9 = 810.67 \text{ SY}$$

$$7273.79 \text{ SY} \times 38.07/\text{SY} = \underline{\underline{\$276913.19}}$$



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-4**

SHEET NO.: **5 of 7**

TYPICALS

8316 FT L<sub>2</sub>

SUPERPAVE

2" - 12.5mm

$$\frac{2''}{12} \times 8' \times 8316 \text{ FT} \times .076 \text{ T/CF} = 842.69 \text{ TONS}$$

GAB

$$8' \times \frac{4''}{12} \times \frac{150 \text{ lb}}{\text{ft}^3} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times 8316 \text{ FT} = 1663.2 \text{ TONS}$$

SUPERPAVE

$$842.69 \times 175.00 = \$147,470.75$$

GAB

$$1663.20 \times \$19.98 = \$33,230.74$$

$$\$96,432.49$$

# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **RW-4**

**ELIMINATION OF BIKE LANE**

SHEET NO.: **6 of 7**

R/W

REDUCTION IN PAVEMENT

$$9 \times 7273.79 \text{ SY} / 43560 = 1.5 \text{ ACRES}$$

$$1.5 \times 35,000/\text{ACRE} = \underline{\underline{\underline{\$ 52,500}}}$$

ELIMINATE SIDEWALK → REPLACE WITH MULTI-USE TRAIL

$$\$ 313,131.00$$

# COST WORKSHEET

PROJECT: **SR 1017/FLOWING WELLS ROAD** ALTERNATIVE NO.: **R20-4**  
*Columbia County, Georgia*

**ELIMINATION OF BIKE LANE**

SHEET NO.: **7 of 7**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
ELIMINATING BIKE LANES	SY	7274	\$38.07	\$ 276,921			
				\$ 13846			
				\$ 22154			
<b>TOTAL</b>				<b>\$ 312,921</b>			
RIGHT OF WAY	AC	1.5	\$35,000	\$ 52,500			
CLW MV @ 247%				\$ 129,675			
<b>TOTAL</b>				<b>\$ 182,175</b>			
ELIMINATION OF SIDEWALKS				\$ 313,131.00			
MULTI-USE TRAIL							
12.5mm SUPERPAVE	TONS	843	\$75.00	\$ 63,225.00			- 96,452
GAB	TONS	1663	\$19.98	\$ 33,227			
EIT RATE @ 5%				4823			
CONST CONT @ 8%				7716			
<b>TOTAL</b>				<b>\$ 108,991</b>			<b>x2 217,982</b>
<b>Subtotal</b>							
Markup (%) at							
<b>TOTAL</b>							

**\$ 590,245.00**

*BOTH SIDES*

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County*

ALTERNATIVE NO.: **RW-7**

DESCRIPTION: **REDUCE COMMERCIAL PROPERTY SLOPES TO 2:1**

SHEET NO.: **1 of 12**

**ORIGINAL DESIGN:**

The current design uses 4:1 slopes throughout the roadway.

**ALTERNATIVE:** (Sketch attached)

Reduce the slopes to 2:1 slopes in commercial areas.

**ADVANTAGES:**

- Reduces right-of-way
- Reduces easements
- Reduces earthwork

**DISADVANTAGES:**

- Requires maintenance (mowing)

**DISCUSSION:**

Reducing the slopes from 4:1 to 2:1 will generate savings in right-of-way and earthwork. Reducing the right-of-way will also reduce the impacts on local businesses.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 261,044	—	\$ 261,044
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 261,044	—	\$ 261,044

REDUCE SLOPES

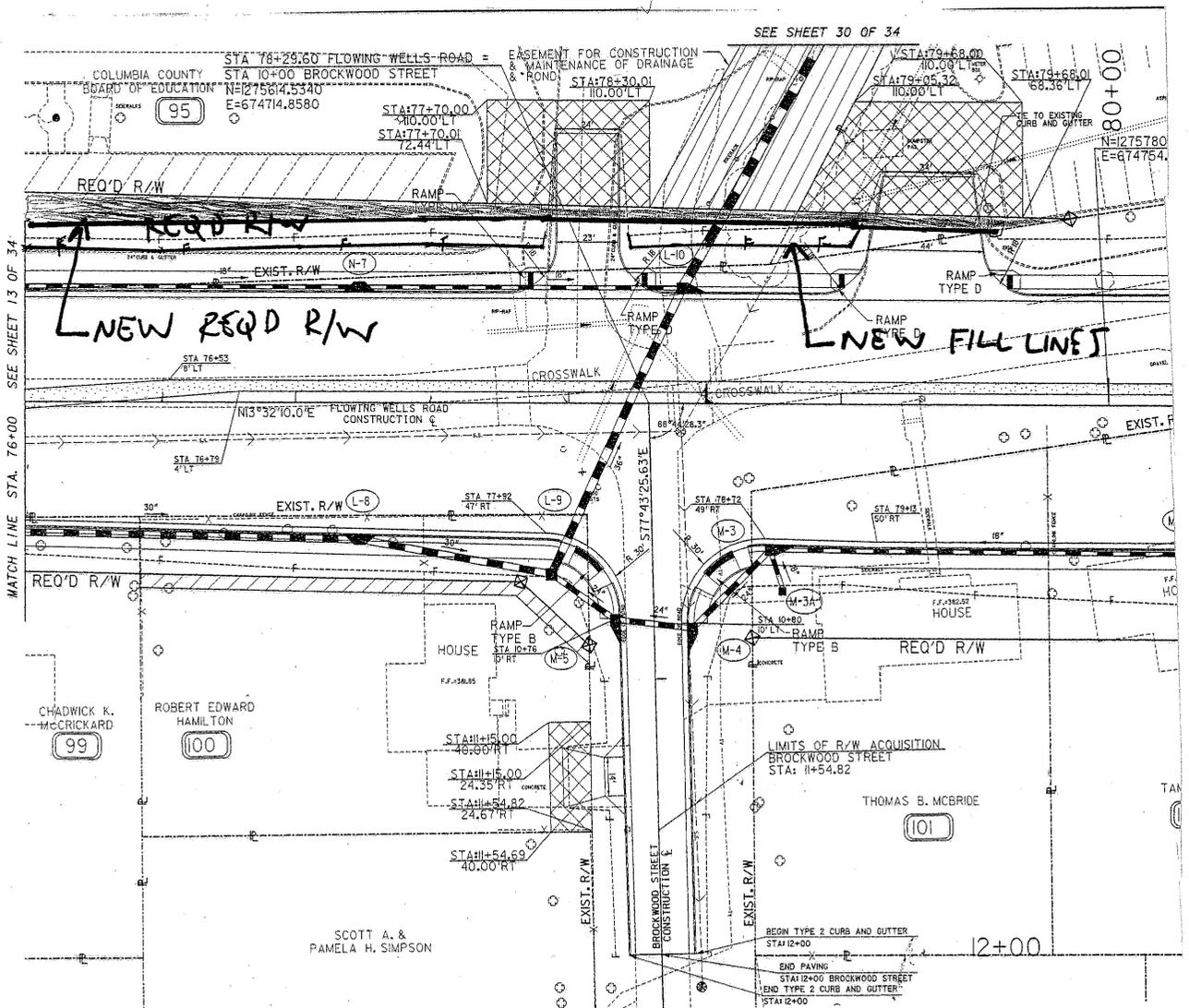
SKETCH 

PROJECT: SR 1017/FLOWING WELLS ROAD  
Columbia County, Georgia

ALTERNATIVE NO.: 20-7

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: 2 of 12



# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-7**

SHEET NO.: **3 of 12**

$$\text{PAR 1} \quad 8' (\text{REDUCTION}) \times 155' = 1245 \text{ SF}$$

$$\text{PAR 95} \quad 8' (\text{REDUCTION}) \times 505' = 4040 \text{ SF}$$

$$\text{PAR 106} \quad 4' (\text{REDUCTION}) \times 90' = 360 \text{ SF} \quad 75 \times 4 = 300, \quad 30 \times 2/2 = 60$$

$$\text{PAR 104} \quad 10' (\text{REDUCTION}) \times 155' = 1550 \text{ SF}$$

$$\text{PAR 110} \quad 6.5' (\text{REDUCTION}) \times 305' = 1982.5 \text{ SF}$$

$$\text{PAR 108} \quad 7' (\text{REDUCTION}) \times 120' = 840 \text{ SF}$$

PAR 109

$$2' (\text{REDUCTION}) \times 130' = 260 \text{ SF}$$



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: R20-7

SHEET NO.: 4 of 12

R/W

PAR 1

$$1245 \text{ SF} / 43,560 = .029 \text{ ACRES}$$

PAR 95

$$4040 \text{ SF} / 43,560 \text{ SF} = .093 \text{ ACRES}$$

PAR 106

$$360 \text{ SF} / 43560 \text{ SF} = .008 \text{ ACRES}$$

PAR 104

$$1550 \text{ SF} / 43560 = .036 \text{ ACRES}$$

PAR 110

$$1982.5 \text{ SF} / 43560 = .046 \text{ ACRES}$$

PAR 108

$$841.5 \text{ SF} / 43560 = .019 \text{ ACRES}$$

PAR 109

$$260 \text{ SF} / 43560 = .006 \text{ ACRES}$$

# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **2w-7**

SHEET NO.: **5** of 12

WT 12+50-13+00 = 8 SF x 50 FT = 400 CF → 400 CF/27 = 14.8 CY  
 CUT 13+00-13+50 = 4.5 SF x 50 FT = 225 CF → 225 CF/27 = 8.3 CY  
 CUT 13+50-14+00 = 1.75 SF x 50 FT = 87.5 CF → 87.5/27 = 3.2 CY  
 14+50-15+00 = .75 SF x 50 FT = 37.5 CF → 37.5/27 = 1.4 CY  
 15+00-15+50 = .375 SF x 50 FT = 18.75 CF → 18.75 CF/27 = .69 CY  
 15+50-16+00 = 1.13 SF x 50 FT = 56.5 CF → 56.5 CF/27 = 2.1 CY  
 16+00-16+50 = 2 SF x 50 FT = 100 CF → 100 CF/27 = 3.7 CY  
 17+50-18+00 = 1 SF x 50 FT = 50 CF → 50 CF/27 = 1.9 CY  
 18+00-18+50 = 1.25 SF x 50 FT = 62.5 CF → 62.5 CF/27 = 2.3 CY  
 18+50-19+00 = 1 SF x 50 FT = 50 CF → 50 CF/27 = 1.9 CY

