

# VALUE ENGINEERING REPORT

**Spout Springs Road  
Widening and Reconstruction  
PI No. 0009679  
Hall County**

September 10, 2012

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## PROJECT OWNERS:



Hall County  
Public Works and Utilities  
300 Henry Ward Way  
Gainesville, GA 30501



Georgia Department of Transportation  
600 West Peachtree Street  
Atlanta, GA 30308

## VALUE ENGINEERING CONSULTANT:



**AMEC Environment & Infrastructure, Inc.**  
1075 Big Shanty Road NW, Suite 100  
Kennesaw, GA 30144

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## **Disclaimer**

This Value Engineering (VE) report presents recommendations for consideration by the design team for alternate methods of completing the current design that may be acceptable to both the design team and the owner. In most cases, each recommendation contains a cost estimate to help evaluate each recommendation on a cost effective basis including both capital and life cycle costs. These estimates are generated whenever possible using the design team's best estimate of cost and mark-ups for quantities and/or unit costs for items proposed to be changed. Using this method, a comparison can be made of the cost estimates for each item by evaluating the original design concept against the proposed change in the VE recommendation. The VE recommendation cost estimates are developed based on the information provided by the design team during the study. At this stage of design, and considering the limited time available for a VE study, the costs should be considered as order of magnitude costs only and do not reflect the final design estimated costs or actual construction costs. The difference in the original design concept and proposed VE recommendation reflects the potential cost change that may be considered by decision makers.

Finally, the VE recommendations and associated cost estimates are for consideration by only the design team and owner. The VE team does not make decisions as to which, if any, of the recommendations are incorporated into the project design. A decision to incorporate a VE recommendation is the responsibility of the design team. Also, the VE recommendations do not have to be accepted as presented in the VE study report. The recommendations should be considered a concept that can be improved and/or modified by the design team to result in a design modification that is mutually acceptable to the design team, project sponsor and owner and includes GDOT.

## **EXECUTIVE SUMMARY**

# **Executive Summary**

## **VALUE ENGINEERING STUDY**

**Spout Springs Road  
Widening and Reconstruction  
PI No. 0009679  
Hall County  
August 27-30, 2012**

### **Introduction**

This report presents the results of a value engineering (VE) study conducted on the proposed design for the Spout Springs Road Widening and Reconstruction project in Hall County. This project is intended to relieve congestion, accommodate current and future travel demands, reduce crash frequency and severity and improve intersection operations to an acceptable level of service (LOS) throughout the corridor.

The project begins about 700 feet south of Thompson's Mill Road and extends to the intersection of Hog Mountain Road, a distance of about 5.7 miles and is entirely in Hall County. At Thompson's Mill Road, the southern project terminus, the traffic volumes drop by approximately 30%. At the northern project limit Spout Springs Road transitions to a flush section with turn lanes and then to a raised narrow median section at the I-985 interchange.

The proposed roadway will consist of a four, 12 foot lanes with a raised, concrete, 24 – 32 foot median and curb and gutter with a 5 foot concrete sidewalk and a 10 foot wide multi-use path on one side. In some areas, the multi-use trail will be on both sides of the road. Spout Springs Road is classified as a rural major collector. The posted and design speed is 45 mph.

Major contract work items include asphalt paving earthwork drainage retaining walls sidewalks curb and gutter traffic signals and erosion control measures. The total estimated project cost is \$68,294,216 and includes \$28,795,000 for right of way. The project is following the GDOT Plan Development Process (PDP); however, it is locally administered by Hall County. The current overall schedule is for R/W authorization in March 2015 and project letting in March 2018. The design is currently in the concept stage. The environmental document is not yet approved. The VE study was conducted September 27 - 30, 2012, at the Georgia DOT Headquarters in Atlanta using a three person VE team.

This report presents the Team's recommendations and all back-up information for consideration by the decision-makers. This Executive Summary includes a brief description of each recommendation. The Study Identification contains information about the project and the team. The Recommendations presents a detailed description and support information about each recommendation. The Appendix includes a complete record of the team's activities and

findings. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

## **Results Obtained**

The VE team focused their efforts on the high cost items of the project. Using function analysis and brain storming techniques, the team generated 28 ideas with 23 identified for additional evaluation as possible recommendations or design considerations. The VE team developed 9 independent recommendations with 3 alternate recommendations, and 1 design consideration. A detailed write-up of each recommendation is contained in the respective portion of this report. The following is a summary of the recommendations.

## **Recommendation Summary**

### **Idea B-1: Realign the side access driveway at the Thompson's Mill Road intersection to eliminate the 5-leg intersection.**

The current 5 leg intersection layout presents operational concerns. This would be a project cost increase however it would improve a problematic condition and allow some left turns into the back of the commercial area.

*The total project increase is \$387,000.*

### **Idea B-2: Use 11 foot lanes; all 4 lanes.**

This will reduce the overall project footprint and is consistent with the SR 347 project.

*The total potential savings is \$1,327,300.*

### **Idea B-2.1: ALTERNATE TO B-2; Use 11 foot lanes for only the 2 inside lanes.**

If truck percentages and school buses present a concern, consider only the inside lanes for 11 feet.

*The total potential savings is \$663,650.*

### **Idea B-3: Reduce the number of median openings, add signalized intersections.**

This recommendation will significantly reduce the number of median openings from 29, including the current signalized intersections, to 10 and provide signalization at all the openings. This will require 6 additional signals and will also incorporate a narrower, 20 foot wide median.

*The total potential savings is \$2,110,000.*

**Idea B-6: Reduce the 32 foot median to 24 feet at the southern section.**

At the southern section of the project, in the commercial area from Thompson's Mill Road to the median opening at STA. 241+00, reduce the median from 32 to 24 feet and add a signal to the commercial driveway 750 feet north of SR 347.

*The total potential savings is \$674,000.*

**Idea B-6.1: ALTERNATE TO B-6; Reduce the 32 foot median to 20 feet at the southern section.**

This recommendation further reduces the roadway template width to 20 feet.

*The total potential savings is \$1,305,000.*

**Idea B-6.2: ALTERNATE TO B-6; Eliminate the raised median.**

Since all of the median in the area will be left turn lanes and storage, eliminate the raised median altogether. This will match the northern project terminus section.

*The total potential savings is \$3,405,000.*

**Idea B-8: Use rural section for Elizabeth Lane.**

This matches the existing conditions for Elizabeth Lane in a very low volume pedestrian zone.

*The total potential savings is \$203,500.*

**Idea E-1: Adjust profile to optimize grades.**

Maximize the profile grade to the allowable 8% to minimize earthwork, reduce the roadway template width and culvert length at the low point at STA. 296+00.

*The total potential savings is \$399,000.*

**Idea E-1.1: DESIGN CONSIDERATION: Adjust profile to optimize grades.**

At the northern section of the project, STA. 485+00 to Hog's Mountain Road, where there is a creek running contiguous to the existing roadway, consider optimizing the profile to reduce impacts to the creek. This will need to be reviewed as part of the PAR for the permit.

**Idea G-1: Reduce the median width to 20 feet.**

Reduce the median width to 20 feet for the length of the project, except for areas with 32 foot wide median.

*The total potential savings is \$1,130,000.*

**Idea K-1: Use 24 inch curb and gutter for median.**

Since this is not a state route, using a narrower gutter will provide some material and right of way cost savings.

*The total potential savings is \$165,600.*

**Idea M-1: Use asphalt in lieu of concrete for multi-use path.**

This recommendation proposed a material substitution for 10 foot wide, multi-use path.

*The total potential savings is \$117,200.*

## Spout Springs Road Widening and Reconstruction

### SUMMARY OF POTENTIAL COST SAVINGS

IDEA No.	RECOMMENDATION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS
B-1	Realign the access driveway at the 5-leg intersection of Thompson's Mill Road	\$0	(\$387,000)	(\$387,000)	N/A	(\$387,000)
B-2	Use 11 foot lanes; all 4 lanes	\$1,327,300	\$0	\$1,327,300	N/A	\$1,327,300
B-2.1	<b>Alternate to B-2;</b> Use 11 foot lanes; inside lanes only	\$663,650	\$0	\$663,650	N/A	\$663,650
B-3	Reduce number of median openings; add 6 signalized intersections.	\$2,860,000	\$750,000	\$2,110,000	N/A	\$2,110,000
B-6	Reduce 32 ft median at southern section to 24 ft	\$799,000	\$125,000	\$674,000	N/A	\$674,000
B-6.1	<b>Alternate to B-6;</b> Reduce median to 20 feet	\$1,430,000	\$125,000	\$1,305,000	N/A	\$1,305,000
B-6.2	<b>Alternate to B-6;</b> Eliminate raised median in southern section	\$3,670,000	\$265,000	\$3,405,000	N/A	\$3,405,000
B-8	Use rural section for Elizabeth Lane	\$228,500	\$25,000	\$203,500	N/A	\$203,500
E-1	Adjust profile to maximize grades; minimize/balance earthwork	\$399,000	\$0	\$399,000	N/A	\$399,000
E-1.1	<b>Design Consideration;</b> Adjust profile to avoid impacts at northern section of project	\$0	\$0	\$00	N/A	\$0
G-1	Reduce median to 20 ft; entire project length; maintain areas of 32 ft width.	\$1,130,000	\$0	\$1,130,000	N/A	\$1,130,000

## Spout Springs Road Widening and Reconstruction

### SUMMARY OF POTENTIAL COST SAVINGS

IDEA No.	RECOMMENDATION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS
K-1	Use 24 inch curb and gutter for median	\$481,600	\$316,000	<b>\$165,600</b>	N/A	<b>\$165,600</b>
M-1	Use asphalt in-lieu of concrete for multi-use path	\$737,800	\$620,600	<b>\$117,200</b>	N/A	<b>\$117,200</b>

## **STUDY IDENTIFICATION**

## Study Identification

<b>Project: Spout Springs Road Widening and Reconstruction</b>	<b>Date: August 27-30, 2012</b>
<b>Study Location: GDOT General Offices, Atlanta, GA</b>	

### VE Team Members

Name:	Title:	Organization:	Telephone:
Joe Wheeler, PE	Highway Design	RS & H	678-528-7225
Lenor Bromberg, PE, AVS	Highway Design	KEA	678-904-8591
George Obaranec, PE, CVS	VE Team Facilitator	AMEC	770-421-3346

### Project Description

This project is the widening and reconstruction of Spout Springs Road in Hall County. This project is intended to relieve congestion, accommodate current and future travel demands, reduce crash frequency and severity and improve intersection operations to an acceptable level of service (LOS) throughout the corridor.

The project begins about 700 feet south of Thompsons Mill Road and extends to the intersection of Hog Mountain Road, a distance of about 5.7 miles and is entirely in Hall County. At Thompson’s Mill Road, the southern project terminus, the traffic volumes drop by approximately 30%. At the northern project limit Spout Springs Road transitions to a flush section with turn lanes and then to a raised narrow median section at the I-985 interchange.

