STP-8042(9)

I-185/Buena Vista Road

Interchange Reconstruction

P.I. No. 351190

Muscogee County, Georgia

Value Engineering Study Report

Concept Development Stage

October 2005

Design Consultant

PBS&J

Value Engineering Consultant

Lewis & Zimmerman Associates, Inc.

Lewis & Zimmerman Associates, Inc.
Taking the Chance out of Change
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October 5, 2005

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

re: Project Numbers STP-8042(9)
I-185 at Buena Vista Road Interchange Reconstruction
Muscogee County, Georgia
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to submit four hard copies and one electronic copy of the referenced report. The alternatives and design suggestions developed during this VE effort identify opportunities to improve the value of the project in terms of safety, interchange operational efficiencies, constructability, and capital cost.

We wish to take this opportunity to thank you, the State of Georgia Department of Transportation participants, the Federal Highway Administration, and PBS&J for assisting the VE team in generating creative, alternative solutions for this project. We look forward to working with you on future assignments and providing additional value engineering services.

Sincerely,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

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

Attachment

TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report summarizes the events of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the State of Georgia Department of Transportation (GDOT), Atlanta, Georgia. The subject of the study was the U.S. Interstate Highway 185 (I-185)/Buena Vista Road (City Street (CS) 2228) Interchange Reconstruction known as Project STP-8042(9), P. I. No. 351190 in Muscogee County, Georgia. The project is being designed by PBS&J of Atlanta, Georgia. The workshop was conducted in GDOT's offices on September 13-15, 2005.

PROJECT DESCRIPTION

The proposed project consists of improvements to the interchange of I-185 at Buena Vista Road. These improvements extend along Buena Vista Road from Brighton Road to Dogwood Drive. Improvements along I-185 consist of the reconstruction of the entrance and exit ramps to Buena Vista Road. The proposed project would add capacity to the interchange and CS 2228 improve access to and from the interchange, and provide a safer travel environment around the interchange.

Buena Vista Road currently consists of a five-lane typical section with two through lanes in each direction and a two-way center turn lane. The proposed project adds a through lane in the eastbound direction from Brighton Road to Linden Circle. A raised median is also proposed through the project limits, with median openings at Brighton Road, the intersections at the southbound and northbound ramp termini, Linden Circle, and Dogwood Drive. Left and right turn lanes are proposed at all intersections, with double left turn lanes proposed to southbound and northbound I-185. The existing traffic signals located at the intersections of the ramp termini, Linden Circle, and Dogwood Drive would be upgraded as part of the project. A proposal for a new signal at Brighton Road would be considered pending a signal warrant study at that location.

As part of the project, the intersections of Buena Vista Road at Fairfield Drive and Pembrook Drive would become right-in, right-out only. In addition, the most western intersection of Linden Circle at Buena Vista Road would be closed with the construction of a cul-de-sac.

The entrance and exit ramps to and from I-185 at Buena Vista Road would be upgraded as part of the project. The improvements on the entrance ramps include additional lanes to accommodate the double left turns from Buena Vista Road. Improvements to the exit ramps from I-185 include additional deceleration length on the ramps as well as improved signage and sight distance from the interstate. All ramps are proposed to be reconstructed with concrete pavement.

The current probable cost of construction is $15,992,900 as noted on the STP-8042(9), P.I. No. 351190, Preliminary Cost Estimate, Muscogee County, contained in the August 31, 2005, Project Concept Report prepared by PBS&J. The project contains inflation at 5.00% per annum for four years (21.55%) and Engineering and Construction of 10.00%. In addition, $25,471,500 has been identified as the right-of-way costs with $238,000 in reimbursable utilities and $617,511 in non-reimbursable utilities. Therefore, the current grand total for the project is $42,319,911.

CONCERNS AND OBJECTIVES

The project is a relatively simple interchange reconstruction to relieve traffic congestion and improve operational efficiency while accommodating the projected future growth and improving the overall safety within the project limits. The safety concern stems from the fact the that both I-185 and Buena Vista Road are experiencing accident and injury rates that are higher than the statewide average for an urban interstate and an urban principal arterial. The accident rates for Buena Vista Road are more than three times the statewide average in some locations. These high accident and injury rates can be attributed to the highly developed nature of the corridor, and the fact that left turns are allowed at all locations via a center two-way left turn lane.

Another concern noted was the inordinate amount of right-of-way costs associated with the improvements noted above. This too can be attributed to the highly developed nature of the corridor and the fact that the adjacent businesses generate a high amount of crossing traffic throughout the corridor.

The VE team also noted other areas of concern: (1) the need to take advantage of existing roadway assets of the southbound I-185 off ramp to Buena Vista Road; (2) the need to include numerous right-only queuing lanes from Buena Vista Road to side roads; and (3) the need to continue the project limits further east to the intersection of Buena Vista Road and Hunt Avenue/Wright Drive or even further east to the Floyd Road intersection.

The objective of the VE study was to identify opportunities to improve the value of the project in terms of safety, interchange operational efficiencies, constructability, and capital cost.

HIGHLIGHTS OF THE STUDY

As stated above, the primary goals of the project are to relieve traffic congestion, the operational efficiency of the interchange, and improve the overall safety within the project limits. Numerous ideas were developed along the lines of improved safety and reducing right-of-way takes as well as reduction in the overall amount of work needed to accomplish the necessary upgrades. Listed below are some of the more salient ideas developed.

The design calls for lengthening the northbound (NB) off ramp from I-185 onto Buena Vista Road that entails a re-work of the abutment at the Steam Mill Road underpass. Alternative 10 would eliminate all the work associated with that undertaking as demographics do not support such a lengthening. Retaining the status quo permits easy and safe access to the off ramp in the manner current users are accustomed to using. Initial savings close to $1,000,000 could be realized if this alternative were implemented. If improvements are still desired for this off ramp, then Alternative 11 would widen the NB shoulder only without involving any work to the Steam Mill Road underpass. Savings would be reduced but the alternative still yields over $850,000 in savings.

Buena Vista Road has three through lanes as it crosses over I-185 to accommodate the anticipated traffic. Immediately west of the interchange, Buena Vista Road converges to two lanes creating what is believed to be an undesirable traffic weave. Alternative 16A eliminates one through-lane forcing a commitment by the users at an earlier point in their travel from east to west along Buena Vista Road. This would improve the safety on the new bridge and ensure better queuing for accessing both NB and southbound (SB) I-185 on ramps. Savings of about $930,000 could be realized with this reconfiguration. Similarly, if the southern

most through-lane were combined with the free right turn onto the SB I-185 access ramp, then a lane can still dropped from the bridge without any adverse effects and still save nearly $800,000.

By reconfiguring the NB I-185 on ramp, widening of the Bull Creek Bridge could be avoided with initial cost savings approaching $700,000 as noted on Alternative 12.

Finally, Alternatives 7 and 8 extend the project limits beyond the current termini. The VE team was informed that traffic reduces drastically after the off-set Hunt Avenue/Wright Drive intersection and, correspondingly, a reduction in accidents was also observed and documented. Improvements to the Buena Vista Road/I-185 Interchange should commence at the aforementioned Hunt/Wright off-set intersection by straightening the intersection and decoupling the off-set. This terminus assures a better traffic flow and facilitates accessibility to the interstate; however, the additional work results in an increase of over $2,475,000 to the project as noted on Alternative 8. In a similar manner, to capture the ultimate improvements, the project could be extended to the Buena Vista/Floyd Road intersection to further alleviate congestion. Unfortunately, insufficient data was available to price the additional cost associated with this extension but is provided as a design suggestion in Alternative 7.

The *Summary of Potential Cost Savings* worksheet follows this narrative outlining all of the alternatives and design suggestion developed by the VE team. Some of the alternatives are mutually exclusive or interrelated so that addition of all project cost savings does not equal total savings for the project. A full listing of all of the ideas considered by the VE team can be found on the *Creative Idea Listing* worksheets in the Study Results section of this report.