TOTAL CUT - 26.3 CY

TOTAL FILL - 13.99 CY

# CALCULATIONS



PROJECT: SR 1017/FLOWING WELLS ROAD  
Columbia County, Georgia

ALTERNATIVE NO.: Rw-7

SHEET NO.: 6 of 12

73+50 - 74+00	$2.5 \text{ SF} \times 50 \text{ FT} = 125 \text{ CF}$	$125 \text{ CF} / 27 = 4.6 \text{ CY}$
74+00 - 74+50	"	" = 4.6 CY
74+50 - 75+00	$2.7 \text{ SF} \times 50 \text{ FT} = 137.5 \text{ CF}$	$\rightarrow 137.5 \text{ CF} / 27 = 5.1 \text{ CY}$
75+00 - 75+50	$4.75 \text{ SF} \times 50 \text{ FT} = 237.5 \text{ CF}$	$\rightarrow 237.5 \text{ CF} / 27 = 8.8 \text{ CY}$
75+50 - 76+00	$6.5 \times 50 \text{ FT} = 325 \text{ CF}$	$\rightarrow 325 \text{ CF} / 27 = 12.04 \text{ CY}$
76+00 - 76+50	$7.0 \text{ SF} \times 50 \text{ FT} = 350 \text{ CF}$	$\rightarrow 350 \text{ CF} / 27 = 13 \text{ CY}$
76+50 - 77+00	$7.5 \text{ SF} \times 50 \text{ FT} = 375 \text{ CF}$	$\rightarrow 375 \text{ CF} / 27 = 13.9 \text{ CY}$
77+00 - 77+50	$8.5 \text{ SF} \times 50 \text{ FT} = 425 \text{ CF}$	$\rightarrow 425 \text{ CF} / 27 = 15.7 \text{ CY}$
77+50 - 78+00	$9.5 \text{ SF} \times 50 \text{ FT} = 475 \text{ CF}$	$\rightarrow 475 \text{ CF} / 27 = 17.6 \text{ CY}$
78+00 - 78+50	"	" " " 17.6 CY
78+50 - 79+00	$10 \text{ FT} \times 50 \text{ FT} = 500 \text{ CF}$	$500 \text{ CF} / 27 = 1.9 \text{ CY}$
79+00 - 79+50	$119.5 \text{ SF} \times 50 \text{ FT} ; "$	17.6 CY
79+50 - 80+00	$8 \text{ SF} \times 50 \text{ FT} = 400 \text{ CF}$	$400 \text{ CF} / 27 = 14.8 \text{ CY}$

TOTAL = 147.2 CY

# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: R<sub>w</sub>-7

SHEET NO.: 7 of 12

82+00 - 82+50 1 SF x 50 FT = 50 CF → 50 CF / 27 = 1.9 CY

82+50 - 83+00 1 " " 1.9 CY

~~83+00 - 83+50~~

F 85+00 - 85+50 59 SF x 50 FT = 2950 CF = 2950 CF / 27 = 109.3 CY

~~85~~

R 85+00 - 85+50 3 SF x 50 FT = 150 CF = 150 CF / 27 = 5.6 CY

L 85+50 - 86+00 55.5 SF x 50 FT 2775 CF = 2775 CF / 27 102.8 CY

R 85+50 - 86+00 " " 5.6 CY

L 86+00 - 86+50 43.5 SF x 50 FT = 2175 CF = 2175 / 27 80.6 CY

R 86+00 - 86+50 3 SF x 50 FT " " 5.6 CY

L ~~86+50~~ - 87+00 29.5 SF x 50 FT = 1475 CF = 1475 CF / 27 = 54.6 CY

R 86+50 - 87+00 6.5 SF x 50 FT = 325 CF = 325 CF / 27 = 12 CY

L 87+00 - 87+50 18.5 SF x 50 FT = 925 CF 925 CF / 27 = 34.3 CY

~~R 87+00 - 87+50~~

L 87+50 - 88+00 10 SF x 50 FT = 500 CF 500 CF / 27 = 18.5 CY

L 88+00 - 88+50 3.5 SF x 50 FT 175 CF 175 CF / 27 = 6.5 CY

R 88+00 - 88+50 14.5 SF x 50 FT 725 CF 725 CF / 27 = 26.9 CY

R 88+50 - 89+00 17.5 SF x 50 FT 875 CF 875 CF / 27 = 32.4 CY

TOTAL = 498.5 CY



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-7**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **8 of 12**

90+00 - 90+50 ~~0~~ 19.5 SF X 50 FT = 975 CF 975 CF / 27 = 36.1  
~~0~~ 2

90+50 - 91+00 13.5 SF X 50 FT = 675 CF 675 CF / 27 = 25.0

91+50 - 92+50 400 CF / 27 = ~~14.8~~ 14.8 CY

92+00 - 93+50 5 SF X 150 FT = 750 CF 750 CF / 27 = 27.8 CY

102.7 CY

# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-7**

SHEET NO.: **9 of 12**

13.99

498.5 CY

147.2 CY

~~138.9 CY~~

102.7 CY

1

762.4 ~~101.3~~ CY

FILL

762.4

~~101.3~~ CY

$$\times \$5.00/\text{CY} = \text{\$3812}$$

$$26.3 \text{ CY} \times \$5.00/\text{CY} = \text{\$131.5}$$

CUT

26.3 CY

# COST WORKSHEET

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **Rw-7**

**REDUCING SLOPES**

SHEET NO.: **10** of **12**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
<b>R/W</b>							
PAR 1	ACRES	.029	312,000	\$ 9,048.00			
				905.00			
PAR 1 TOTAL				\$ 9,953.00			
PAR 95	ACRES	.093	312,000	\$ 29,016.00			
				2,902			
PAR 95 TOTAL				\$ 31,918.00			
PAR 106	ACRES	.088	312,000	\$ 27,496.00			
				250			
PAR 106 TOTAL				\$ 27,746.00			
PAR 104	ACRES	.036	312,000	\$ 11,232.00			
				1123			
PAR 104 TOTAL				\$ 12,355.00			
PAR 110	ACRES	.046	312,000	\$ 14,352.00			
				1435			
PAR 110 TOTAL				\$ 15,787.00			
<b>Subtotal</b>							
Markup (%) at				15%			
<b>TOTAL</b>							

# COST WORKSHEET



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: 20-7

**REDUCING SLOPES**

SHEET NO.: 11 of 12

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
FILL GRADING EST RATE @ 5% CONST CNT @ 8%	CY	<del>900</del>	\$5.00	<del>\$4500.00</del>	3872		
		762.4		<del>3812</del>	191		
				<del>300</del>	305		
TOTAL				\$5091.00			
CUT GRADING EST RATE @ 5% CONST CNT @ 8%	CY	26.3	\$5.00	\$132.00			
				\$7.00			
				\$11.00			
TOTAL				\$150.00			
TOTAL				\$4458.00			
Subtotal							
Markup (%) at							
TOTAL							

~~\$4500.00~~  
\$4500.00

# COST WORKSHEET

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: **20-7**

**REDUCING SLOPES**

SHEET NO.: **12 of 12**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
<u>R/W</u>							
PAR 108	ACRES	.019	\$/312,000	\$59,280.00			
				INFLATION @ 10%	\$593.00		
PAR 108 TOTAL				→	\$65,210.00		
PAR 109	ACRES	.006	\$/312,000	\$1,872.00			
				INFLATION @ 10%	\$187		
PAR 109 TOTAL				→	\$2,059.00		
R/W ml @ 247%							
			73,944				
			182,642				
				→	\$256,586.00		
					7375		
Subtotal							
Markup (%) at		15%					
TOTAL					\$81,321.00		

-7395  
→ \$256,586.00

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County, Georgia*

ALTERNATIVE NO.: **ROW-1**

DESCRIPTION: **REDUCE RIGHT-OF-WAY FOOTPRINT**

SHEET NO.: **1 of 8**

**ORIGINAL DESIGN:** (Sketch attached)

The original footprint of the right-of-way lines has an offset that is too far from the center line.

**ALTERNATIVE:** (Sketch attached)

Bring the right-of-way footprint in closer towards the center line. In this study, the footprint was brought in to about ten ft. from cut and fill limits.

**ADVANTAGES:**

- Reduces right-of-way cost
- Reduces damage cost in some areas outside of land cost
- Reduces other special cost

**DISADVANTAGES:**

- Increases right-of-way markers

**DISCUSSION:**

For more cost savings, the areas adjusted that are in a cut section can go to a 5-ft. offset instead of a 10-ft. offset.

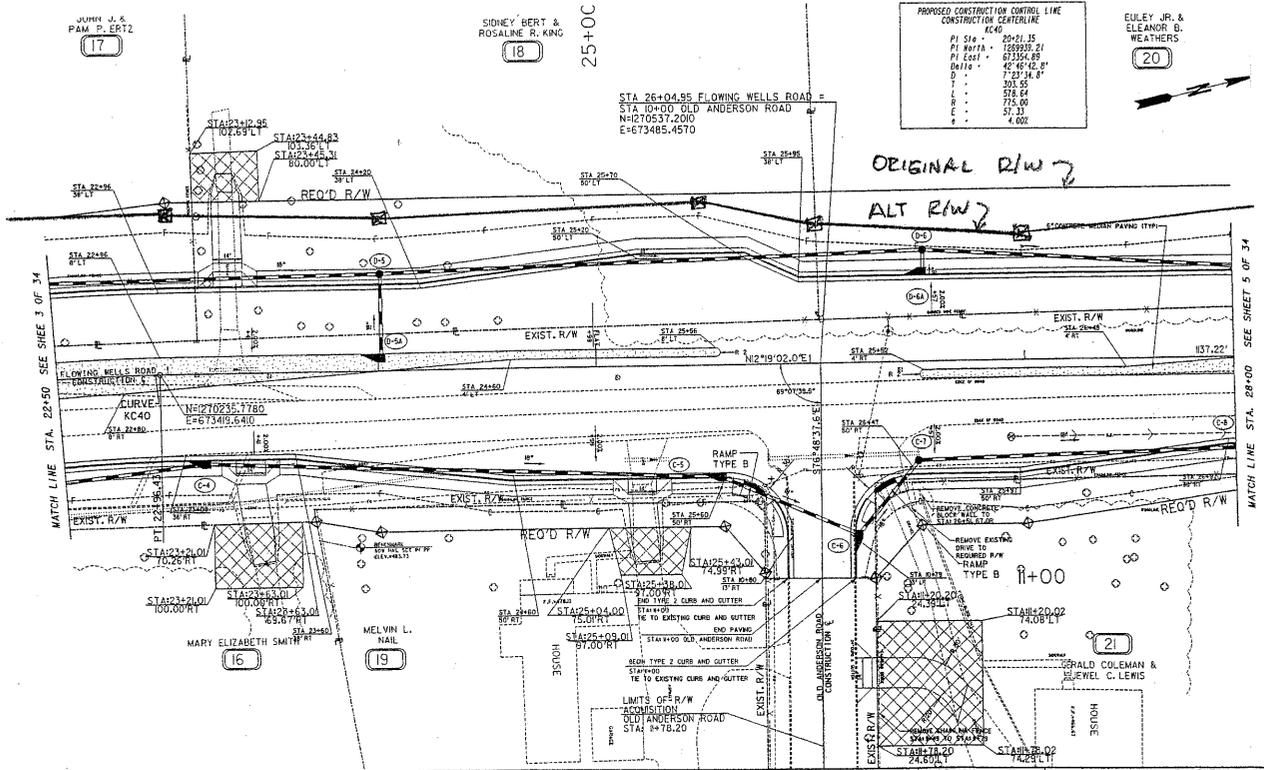
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 89,295	—	\$ 89,295
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 89,295	—	\$ 89,295