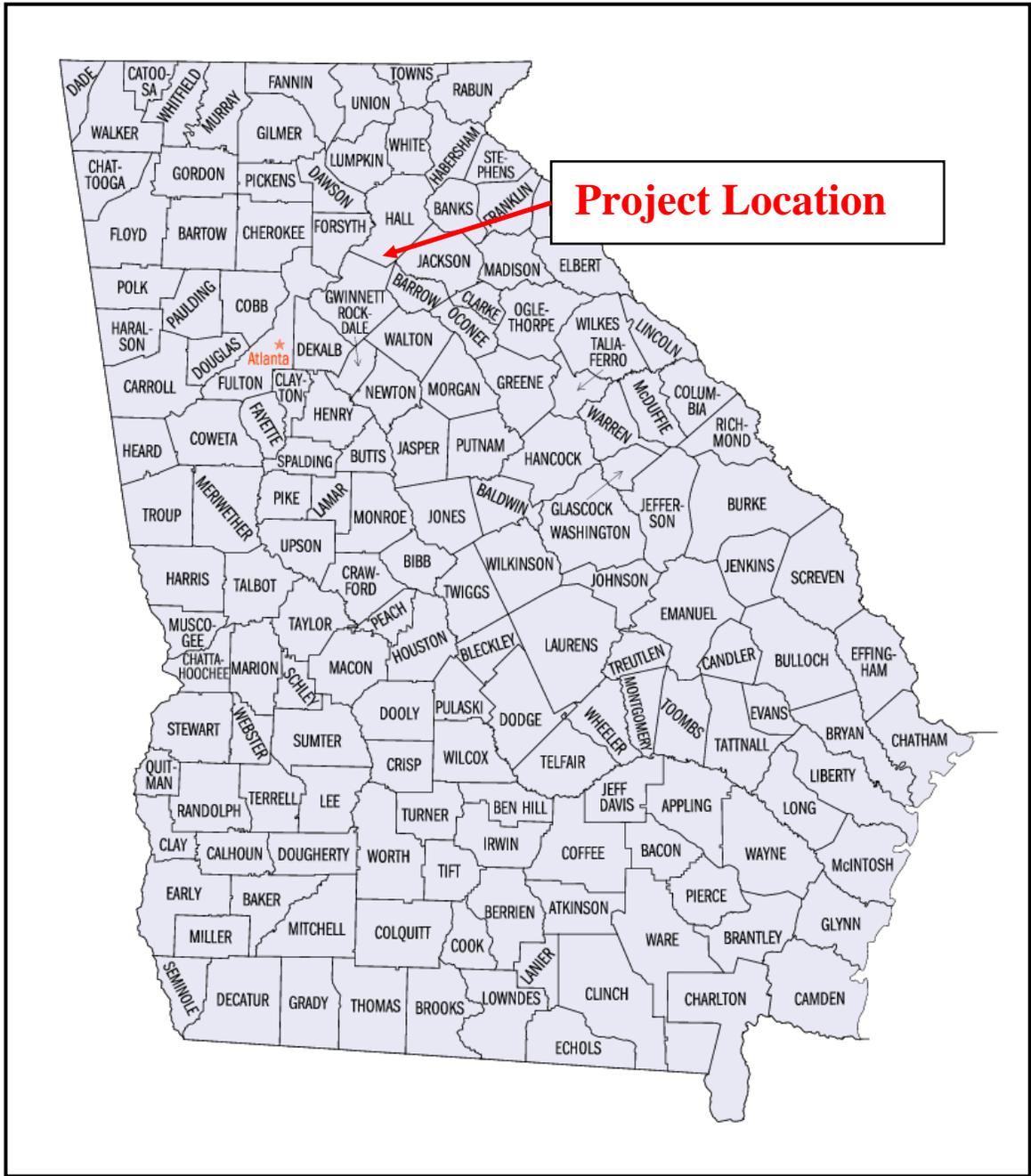
The proposed roadway will consist of a four, 12 foot lanes with a raised, concrete, 24 – 32 foot median and curb and gutter with a 5 foot concrete sidewalk and a 10 foot wide multi-use path on one side. In some areas, the multi-use trail will be on both sides of the road. Spout Springs Road is classified as a rural major collector. The posted and design speed is 45 mph.

Major contract work items include asphalt paving earthwork drainage retaining walls sidewalks curb and gutter traffic signals and erosion control measures. The total estimated project cost is \$68,294,216 and includes \$28,795,000 for right of way. The project is following the GDOT Plan Development Process (PDP); however, it is locally administered by Hall County. The current overall schedule is for R/W authorization in March 2015 and project letting in March 2018. The design is currently in the concept stage. The environmental document is not yet approved.

## **Project Design Briefing**

The VE team received a project briefing by Hall County's project design team represented by Margie Pozin. The following information and comments were presented:

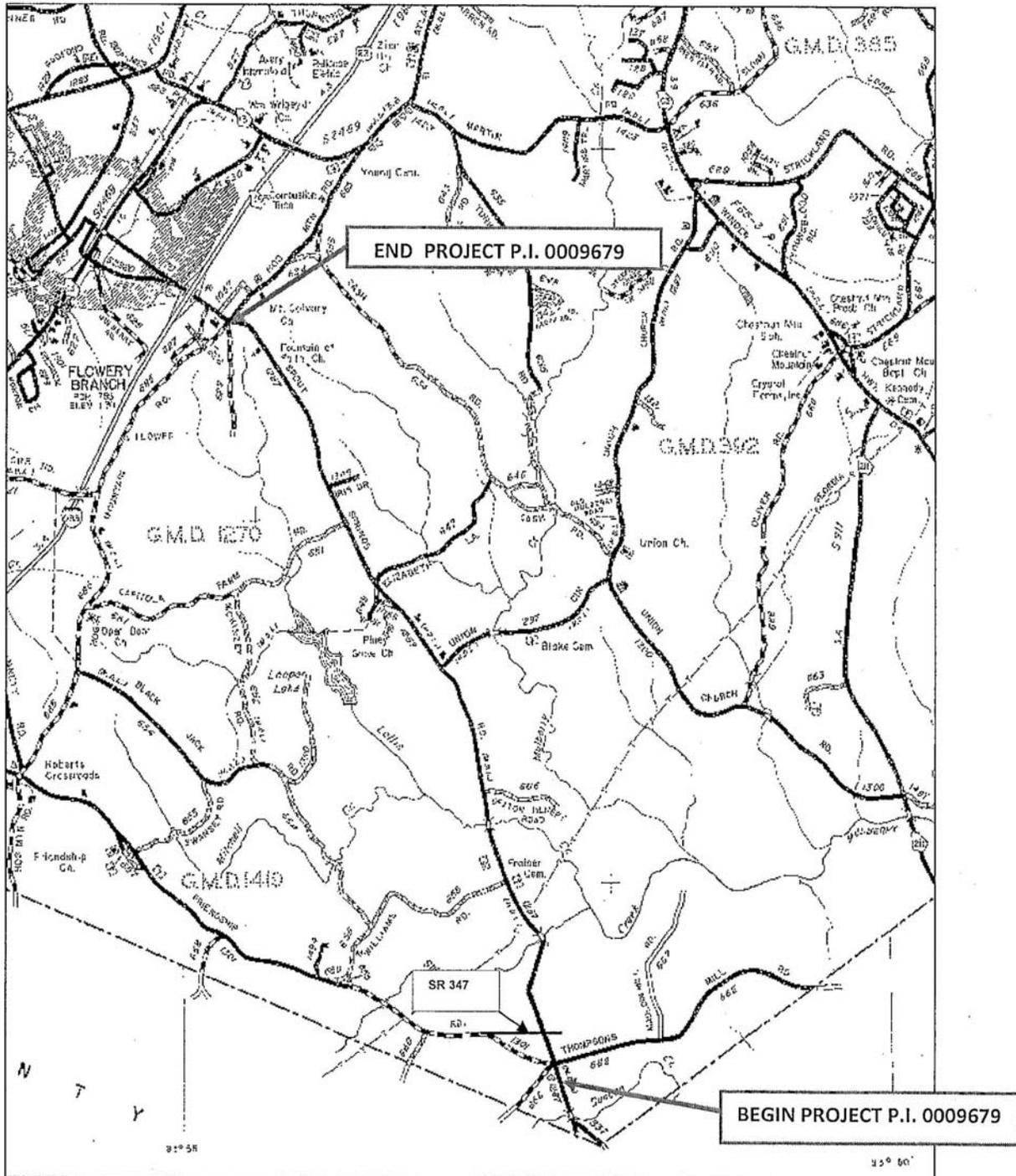
- This is a locally administered project by Hall County however it is following the GDOT PDP and funding guidelines. It is on the County's long range plan.
- This project will widen and reconstruct CR 1287/Spout Springs Road from just south of the Thompson's Mill Road intersection to the Hog Mountain Road intersection, a distance of about 5.7 miles.
- The existing 2-lane road will be widened to a 4-lane roadway. The preferred typical section includes 4- 12 foot wide lanes and a raised, 24 - 32 ft wide median.
- Included in the typical section are a 5 foot wide concrete sidewalk on one side of the road and a 10 foot wide multi-use path on the other side. In the central section of the project around the school and library, the 10 foot wide multi-use path is proposed on both sides. This is a designated county bike route.
- The median widths were developed to accommodate the left and u-turn movements. The 24 foot dimension was requested by the District. The 32 foot dimension was used to provide a refuge area for 2-stage crossings. Sight distances were a factor for both types of median.
- This area of Hall County is growing rapidly and the projected traffic demands require a 4-lane section.
- The current alignment is generally winding through rolling terrain. Several of the side streets have severe grades, up to 15%.
- There is an adjacent project, the SR 347 improvements that intersect Spout Springs Road close to the southern terminus. The design team has reviewed the project improvements and coordinated the modifications with this project.
- There are 2 major, multiple cell culverts crossing Spout Springs Road. The current approach is that both are in good condition and will be extended. The current plans do not reflect any proposed detailed drainage layouts.
- There are 2 oversized u-turn eyebrows in proximity to each of the project limits. They are intended for school buses and trailers.
- The required Right of Way lines shown on the concept layout represent the most conservative, current layout. Once the concept is approved and preliminary engineering is initiated, the design team will review to reduce the right of way where possible including incorporating easements, walls and reduced widths.
- The current posted speed limit and design speed is 45 mph.
- The design team is considering using available median space for potential bio-retention and water quality measures however, there are no current specific designs.
- The utility modification costs are generally consistent under any of the studied alternatives.
- There are currently 4 identified historic resources along the project. None will be affected by the proposed improvements.
- The environmental document is being developed. A Practical Alternative Report (PAR) will be required at some areas for permit authorization especially at the creek along the western edge of Spout Springs Road, just south of the northern project limit.
- The project schedule is for R/W authorization in March 2015 and project letting in March 2018.