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
1	Eliminate of proposed acceleration lane from southbound Rosewood Drive to westbound Buena Vista Road	$167,550	$0	$167,550		$167,550
2	Add a left turn lane at the Linden Circle intersection with Buena Vista Road	$0	$6,684	($6,684)		($6,684)
3	Begin the three-lane section of Buena Vista Road westbound at the main entrance to the shopping center	$0	$74,649	($74,649)		($74,649)
7	Extend proposed project limits along Buena Vista Road to Floyd Road	DESIGN SUGGESTION				
8	Increase project limits eastward to the Hunt Avenue/Wright Drive intersection	$0	$2,475,498	($2,475,498)		($2,475,498)
9	Shift the I-185 southbound exit to use more of the existing ramp	$87,462	$0	$87,462		$87,462
10	Eliminate the parallel northbound I-185 exit ramp to Buena Vista Road	$1,031,642	$0	$1,031,642		$1,031,642
11	Improve the shoulder for northbound I-185 exit ramp to Buena Vista Road	$1,031,642	$174,925	$856,717		$856,717
12	Reconfigure the northbound I-185 on ramp to eliminate the Bull Creek bridge widening	$716,252	$0	$716,252		$716,252
13	Reduce the width of the Buena Vista Road bridge over I-185	$3,401,582	$3,085,588	$315,994		$315,994
16A	Eliminate third through lane up to Buena Vista Road and I-185	$927,054	$0	$927,054		$927,054
16B	Eliminate free right turn Buena Vista Road lane eastbound to southbound I-185	$794,961	$0	$794,961		$794,961
22	Cul-de-sac Pembrook Drive to eliminate relocations	$637,867	$18,794	$619,073		$619,073
23	Close the Fairfield Drive intersection with Buena Vista Road	$16,634	$7,650	$8,984		$8,984
25	Eliminate the right lane (deceleration lane) from westbound Buena Vista Road to Brighton Road	$84,827	$0	$84,827		$84,827

STUDY RESULTS

INTRODUCTION

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

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

RESULTS OF THE STUDY

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

Of the 25 ideas generated, 15 of them were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 13 alternatives for change with an impact on project costs and two design suggestions that will enhance the value of the project in terms of durability, reduced labor effort/improved constructibility, and expansion of the work product. All of these alternatives and design suggestions are presented in detail following this narrative and on the *Summary of Potential Cost Savings* worksheets.

EVALUATION OF ALTERNATIVES

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

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

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

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
1	Eliminate of proposed acceleration lane from southbound Rosewood Drive to westbound Buena Vista Road	$167,550	$0	$167,550		$167,550
2	Add a left turn lane at the Linden Circle intersection with Buena Vista Road	$0	$6,684	($6,684)		($6,684)
3	Begin the three-lane section of Buena Vista Road westbound at the main entrance to the shopping center	$0	$74,649	($74,649)		($74,649)
7	Extend proposed project limits along Buena Vista Road to Floyd Road	DESIGN SUGGESTION				
8	Increase project limits eastward to the Hunt Avenue/Wright Drive intersection	$0	$2,475,498	($2,475,498)		($2,475,498)
9	Shift the I-185 southbound exit to use more of the existing ramp	$87,462	$0	$87,462		$87,462
10	Eliminate the parallel northbound I-185 exit ramp to Buena Vista Road	$1,031,642	$0	$1,031,642		$1,031,642
11	Improve the shoulder for northbound I-185 exit ramp to Buena Vista Road	$1,031,642	$174,925	$856,717		$856,717
12	Reconfigure the northbound I-185 on ramp to eliminate the Bull Creek bridge widening	$716,252	$0	$716,252		$716,252
13	Reduce the width of the Buena Vista Road bridge over I-185	$3,401,582	$3,085,588	$315,994		$315,994
16A	Eliminate third through lane up to Buena Vista Road and I-185	$927,054	$0	$927,054		$927,054
16B	Eliminate free right turn Buena Vista Road lane eastbound to southbound I-185	$794,961	$0	$794,961		$794,961
22	Cul-de-sac Pembrook Drive to eliminate relocations	$637,867	$18,794	$619,073		$619,073
23	Close the Fairfield Drive intersection with Buena Vista Road	$16,634	$7,650	$8,984		$8,984
25	Eliminate the right lane (deceleration lane) from westbound Buena Vista Road to Brighton Road	$84,827	$0	$84,827		$84,827

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**1**
DESCRIPTION:	**ELIMINATE PROPOSED ACCELERATION LANE FROM SOUTHBOUND ROSEWOOD DRIVE TO WESTBOUND BUENA VISTA ROAD**	SHEET NO.:	1 of 5

ORIGINAL DESIGN: (Sketch attached)

The original design includes a new right acceleration lane from southbound Rosewood Drive to westbound Buena Vista Road.

ALTERNATIVE: (Sketch attached)

Make no change to the northwest corner of intersection. Begin the raised median further west of Rosewood Drive and maintain existing right-of-way in order to avoid taking residence.

ADVANTAGES:

- Eliminates one residential take
- Eliminates cost of improvement
- Decreases activity/time on construction schedule

DISADVANTAGES:

- Impacts westbound Buena Vista Road traffic

DISCUSSION:

The benefit of adding the acceleration lane onto westbound Buena Vista Road is related to a decreased impact to traffic. The existing intersection is currently signalized. It seems that the cost of the improvement does not provide a significant benefit to the project.

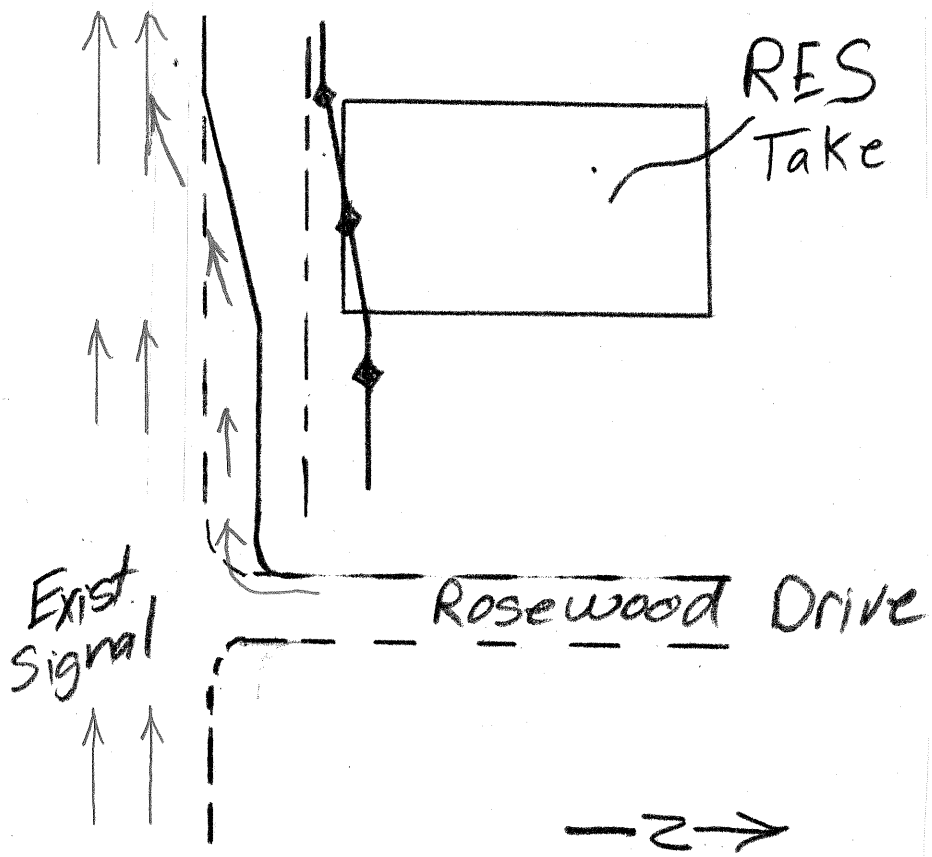
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 167,550	—	$ 167,550
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 167,550	—	$ 167,550