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County

ALTERNATIVE NO.: **Row-1**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **2 of 8**



PROPERTY AND EXISTING R/W LINE  
QUAIRED R/W LINE  
INSTRUCTION LIMITS  
USEMENT FOR CONSTR  
MAINTENANCE OF SLOPES  
USEMENT FOR CONSTR OF SLOPES  
USEMENT FOR CONSTR OF DRIVES

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

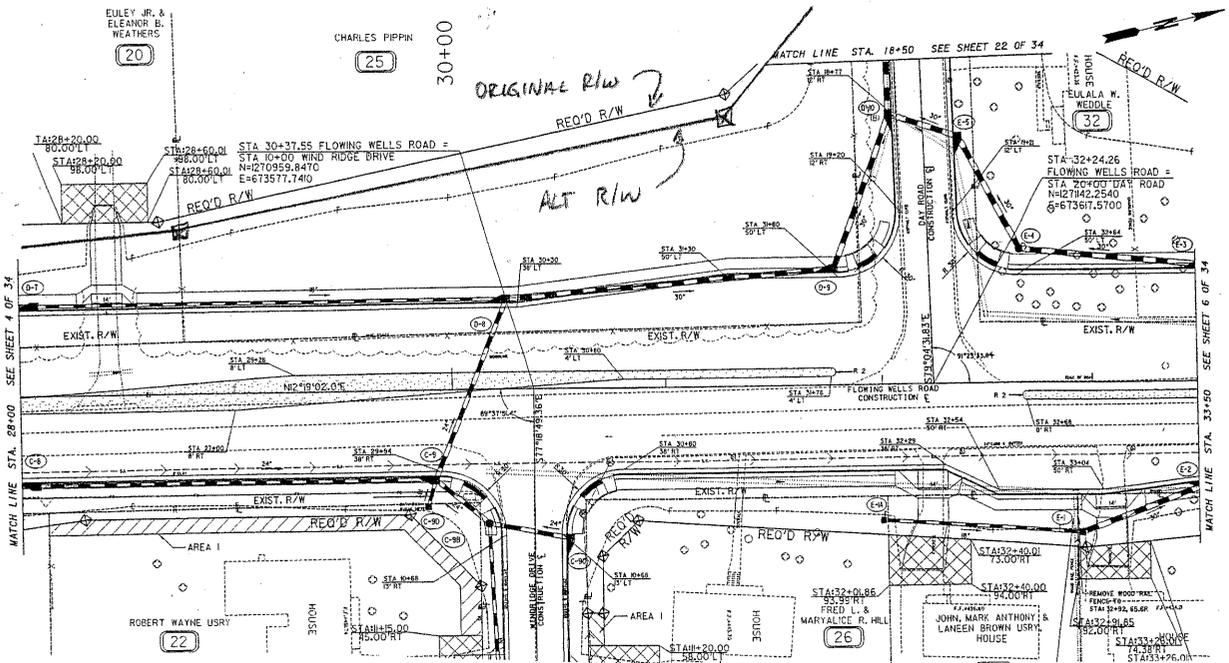


W.R. TOOLE ENGINEERS, INC.  
1005 BROAD STREET  
SUITE 200  
AUGUSTA, GA 30901  
(706) 722-4141

SCALE IN FEET  
0 40 80

NO.	DATE	DESCRIPTION

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: ROAD DESIGN  
**MAINLINE PLAN**  
PROJECT STP00-7062-001(001)

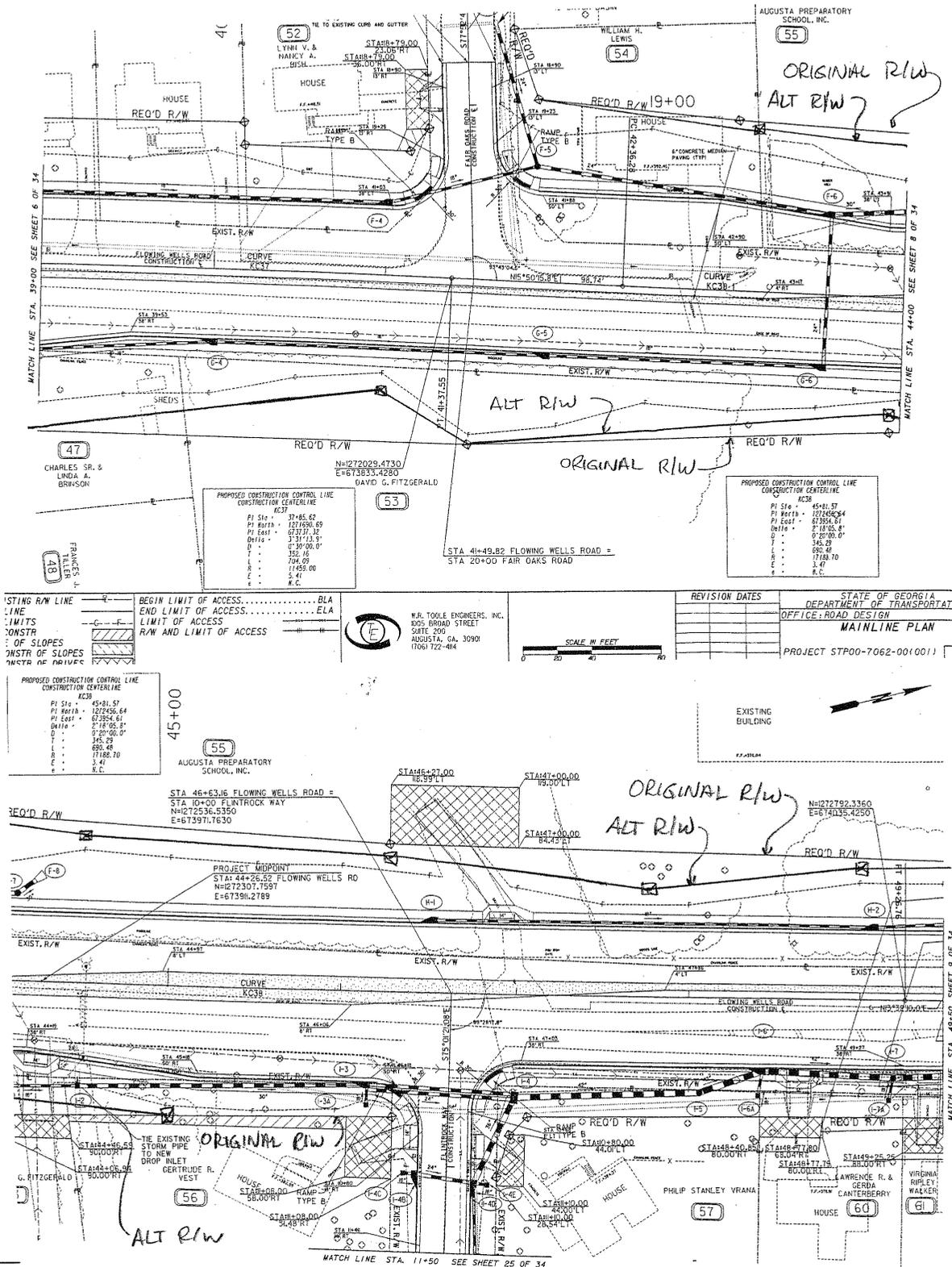


PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County

ALTERNATIVE NO.: **Row-1**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **3 of 8**



EXISTING R/W LINE  
LIMITS  
CONSTR  
OF SLOPES  
INSTR OF SLOPES  
INSTR OF DRIVE/CS

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

W.R. TOOLE ENGINEERS, INC.  
2005 BRIND STREET  
SUITE 200  
AUGUSTA, GA. 30901  
(706) 722-4114

REVISION DATES


SCALE IN FEET  
0 20 40 60

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: ROAD DESIGN  
MAINLINE PLAN  
PROJECT STP00-7062-001(001)

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC38

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

45+00  
AUGUSTA PREPARATORY SCHOOL, INC.

STA 46+63.16 FLOWING WELLS ROAD =  
STA 10+00 FLINTRUCK WAY  
N=1272536.5350  
E=675971.7630

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC39

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

EXISTING BUILDING

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC37

PI Sta	37+85.62
PI Horiz	1271930.69
PI Vert	673771.32
PI East	2717133.91
Delta	2717133.91
D	072°00.00'
L	322.16
T	704.09
E	17459.00
C	2.41
E	R.C.

45+00  
AUGUSTA PREPARATORY SCHOOL, INC.

STA 44+26.52 FLOWING WELLS RD  
N=1272307.7597  
E=675962.2789

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC38

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

EXISTING BUILDING

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC39

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

45+00  
AUGUSTA PREPARATORY SCHOOL, INC.

STA 44+26.52 FLOWING WELLS RD  
N=1272307.7597  
E=675962.2789

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC39

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

EXISTING BUILDING

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC39

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

45+00  
AUGUSTA PREPARATORY SCHOOL, INC.

STA 44+26.52 FLOWING WELLS RD  
N=1272307.7597  
E=675962.2789

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC39

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

EXISTING BUILDING

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC39

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

45+00  
AUGUSTA PREPARATORY SCHOOL, INC.

STA 44+26.52 FLOWING WELLS RD  
N=1272307.7597  
E=675962.2789

PROPOSED CONSTRUCTION CONTROL LINE  
CONSTRUCTION CENTERLINE  
KC39

PI Sta	45+01.57
PI Horiz	1272436.64
PI Vert	673954.61
PI East	2718705.61
Delta	2718705.61
D	072°00.00'
L	345.29
T	680.48
E	1718.70
C	2.41
E	R.C.