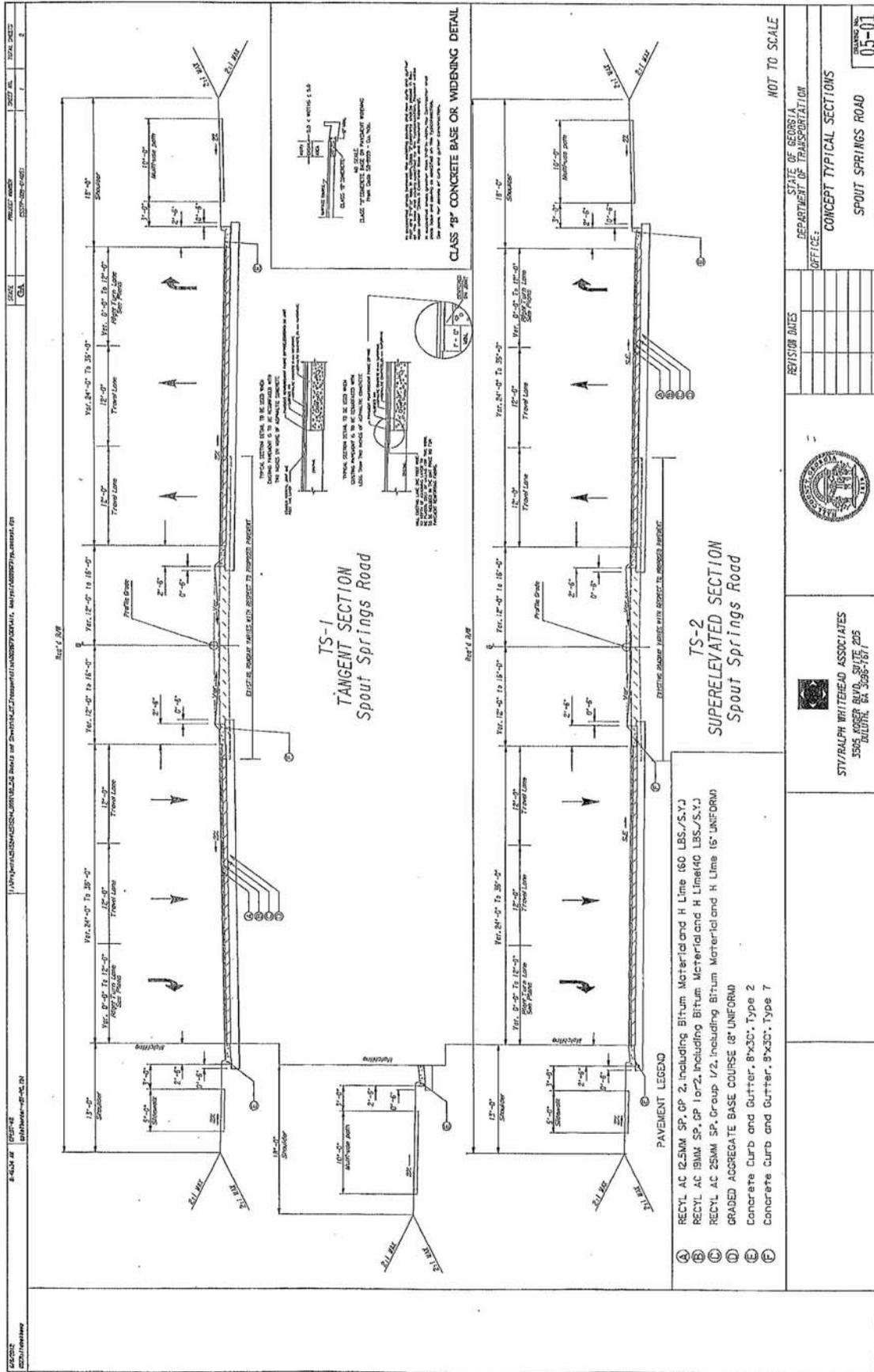


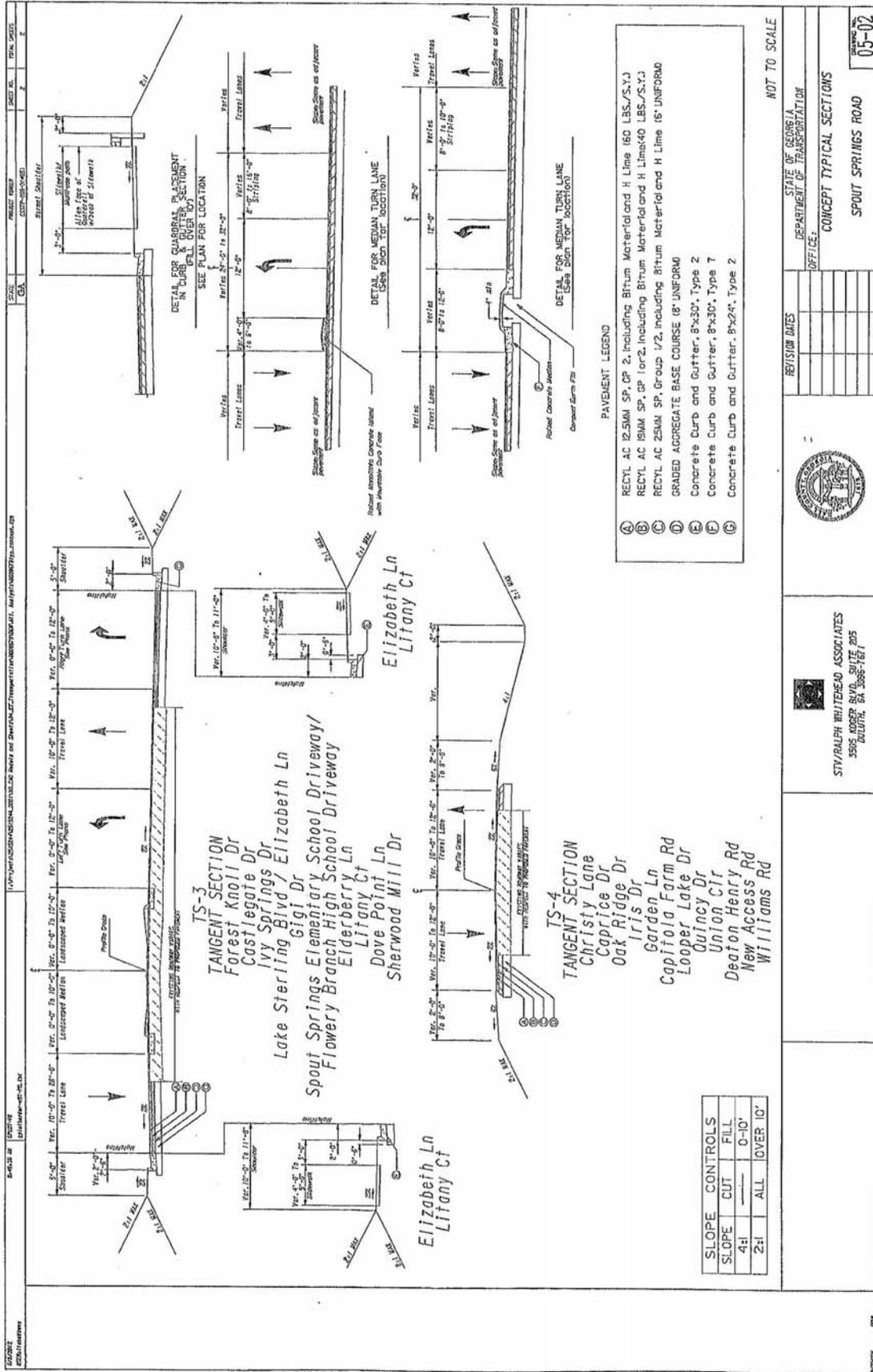
### Project Location Map

PROJECT LOCATION MAP

CR 1287/SPOUT SPRINGS ROAD FROM APPROXIMATELY 700 FEET SOUTH OF THOMPSONS MILL RD TO HOG MOUNTAIN RD







## **VE RECOMMENDATIONS**

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: Spout Springs Road**

<b>IDEA No.:</b> B-1	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Realign the access drive at the Thompson's Mill Road intersection
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Comp By: JDW Date: 8-28-12                      Checked By: GAO                      Date: 9-5-12

**Original Concept:** Maintain the current 5 leg alignment at the Thompson's Mill Road and access drive intersection.

**Proposed Change:** Realign the access drive further away (westerly) from the intersection.

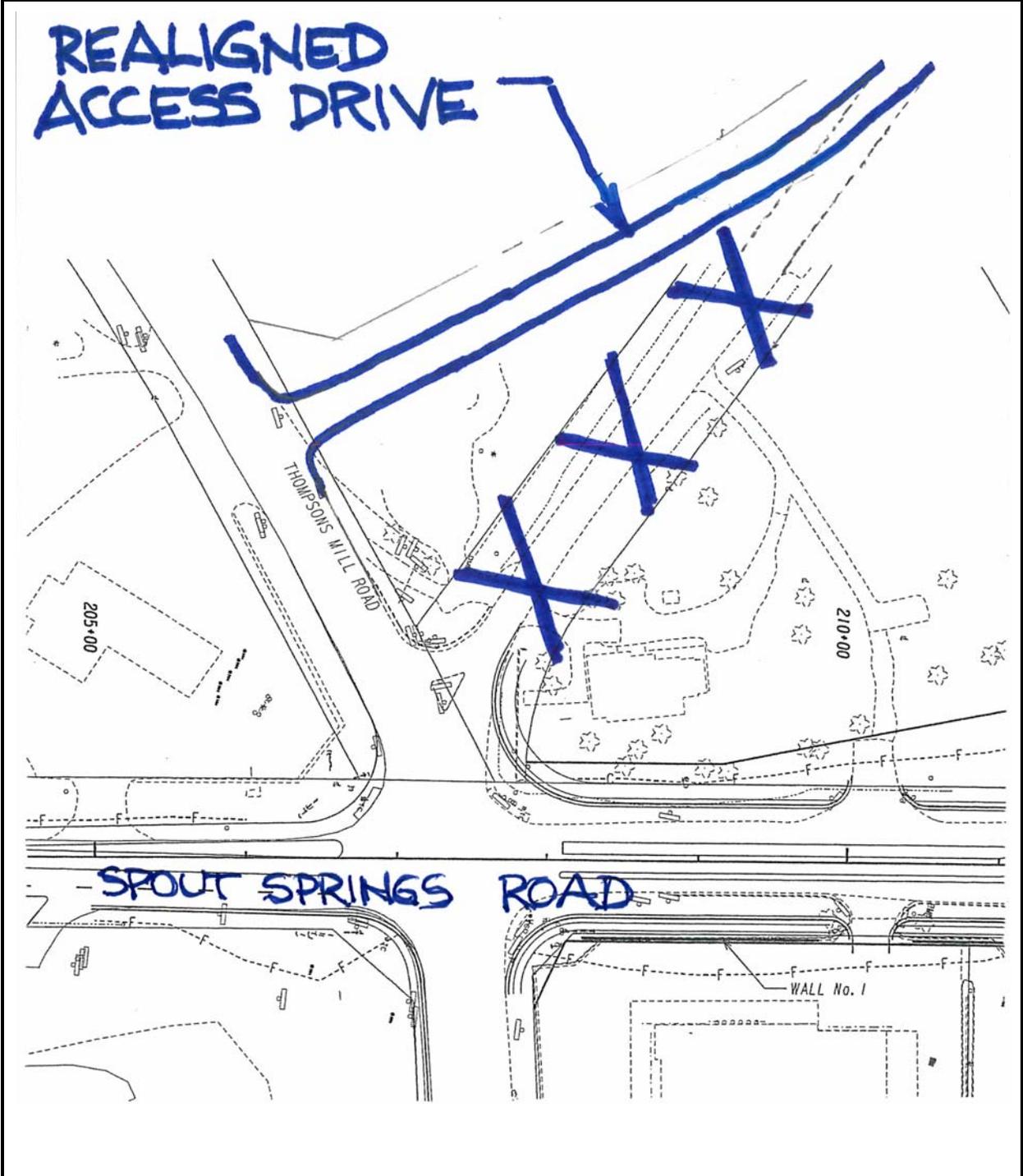
**Justification:** The current intersection is a 5-leg alignment with restricted movements and probable traffic and access concerns. Realigning the access drive would improve the layout, add some storage capacity and potentially allow better access to the backs of the commercial areas. This would be a project cost increase however it is an area that should be considered as part of the overall project improvements.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$0		
<b>Proposed</b>	\$387,000		
<b>Savings</b>	(\$387,000)		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>(\$387,000)</b>