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 1

☑ AS DESIGNED ☐ ALTERNATIVE

SHEET NO.: 2 of 5



Existing
Proposed
Existing ROW
Proposed ROW

NTS

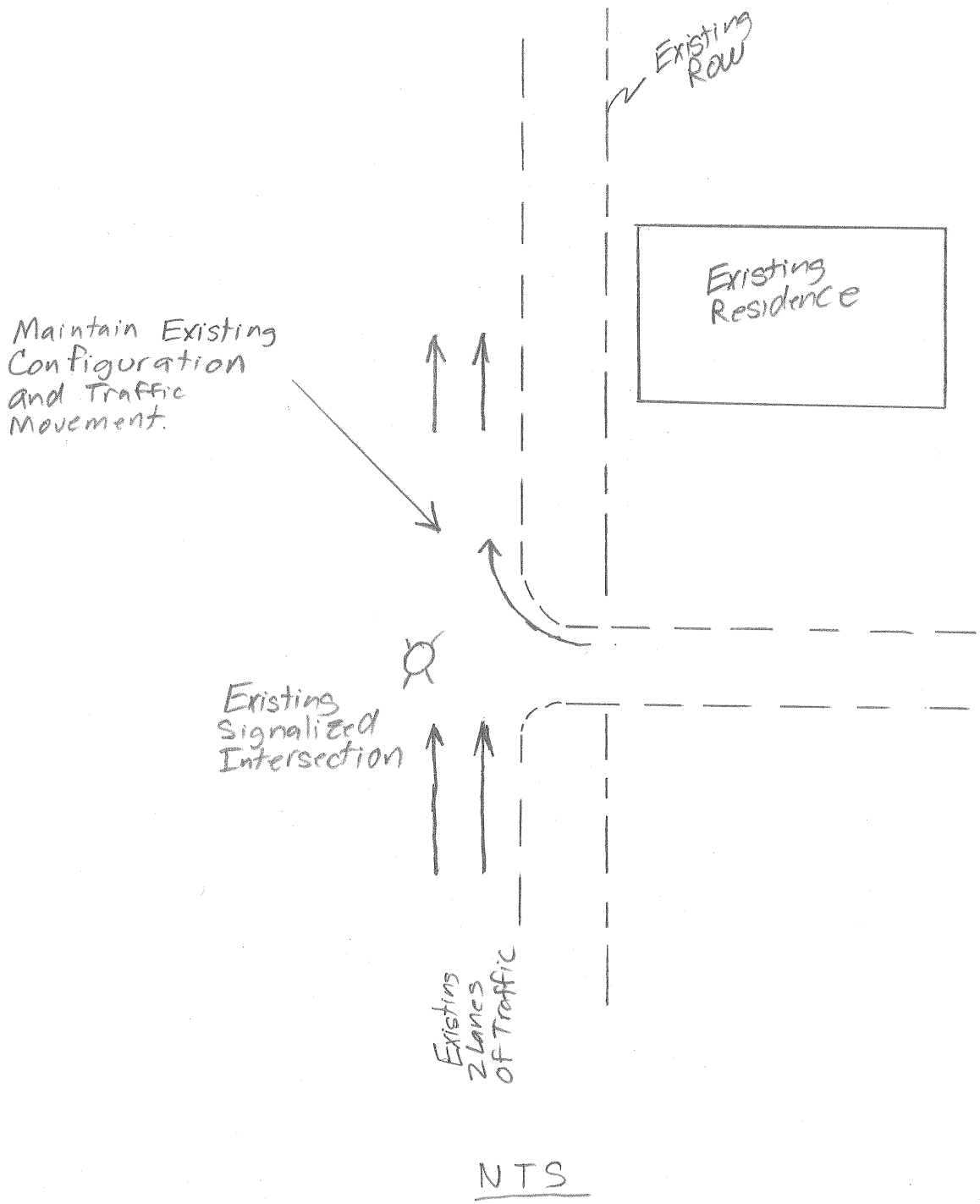
SKETCHES

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 1

☐ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 3 of 5



CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 1

DESCRIPTION:

SHEET NO.: 4 of 5

Curb & Gutter: ±200 LF · $12.00 · 1.3371 = $3209

Sidewalk: ±200' · 5' · $26.50 · 1.3371 = $35,433

AC Pavement: ±110ft · 12ft · $\frac{1\,SY}{9\,ft^2}$ · $37.40/SY · 1.3371 = $7,334

Landscape/Grading: $1400/Acre

$13.5\,ft \cdot 200\,ft \cdot \frac{1\,Acre}{43{,}560\,ft^2} \cdot \$1400/Acre \cdot 1.3371 = \$109$

Right of Way:

Land = $\frac{1}{2} \cdot 16ft \cdot 250\,ft$ $7.25 ft^2 · 3.472 = $50,344

Relocation = $20,000/parcel · 3.472 = $69,440

Clear & Grub:

$\frac{1}{2} \cdot 20ft \cdot 200ft / 43560\,ft$ = 0.05 Acre

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 1

DESCRIPTION

SHEET NO.: 4 of 5

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Clear and grub	AC	0.05	25,000	1,250			
Landscape and Grading	AC	0.062	1,400	87			
Sidewalk	SF	1,000	26.50	26,500			
Curb and Gutter	LF	200	12.00	2,400			
Asphalt Concrete Pavement	SY	147	37.40	5,487			
Subtotal				35,723			
Markup at 33.71%				12,042			
Subtotal Construction				**47,766**			
Right-of-Way Costs							
Land	SF	2,000	7.25	14,500			
Relocation	Parcel	1	20,000	20,000			
Subtotal				34,500			
Markup at 247.20%				85,284			
Subtotal ROW				**119,784**			
Sub-total				167,550			
Mark-up at				Incl			
TOTAL				167,550			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**2**
DESCRIPTION:	**ADD A LEFT TURN LANE AT THE LINDEN CIRCLE INTERSECTION WITH BUENA VISTA ROAD**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The intersection currently has one lane for left, right, and through movements for local neighborhood and the apartment complex.

ALTERNATIVE:

Add a left turn lane in addition to the right turn and through lanes already proposed.

ADVANTAGES:

- Improves movement from Linden Circle to Buena Vista Road
- Improves traffic flow
- Improves safety
- Improves line-of-sight

DISADVANTAGES:

- None apparent

DISCUSSION:

The addition of a left turn lane to Linden Circle will enhance movement and safety through the intersection. This alone will improve the flow of traffic as line-of-sight is also improved, making drivers more aware of their immediate surroundings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 0	—	$ 0
ALTERNATIVE	$ 6,684	—	$ 6,684
SAVINGS	$ (6,684)	—	$ (6,684)

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 2

DESCRIPTION:

SHEET NO.: 2 of 3

Asphalt Pavement - (100' x 12) + (50 x 12 ÷ 2) = 1200 ÷ 9 x $37.40/SY = $3,653

Striping - 100LF x $0.25 = $25

No add'l R/W, Sidewalk or C/G needed

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 2

DESCRIPTION

SHEET NO. 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Asphalt Pavement	SY				133	37.40	4,974
Striping	LF				100	0.25	25
	Sub-total						4,999
Mark-up at	33.71 %						1,685
	TOTAL						6,684

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**3**
DESCRIPTION:	**BEGIN THE THREE-LANE SECTION OF BUENA VISTA ROAD WESTBOUND AT THE MAIN ENTRANCE TO THE SHOPPING CENTER**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The original design shows a right turn lane on westbound (WB) Buena Vista Road between Woodburn Drive and the first entrance to the shopping center, and between the first entrance and main entrance to the shopping center.

ALTERNATIVE:

Maintain two through lanes between Rosewood Drive and the main entrance to the shopping center. The third lane is added from the main entrance and continues WB on Buena Vista Road. The right turn movements in the design year onto Woodburn Drive and the shopping center are minimal.