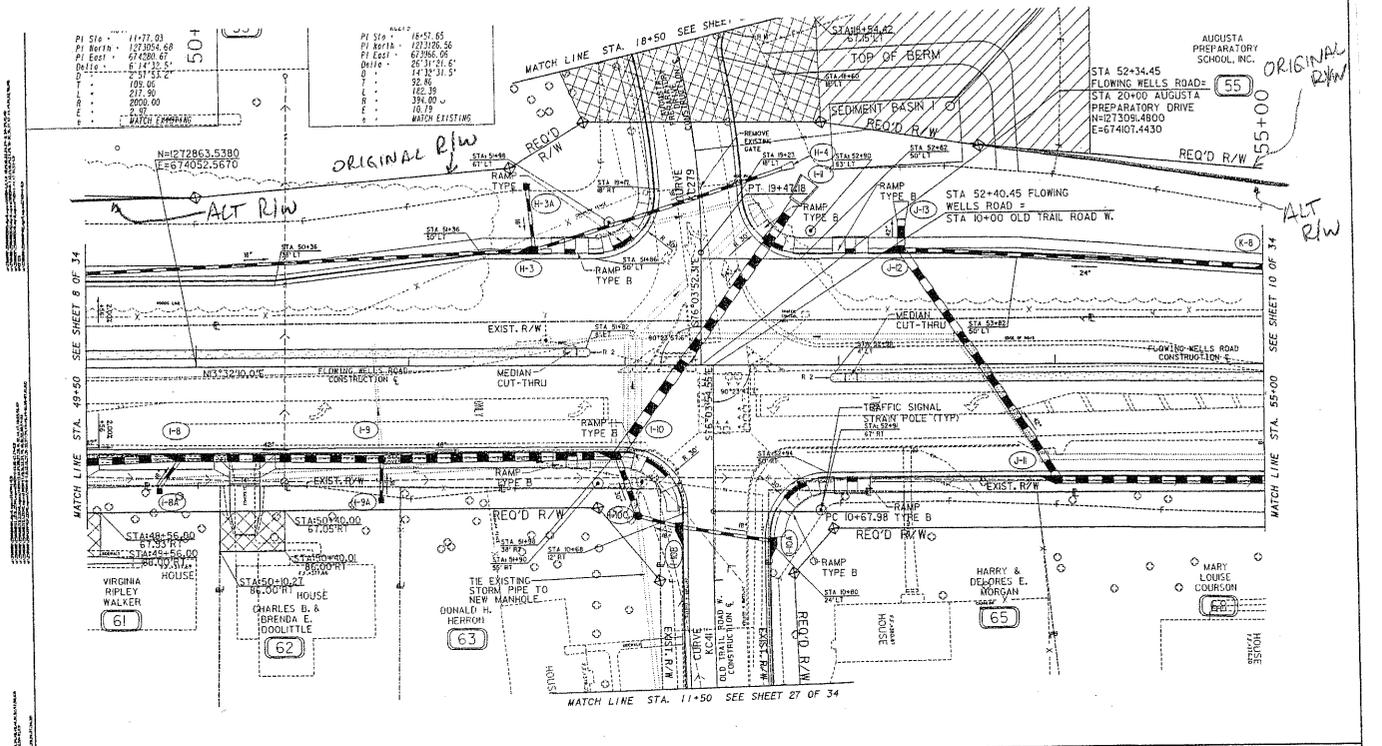
EXISTING BUILDING

PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County

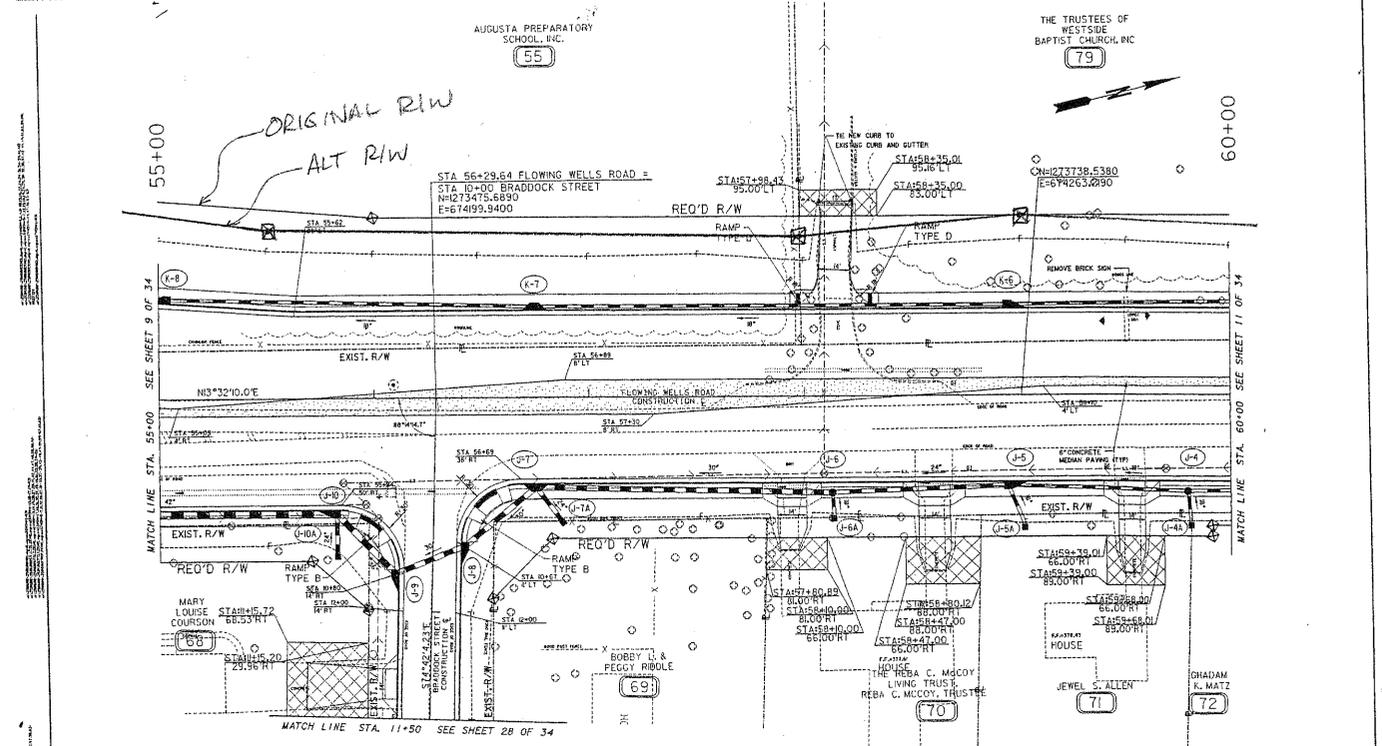
ALTERNATIVE NO.: **200-1**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **4 of 8**



<p>PROPERTY AND EXISTING R/W LINE REQUIRED R/W LINE CONSTRUCTION LIMITS EASEMENT FOR CONSTR &amp; MAINTENANCE OF SLOPES EASEMENT FOR CONSTN OF SLOPES FACEWAY FOR CONSTN OF DRIVES</p>	<p>BEGIN LIMIT OF ACCESS.....BLA END LIMIT OF ACCESS.....ELA LIMIT OF ACCESS R/W AND LIMIT OF ACCESS</p>	<p>W.R. TOOLE ENGINEERS, INC. 1005 BRAD STREET SUITE 200 AUGUSTA, GA. 30901 (706) 722-884</p>	REVISION DATES	STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: ROAD DESIGN
			<p>SCALE IN FEET 0 20 40 60</p>	<p>MAINLINE PLAN PROJECT STP00-7062-00(001) 19 00</p>

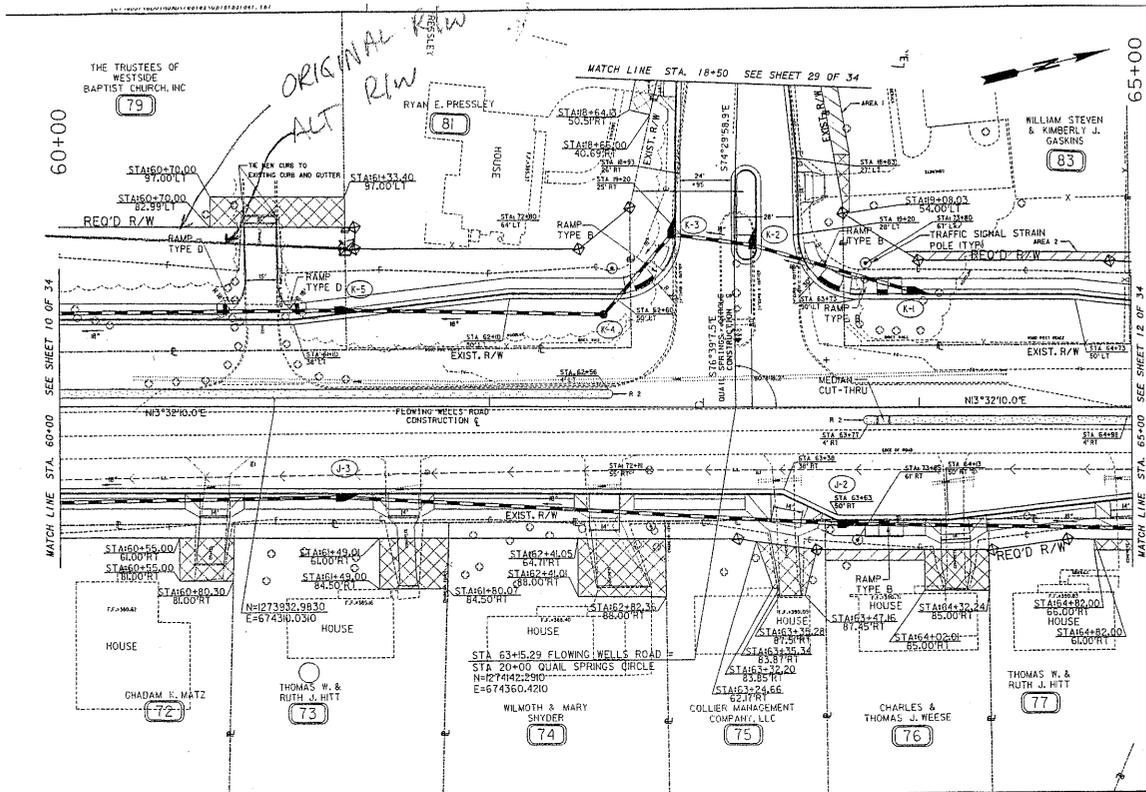


PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County

ALTERNATIVE NO.: **Row-1**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO.: **5 of 8**



AND EXISTING R/W LINE  
TO R/W LINE  
SECTION LIMITS  
FOR CONSTR  
T FOR CONSTR OF SLOPES  
T FOR CONSTR OF SLOPES  
T FOR CONSTR OF SLOPES

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

 W.B. TOOLE ENGINEERS, INC.  
1005 BRADY STREET  
SUITE 200  
AUGUSTA, GA. 30901  
(706) 722-4144

SCALE IN FEET  
0 20 40 60

REVISION DATES

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: ROAD DESIGN  
**MAINLINE PLAN**  
PROJECT STP00-7062-00(001) 13-11



# CALCULATIONS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
Columbia County, Georgia

ALTERNATIVE NO.: Row-1

SHEET NO.: 7 of 8

o REDUCTION IN R/W FOOTPRINT TO WITHIN 10' OF CUT/FILL LIMITS  
CUT LIMITS CAN GO TO WITHIN 5' OF LIMIT LINE; FOR THIS  
STUDY, 10' IS ASSUMED FOR OFFSET TO LIMIT LINE.