SKETCH

Project: Spout Springs Road

Idea No.: B-1  
Client: Hall County/GDOT  
Sheet 2 of 4





## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B-1  
Client: Hall County/GDOT  
Sheet 4 of 4

Additional right of way:

$$(450 \text{ ft} \times 200 \text{ ft}) \times 0.5 = 45,000 \text{ sq ft} = 1.033 \text{ acres}$$

Proposed Right of Way Cost: Overall Project acreage:

$$\text{Total Cost} = \$28,795,000;$$

$$\text{Total area, both residential and commercial} = 77.49 + 8.15 = 85.64$$

$$\$28,795,000 / 85.64 = \$336,233 \text{ per acre} = \$7.719 \text{ per sq ft}$$

Additional pavement required:

$$500 \times 24 = 12,000 \text{ sq ft} = 1,333 \text{ sq yds}$$

Side road pavement cost:

Asphalt pavement: 4.5 in asphalt / 8 inch GAB

$$(4.5/12 \text{ ft}) (150 \text{ \#/cf}) (1 \text{ ton} / 2000 \text{ \#}) = 0.028125 \text{ ton/sf}$$

$$(8/12 \text{ ft}) (135 \text{ \#/cf}) (1 \text{ ton} / 2000\text{\#}) = 0.045 \text{ ton/sf}$$

Cost per SY

$$(0.028125 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$61 / \text{ton}) + (0.045 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$14.82 / \text{ton}) = \\ \$ 15.44 + 6.00 = \$21.44 / \text{SY} \quad \text{USE: } \$22 \text{ per SY}$$

Assume miscellaneous improvements; signing, striping, drainage - \$10,000

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: Spout Springs Road**

<b>IDEA No.:</b> B.2	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Reduce all through lanes to 11 feet wide
Comp By: JDW Date: 8-28-12      Checked By: GAO      Date: 9-4-12		

**Original Concept:** The concept typical section shows two 12-foot lanes in each direction on the mainline.

**Proposed Change:** Reduce the through travel lanes to 11 feet wide for all 4 lanes.

**Justification:** Reducing the through lanes to 11 feet will reduce project costs and right of way width. The adjacent SR 347 project which has higher overall traffic volumes and truck percentages is being constructed with 11 foot lanes.

COST SUMMARY		INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>		\$1,327,300		
<b>Proposed</b>		\$0		
<b>Savings</b>		\$1,327,300		\$0
<b>FUTURE COST:</b>	<b>Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>				<b>\$1,327,300</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B.2

Client: Hall County/GDOT

Sheet 3 of 3

Reduce width of pavement by four feet (two feet in each direction) for the length of the project.

Project length; Begin Sta. 201+00; End Sta. 499+00; Total Length 29,800 feet

Area of pavement = 29,800 ft. x 4 ft. = 119,200 sq. ft. = 13,244.44 sq. yd. (use 13,244)

Unit prices are from Detailed Estimate provided for VE study

Use following pavement section for estimates (per e-mail from STV Project Manager)

12.5 mm Superpave (165 lbs/sq. yd.)

19 mm Superpave (220 lbs/sq. yd.)

25 mm Superpave (440 lbs/sq. yd.)

Graded Aggregate Base Course (8 inches uniform)

12.5 mm Superpave – 165 lbs/sq. yd. x 13,244 sq. yd. = 2,185,260 lbs. = 1,092.63 tons

1,092.63 tons x \$64.51/ton = \$70,485.56

19 mm Superpave – 220 lbs/sq. yd. x 13,244 sq. yd. = 2,913,680 lbs. = 1,456.84 tons

1,456.84 tons x \$57.24/ton = \$83,389.52

25 mm Superpave – 440 lbs./sq. yd x 13,244 sq. yd. = 5,827,360 lbs. = 2,913.68 tons

2,913.68 tons x \$55.38/ton = \$161,359.60

Graded Aggregate Base – 119,200 sq. ft. x 0.6667 ft. = 79,470.64 cu. ft. = 2,943.36 cu. yd.

2,943.36 cu. yd. x 2.07 tons/cu. yd. = 6,092.76 tons

6,092.76 tons x \$14.82/ton = \$90,294.70

Bituminous tack coat – 0.035 gal/sq. yd. x 13,244 sq. yd. = 463.54 gal x 2 = 927.08 gallons

927.08 gallons x \$1.79/gallon = \$1,659.47

Right of Way – 29,800 feet x 4 feet = 119,200 square feet.

Proposed Right of Way Cost: Overall Project acreage:

Total Cost = \$28,795,000;

Total area, both residential and commercial = 77.49 + 8.15 = 85.64

$\$28,795,000 / 85.64 = \$336,233 \text{ per acre} = \$7.719 \text{ per sq ft}$

119,200 sq. ft. x \$7.719/sq. ft = \$920,104.80

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: Spout Springs Road**

<b>IDEA No.:</b> B.2.1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Reduce inside lanes to 11 feet wide
Comp By: JDW Date: 8-28-12      Checked By: GAO      Date: 9-4-12		

**Original Concept:** The concept typical section shows two 12-foot lanes in each direction on the mainline

**Proposed Change:** Reduce only the 2 inside lanes to 11 feet wide if there is a concern regarding large truck and school bus turnarounds or other operational movements. This is an alternate to Idea B-2 which reduces all 4 lanes to 11 feet.

**Justification:** Reducing the through lanes to 11 feet will reduce project costs and right of way width. The adjacent SR 347 project which has higher overall traffic volumes and truck percentages is being constructed with 11 foot lanes.

COST SUMMARY		INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>		\$663,650		
<b>Proposed</b>		\$0		
<b>Savings</b>		\$663,650		\$0
<b>FUTURE COST:</b>	<b>Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>				<b>\$663,650</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B.2.1

Client: Hall County/GDOT

Sheet 3 of 3

Reduce width of pavement by two feet (one foot in each direction) for the length of the project.

Project length; Begin Sta. 201+00; End Sta. 499+00; Total Length 29,800 feet

Area of pavement = 29,800 ft. x 2 ft. = 59,600 sq. ft. = 6622.22 sq. yd. (use 6622)

Unit prices are from Detailed Estimate provided for VE study

Use following pavement section for estimates (per e-mail from STV Project Manager)

12.5 mm Superpave (165 lbs/sq. yd.)

19 mm Superpave (220 lbs/sq. yd.)

25 mm Superpave (440 lbs/sq. yd.)

Graded Aggregate Base Course (8 inches uniform)

12.5 mm Superpave – 165 lbs/sq. yd. x 6622 sq. yd. = 1,092,630 lbs. = 546.32 tons

546.32 tons x \$64.51/ton = \$35,243.10

19 mm Superpave – 220 lbs/sq. yd. x 6622 sq. yd. = 1,456,840 lbs. = 728.42 tons

728.42 tons x \$57.24/ton = \$41,694.76

25 mm Superpave – 440 lbs./sq. yd x 6622 sq. yd. = 2,913,680 lbs. = 1456.84 tons

1456.84 tons x \$55.38/ton = \$80,679.80

Graded Aggregate Base – 59,600 sq. ft. x 0.6667 ft. = 39,735.32 cu. ft. = 1471.68 cu. yd.

1471.68 cu. yd. x 2.07 tons/cu. yd. = 3046.38 tons

3046.38 tons x \$14.82/ton = \$45,147.35

Bituminous tack coat – 0.035 gal/sq. yd. x 6622 sq. yd. = 231.77 gal x 2 = 463.54 gallons

463.54 gallons x \$1.79/gallon = \$829.74

Right of Way – 29,800 feet x 2 feet = 59,600 square feet

Proposed Right of Way Cost: Overall Project acreage:

Total Cost = \$28,795,000;

Total area, both residential and commercial = 77.49 + 8.15 = 85.64

\$28,795,000 / 85.64 = \$336,233 per acre = \$7.719 per sq ft

59,600 sq. ft. x \$7.719/sq. ft = \$460,052.40

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: Spout Springs Road**

<b>IDEA No.:</b> B-3	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Reduce number of median openings; add signals at designated locations
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Comp By: JDW Date: 8-28-12      Checked By: GAO      Date: 9-4-12

**Original Concept:** Provide median openings throughout the project corridor; generally at 800 – 1,000 foot spacing. Min – 500 ft; max – 1,500 ft. The total number of openings for entire project is 26.

**Proposed Change:** Eliminate the median openings throughout the project, reduce the median width to 20 ft and provide signalized intersections for controlled movements, left and u-turns.

**Justification:** The projected traffic volumes for the design year, 2040 are at 36,000 Vehicles Per Day (VPD). The relatively large amount of median openings is provided to allow access for all the side roads along the project corridor however, reducing the number of openings and providing signals at an additional 6 locations will allow controlled access and movements. By incorporating this recommendation, the median can be reduced to 20 feet, standard width. Based on the location of the proposed signals, the maximum distance for u-turn travel is less than ½ mile.

With the addition of the signals, all movements will be at controlled openings and sporadic u-turn locations as well as cross-over and weaving operations will be eliminated.