ADVANTAGES:

- Reduces pavement and right-of-way costs
- Facilitates turning movements
- Improves safety
- Eliminates an unnecessary pavement
- Precludes accidents from side streets

DISADVANTAGES:

- Adds cost

DISCUSSION:

The current concepts show right turn lanes between Woodburn Drive and the main entrance to the shopping center that is not justified by proposed traffic projections. Two through lanes will be maintained.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 0	—	$ 0
ALTERNATIVE	$ 74,649	—	$ 74,649
SAVINGS	$ (74,649)	—	$ (74,649)

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 3

DESCRIPTION:

SHEET NO.: 2 of 3

Asphalt Paving - 220 LF × 12 ÷ 9 = 293.3 SY
170 LF × 12 ÷ 9 = 226.7
100 LF × 6 ÷ 9 = 66.7
586.7 SY × $37.40/SY = $21,942.60

R/W - 180 LF × 10 = 1800 SF × $7.25/SF = $13,050

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 3

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM	ORIGINAL ESTIMATE				PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Asphalt Concrete Pavement	SY				586.70	37.40	21,943
Subtotal							21,943
Markup at 33.71%							7,397
Subtotal Construction							**29,339**
Right-of-Way Costs							
Land	SF				1,800	7.25	13,050
Subtotal							13,050
Markup at 247.20%							32,260
Subtotal ROW							**45,310**
Sub-total							74,649
Mark-up at							Incl
TOTAL							74,649

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**7**
DESCRIPTION:	**EXTEND PROPOSED PROJECT LIMITS ALONG BUENA VISTA ROAD TO FLOYD ROAD**	SHEET NO.:	1 of 1

ORIGINAL DESIGN:

The current proposed project limit along Buena Vista Road ends at Rosewood Drive.

ALTERNATIVE:

Consider extending the project limits from Rosewood Drive to Floyd Road.

ADVANTAGES:

- Improves safety along entire corridor of Buena Vista Road between I-185 and Floyd Road
- Traffic drops off past Hunt-Wright Intersection so improvements would be limited to safety

DISADVANTAGES:

- Limits present funding source to interchange improvement and access to interchange with I-185

DISCUSSION:

Discussion of concept alternatives showed the possibility of reducing the high accident rate along Buena Vista Road if improvements were continued to Floyd Road. There is a possibility of combining with a local project for additional funding.

The additional length of improvement to Buena Vista Road is not known and therefore a cost could not be generated.

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

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.: **8**
DESCRIPTION:	**INCREASE PROJECT LIMITS EASTWARD TO THE HUNT AVENUE/WRITE DRIVE INTERSECTION**	SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The original design ends the project at Rosewood Drive on the east end. The objective is to maintain the interchange improvement nature of the project and leverage the federal funding that is available. The designer indicates that the traffic volume drop off on eastbound Buena Vista is at Hunt Avenue/Wright Drive.

ALTERNATIVE:

Extend eastern project limits to the intersection of Buena Vista Road and Hunt Avenue/Wright Drive. This is very similar to Alt. No. 2. Eliminate the right deceleration and acceleration lanes along westbound Buena Vista Road at Celia Drive and Rosewood Drive. This recommendation also does not include the right deceleration and acceleration lanes into the existing shopping mall west of Woodburn Drive. In general, the project should be viewed as an arterial widening as well as an interchange improvement.

ADVANTAGES:

- Includes additional funding that could be accessed in arterial widening
- Saves costs by leveraging various funding sources to provide more comprehensive improvements
- Alleviates the congestion and accident issues

DISADVANTAGES:

- Increases cost
- Increases duration of project
- Impacts businesses on the south side of Buena Vista Road east of Rosewood Drive
- Requires one residential take

DISCUSSION:

Cost of construction for the existing project is $16,000,000. However, traffic information indicates that the traffic volumes and accidents do not decrease until after the intersection of Buena Vista Road and Hunt Avenue/Wright Drive. The eastern termini of the current project will not go far enough on Buena Vista Road to cover the limits of the congestion and accident issues on Buena Vista Road. For an additional $938,791 the limits could be extended to improve Buena Vista Road to improve traffic congestion and accident issues.

Local funds may be available to support an arterial widening. This project should be viewed as an arterial widening as well as an interchange improvement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 0	—	$ 0
ALTERNATIVE	$ 2,475,498	—	$ 2,475,498
SAVINGS	$ (2,475,498)	—	$ (2,475,498)

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 8

DESCRIPTION:

SHEET NO.: 2 of 3

Curb & Gutter:
4740 LF Along Buena Vista
2,100 LF At Hunt Ave / Wright Drive
6840 LF

Concrete Median:
370 LF

Pavement:
1400 LF Along Buena Vista Rd
600 LF · 3 At Hunt Ave / Wright Drive
210 LF · 1
130 LF · 1
250 LF · 1
320 LF · 1
4110 LF · 12 ft = 49,320 SF = 5480 SY

AC Removal:
400' · 8'
180' · 20'
½ · 30' · 25'
24' · 110'
9815 SF = 1091 SY

Striping:
Broken White
1050 LF · 2
2100 LF

Solid White
600 LF · 2
300 LF
200 LF · 2
150 LF
360 LF
370 LF
240 LF
40 LF
240 LF
3300 LF

Land
1100' · 12'
600' · 70'
12 · 200'
57,600 SF
= 1.3 Acre

Millings:
1080' · 70'
400' · 30'
220' · 24'
70' · 24'
310' · 38'
150' · 30'
30' · 40'
200' · 12'
114,440 SF = 12,716 SY

Clearing & Grubbing:
49,320 SF = 1.13 Acre

Sidewalk:
1050' · 5' · 2
600' · 5'
250' · 5'
130' · 5'
400' · 5'
250' · 5'
18,650 SF = 2072 SY

Storm Drain:
2100 LF
880 LF · 2
3860 LF

Catch Basin:
3860 LF / 300 LF = 13

Signal: 1

Take:
1

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 8

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM	ORIGINAL ESTIMATE				PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Curb and Gutter	LF				6,840	12.00	82,080
Asphalt Concrete Pavement	SY				5,480	37.40	204,952
Asphalt Concrete Removal	LS				1	2,000	2,000
Milling	LS				1	10,000	10,000
Sidewalk	SY				2,072	26.50	54,908
Signal	EA				1	75,000	75,000
Concrete Median	LF				370	31.00	11,470
Striping - Broken White	LF				2,100	0.15	315
Striping - Solid White	LF				3,300	0.25	825
Clear and Grubbing	AC				1.13	25,000	28,250
Storm Drain	LF				3,860	41.00	158,260
Catch Basin	EA				13	1,850	24,050
Asphalt Concrete Overlay	LS				1	50,000	50,000
Subtotal							702,110
Markup at 33.71%							236,681
Subtotal Construction							**938,791**
Right-of-Way Costs							
Land	SF				57,600	7.25	417,600
Parcel	EA				1	25,000	25,000
Subtotal							442,600
Markup at 247.20%							1,094,107
Subtotal ROW							**1,536,707**
	Sub-total						2,475,498
Mark-up at							Incl
	TOTAL						2,475,498

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**9**
DESCRIPTION:	**SHIFT THE I-185 SOUTHBOUND EXIT TO USE MORE OF THE EXISTING RAMP**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The I-185 southbound (SB) exit ramp is shown on the new alignment next to the existing ramp to improve the skew angle of the intersection with Buena Vista Road.

ALTERNATIVE:

Shift the proposed ramp to use more of the existing ramp. Investigate maintaining access to the Orkin® pest control property.