<u>PARCEL #</u>	<u>AREA MEASURED - ACRES</u>
17	0.0023
18	0.0469
20	0.0966
25	0.0506
41	0.0129
42	0.0207
47	0.0230
53	0.1362
54	0.0149
PREP SCHOOL 55	0.2275
56	0.0067
CHURCH 79	0.0491

o ASSUMED COST PER R/W COST ESTIMATE BY GDOT :

RES. = \$ 35,000 / AC	0.4108 AC
SCHOOL = \$ 4,000 / AC	0.2275 AC
CHURCH = \$ 41,000 / AC	0.0491 AC



---

---

## PROJECT DESCRIPTION

---

---

The project will widen Flowing Wells Road from two to four lanes to accommodate current and future vehicle traffic growth. Located near the border of Columbia and Richmond Counties, Flowing Wells Road serves as an inter-radial connector to major radial transportation corridors. Existing land use along Flowing Wells Road is predominately residential with interspersed religious and educational institutions. Commercial land use characterizes the area near the northern terminus.

The proposed improvement is to widen Flowing Wells Road from two through lanes to four through lanes with turn lanes as needed. The proposed southern terminus is the I-20/Wheeler Road interchange. Proceeding northward, Flowing Wells Road intersects Wheeler road north of I-20 with a stop condition. To address existing and future travel demand, the intersection of Wheeler Road and Flowing Wells Road was realigned during construction of the I-20/Wheeler Road interchange.

Wheeler Road funnels traffic to Flowing Wells Road from I-520 and areas accessing Wheeler Road as it proceeds southeasterly to downtown Augusta. Rapid development of Columbia County has increased travel demand between Columbia County and other sections of the Augusta area. With the construction of the new I-20/Wheeler road interchange and the realignment of Wheeler Road to provide through movement to Flowing Wells Road, travel demand along Flowing Wells will increase and can only exacerbate existing travel conditions.

The Augusta Regional Transportation Study identified the Flowing Wells corridor as experiencing existing and future transportation deficiencies. The proposed improvement is a component of the ARTS Year 2015 Transportation Plan, adopted by the ARTS Policy Committee on December 8, 1994. The transportation study is a comprehensive, cooperative and continuing transportation planning process conducted by the local governments, the Georgia and South Carolina Departments of Transportation, and the Federal Highway and Federal Transit Administrations. The proposed improvement is included in the current ARTS Transportation Improvement Program and the State Transportation Improvement Program.

### **Description of the approved Concept:**

The existing Flowing Wells Road is a rural two-lane facility (two 12-ft. lanes) and variable width graded shoulders. A total of 173 accidents occurred within the project limits between the years 1993 and 1995. Of the 173 accidents, 74 were rear end collisions and 80 were angle intersecting accidents. The base traffic (2001) for this project is 18,000 VPD and the design year traffic (2021) projection is 28,400 VPD. The proposed design speed is 43.5 mph (70km/h).

The proposed construction will widen Flowing Wells Road to a four-lane divided urban section with a 20-ft. raised median (four 12-ft. through lanes) and a 4-ft. bicycle lane on each side of the roadway. The typical section will include a 12-ft. shoulder with a 5-ft. sidewalk on each side of the roadway. Traffic will be maintained at all times during construction. A five-lane alternative was considered. However, the median alternative is preferred for the safety of the motorist due to the heavy traffic volumes.

The project is classified as an Urban Minor Arterial Roadway.

The anticipated total project cost is \$33,118,192, which includes a total cost of construction of \$9,618,714, and \$23,499,479 for right-of-way. These figures are broken down as follows:

<b>Flowing Wells Road STP-7062(1)</b>	
<b>P.I. No. 250600</b>	
Construction Subtotal	\$ 8,512,136
E&I (5%)	425,607
Construction Contingencies (8%)	680,971
<b>Construction Total</b>	<b>\$ 9,618,714</b>
Right of Way Subtotal	13,761,775
Condemnation increase & Legal (50%)	6,880,888
Service fee & Appraisal	440,000
Condemnation Cost	60,500
Incidentals	220,000
ROW net	21,363,163
Inflation (10%)	2,136,316
<b>ROW total</b>	<b>\$ 23,499,479</b>
<b>Project Grand Total</b>	<b>\$ 33,118,192</b>

---

---

## VALUE ANALYSIS AND CONCLUSIONS

---

---

### INTRODUCTION

This section describes the procedures used during the value engineering study on the Flowing Wells Road Widening and Reconstruction project. It is followed by separate narratives and conclusions including:

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

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

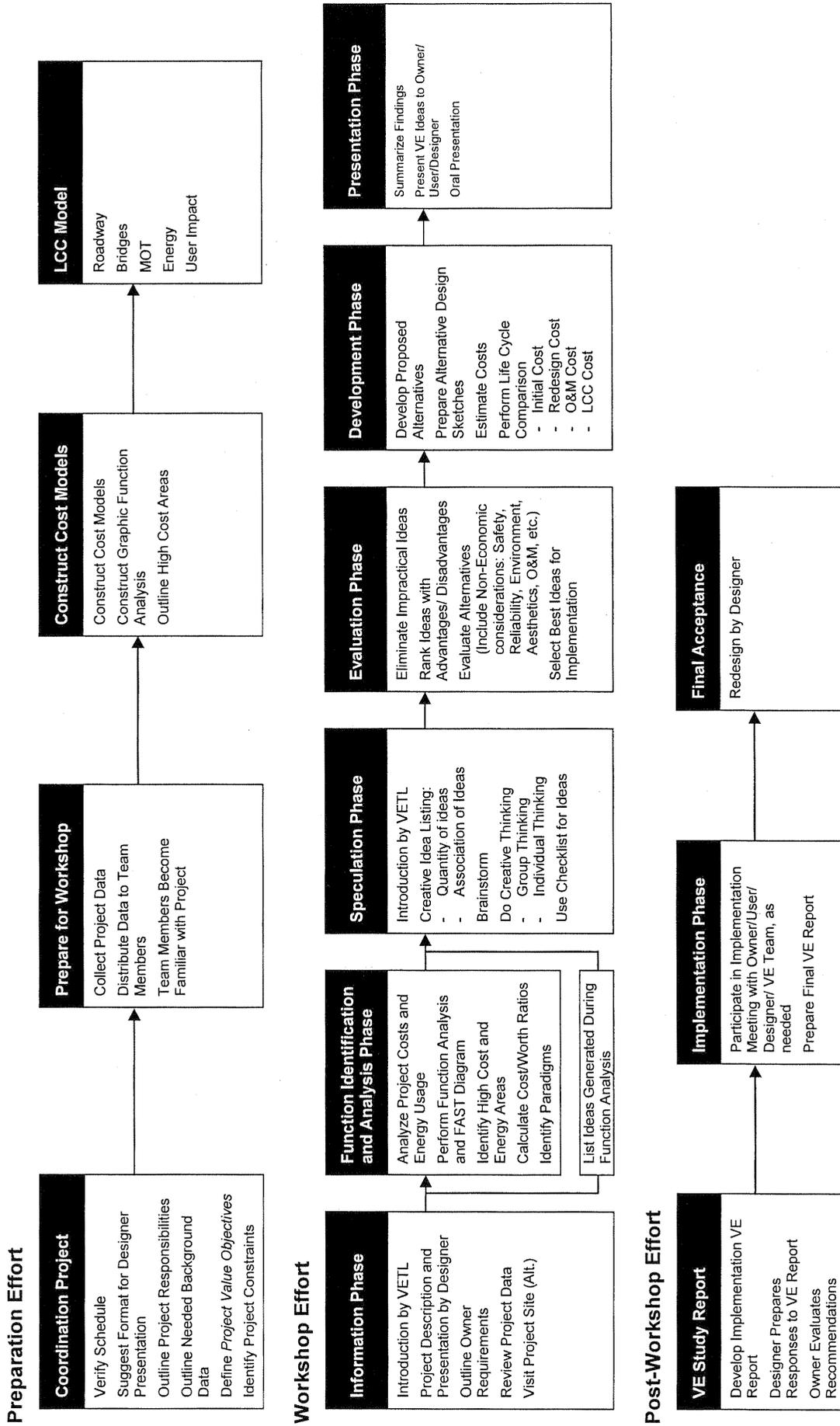
### PREPARATION EFFORT

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

Information relating to the project's purpose and need, owner concerns, project stakeholder concerns, design criteria, project constraints, funding sources and availability, regulatory agency approval requirements, and the project's schedule and costs are very important as they provide the VE team with insight as to how the project has progressed to its current state.

Project cost data provided by the designers was used by the VE team as the basis for a comparative analysis with other similar projects. To prepare for this exercise, the VE team leader used the cost estimate prepared by the designers to develop cost models for the project. The models (described in the Cost model section of this report) were used to distribute the total project cost among the various elements or functions comprising the project. The VE team used this data to identify the high cost elements or functions that drive the project and the elements or functions providing little or no value so that the team could effectively use its time and focus on reducing or eliminating the impact of those elements.