COST SUMMARY		INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>		\$2,860,000		
<b>Proposed</b>		\$750,000		
<b>Savings</b>		\$2,110,000		\$0
<b>FUTURE COST:</b>	<b>Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>				<b>\$2,110,000</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B-3

Client: Hall County/GDOT

Sheet 3 of 3

Total project length; Sta 208+00 to 498+00; 29,000 ft = 5.492 miles

Areas of 32 foot median:

Sta 214+00 to Sta 234+00; 2,000 ft

Sta 252+00 to Sta 264+00; 1,200 ft

Sta 354+00 to Sta 364+00; 1,000 ft

Sta 419+00 to Sta 434+00; 1,500 ft

Total        5,700 ft

Median reduction:

$5,700 (32 - 20) + 23,300 (24-20) = 68,400 + 93,200 = 161,600 \text{ sq ft} = 17,956 \text{ sq yds}$

Full depth pavement cost:

Asphalt pavement; Spout Springs Road: 7.5 in asphalt / 8 inch GAB

$(7.5/12 \text{ ft}) (150 \text{ \#/cf}) (1 \text{ ton} / 2000 \text{ \#}) = 0.046875 \text{ ton/sf}$

$(8/12 \text{ ft}) (135 \text{ \#/cf}) (1 \text{ ton} / 2000\text{\#}) = 0.045 \text{ ton/sf}$

Cost per SY

$(0.054675 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$61 / \text{ton}) + (0.045 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$14.82 / \text{ton}) =$

$\$ 25.73 + 6.00 = \$31.73 / \text{SY}$     USE:    \$32 per SY

Concrete median cost = 35.22;    Use \$35 for median / pavement cost

Proposed Right of Way Cost: Overall Project acreage:

Total Cost = \$28,795,000;

Total area, both residential and commercial = 77.49 + 8.15 = 85.64

$\$28,795,000 / 85.64 = \$336,233 \text{ per acre} = \$7.719 \text{ per sq ft}$

Add signals:

Sta. 258+00; Sherwood Mills Road/Dove Point Lane

Sta. 276+00; Williams Road

Sta. 331+00; Driveway

Sta. 357+00; Union Circle

Sta. 441+00; Oak Ridge Drive/Ivy Springs Drive

Sta. 470+00; Castlegate Drive/Forest Knoll Drive

Reduction in retaining walls; Assume 20%

Total cost of retaining walls, including shoring:  $\$3,128,828 \times 0.20 = \$625,766$

Earthwork reduction: assume 10% reduction:

Total earthwork cost:  $\$3,624,485 \times 0.10 = \$362,449$

## DEVELOPMENT AND RECOMMENDATION PHASE

### Project: Spout Springs Road

<b>IDEA No.:</b> B-6	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Reduce median width at southern section
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Comp By: JDW    Date: 8-28-12    Checked By: GAO    Date: 9-4-12

**Original Concept:** Construct a 32 foot wide median at the southern section of the project, in the area from Thompson’s Mill Road to the proposed median opening at about Sta. 241+00.

**Proposed Change:** Reduce the median in the referenced area to 24 ft

**Justification:** This section of the project is a heavily commercialized area representing the highest cost of right of way. Additionally, retaining walls are proposed to minimize impacts to adjacent parking and business operations. Any reduction in the roadway template width will provide overall project savings to both construction and right of way costs. Since all of the area will be accommodated with left turn lanes and tapers, no 2-way center turn lane is provided. An additional signal is included at the commercial driveway at Sta. 230+00. All intersection movements will be controlled at signalized intersections, therefore, reducing the median width is recommended.

There is also concern regarding additional anticipated re-routed traffic from the SR 347 project. Even though Thompson’s Mill Road will be cul-de-saced, there will be options for continuation and by-pass of the short segment to SR 347. Not all traffic will be re-routed this way thereby reducing some of the projected volumes.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$799,000		
<b>Proposed</b>	\$125,000		
<b>Savings</b>	\$674,000		\$674,000
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$674,000</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B-6

Client: Hall County/GDOT

Sheet 3 of 3

Reduce right of way – Sta 208+00 to 235+00; 2,700 ft

Reduce from 32 ft to 24 ft; 8 foot reduction

$$2,700 \text{ ft} \times 8 \text{ ft} = 21,600 \text{ sq ft.}$$

Proposed Right of Way Cost: Per acre cost with mark-up:

Total Cost = \$28,795,000;

Residential: \$87,160 per acre x 77.49 acres = \$6,754,028

Commercial: \$435,600 per acre x 8.15 acres = \$3,550,140

Total        \$ 10,304,168

$$\$28,795,000 / \$10,304,168 = 2.7945 \text{ Mark-up}$$

Residential: \$87,160 per acre x 2.7945 = \$243,568.62 per acre = \$5.592 per sq ft

Commercial: \$435,600 per acre x 2.7945 = \$1,217,284.20 per acre = \$27.945 per sq ft

Reduction in wall heights; Assume 2 foot reduction

Length of walls: 610 + 200 + 260 + 200 = 1,270 ft

$$2 \times 1,270 = 2,540 \text{ sq ft}$$

Reduced concrete median; 8 ft; 2,200 ft

$$2,200 \times 8 = 17,600 \text{ sq ft} = 1,955 \text{ sq yds}$$

Add traffic signal at the driveway at Sta 230+00; \$125,000

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: Spout Springs Road**

<b>IDEA No.:</b> B-6.1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> ALTERNATE TO B-6; Reduce median width at southern section
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Comp By: JDW    Date: 8-28-12                      Checked By: GAO                      Date: 9-4-12

**Original Concept:** Construct a 32 foot wide median at the southern section of the project, in the area from Thompson’s Mill Road to the median opening at about Sta. 241+00.

**Proposed Change:** Reduce the median in the referenced section to 20 feet.

**Justification:** This section of the project is a heavily commercialized area representing the highest cost of right of way. Additionally, retaining walls are proposed to minimize impacts to adjacent parking and business operations. Any reduction in the roadway template width will provide overall project savings to both construction and right of way costs. Since all of the area will be accommodated with left turn lanes and tapers, no 2-way center turn lane is provided. An additional signal is included at the commercial driveway at Sta. 230+00. All intersection movements will be controlled at signalized intersections, therefore, reducing the median width is recommended.

There is also concern regarding additional anticipated re-routed traffic from the SR 347 project. Even though Thompson’s Mill Road will be cul-de-saced, there will be options for continuation and by-pass of the short segment to SR 347. Not all traffic will be re-routed this way thereby reducing some of the projected volumes.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$1,430,000		
<b>Proposed</b>	\$125,000		
<b>Savings</b>	\$1,305,000		\$0
<b>FUTURE COST:</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$1,305,000</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B-6.1

Client: Hall County/GDOT

Sheet 3 of 3

Reduce right of way – Sta 208+00 to 240+00; 3,200 ft

Reduce from 32 ft to 20 ft; 12 foot reduction

$$3,200 \text{ ft} \times 12 \text{ ft} = 38,400 \text{ sq ft.}$$

Proposed Right of Way Cost: Per acre cost with mark-up:

Total Cost = \$28,795,000;

Residential: \$87,160 per acre x 77.49 acres = \$6,754,028

Commercial: \$435,600 per acre x 8.15 acres = \$3,550,140

Total        \$ 10,304,168

$$\$28,795,000 / \$10,304,168 = 2.7945 \text{ Mark-up}$$

Residential: \$87,160 per acre x 2.7945 = \$243,568.62 per acre = \$5.592 per sq ft

Commercial: \$435,600 per acre x 2.7945 = \$1,217,284.20 per acre = \$27.945 per sq ft

Reduction in wall heights; Assume 3 foot reduction

Length of walls: 610 + 200 + 260 + 200 + 370 = 1,640 ft

$$3 \times 1,640 = 4,920 \text{ sq ft}$$

Reduced concrete median; 12 ft; 2,200 ft

$$(2,200 \times 12) + (500 \times 4) = 28,400 \text{ sq ft} = 3,156 \text{ sq yds}$$

Add traffic signal at the driveway at Sta 230+00; \$125,000

## DEVELOPMENT AND RECOMMENDATION PHASE

### Project: Spout Springs Road

<b>IDEA No.:</b> B-6.2	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> ALTERNATE TO B-6; Eliminate the raised median at southern section
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Comp By: JDW    Date: 8-28-12    Checked By: GAO    Date: 9-4-12

**Original Concept:** Construct a 32 foot wide median at the southern section of the project, in the area from Thompson’s Mill Road to the median opening at about Sta. 241+00.

**Proposed Change:** Construct a flush section, no raised median at the southern section of the project. All access points will be controlled at signalized intersections. The existing driveways will be converted to right in/right out. All the area will be comprised of left turn and storage areas, therefore no 2 way left turns will be allowed. This template is consistent with the northern terminus of the project to I-985.

**Justification:** This section of the project is a heavily commercialized area representing the highest cost of right of way. Additionally, retaining walls are proposed to minimize impacts to adjacent parking and business operations. Any reduction in the roadway template width will provide overall project savings to both construction and right of way costs. Since all of the area will be accommodated with left turn lanes and tapers, no 2-way center turn lane is provided. An additional signal is included at the commercial driveway at Sta. 230+00. All intersection movements will be controlled at signalized intersections, therefore, reducing the median width is recommended.

There is also concern regarding additional anticipated re-routed traffic from the SR 347 project. Even though Thompson’s Mill Road will be cul-de-saced, there will be options for continuation and by-pass of the short segment to SR 347. Not all traffic will be re-routed this way thereby reducing some of the projected volumes.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$3,670,000		
<b>Proposed</b>	\$265,000		
<b>Savings</b>	\$3,405,000		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$3,405,000</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B-6.2  
Client: Hall County/GDOT  
Sheet 3 of 3

Reduce Right of Way – Sta 208+00 to 240+00; 3,200 ft  
Reduce from 32 ft to 0 ft; 32 foot reduction  
 $3,200 \text{ ft} \times 32 \text{ ft} = 102,400 \text{ sq ft.}$

Proposed Right of Way Cost: Per acre cost with mark-up:

Total Cost = \$28,795,000;

Residential: \$87,160 per acre x 77.49 acres = \$6,754,028

Commercial: \$435,600 per acre x 8.15 acres = \$3,550,140

Total        \$ 10,304,168

$\$28,795,000 / \$10,304,168 = 2.7945$  Mark-up

Residential: \$87,160 per acre x 2.7945 = \$243,568.62 per acre = \$5.592 per sq ft

Commercial: \$435,600 per acre x 2.7945 = \$1,217,284.20 per acre = \$27.945 per sq ft

Reduction in wall heights; Assume an average 5 foot reduction

Length of walls: 610 + 200 + 260 + 200 + 370 = 1,640 ft

$5 \times 1,640 = 8,200 \text{ sq ft}$

Reduced concrete median / pavement; 32 ft; 3,200 ft

$(3,200 \times 32) = 102,400 \text{ sq ft} = 11,378 \text{ sq yds}$

Add traffic signal at the driveway at Sta 230+00; \$125,000

Reconstruct/convert/restripe existing drives to RIRO – assume \$20,000 per location

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: Spout Springs Road**

<b>IDEA No.:</b> B-8	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Use rural section for Elizabeth Lane
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Comp By: JDW    Date: 8-28-12                      Checked By: GAO                      Date: 9-4-12

**Original Concept:** The typical section for relocated Elizabeth Lane shows an urban section with sidewalk and curb and gutter on both sides of the road.

**Proposed Change:** Use a rural section. Eliminate the sidewalk and curb and gutter.

**Justification:** The existing section of Elizabeth Lane has a rural shoulder. There is no development on the south side of relocated Elizabeth Lane. There is limited development on the north side of Elizabeth Lane; one small subdivision with 8 homes plus a possible connection from Elizabeth Lane to the Prince of Peace Church. Additionally, pedestrian traffic from the school should be encouraged to use the Spout Springs Road trail. There is no pedestrian connection provided from the school parking areas to the proposed Elizabeth Lane sidewalks, therefore, pedestrian traffic along Elizabeth Lane should be minimal.

It is noted that the rural section will be somewhat wider. However, the concept display shows an adequate width of proposed right of way, minimum 180 feet that can accommodate the rural section without acquiring additional right of way.