ADVANTAGES:

- Reduces right-of-way
- Takes advantage of an existing asset
- Forces slow down, improving safety

DISADVANTAGES:

- Creates a tight turning radius for dual left from ramp
- Increases skew angle

DISCUSSION:

Due to the elevation difference at the proposed intersection and that the businesses along the ramp cannot be saved, a total cost savings cannot be determined other than reducing the need for approximately 400 lf of ramp paving. Shifting entirely onto the existing ramp and providing new access to Orkin® may eliminate this displacement, and should be investigated. Elevation difference could be handled with leveling under traffic during off peak times.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 87,462	—	$ 87,462
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 87,462	—	$ 87,462

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 9

DESCRIPTION:

SHEET NO.: 2 of 3

Conc. Paving - 400LF x 16 ÷ 9 = 711SY x $92/SY = $65,412

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 9

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Concrete Paving	SY	711	92.00	65,412			
Sub-total				65,412			
Mark-up at 33.71%				22,050			
TOTAL				87,462			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**10**
DESCRIPTION:	**ELIMINATE THE PARALLEL NORTHBOUND I-185 EXIT RAMP TO BUENA VISTA ROAD**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

Extensive realignment of the exit ramp from south of the Steam Hill Road underpass to Buena Vista Road is noted on the existing design.

ALTERNATIVE:

Regrade the exit ramp only where it exits onto Buena Vista Road.

ADVANTAGES:

- Reduces work
- Spares underpass
- Reduces cost

DISADVANTAGES:

- Eliminates desired longer exit ramp
- Eliminates improved sight distance

DISCUSSION:

The existing ramp configuration is currently sufficient and demographics do not indicate a need for the proposed realignment.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,031,642	—	$ 1,031,642
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 1,031,642	—	$ 1,031,642

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 10

DESCRIPTION:

SHEET NO.: 2 of 3

RETAINING WALLS AT STEAM MILL RD. UNDERPASS = $135,000

PAVEMENT: 16' x 2200'/9 SF = 3911 SY
(FROM START OF PROPOSED PARALLEL EXIT RAMP TO EOR)

R.O.W. = 980' x 15' = 14,700SF

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 10

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Retaining Walls	LS	1	135,000	135,000			
12" Portland Cement Concrete Paving	SY	3,911	67.00	262,037			
Portland Cement Concrete Subbase	SY	3,911	25.00	97,775			
Subtotal				494,812			
Mark-up at 33.71%				166,801			
Subtotal Construction				**661,613**			
Right of Way Costs							
Land	SF	14,700	7.25	106,575			
Subtotal				106,575			
Mark-up at 247.20%				263,453			
Subtotal Construction				**370,028**			
	Sub-total			1,031,642			
Mark-up at				Incl			
	TOTAL			1,031,642			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**11**
DESCRIPTION:	**IMPROVE THE SHOULDER FOR NORTHBOUND I-185 EXIT RAMP TO BUENA VISTA ROAD**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

Extensive realignment of the exit ramp from south of the Steam Hill Road underpass to Buena Vista Road is noted on the concept development drawings.

ALTERNATIVE:

Improve the shoulder from Steam Mill Road underpass to the gore.

ADVANTAGES:

- Reduces work
- Spares underpass
- Reduces cost

DISADVANTAGES:

- Eliminates desired longer exit ramp

DISCUSSION:

Improving the shoulder improves the sight distance without having to impact the Steam Mill Road underpass and right-of-way.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,031,642	—	$ 1,031,642
ALTERNATIVE	$ 174,925	—	$ 174,925
SAVINGS	$ 856,717	—	$ 856,717

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 11

DESCRIPTION:

SHEET NO.: 2 of 3

ORIGINAL:

RETAINING WALLS AT STEAM MILL RD. UNDERPASS = $135,000

PAVEMENT: 16' x 2200'/9SF = 3911 SY.
(FROM START OF PROPOSED PARALLEL EXIT RAMP TO GORE)

R.O.W. = 980' x 15' = 14,700SF.

ALTERNATIVE:

PAVEMENT: 16' x 800'/9SY = 1422 SY

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 11

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Retaining Walls	LS	1	135,000	135,000			
12" Portland Cement Concrete Paving	SY	3,911	67.00	262,037	1,422	67.00	95,274
Portland Cement Concrete Subbase	SY	3,911	25.00	97,775	1,422	25.00	35,550
Subtotal				494,812			130,824
Mark-up at 33.71%				166,801			44,101
Subtotal Construction				**661,613**			**174,925**
Right of Way Costs							
Land	SF	14,700	7.25	106,575			
Subtotal				106,575			
Mark-up at 247.20%				263,453			
Subtotal Construction				**370,028**			
Sub-total				1,031,642			174,925
Mark-up at				Incl			Incl
TOTAL				1,031,642			174,925

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**12**
DESCRIPTION:	**RECONFIGURE THE NORTHBOUND I-185 ON RAMP TO ELIMINATE THE BULL CREEK BRIDGE WIDENING**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The on-ramp from Buena Vista Road onto northbound I-185 is widened at the beginning. Parallel lanes with realignment require the Bull Creek Bridge widening where the ramp merges with I-185 north.

ALTERNATIVE:

Only widen the beginning segment of the existing ramp to accommodate the parallel lanes.

ADVANTAGES:

- Spares the bridge from being widened
- Cuts down on required work on the on-ramp
- Simplifies design and construction

DISADVANTAGES:

- None apparent

DISCUSSION:

It is feasible to do work only to the beginning segment of the ramp without affecting the rest of the ramp.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 716,252	—	$ 716,252
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 716,252	—	$ 716,252

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 12

DESCRIPTION:

SHEET NO.: 2 of 3

CONCRETE PAVEMENT + SUBBASE

= 12' X 1090' / 9 SF = 1453 SY

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 12

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
12" PC CONC. PAVEMENT	SY	1453	67	97,351			
PC CONC. SUBBASE	SY	1453	25	36,325			
BULL CRK. BR. - WIDENING	EA	1	402,000	402,000			

	Sub-total	535,676	
Mark-up at	33.71 %	180,576	
	TOTAL	716,252	

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**13**
DESCRIPTION:	**REDUCE THE WIDTH OF THE BUENA VISTA ROAD BRIDGE OVER I-185**	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the eastbound Buena Vista Road bridge over I-185 to contain five lanes (three through lanes and two turn lanes) with 6-ft. sidewalks.

ALTERNATIVE: (Sketch attached)

Configure the Buena Vista Road bridge with four lanes (three through lanes and two turn lanes) and 6-ft. sidewalks.

ADVANTAGES:

- Decreases cost
- One right turn lane from I-185 northbound exit can be made continuous

DISADVANTAGES:

- None apparent

DISCUSSION:

Traffic analysis shows the need for three eastbound lanes to accommodate additional traffic from I-185 northbound exit to eastbound Buena Vista Road. Therefore, the third through lane (eastbound) on the bridge is not warranted (refer to Alt. No. 16).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 3,401,582	—	$ 3,401,582
ALTERNATIVE	$ 3,085,588	—	$ 3,085,588
SAVINGS	$ 315,994	—	$ 315,994