# Value Engineering Study Task Flow Diagram



## VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a three and a half-day effort beginning with an orientation/kickoff meeting on June 3, 2008. During the workshop, the VE job plan was followed in compliance with GDOT and SAVE International guidelines for VE studies. The job plan guided the search for alternatives to mitigate or eliminate high cost drivers, support functions providing little or no value, and potential project risk elements. Alternatives to specifically address the owners project concerns and enhance value by improving performance, reducing maintenance requirements, enhancing constructability, and providing missing or less than optimal functionality were also entertained. The Job Plan includes the following 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:

- Flowing Wells Road Widening and Reconstruction Traffic Study for W.R. Toole Engineers, Inc. for Columbia County, Georgia. Prepared by: Street Smarts, October 2001;
- Half Size Construction Plans entitled Plan and Profile, Flowing Wells Road Improvements, Federal Aid Project STP-7062(1) "Exempt", Columbia County, GDOT P. I. No. 250600; prepared by W. R. Toole Engineers, Inc. for the State of Georgia Department of Transportation; run date May 19 , 2008;
- Preliminary Field Plan Review Inspection Report, Project Number: STP-7062(1), Columbia County, P.I. No.: 250600, Widening of Flowing Wells Rd. from I/20/Wheeler Rd Interchange to SR 104/Washington Rd., Inspection Date: November 2, 2006, Report Date: November 9, 2006;
- Revised Project Concept Report Approval, STP-7062(1) Columbia County, P.I. No. 250600, Department of Transportation, State of Georgia, 3/13/2002;
- Revised Construction Cost Estimate, STP-7062(1) Columbia County, GDOT P.I. No. 250600, Department of Transportation, State of Georgia, 3/13/2002;
- Construction Estimate Report for File "STP-7062(1)" for Project STP-7062(1); P. I. No. 250600; prepared by W.R. Toole Engineers, Inc., for the State of Georgia Department of Transportation; undated (May 19 2008) Grand Total Project Cost \$9,363.349.81;
- Preliminary Right-of-Way Cost Estimate for Project STP-7062(1) Columbia County; P. I. No. 250600; prepared by the State of Georgia Department of Transportation Office of Right-of-Way; dated February 14, 2008;
- Item Mean Summary for 01/2008 to 04/2008 for Spec Year 2001 Contracts, Date 4/01/2008.
- GDOT Design Policy Manual, Georgia Department of Transportation, Version 2.0, Revised May 21, 2007;
- Preconstruction Status Report By P.I. Number, SR 1017/Flowing Wells Road FM I-20 To SR 104/Washington Rd. Dated 05/29/2008;

- General Highway Map, Columbia County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services, in cooperation with the U. S. Department of Transportation, Federal Highway Administration; dated 1987;
- 2006 Georgia Official Highway and Transportation Map; prepared by the Department of Transportation; dated 2006;
- Standard Specifications Construction of Transportation Systems; prepared by the Department of Transportation, State of Georgia; 2001 Edition;
- A Policy on Geometric Design of Highway and Streets; prepared by the American Association of State Highway and Transportation Officials; dated 2004;
- Standards and Construction Details Binder; prepared by the Department of Transportation, State of Georgia; undated;
- Design Policy Manual; A Georgia Department of Transportation Publication; Version 2.0; revised June 1, 2007;
- Guide for the Planning, Design, and Operation of Pedestrian Facilities, AASHTO, July, 2004;
- Guide for the Development of Bicycle Facilities, AASHTO, 1999.

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

Having gained some information on the project, the VE team proceeded to further enhance its project knowledge by defining the functions provided, identifying the costs to provide these functions, and determining whether the value provided by the functions has been optimized. Function Analysis is a means of evaluating a project to determine if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. The elements performing support functions add cost to the final product, but have a relatively low worth to the base function.

Function is defined as the intended use of a physical or process element. In the VE process, the team attempted to identify functions in the simplest manner using active verb/measurable noun word combinations. Sometimes modifying adjectives were used with the noun to clarify the definition. To accomplish this, the team first looked at the project in its entirety and randomly listed its functions which were recorded on Random Function Analysis Worksheets (provided in the Function Identification and Analysis section). Then the individual function(s) were identified for the major components of the project depicted on the cost model(s).

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

### **Speculation Phase**

This VE study phase involved the creation and listing of ideas. Starting with the functions or project elements with high cost/worth ratios, a high absolute cost compared to the other elements in the project, and secondary functions providing little or no value, the VE team generated as many ideas as possible to provide the necessary functions at a lower total life cycle cost, or to improve the quality of the project. Ideas for improving operation and maintenance, reducing project risk, and simplifying

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

GDOT and the design team may wish to review the creative list since it may contain ideas that can be further evaluated for potential use in the design.

### **Evaluation Phase**

Since the goal of the Speculation Phase was to conceive as many creative ideas as possible without regard for the technical merit or applicability to respond to project goals, this phase of the workshop focused on identifying those ideas that respond to the project value objectives and are worthy of additional research and development before being presented to the owner. The selection process consisted of evaluating the ideas originated during the Speculation Phase based on the project value objectives identified through conversations at the Designers Briefing.

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

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

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

### **Development Phase**

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

## **Presentation Phase**

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

## **POST-WORKSHOP EFFORT**

The post-study portion of the VE study includes the preparation of this report. Personnel from GDOT and the design team will analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before implementation, or presenting reasons for rejection.

Upon completing their reviews, the owner and designer will meet and, by consensus, select those Value Engineering Alternatives and Design Suggestions that provide good value to incorporate into the project.

# VALUE ENGINEERING WORKSHOP AGENDA

---

---

Lewis & Zimmerman Associates, Inc, will conduct a 3.5 day Value Engineering (VE) workshop on the Flowing Wells Road widening and Reconstruction project in Columbia County. The area to be studied includes:

- Wheeler Road, County road (CR) 573, to
  - Washington Road, State Road (SR) 104
- 
- 

The study includes the analysis of 17 intersections, four existing signalized intersections and 13 stop sign controlled intersections.

The study, including the Designer's Briefing will be conducted at:

Room 264  
No. 2 Capitol Square  
Atlanta, GA 30334

The Designers will present the design at the beginning of the VE workshop and will be available to answer questions during the study effort. Georgia Department of Transportation (GDOT) staff is encouraged to attend.

The VE team comprises the following individuals:

Broderick D. Keown, EIT	Roadway Engineer	Delon Hampton and Associates
Brian Sapp, PE	Roadway Engineer	HNTB
John E. Sloggy, CVS	VE Team Leader	Lewis & Zimmerman Associates

## **Tuesday, June 3, 2008**

8:00 am -9:00 am                      **Convene VE team**                      **(VE Team)**

VE team gathers to review project documents and prepare for VE study

9:00 am – 9:45 am                      **Designer's Presentation:**                      **(All Participants)**  
**Welcome, Introduction and Objectives**

Welcome;  
Opening remarks and Introduction of participants: Owner, Designer, VE Team members  
History and background of the project and available project funds  
Overview of the VE process, Workshop organization and Agenda.  
Review VE workshop Objectives and Goals

9:45 am -11:30 am                      **Designers Presentation:**                      **(All Participants)**  
**Design Team Detailed Presentation**

---

---

Overview, Scope, and Project requirements  
Key design Issues for all disciplines  
Construction phasing  
Overview of the current Project Cost Estimate  
Design Team fields VE Team questions

11:30 am – 12:00 pm                    **Identification of Major Project Risks, Project Constraints & Key Issues**                    (VE Team)

VE Team assesses the project risks, project constraints and the key project issues based on the Designer's presentation and documentation review.

12:30 pm – 1:00 pm                    **Lunch**

1:00 pm – 1:30 pm                    **Cost Model**                    (VE Team)

VE team develops cost histogram from the project estimate

1:30 pm – 2:30 pm                    **Functional Analysis**                    (VE Team)

Identify basic and secondary functions  
Analyze cost model and worth assignments

2:30 pm- 6:00 pm                    **Creative Phase**                    (VE Team)

Brainstorm to generate ideas

6:00 pm                    **Daily Wrap-up Session**                    (VE Team)

**Wednesday, June 4, 2008**

7:00 am – 8:00 am                    **Creative Phase (cont.)**                    (VE Team)

The VE Team continues the brainstorming session

8:00 am – 10:00 am                    **Evaluation Phase**                    (VE Team)

Establish criteria for evaluation and rate each idea on a scale of 1 to 5, identifying the "best" ideas for development

10:00 am- 12:00 pm                    **Development Phase**                    (VE Team)

Assign team members to carryout the highly ranked ideas from the evaluation phase

The VE team develops creative ideas into value engineering alternatives with sketches, calculations and written justifications. Initial and life-cycle cost estimates comparing baseline and proposed designs will be prepared.

12:00 pm – 12:30 pm	<b>Lunch</b>	
12:00 pm – 6:00 pm	<b>Development Phase</b>	<b>(VE Team)</b>
	The VE team continues the Development phase	
6:00 pm	<b>Daily Wrap-up Session</b>	<b>(VE Team)</b>

**Thursday, June 5, 2008**

7:00 am – 12:00 pm	<b>Development Phase</b>	<b>(VE Team)</b>
12:00 pm – 12:30 pm	<b>Lunch</b>	
12:00 pm – 6:00 pm	<b>Development Phase</b>	<b>(VE Team)</b>
6:00 pm	<b>Daily Wrap-up Session</b>	<b>(VE Team)</b>

**Friday, June 6, 2008**

7:00 am – 9:00 am	<b>Development Phase</b>	<b>(VE Team)</b>
9:00 am – 12:00 am	<b>Presentation Phase</b>	<b>(All Participants)</b>

The VE team presents the Value Engineering alternatives to the Designers and GDOT representatives. A draft copy of the Summary of VE Alternatives will be distributed.

---

## VALUE ENGINEERING WORKSHOP PARTICIPANTS

---

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

Broderick D. Keown, EIT

Roadway Engineer

Delon Hampton and Associates

Brian Sapp, PE

Roadway Engineer

HNTB

John E. Sloggy, CVS

VE Team Leader

Lewis & Zimmerman Associates

### OWNER/DESIGNER PRESENTATION

Representatives from GDOT and W.R. Toole Engineers presented an overview of the project on Tuesday, June 3, 2008. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE study, was to bring the VE team up-to-speed regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

### Site Visit

A virtual site visit was accomplished online via Google Earth during the VE workshop.

### VALUE ENGINEERING TEAM PRESENTATION

The VE team conducted an informal presentation on Friday, June 6, 2008 to GDOT with the design team. Copies of the draft Summary of VE Alternatives worksheets were provided for interim use.

A copy of the meeting participants is attached for reference.