<b>COST SUMMARY</b>	<b>INITIAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL L. C. COST SAVINGS</b>
<b>Original</b>	\$228,500		
<b>Proposed</b>	\$25,000		
<b>Savings</b>	\$203,500		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$203,500</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: B-8

Client: Hall County/GDOT

Sheet 3 of 3

Conc. Sidewalk, 4 In. – 3800 linear feet x 5 feet wide = 19,000 sq. ft.  
19,000 sq. ft = 2111.11 sq. yd. (use 2111)

The unit price for Conc. Sidewalk, 4 In. (\$14.12) as shown in the Detailed Cost Estimate that was provided for the VE study appears to be low. This was discussed with Gene McKissick of the Office of Engineering Services. Based on his findings, a more realistic cost for concrete sidewalk for the proposed project quantity (> 15,000SY) was \$20/SY.

(2111 sq. yd.)(\$20/sq. yd.) = \$42,220.00

Conc. Curb and Gutter, 8" x 30", Tp 2 – 3800 linear feet  
3800 LF x \$9.84/LF = \$37,392.00

### Drainage

Catch Basins – assume 300 foot spacing, i.e. 6 per side or total of 12 each

12 EA x \$2266.40/EA = \$27,196.80

Storm Drain Pipe – assume 1700 LF of 18 inch pipe and 200 LF of 24 inch pipe on each side.

Storm Drain Pipe, 18 Inch – 3400 LF x \$31.19/LF = \$106,046.00

Storm Drain Pipe, 24 Inch – 400 LF x \$38.90/LF = \$15,560.00

### Additional earthwork

Unclassified Excavation – Assume \$25,000

## DEVELOPMENT AND RECOMMENDATION PHASE

### Project: Spout Springs Road

<b>IDEA No.:</b> E-1	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Use maximum allowable grades to adjust profile for reduced earthwork
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Comp By: LMB    Date: 8-29-12                      Checked By: GAO                      Date: 9-5-12

**Original Concept:** The concept profile utilizes a maximum 6.5% grade although the allowable maximum grade is 8%.  
Current earthwork quantities: 329,700 CY of Unclassified Excavation and 253,550 CY of Excavated Borrow.

**Proposed Change:** In the area of the low point at Station 297+00, increase the gradients to 7.9 % and 5.4%. This will reduce the roadway footprint, the required right of way and the overall earthwork quantities. The culvert at the stream will also be shortened.

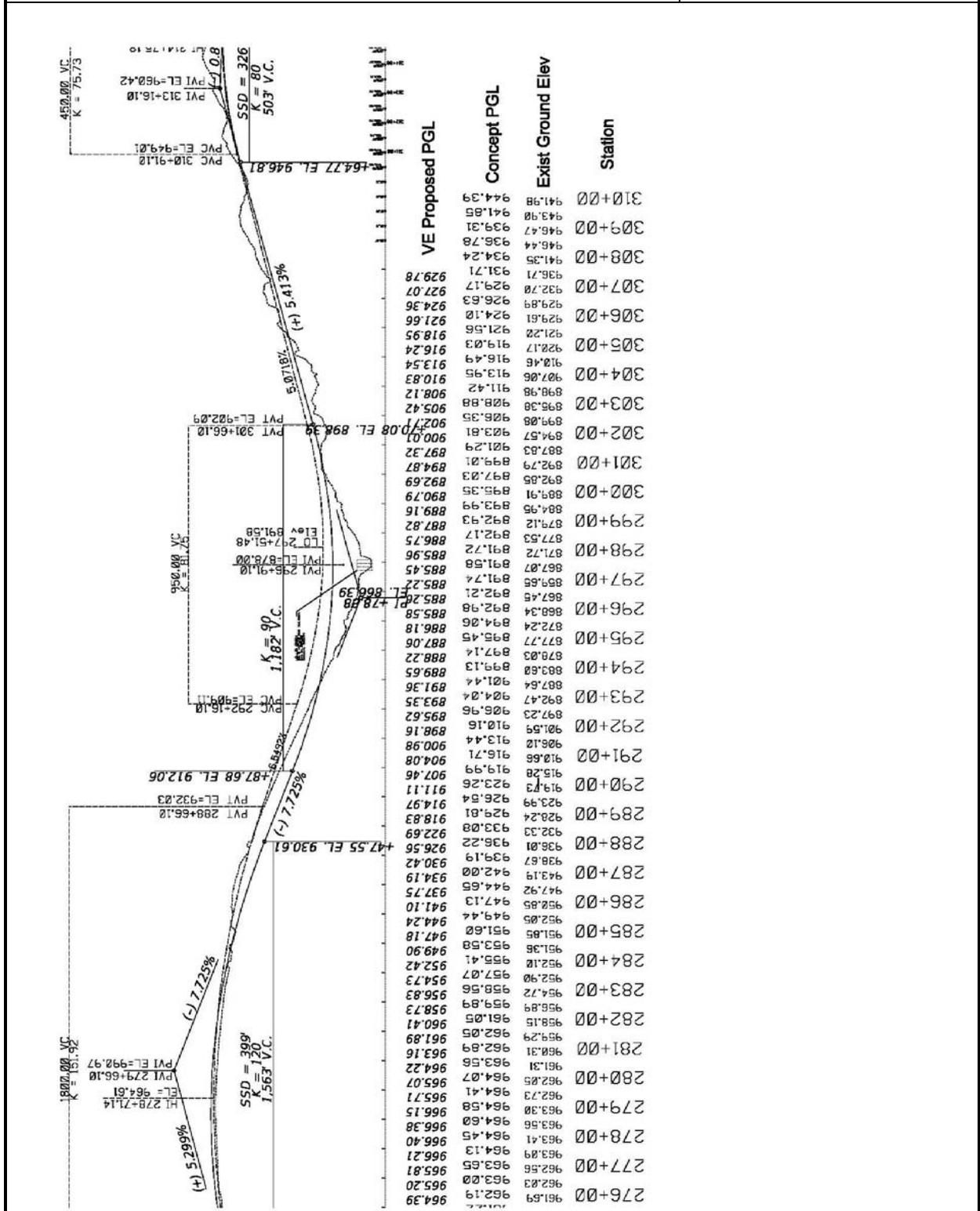
**Justification:** The Concept Report allows a maximum grade of 8% for Spout Springs Road. Increasing the gradient from 6.5% to 7.9% will reduce some of the overall project quantities and right-of-way footprint.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$399,000		
<b>Proposed</b>	\$0		
<b>Savings</b>	\$399,000		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$399,000</b>

# SKETCH

**Project: Spout Springs Road**

Idea No.: E-1  
 Client: Hall County/GDOT  
 Sheet 2 of 4





## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: E-1

Client: Hall County/GDOT

Sheet 4 of 4

**APPROXIMATE STA 282+00 to 304+00:**

Earthwork – using average end area method

STA	Dist.	El. STV	El. VE	Ht. Diff.	ROW LT	ROW RT	Change
282+00	-	-	-	-	-	-	-726.98 sf Fill
288+00	600	936.22	926.22	10	+15	+17	+1593.94 sf Cut
293+50	550	901.44	890.24	11.2	-15	-28	-1702.24 sf Fill
299+00	550	892.93	885.61	7.32	-12	-10	-1124.32 sf Fill
304+00	600	-	-	-	-	-	-292.08 sf Cut

$600 \text{ ft} \times (1593.94 \text{ C} - 726.98 \text{ F})/2 = +260,088 \text{ cf Cut} = +9,633 \text{ cy Cut}$

$550 \text{ ft} \times (1593.94 \text{ C} - 1707.24 \text{ F})/2 = -31,157.5 \text{ cf Cut} = -1,154 \text{ cy Fill}$

$550 \text{ ft} \times (1702.24 \text{ F} + 1124.32 \text{ F})/2 = -777,304 \text{ cy Fill}$

$500 \text{ ft} \times (1124.32 \text{ F} - 292.08 \text{ F})/2 = -177,050 \text{ ct Fill}$

Original: 253,550 cy Fill 329,700 cy Cut

VE: -36,500 cy Fill -9,633 cy Cut

New total: 243,917 cy Fill 293,200 cy Cut

**Right-of-Way:**

Left side of section

$600 \times (0+15)/2 = +4500 \text{ sf}$

$550 \times (+15-15)/2 = 0 \text{ sf}$

$550 \times (-15-12)/2 = -7425 \text{ sf}$

$600 \times (-12-0)/2 = -3600 \text{ sf}$

Right side of section

$600 \times (0+17)/2 = +5100 \text{ sf}$

$550 \times (+17-28)/2 = -3025 \text{ sf}$

$550 \times (-28-10)/2 = -10,450 \text{ sf}$

$600 \times (-10-0)/2 = -3000 \text{ sf}$

Total reduced area: -17,900 sf

Proposed Right of Way Cost: Method 1 – Overall Project acreage:

Total Cost = \$28,795,000;

Total area, both residential and commercial = 77.49 + 8.15 = 85.64

$\$28,795,000 / 85.64 = \$336,233 \text{ per acre} = \$7.719 \text{ per sq ft}$

Assume 10% reduction in culvert costs.

## DEVELOPMENT AND RECOMMENDATION PHASE

### Project: Spout Springs Road

<b>IDEA No.:</b> E-1.1	<b>Sheet No.:</b> 1 of 2	<b>CREATIVE IDEA: Design Consideration</b> Adjust profile to reduce impacts
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Comp By: LMB    Date: 8-29-12                      Checked By: GAO                      Date: 9-5-12

**Original Concept:** The concept profile utilizes a maximum 6.5% grade although the allowable maximum grade is 8%.

**Proposed Change:** At the northern section of the project where there is a stream contiguous to the roadway that will be severely impacted, consider lowering the profile; approximate stations 485 to 499.

**Justification:** The Concept Report allows a maximum grade of 8% for Spout Springs Road. In the area of the impacted stream, the design team, as part of the Practical Alternative Report (PAR) will be required to consider alternatives that reduce impacts.

This consideration proposes to lower the profile by about 7 feet to reduce impacts to the stream. We anticipate that the stream impacts can be eliminated however the stream buffer impacts will most likely not be completely eliminated, although they will be reduced. The environmental mitigation costs presented in the concept analysis are not specifically detailed or broken out per area and therefore cannot be quantified for this adjustment. A factor in lowering the profile as proposed is the constructability review.

As an additional modification measure, the design team can consider reducing and/or eliminating altogether the raised median in this area. This will match the section immediately to the north and the raised median can be transitioned and incorporated beyond the impacts of the stream.

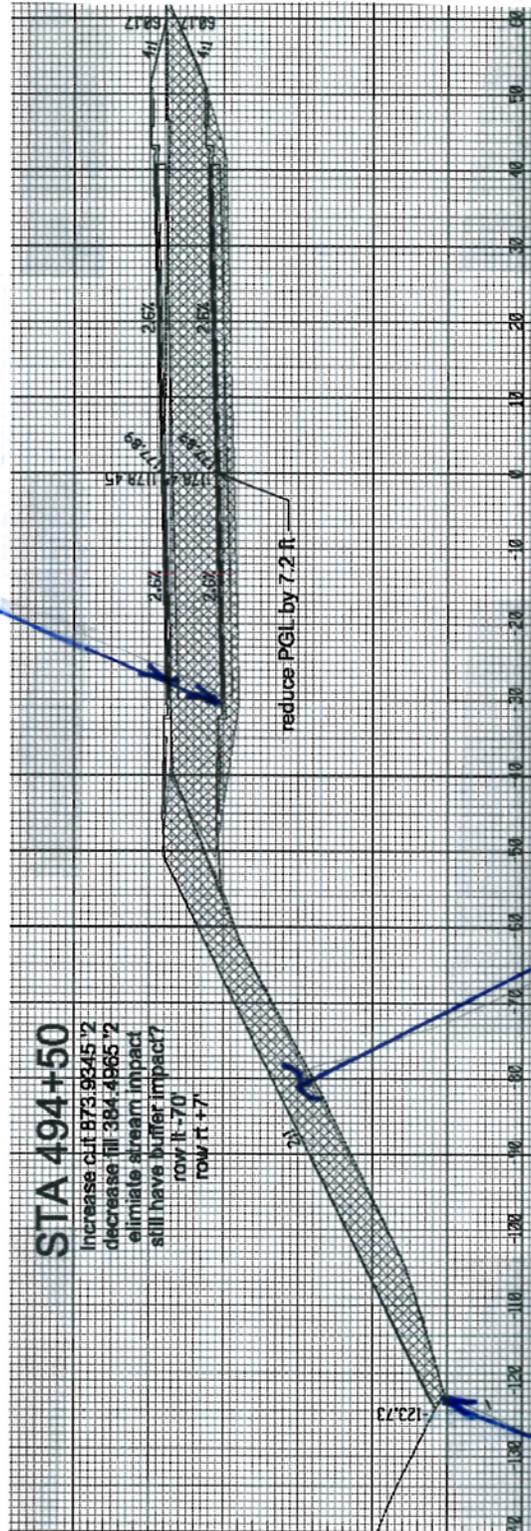
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$0		
<b>Proposed</b>	\$0		
<b>Savings</b>	\$0		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$0</b>

SKETCH

Project: Spout Springs Road

Idea No.: E-1.1  
Client: Hall County/GDOT  
Sheet 2 of 2

LOWER  
PROFILE -  $7\%(\pm)$



REDUCED  
IMPACTS

EXISTING  
STREAM

## DEVELOPMENT AND RECOMMENDATION PHASE

### Project: Spout Springs Road

<b>IDEA No.:</b> G-1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Reduce median width to 20 feet
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Comp By: JDW    Date: 8-28-12    Checked By: GAO    Date: 9-4-12

**Original Concept:** Construct a 24 foot wide median with a 32 foot wide median at certain locations to provide a 2-stage crossing.

**Proposed Change:** Reduce the median width to 20 feet. This is an acceptable width for this type of roadway and follows the current SR 347 template.

**Justification:** This recommendation will reduce the median width to 20 feet saving median cost and right of way acquisition while continuing to provide a 4 foot raised separation at the left turn areas. The 20 foot median is currently proposed on the adjacent SR 347 project and is in compliance with GDOT guidelines for this type of roadway. The areas of 32 foot median width are not changed under this recommendation.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$1,130,000		
<b>Proposed</b>	\$0		
<b>Savings</b>	\$1,130,000		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$1,130,000</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: G-1  
Client: Hall County/GDOT  
Sheet 3 of 3

Total project length; Sta 208+00 to 498+00; 29,000 ft = 5.492 miles

Areas of 32 foot median:

Sta 214+00 to Sta 234+00; 2,000 ft

Sta 252+00 to Sta 264+00; 1,200 ft

Sta 354+00 to Sta 364+00; 1,000 ft

Sta 419+00 to Sta 434+00; 1,500 ft

Total        5,700 ft

Median reduction:

$$(29,000 - 5,700) (24 - 20) = 93,200 \text{ sq ft} = 10,356 \text{ sq yds}$$

Full depth pavement cost:

Asphalt pavement; Spout Springs Road: 7.5 in asphalt / 8 inch GAB

$$(7.5/12 \text{ ft}) (150 \text{ \#/cf}) (1 \text{ ton} / 2000 \text{ \#}) = 0.046875 \text{ ton/sf}$$

$$(8/12 \text{ ft}) (135 \text{ \#/cf}) (1 \text{ ton} / 2000\text{\#}) = 0.045 \text{ ton/sf}$$

Cost per SY

$$(0.054675 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$61 / \text{ton}) + (0.045 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$14.82 / \text{ton}) =$$

$$\$ 25.73 + 6.00 = \$31.73 / \text{SY} \quad \text{USE: } \$32 \text{ per SY}$$

$$\text{Concrete median cost} = 35.22; \quad \text{Use } \$35 \text{ for median / pavement cost}$$

Proposed Right of Way Cost: Overall Project acreage:

Total Cost = \$28,795,000;

$$\text{Total area, both residential and commercial} = 77.49 + 8.15 = 85.64$$

$$\$28,795,000 / 85.64 = \$336,233 \text{ per acre} = \$7.719 \text{ per sq ft}$$

Other miscellaneous savings: retaining walls, drainage, earthwork

Assume - \$50,000

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: Spout Springs Road**

<b>IDEA No.:</b> K-1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Use 8" x 24" Type 7 curb and gutter in median
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Comp By: JDW Date: 8-30-12      Checked By: GAO      Date: 9-4-12

**Original Concept:** The current typical section uses 8" x 30" Type 7 curb and gutter in median (estimated 31,600 linear feet)

**Proposed Change:** Use 8" x 24" Type 7 curb and gutter.

**Justification:** Material costs will be slightly less for the smaller curb. Project savings will be realized on the reduced amount of required right of way. This is not a designated state route and the median drainage is not yet completely designed.

<b>COST SUMMARY</b>	<b>INITIAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL L. C. COST SAVINGS</b>
<b>Original</b>	\$481,600		
<b>Proposed</b>	\$316,000		
<b>Savings</b>	\$165,600		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$165,600</b>

## COST WORKSHEET

**Project: Spout Springs Road**

Idea No.: K.1  
 Client: Hall County / GDOT  
 Sheet 2 of 3

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
<b>Original Design:</b>							
Conc. Curb & Gutter, 8" x 30", Tp 7	LF	31,600	\$11.38	\$359,608			
Additional Right of Way	Sq. Ft.	15,800	\$7.719	\$121,960.20			
<b>VE Design:</b>							
Conc. Curb & Gutter, 8" x 24", Tp 7	LF				31,600	\$10.00	\$316,000
Right of Way	Sq. Ft.				0	\$7.719	0
<b>SUBTOTAL</b>				\$481,568.20			\$316,000
<b>TOTAL ROUNDED</b>				\$481,600			\$316,000

## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: K.1

Client: Hall County/GDOT

Sheet 3 of 3

Use Conc. Curb & Gutter 8" x 24" Type 7 in median

GDOT does not have a pay item for 24 inch curb and gutter with a Type 7 face.

From the CES Estimate provided for the VE study, the 30 inch curb and gutter (Pay item 441-6740) has an estimated price of \$11.38 per linear foot. Assume a price of \$10.00 for the 24 inch curb and gutter.

Right of Way savings

Using 31,600 LF of curb and gutter on both sides of the road – savings for right of way would be 15,800 LF with 1 foot of width, i.e. 15,800 square feet.

Proposed Right of Way Cost: Overall Project acreage:

Total Cost = \$28,795,000;

Total area, both residential and commercial = 77.49 + 8.15 = 85.64

$\$28,795,000 / 85.64 = \$336,233$  per acre = \$7.719 per sq ft

Savings 15,800 sq. ft. x \$7.719/sq. ft. = \$121,960.20

## DEVELOPMENT AND RECOMMENDATION PHASE

### Project: Spout Springs Road

<b>IDEA No.:</b> M-1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Use asphalt in lieu of concrete for multi-use trail
-------------------------	-----------------------------	--

Comp By: JDW Date: 8-30-12      Checked By: GAO      Date: 9-4-12

**Original Concept:** The current typical section uses a 10-foot wide, concrete multi-use trail.

**Proposed Change:** Use asphalt as the paving section. Typical paving section will be 12.5 mm Superpave (165 lbs/sq. yd), 19 mm Superpave (220 lbs/sq. yd), and Graded Aggregate Base (6 inches). This is the same as used for a typical residential driveway and is also typically used on trails.

**Justification:** The proposed change does not alter the footprint of the multi-use trail. It will be more economical to use the asphalt section as well as more suitable for bicyclists, joggers and users of the trail.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$737,800		
<b>Proposed</b>	\$620,600		
<b>Savings</b>	\$117,200		\$0
<b>FUTURE COST: Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$117,200</b>



## CALCULATIONS

**Project: Spout Springs Road**

Idea No.: M.1

Client: Hall County/GDOT

Sheet 3 of 3

The multi-use trail begins at Sta. 207+50 lt. (approx.) and ends at Sta. 498+00 lt. (approx.). This is a distance of 29,050 feet. Additionally, there is a section of multi-use trail on the right side beginning at Sta. 357+50 (Union Circle) and ending at Sta. 399+00 (relocated Elizabeth Lane). This is a distance of 4,150 feet. The total length of multi-use trail is 33,200 feet.

The unit price for Conc. Sidewalk, 4 In. (\$14.12) as shown in the Detailed Cost Estimate that was provided for the VE study appears to be low. This was discussed with Gene McKissick of the Office of Engineering Services. Based on his findings, a more realistic cost for concrete sidewalk for the proposed project quantity (> 15,000SY) was \$20/SY.

Unit prices for 12.5 mm Superpave, 19 mm Superpave, and Graded Aggregate Base are taken from the Detailed Cost Estimate that was provided for the VE study.

Use concrete as the paving surface.

Area = 33,200 feet x 10 feet = 332,000 square feet = 36,888.88 sq. yd. (Use 36,889)  
36,889 sq. yd x \$20/sq. yd. = \$737,780.00

Use asphalt as the paving surface.

From above, area = 36,889 sq. yd.