# WORKSHOP PARTICIPANTS



PROJECT: SR 1017/FLOWING WELLS ROAD <i>Columbia County, Georgia</i>		DATE: JUNE 3-6, 2008
NAME & E-MAIL (please print)	ORGANIZATION/TITLE	PHONE/FAX
Lisa L. Myers em lmeyers@dot.ga.gov	GA DOT Design Review Engineer Manager	Ph 404-651-7468 mob fx 404-463-6131
Michael Keene em mkeene@dot.ga.gov	GDOT – Augusta	Ph 706-855-3466 mob fx 706-855-3479
Ron Wishon em rwishon@dot.ga.gov	GDOT Assistant Project Review Engineer	ph 404-651-7476 mob fx 404-436-6131
Kevin Mack em kemack@dot.ga.gov	GDOT Project Manager 2	ph 706-836-8185 mob fx
Jan C. Hilliard em jhilliard@dot.ga.gov	GDOT Design Group Manager	ph 404-631-1679 mob fx
Anton Sova em asova@dot.ga.gov	GDOT	ph 404-631-1679 mob fx
Brian Summers em bsummers@dot.ga.gov	GDOT Project Review Engineer	ph mob fx
Chartrae Kent em chkent@dot.ga.gov	GDOT	ph 706-986-1257 mob fx
Patrick Allen em paallen@dot.ga.gov	GDOT Traffic Design Supervisor	ph 404-635-8138 mob fx
Darrell Richards em drichards@dot.ga.gov	GDOT Urban Assistant	ph 404-631-1705 mob fx

# WORKSHOP PARTICIPANTS



PROJECT: **SR 1017/FLOWING WELLS ROAD**  
*Columbia County, Georgia*

DATE: **JUNE 3-6, 2008**

NAME & E-MAIL (please print)	ORGANIZATION/TITLE	PHONE/FAX
Alexis H. John em ajohn@dot.ga.gov	GDOT NEPA/Transportation Planner	ph 404-699-4409 mob fx
Chad Sweeney em csweeney@wrtoole.com	W.R. Toole Engineers Inc.	ph 706-722-4114 mob fx
Bob Baisden em rbaisden@wrtoole.com	W.R. Toole Engineers Inc.	ph 706-722-4114 mob fx
Victor Conover em vconover@wrtoole.com	W.R. Toole Engineers Inc.	ph 706-722-4114 mob fx
Brian Sapp em bsapp@hntb.com	HNTB	ph 404-946-5700 mob fx
Broderick Keown EIT em bkeown@delonhampton.com	Delon Hampton & Associates	ph 404-524-8030 mob fx 404-524-2575
John Sloggy CVS em jsloggy@valuebaseddesign.com	Lewis & Zimmerman Value Based Design, LLC	ph 910-322-1561 mob fx 910-822-5601
em		ph mob fx
em		ph mob fx
em		ph mob fx

# WORKSHOP PARTICIPANTS



PROJECT: SR 1017/FLOWING WELLS ROAD  
Columbia County, Georgia

DATE: JUNE 3-6, 2008

NAME & E-MAIL (please print)	ORGANIZATION/TITLE	PHONE/FAX
Lisa L. Myers em lmyers@dot.ga.gov	GA DOT Design Review Eng. Mgr.	ph 404 651 7468 mob fx 404 463 6131
BRIAN SAPP em bsapp@HNTB.com	HNTB	ph 404 - 946 - 5700 mob fx
Michael Keene em mkeene@dot.ga.gov	GDOT - AUGUSTA	ph 706-855-3464 mob fx 706-855-3479
Row Wishton em rwishton@dot.ga.gov	GDOT ASST. PROT. REVIEW ENG.	ph 404-651-7476 mob fx 404 436 - 6131
Kevin Mack em kemack	GDOT Proj Manager 2	ph (706) 836-8185 mob fx
JAN C. HILLIARD em jhilliard@dot.ga.gov	GDOT/DESIGN GROUP MANAGER	ph 404-631-1679 mob fx
ANTON SOVA em asova@dot.ga.gov	GDOT	ph 404-631-1679 mob fx
Broderick Keown em bkeown@delonhampton.com	DHA	ph 404-524-5257 mob fx
BRIAN SUMMERS em bsummers@dot.ga.gov	GDOT PROJECT REVIEW ENGR.	ph mob fx
JOHN SLOGGY em	VALUE BASED DESIGN LZA	ph 910-822-5601 mob 910-322-1561 fx

# WORKSHOP PARTICIPANTS



PROJECT: SR 1017/FLOWING WELLS ROAD Columbia County, Georgia		DATE: JUNE 3-6, 2008
NAME & E-MAIL (please print)	ORGANIZATION/TITLE	PHONE/FAX
Chad Sweeney em cswweeney@wrtoole.com	WRTE	ph 706-722-4114 mob fx
Bob Baisden em RBAISDEN@WRTOOLE.COM	WRTE	ph 706-722-4114 mob fx
Victor Conover em VCONOVER@WRTOOLE.COM	WRTE	ph 706-722-4114 mob fx
Kewen Mack em kemack	GOOT Project Manager 2	ph (706) 836-8185 mob fx
Chartrae Kent em chkent@dot.ga.gov		ph (7) 986-1257 mob fx
PATRICK ALLEN em paallen@dot.ga.gov	GOOT Traffic Design Supervisor	ph 404-635-8138 mob fx
Darrell Richards em drichardsr@dot.ga.gov	GOOT URBAN Assistant office lead	ph 404-631-1705 mob fx
Alexis H. Sohn em ajohna@dot.ga.gov	GOOT NEPA / Transportation Planner	ph 404-699-4409 mob fx
em		ph mob fx
em		ph mob fx

VE STUDY SIGN-IN SHEET

Project No.: STP00-7062-00(001)

County: Columbia

PI No.: 250600

Date: June 3-6, 2008

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
Lisa L. Myers	00244168	Engineering Services	404-651-7468	lmyers@dot.ga.gov
BRIAN SAPP		HNTB	404-946-5700	bsapp@hntb.com
Michael Keene	00319714	GOVT AUGUSTA	706-855-3466	mkeene@dot.ga.gov
Victor Conover		W.R. Toole Engineers	706-722-4114	vconover@wrtoole.com
Bob Baisden		W.R. TOOLE	706-722-4114	RBBAIDEN@WRTOOLE.COM
Chad Sweeney		WATE	706-722-4114	csweeney@wrtoole.com
JOHN SLOGGY		LZA VALUE BASED DESIGN	910-322-1561	JSLOGGY@VALUEBASEDDESIGN.COM
Ron Wister	00208180	ENG SERVICES	404-651-7470	rwister@dot.ga.gov
Darrell Fickard	00255889	Vibrant Design	4-631-1705	dfickard@dot.ga.gov
JAN C. HILLIARD	00248650	URBAN DESIGN	4-631-1679	jhilliard@dot.ga.gov
Anton Sovg	00924157	URBAN DESIGN		asovg@dot.ga.gov
Bladrick Keenan		DHVA	4-524-2525	bkeenan@delonhampton.com
BRIAN SUMMERS	00208175	GDOT FS		bsummers@dot.ga.gov
PATRICK ALLEN	00883521	GDOT - TD	4/635-8138	paallen@dot.ga.gov
Kevin Mark	00919378	GDOT - Proj Manager 2	(706) 836-8125	<del>kmack@dot.ga.gov</del> ke.mack@dot.ga.gov
Chartrac Kent	00924348	D-7 PERSON DESIGN	7/486-1257	ckent@dot.ga.gov
ALEXIS H. SONA	00868199	GDOT-OEL/NEPA	4/699-4409	ahsona@dot.ga.gov

## ECONOMIC DATA

---

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

Year of Analysis:	2008
Construction Start-Up:	Long Range
Construction Duration:	±18 Months (R. W. Toole)
Economic Planning Life:	35 years for Pavement
Discount Rate/Interest:	2.50% (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2007)
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

## COST MODEL

The VE team leader prepared the attached cost model for the project prior to the workshop. The model is arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas. As can be expected, judgments at this stage of the study is based on experience and intuition rather than fact, which is 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:

- Lane width reduction
- Roadway reduction due to alignment/realignment
- Median width reduction
- Minimize median openings
- Bicycle lane improvements
- Right-of-way reductions

To facilitate the cost developments of the selected ideas, the VE team generated numerous “component” prices for the specific pavement design that are noted below. Reference the “Typical Section” detail drawing (Sheet 5-01) to identify the various components.

Flowing Wells Road STP-7062(1)						
Component	Pavement Thickness	Superpave	Conversion lb/sy	Conversion ton/lb	Asphalt Cost/ton	Unit Cost (SY)
A	1 ½”	12.5 mm	165	ton/2000lb	\$ 75/ton	\$ 6.19
B	2”	19 mm	220	ton/2000lb	75/ton	8.25
C	3”	19 mm	330	ton/2000lb	75/ton	12.38
D	3”	25 mm	330	ton/2000lb	75/ton	12.38
F (10” GAB)	10”/12”		150lb/ft <sup>3</sup>	ton/2000lb	75/ton	11.25
Mainline A+B+D+F						38.07
Quail Springs A+C+D+F						42.20

The combined construction and right-of-way costs are \$33,118,192

The raw unit prices for right-of-way for the project are as follows:

- Commercial land: \$312k/acre
- Residential land: \$35k/acre
- School/Church: \$41k/acre

The bases of the improvement and damages costs are not detailed.

# COST HISTOGRAM

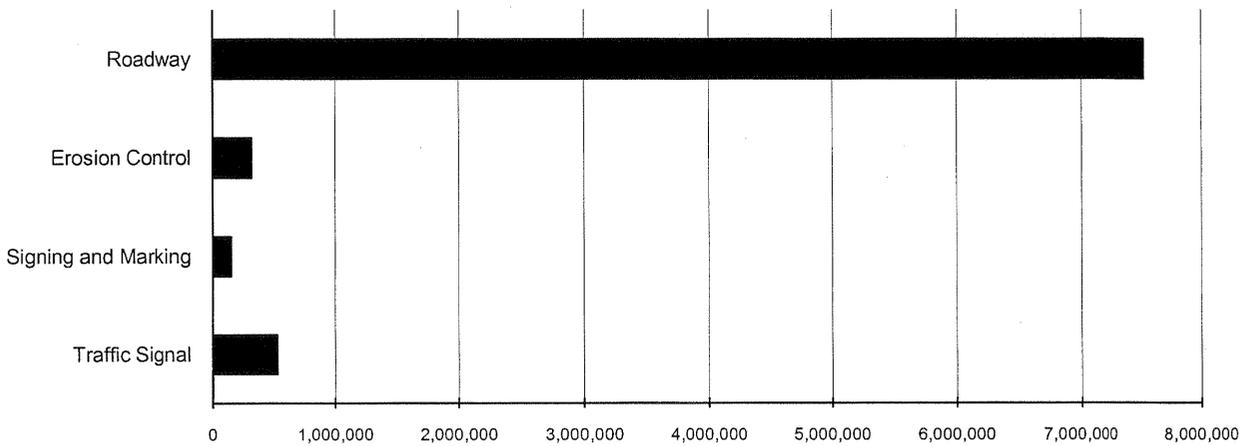


**PROJECT: SR 1017/FLOWING WELLS ROAD, COLUMBIA COUNTY, GEORGIA**

STP-7062(1) Columbia County

P.I. Number: 250600

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Roadway	7,524,042	88.39%	88.39%
Erosion Control	313,094	3.68%	92.07%
Signing and Marking	150,000	1.76%	93.83%
Traffic Signal	525,000	6.17%	100.00%
Construction Subtotal	\$ 8,512,136	<b>100.00%</b>	
Engineering & Inspection @ 5.00%	\$ 425,607		
Construction Contingencies 8.00%	\$ 680,971		
Construction Total	\$ 9,618,714		
Right-of-Way Costs STP-7062(1): Land	\$ 2,520,370		
Right-of-Way Costs: Improvements	\$ 4,543,715		
Right-of-Way Costs :Damages	\$ 5,733,690		
Right-of-Way Costs :Relocation	\$ 676,000		
Right-of-Way Costs :Property Management	\$ 288,000		
Right-of-Way Subtotal	\$ 13,761,775		
C/O Condemnation Increase & Legal Cost @ 50.00%	\$ 6,880,888		
Service Fees & Appraisal Cost (110 parcels x \$4000)	\$ 440,000		
Condemnation Cost (110 Parcels x 10% x \$5500)	\$ 60,500		
Incidentals (110 Parcels x \$2000)	\$ 220,000		
Right-of-Way Net Cost	\$ 21,363,163		
Inflation Factor (10% urban)	\$ 2,136,316		
Right-of-Way Total	\$ 23,499,479		
Reimbursable Utilities Costs; P.I. Number: 250600			
Reimbursable Utilities Subtotal			
Project Grand Total	\$ 33,118,192		



Costs in graph are not marked-up.

## FUNCTION ANALYSIS

---

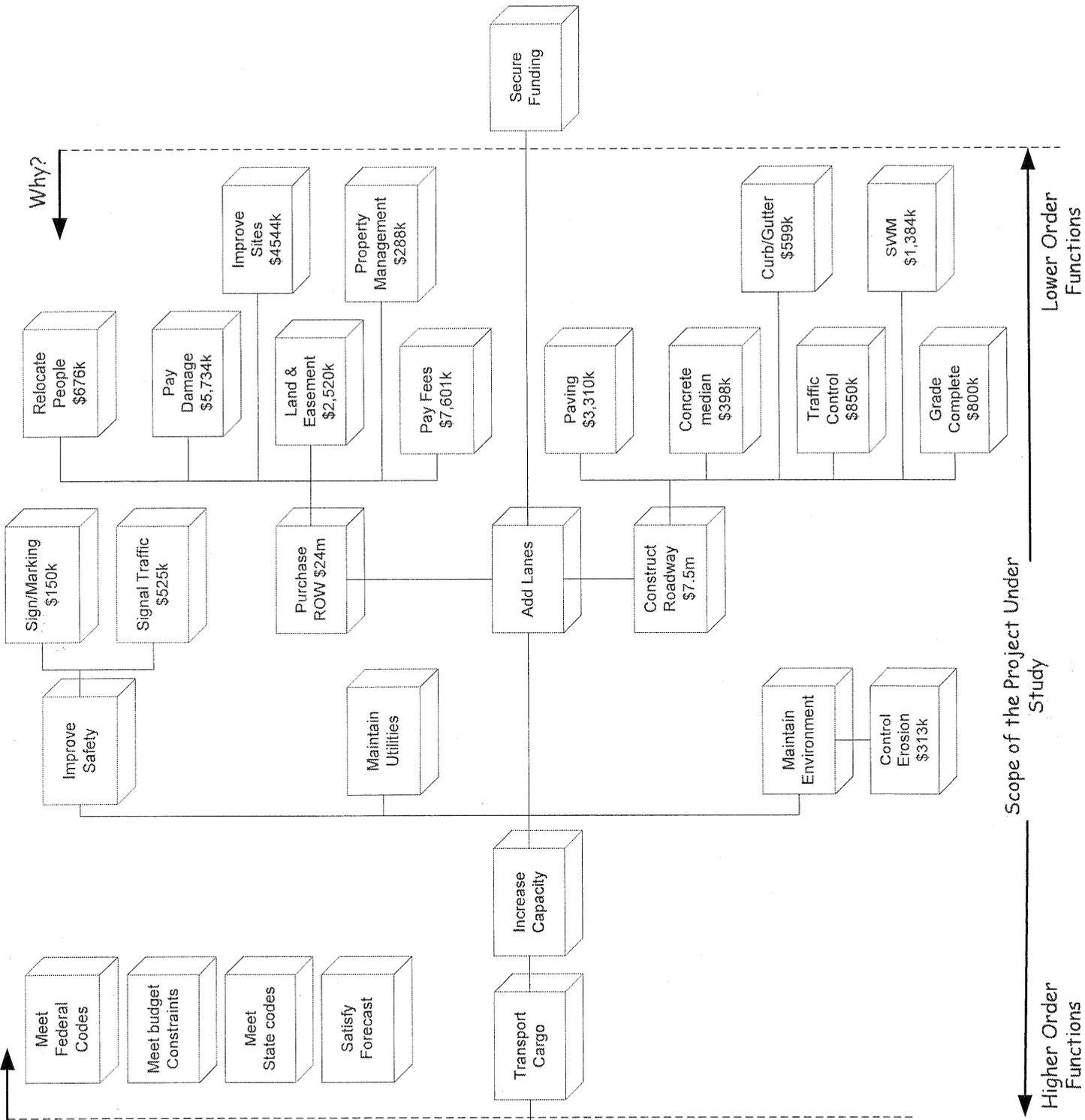
Function analysis was performed to define the requirements for each project element and ensure a complete and thorough understanding by the VE team of the basic functions needed to attain a given requirement. A Random Function Analysis worksheet for the project is attached. This part of the function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

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

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

This F.A.S.T. diagram notes the critical function paths and identifies the project's basic functions as Promoting/Growth and Promoting/Development by Increasing/Capacity.





How?

When?

When?

**FAST Diagram**

Georgia DOT  
 Flowing Wells Road  
 STP-7062-1  
 Drawn: J Stoggy  
 jstoggy@valuebaseddesign.com  
 Date: 6.5.2008

## CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

---

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

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

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

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

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

# CREATIVE IDEA LISTING



PROJECT: <b>SR 1017/FLOWING WELLS ROAD</b> <i>Columbia County, Georgia</i>	SHEET NO.:	<b>1 of 3</b>
---	------------	---------------

NO.	IDEA DESCRIPTION	RATING
<b>RIGHT-OF-WAY</b>		Total Score
RW-1	11-ft. through lanes – flush median	5
RW-2	11-ft. through lanes – raised median	5
RW-3	Reduce median width – dowel in place vs. poured in place	5
	<ul style="list-style-type: none"> <li>• Flush median – 14 ft. to 12 ft.</li> <li>• 8-ft. raised median-widen at intersections</li> </ul>	
RW-4	Multi-use trail combines sidewalk and bike lane	5
	<ul style="list-style-type: none"> <li>• Reduce existing 12-ft. shoulders</li> <li>• Eliminate 4-ft. bike lane and make 10-ft. multi-use trail on both sides (asphalt)</li> </ul>	
RW-5	Reduce median openings – flush from 232 to Washington	5
	<ul style="list-style-type: none"> <li>• where to use mountable curb</li> </ul>	
RW-6	Review left turn storage – need traffic study	3
RW-7	Reduce slopes 2:1 ratio – non-residential/guardrail	5
RW-9	Review storm water management (SWM) layout – eliminate pipe/review drainage design	DS
RW-10	SWM – Old Trail/Augusta prep – constructability: skewed pipe across intersection	DS
	<ul style="list-style-type: none"> <li>• Culvert?</li> <li>• Cross road and use larger pipe</li> <li>• Underground retention</li> </ul>	
RW-11	Concrete median: cost seems low	DS
RW-12	Tie Day road to Wind Ridge	3
	<ul style="list-style-type: none"> <li>• Save ROW and property</li> <li>• Additional construction costs</li> <li>• Accommodate future use</li> <li>• Improve safety</li> <li>• Use guardrail and 2:1 bank</li> </ul>	

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

# CREATIVE IDEA LISTING



PROJECT: <b>SR 1017/FLOWING WELLS ROAD</b> <i>Columbia County, Georgia</i>	SHEET NO.:	<b>2 of 3</b>
---	------------	---------------

NO.	IDEA DESCRIPTION	RATING
RW-13	Tie Pleasant Home to Fair Oaks <ul style="list-style-type: none"> <li>• Provide required median spacing (traffic turns require dual lefts both directions)</li> <li>• Improve flow</li> <li>• Purchase property (no houses)</li> <li>• Permitting issues?</li> <li>• Increase construction costs</li> </ul>	3
RW-14	Martinez Elementary School – shift parking lot intersection south <ul style="list-style-type: none"> <li>• Tie in directly to off-road lot</li> <li>• Gets parking off Flowing Wells</li> <li>• Improve safety</li> <li>• Add gravity wall and reduce ROW purchase in front of school</li> <li>• Save one house purchase</li> <li>• Improve dual left safety ( improve function)</li> </ul>	3
RW-15	Check profile- match K values to roadway speed on side roads	DS
RW-16	Check pavement design	DS
RW-17	Minimize vertical profile 1503-1510	DS
RW-18	Curb – type 7 quantities?	3
RW-19	Narrower gutters – 24 in. vs. 30 in.	3
RW-20	Driveway profile (15 <sup>0</sup> max on residential driveway) reduce easement	3
RW-21	Shorten realignment of side roads	3
RW-22	Change pavement type	3
ROW-1	Check footprint - Verify “typical” section to match cross sections + both match design	5
ROW-2	Point of Intersection (PI) no curve	2
<b>EROSION CONTROL</b>		
EC-1	Need to accommodate current standard (new permit)	DS

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