12.5 mm Superpave – 36,889 sq. yd. x 165 lbs/sq. yd = 6,086,685 lbs. = 3,043.34 tons  
3,043.34 tons x \$64.51/ton = \$196,325.86

19 mm Superpave – 36,889 sq. yd. x 220 lbs/sq. yd. = 8,115,580 lbs. = 4,057.79 tons  
4,057.79 tons x \$57.25/ton = \$233,308.48

Graded Aggregate Base – 332,000 sq. ft. x 0.5 ft. = 166,000 cu. ft. = 6,148.15 cu. yd.  
6,148.15 cu. yd. x 2.07 tons/cu. yd. = 12,726.67 tons  
12,726.67 tons x \$14.82/ton = \$188,609.25

Bituminous Tack Coat – 0.035 gal/sq. yd. x 36,889 sq. yd. = 1,291.12 gal.  
1,291.12 gal. x \$1.79/gal. = \$2,311.10

# **APPENDIX**

## Approving/Authorizing Persons

Name:	Position:	Telephone:
Jody Woodall	Hall County	770-531-6800
Margie Pozin	Design Consultant - PM	770-452-0797
Doug Fadool	GDOT - Project Manager	404-308-1353
Lisa Myers / Matt Sanders	GDOT - State Project Review Engineer	404-631-1770

## Personal Contacts

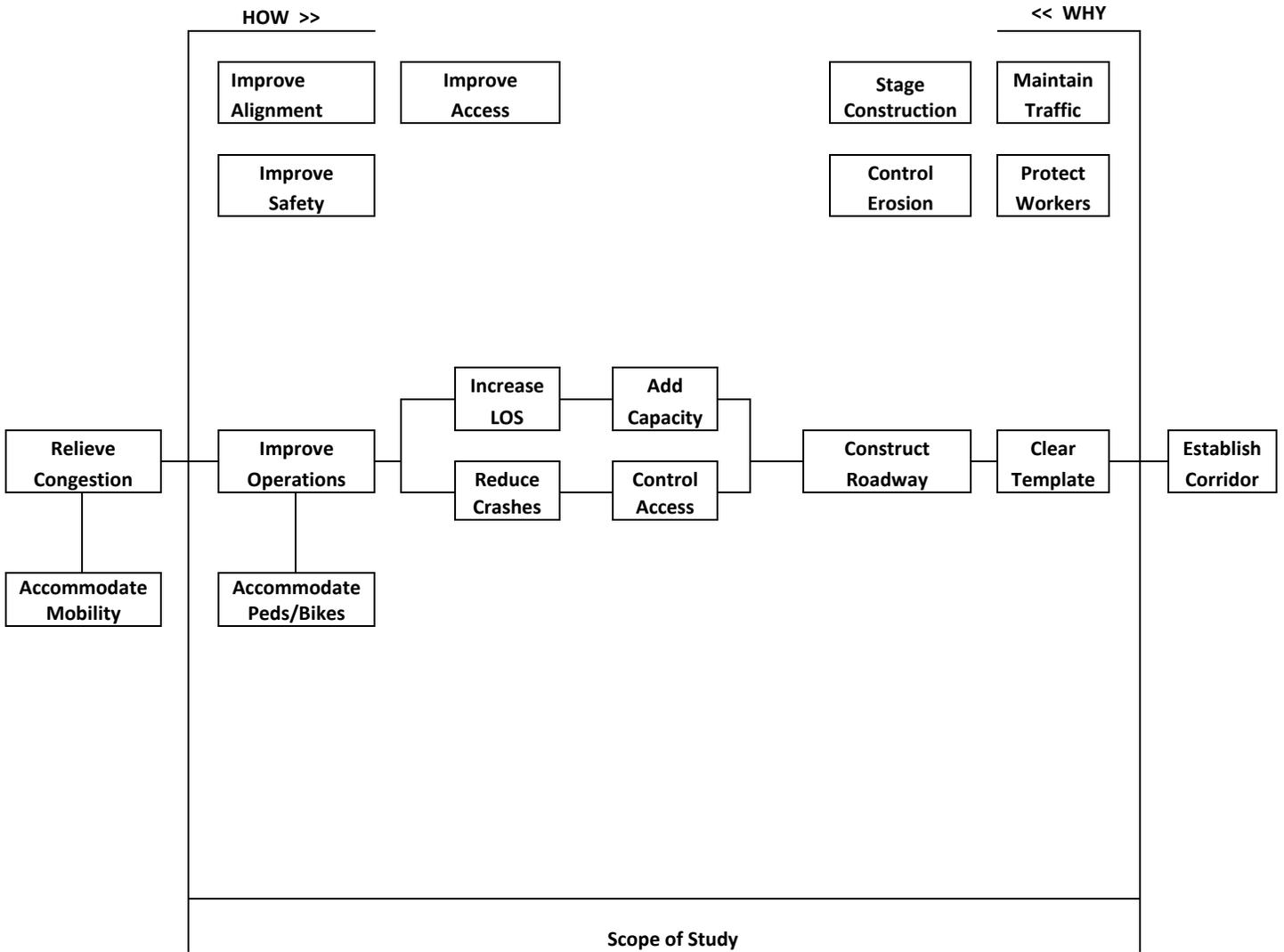
Name:	Position:	Notes:
N/A		

## Documents/Abstracts

Reference:	Reference:
Concept Plans – including typical sections, plans, profile and cross-sections	Concept R/W Cost Estimate
Concept Cost Estimate	VE Study constraints worksheet
Project Concept Report	Median Opening Design Table



# FAST DIAGRAM



## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** Spout Springs Road

**Basic Function:** improve operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>A</b>	<b>Right of Way</b>	store	project	\$28,795,000	42.16%	Yes
		allow	access			
		allow	construction			
		allow	utilities			
		establish	corridor			
		incorporate	aesthetics			
		allow	median /u-turns			
<b>B</b>	<b>Roadway Pavement</b>	support	traffic (loads)	\$9,859,966	14.44%	Yes
		access	properties			
		accommodate	traffic (future)			
		allow	u-turns			
		convey	drainage			
		realign	intersections			
		connect	corridor			
		stage	construction			
		avoid	resources (env)			
		appease	residents			
<b>C</b>	<b>Utility Modifications</b>	extend	facilities	\$6,761,610	9.90%	No
		service	customers			
<b>D</b>	<b>Drainage</b>	convey	run-off	\$5,445,065	7.97%	No
		collect	run-off			
		extend	culverts			
<b>E</b>	<b>Earthwork</b>	create	template	\$3,624,485	5.31%	Yes
		support	road			
		allow	access			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** Spout Springs Road

**Basic Function:** improve operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
		follow	standards			
		eliminate	walls			
		establish	limits			
<b>F</b>	<b>Retaining walls</b>	reduce	earthwork	\$3,128,828	4.58%	Yes
		reduce	right of way			
		minimize	impacts			
<b>G</b>	<b>Concrete median</b>	separate	traffic	\$1,801,719	2.64%	Yes
		conform	standards			
		control	run-off			
		control	access			
		allow	refuge			
<b>H</b>	<b>Traffic control</b>	protect	public	\$1,621,576	2.37%	No
		delineate	work zones			
		maintain	access			
<b>I</b>	<b>Landscaping</b>	beautify	project	\$1,542,000	2.26%	No
		treat	run-off			
		replace/restore	amenities			
<b>J</b>	<b>Erosion control</b>	control	sediment/pollution	\$1,533,895	2.25%	No
		treat	run-off			
<b>K</b>	<b>Concrete curb and gutter</b>	delineate	roadway	\$1,153,993	1.69%	Yes
		delineate	side roads			
		minimize	right of way			
		collect	run-off			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** Spout Springs Road

**Basic Function:** improve operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
L	Stream impacts	acquire	permit	\$954,030	1.40%	No
M	Concrete sidewalk	support	peds/bikes	\$904,882	1.32%	Yes
		connect	nodes			
N	Traffic signals	inform	motorist	\$650,000	0.95%	No
		control	traffic			
		reduce	median			
O	Miscellaneous			\$349,930	0.51%	No
P	Signing and Marking	inform	motorist	\$167,237	0.24%	No
		control	traffic			
		convey	information			

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>A</b>	<b>Right of Way</b>		
A-1	Establish realistic limits; mainline	Design to consider	✓
A-2	Establish realistic limits; side roads	Design to consider	✓
A-3	Use easements	Design to consider	✓
A-4	Reduce median width; 20 ft	See G-1	✓
A-5	Use steeper side-slopes	Design to consider	✓
<b>B</b>	<b>Roadway pavement</b>		
B-1	Review side road alignments/limits	See B-10	✓
B-2	Use 11 foot lanes		✓
B-3	Reduce median openings		✓
B-4	Review widening demands at southern section	See B-6	✓
B-5	Add work to current SR 347 project	Coordination effort not feasible; project awarded	✓
B-6	Reduce median width at southern section		✓
B-7	Review northern section impacts	See E-1; Design Consideration	✓
B-8	Eliminate curb and gutter on side roads	See B-10	✓
B-9	Re-use existing pavement; review alignment	Right of way costs and impacts prohibitive X	X
B-10	Eliminate Elizabeth Street sidewalk		✓
<b>C</b>	<b>Utility Modifications</b>		
<b>D</b>	<b>Drainage</b>		
D-1	Construct trunk line in median	Not enough information developed to properly analyze	X
<b>E</b>	<b>Earthwork</b>		
E-1	Maximize profile; lower/raise grades		✓

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
E-2	Use walls/reduce earthwork	Design to consider	
<b>F</b>	<b>Concrete retaining walls</b>		
F-1	Review need for walls	See A-2	✓
F-2	Optimize location of walls	Design to consider	✓
F-3	Use MSE walls	Design to consider	✓
<b>G</b>	<b>Concrete median</b>		
<b>G-1</b>	Reduce median to 20 feet		✓
<b>G-2</b>	Reduce median to 16 feet		✓
<b>H</b>	<b>Traffic Control</b>		
H-1	Review cross-over grades	MOT concerns	X
H-2	Review Iris/Garden	MOT concerns	X
<b>I</b>	<b>Landscaping</b>		
I-1	Reduce openings; create areas for landscaping	See B-3	✓
<b>J</b>	<b>Erosion Control</b>		
<b>K</b>	<b>Curb and Gutter</b>		
K-1	Use 24 inch C/G in median		✓
<b>L</b>	<b>Linear Stream Impacts</b>		
<b>M</b>	<b>Concrete Sidewalk/Path</b>		
M-1	Use asphalt for trail		✓
<b>N</b>	<b>Traffic Signal</b>		
<b>O</b>	<b>Miscellaneous</b>		
<b>P</b>	<b>Signing and Marking</b>		

VE STUDY SIGN-IN SHEET

Project No.: N/A      County: Hall      Date: August 27-30, 2012

PI No.: 0009679

Days

FIRST	LAST	NAME	GDOT OFFICE OR COMPANY NAME	PHONE NUMBER	EMAIL ADDRESS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lisa L. Myers	Engineering Services	404-631-1770	lmyers@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Matt Sanders	Engineering Services	404-631-1752	msanders@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Melissa Harper	Construction	404-631-1971	mharper@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ken Werho	Traffic Operations	404-635-8144	kwerho@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	George Obaranec	AMEC	770-421-3346	george.obaranec@amec.com
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Joe Wheeler	RS&H	678-528-7225	joe.wheeler@rsandh.com
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lenor Bromberg	KEA Group	404-805-8244	lbromberg@keagroup.com
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Larisa Tabakhova	STV	678-892-4958	larisa.tabakhova@stvinc.com
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Margie Pozin	STV	770-452-0797	margie.pozin@stvinc.com
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Chris Barrow	Traffic Ops	404-635-2939	cpbarrow@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Douglas Fadool	Program Delivery	404-308-1353	dfadool@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Henry Green	Planning	404-631-1792	hgreen@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Jody Woodall	Hall County	770-531-6800	jwoodall@hallcounty.org
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Blair Reynolds	Hall County	770-531-6800	breyolds@hallcounty.org
		<u>Via Video w/D-1:</u>			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Harold Mull	D1 Asst. Const. Eng.	770-532-5519	hmull@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Bruce Nicholson	KCI	770-550-1015	brnicholson@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Doug Wood	D1 Area Engineer	678-332-8245	Doug.Wood@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Brent Cook	D1 Preconstruction Eng.	770-532-5520	bcook@dot.ga.gov

Check all that attend       Did Not Attend      18 Attended Project Overview (Day 1)      12 Attended Project Presentation (Day 4)