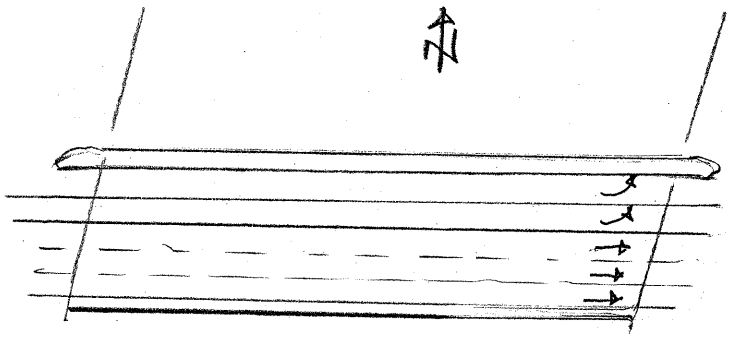
SKETCHES

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

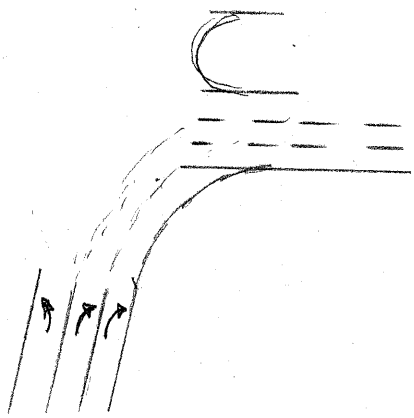
ALTERNATIVE NO.: 13

☑ AS DESIGNED ☑ ALTERNATIVE

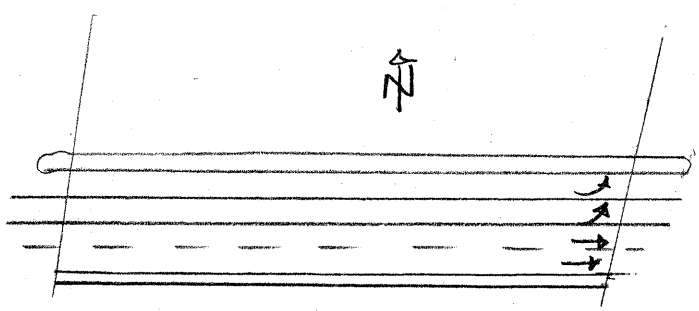
SHEET NO.: 2 of 4



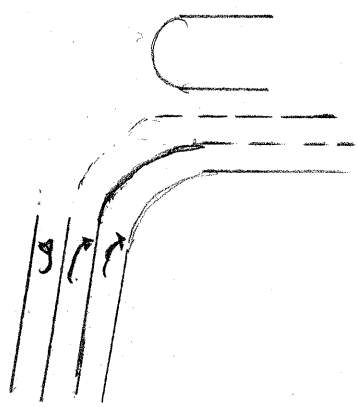
BUENA VISTA RD. BR / I-185



AS DESIGNED



BUENA VISTA RD. BR / I-185



ALTERNATIVE

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 13

DESCRIPTION:

SHEET NO.: 3 of 4

ORIGINAL DESIGN:
WIDTH OF BUENA VISTA RD. BR. /I-185

WB = 2x 1.625' + 2 x 12' (THRU) + 2x12' (LEFT) + 6' SW = 57.25'

EB = 2 x 1.625' + 3 x 12' (THRU) + 2 x 12' (LEFT) + 6' SW = 69.25'

126.5'

TOTAL COST = $2,544,000

ALTERNATIVE DESIGN:

TOTAL WIDTH = 2 x 57.25' = 114.5'

COST = $2,544,000 x $\frac{114.5'}{126.5'}$ = $2,302,672

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 13

DESCRIPTION

SHEET NO. 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Bridge - Buena Vista /I-85	EA	1	2,544,000	2,544,000	EA	2,307,672	2,307,672

	Sub-total		2,544,000		2,307,672
Mark-up at	33.71 %		857,582		777,916
	TOTAL		3,401,582		3,085,588

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.: **16A**
DESCRIPTION:	**ELIMINATE THE THIRD THROUGH LANE UP TO BUENA VISTA ROAD BRIDGE OVER I-185**	SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The drawings indicate three through lanes on the new Buena Vista Road bridge over I-185.

ALTERNATIVE: (Sketch attached)

Provide only two through lanes on the new Buena Vista Road Bridge.

ADVANTAGES:

- Narrows road section which in turn reduces right-of-way
- Eliminates need to displace the Chevron business

DISADVANTAGES:

- None apparent

DISCUSSION:

Eliminating the third lane from Buena Vista Road bridge over I-185 provides for a narrower roadway cross section which allows for the possibility of not requiring the displacement of the Chevron business. In addition, demographics do not appear to support a third through lane (refer to Alt. No. 16B).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 927,054	—	$ 927,054
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 927,054	—	$ 927,054

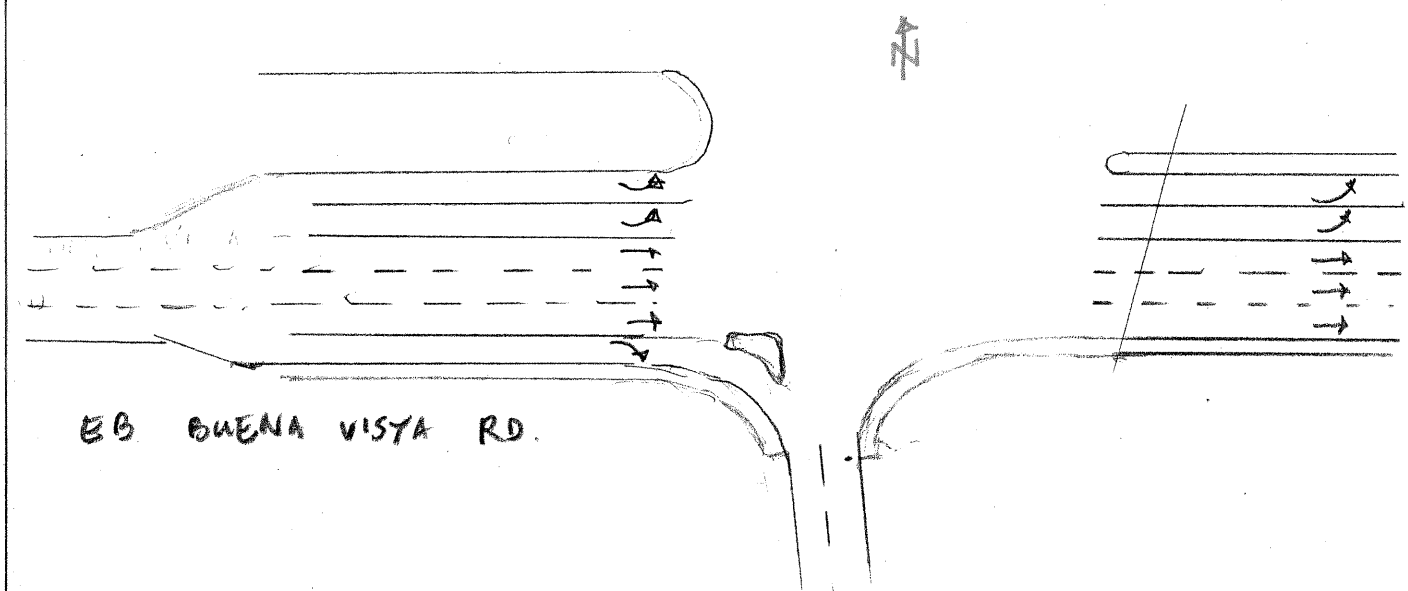
SKETCHES

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

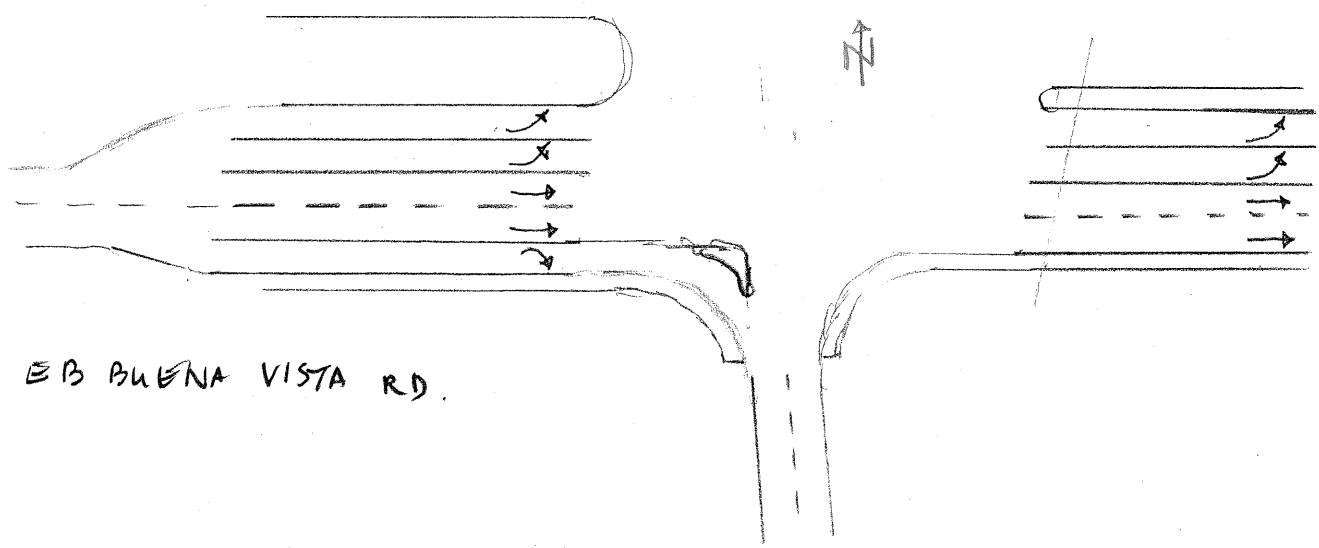
ALTERNATIVE NO.: 16A

☑ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED



ALTERNATIVE

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 1C 4

DESCRIPTION:

SHEET NO.: 3 of 4

PAVEMENT

ASPHALT = 12' x 2200' / 9 SF = 2,933 SY
+ G.A.B.

R.O.W. = 173' x 160' x 27,200 SF x $7.25/SF COMMERCIAL = $197,200

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: **16A**

DESCRIPTION

SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
8" Asphalt	SY	2,933	26.42	77,490			
12" GAB	SY	2,933	11.00	32,263			
Striping - 5" Skip White	LF	2,200	3.00	6,600			
Subtotal				116,353			
Mark-up at 33.71%				39,223			
Subtotal Construction				**155,575**			
Right of Way Costs							
Land	SF	27,200	7.25	197,200			
Parcel	EA	1	25,000	25,000			
Subtotal				222,200			
Mark-up at 247.20%				549,278			
Subtotal Construction				**771,478**			
	Sub-total			927,054			
Mark-up at				Incl			
	TOTAL			927,054			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.: **16B**
DESCRIPTION:	**ELIMINATE FREE RIGHT TURNBUENA VISTA ROAD LANE EASTBOUND TO SOUTHBOUND**	SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The current design indicates two left turn lanes, three through lanes, and one free flow right turn lane on the Buena Vista Road Bridge over I-185.

ALTERNATIVE: (Sketch attached)

Eliminate the free right turn by combining with one of the three through lanes on the Buena Vista Road Bridge over I-185.

ADVANTAGES:

- Eliminates the need to displace the Chevron business

DISADVANTAGES:

- Regulates free right turn flow

DISCUSSION:

Eliminating the proposed free right turn lane eastbound to southbound I-185 allows the Chevron business to be saved. Combined with Alt. No. 16A, saving the Chevron business is more feasible (refer to Alt. No. 16A).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 794,961	—	$ 794,961
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 794,961	—	$ 794,961

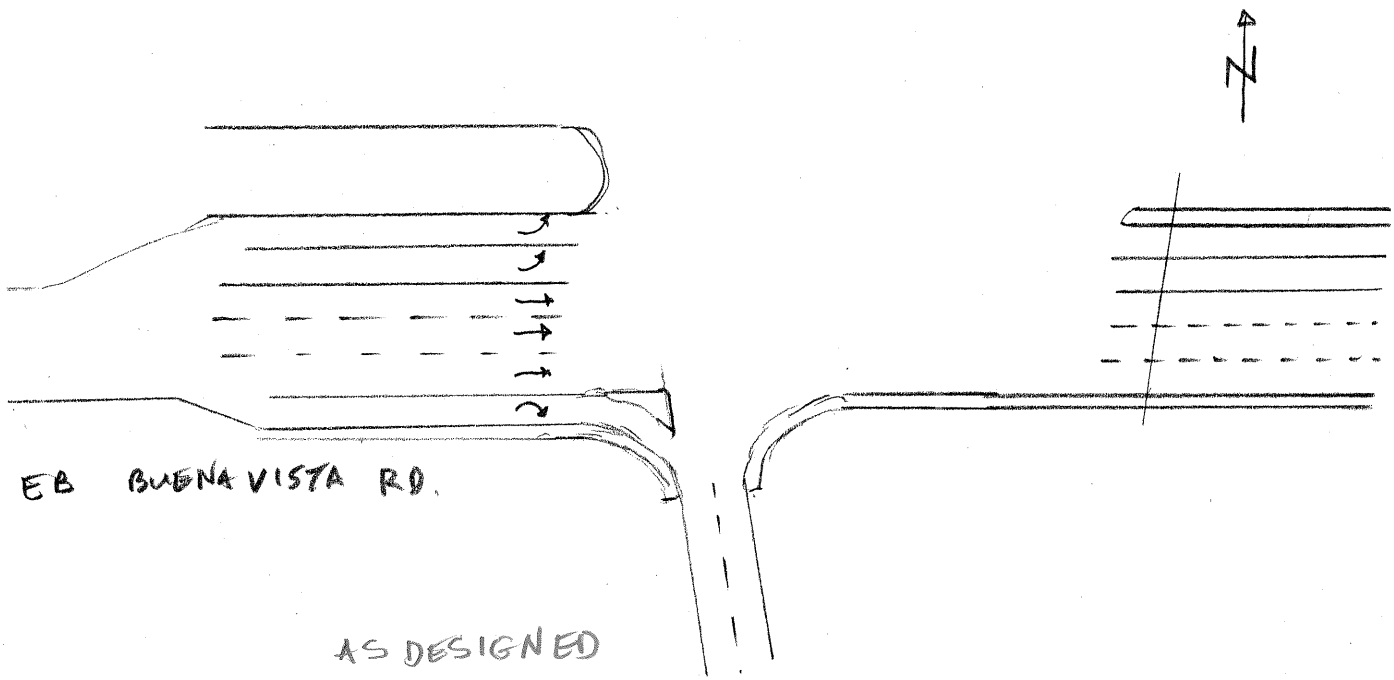
SKETCHES

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

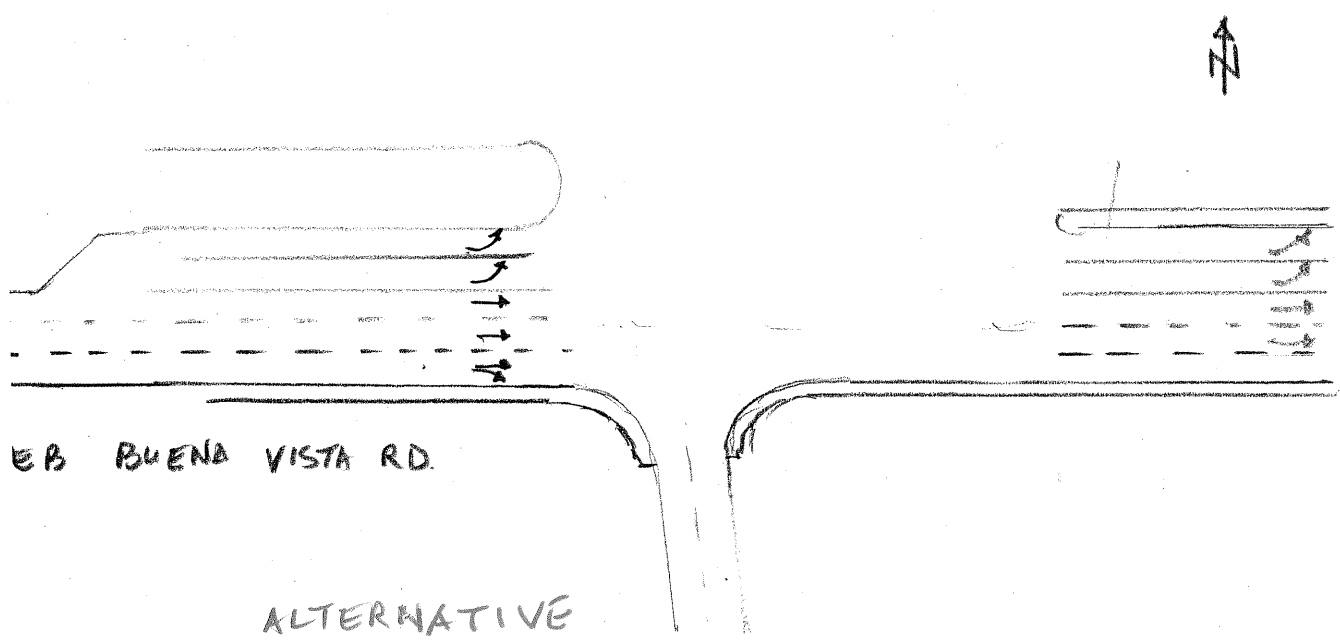
ALTERNATIVE NO.: 16B

☑ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED



ALTERNATIVE

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 16B

DESCRIPTION:

SHEET NO.: 3 of 4

PAVEMENT:

ASPHALT: 12' x 350' / 9 SF = 467 SY
+ GABS

R.O.W = 170' x 160' = 27,200 SF x $ 7.25/SF (COMMERCIAL) = $197,200

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: **16B**

DESCRIPTION

SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
8" Asphalt	SY	467	26.42	12,338			
12" GAB	SY	467	11.00	5,137			
Striping - 5" Solid White	LF	350	0.25	88			
Subtotal				17,563			
Mark-up at 33.71%				5,920			
Subtotal Construction				**23,483**			
Right of Way Costs							
Land	SF	27,200	7.25	197,200			
Parcel	EA	1	25,000	25,000			
Subtotal				222,200			
Mark-up at 247.20%				549,278			
Subtotal Construction				**771,478**			
	Sub-total			794,961			
Mark-up at				Incl			
	TOTAL			794,961			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**22**
DESCRIPTION:	**CUL-DE-SAC PEMBROOK DRIVE TO ELIMINATE RELOCATION**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

Approximately 480 ft. of Pembrook Drive is relocated to intersect Buena Vista Road with a right-in/right-out condition.

ALTERNATIVE:

Cul-de-sac Pembrook Drive just south of Holley Self Storage to maintain access. Local traffic will use Woodburn Drive to access Buena Vista Road with a right-in/right-out condition or use a local road to access Rosewood Drive then Buena Vista Road at the signalized intersection.

ADVANTAGES:

- Saves cost of 500 ft. of roadway relocation

DISADVANTAGES:

- Local Pembrook traffic must travel an additional distance to access Buena Vista Road to I-185

DISCUSSION:

Pembrook Drive is relocated to provide right turn only onto Buena Vista Road. Traffic wishing to travel eastbound on Buena Vista Road must U-turn at the I-185 interchange, which is a potentially dangerous movement, or use Woodburn Drive and U-turn at Linden Circle. Only local Pembrook Drive traffic wishing to travel westbound on Buena Vista Road or access I-185 will be impacted.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 637,867	—	$ 637,867
ALTERNATIVE	$ 18,794	—	$ 18,794
SAVINGS	$ 619,073	—	$ 619,073

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 2

DESCRIPTION:

Savings

480 LF of Asphalt Paving - 480 x 24 ÷ 9 = 1280 SY x $37.40/SY = $47,872

960 LF of V-Gutter - 960 LF x 1.5 ÷ 9 = 160 SY x $35 = $5,600

R/W Reduced - 450' x 100' ÷ 2 = 22,500 SF x $7.25/SF (Commercial) = $163,125

Add'l Costs

Cul-de-Sac - 50' x 90' x .7 ÷ 9 = 350 SY x $37.40 = $13,090

V-Gutter - 165 LF x 1.5 ÷ 9 = 27.6 SY x $35 = $966

R/W - No add'l R/W needed

Total Savings - Paving - $34,782

V-Gutter - $4,634

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 22

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Asphalt Paving	SY	1,280	37.40	47,872	350	37.40	13,090
Valley Gutter	SY	160	35.00	5,600	27.60	35.00	966
Subtotal				53,472			14,056
Mark-up at 33.71%				18,025			4,738
Subtotal Construction				**71,497**			**18,794**
Right of Way Costs							
Land	SF	22,500	7.25	163,125			
Subtotal				163,125			
Mark-up at 247.20%				403,245			
Subtotal Construction				**566,370**			
Sub-total				637,867			18,794
Mark-up at				Incl			Incl
TOTAL				637,867			18,794

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**23**
DESCRIPTION:	**CLOSE THE FAIRFIELD DRIVE INTERSECTION WITH BUENA VISTA ROAD**	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The current design maintains the Fairfield Drive intersection with Buena Vista Road using right-in/right out access only.

ALTERNATIVE:

Remove access from Fairfield Drive. Local traffic will use Brighton Road to access Buena Vista Road. This will increase safety by diverting minimal volume to the signalized intersection at Brighton Road.

ADVANTAGES:

- Eliminates potential traffic hazard to through traffic and diverts to signalized intersection
- Improves safety
- Improves traffic flow

DISADVANTAGES:

- Adds travel distance

DISCUSSION:

Eliminating the intersection will reduce a hazard to through traffic on Buena Vista Road. Traffic going east on Buena Vista Road will already use this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 16,634	—	$ 16,634
ALTERNATIVE	$ 7,650	—	$ 7,650
SAVINGS	$ 8,984	—	$ 8,984

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 23

DESCRIPTION:

SHEET NO.: 2 of 3

Savings

70 LF Asphalt Paving - (70 x 24 + 560 + 140) ÷ 9 = 264.4 SY x $37.40 = $9890

180 LF of Curb + Gutter - 180 x $12.00 = $2,160

180 LF of Sidewalk - 180 LF x 5 ÷ 9 = 100 SY x $26.50/SY = $2,650

Add'l Costs -

80 LF Curb + Gutter = 80 x $12.00 = $960

80 LF Sidewalk - 80 x 5 ÷ 9 = 44.4 SY x $26.50 = $1,178

V-Gutter - 100 x 1.5 ÷ 9 = 16.7 SY x 35.00 = $583

Removal of Exist. Road - LS - $3,000

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 23

DESCRIPTION

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Asphalt Paving	SY	264	37.40	9,874			
Curb and Gutter	LF	180	12.00	2,160	80	12.00	960
Sidewalk	SY	100	26.50	2,650	44.00	26.50	1,166
V-Gutter	SY				17	35.00	595
Removal of Existing Road	LS				1	3,000	3,000
	Sub-total			14,684			5,721
Mark-up at	33.71%			4,950			1,929
	TOTAL			19,634			7,650

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***	ALTERNATIVE NO.:	**25**
DESCRIPTION:	**ELIMINATE THE RIGHT DECELERATION LANE FROM WESTBOUND BUENA VISTA ROAD TO BRIGHTON ROAD**	SHEET NO.:	1 of 5

ORIGINAL DESIGN: (Sketch attached)

In addition to the widening in this location, a right deceleration/turn lane is being provided.

ALTERNATIVE: (Sketch attached)

Eliminate the right deceleration/turn lane from westbound Buena Vista road to northbound Brighton Road.

ADVANTAGES:

- Saves one residence
- Eliminates cost of improvement

DISADVANTAGES:

- Impacts westbound Buena Vista Road traffic

DISCUSSION:

Eliminating the right deceleration/turn lane from westbound Buena Vista Road to northbound Brighton Road decreases the project cost and eliminates the need to take the adjacent residence. Due to the fact that the signal is being added to the project at this intersection, the decreased impact to traffic does not seem sufficient to justify the cost and relocation.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 84,827	—	$ 84,827
ALTERNATIVE	$ 0	—	$ 0
SAVINGS	$ 84,827	—	$ 84,827

SKETCHES

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 25

☑ AS DESIGNED ☐ ALTERNATIVE

SHEET NO.: 2 of 5

NTS

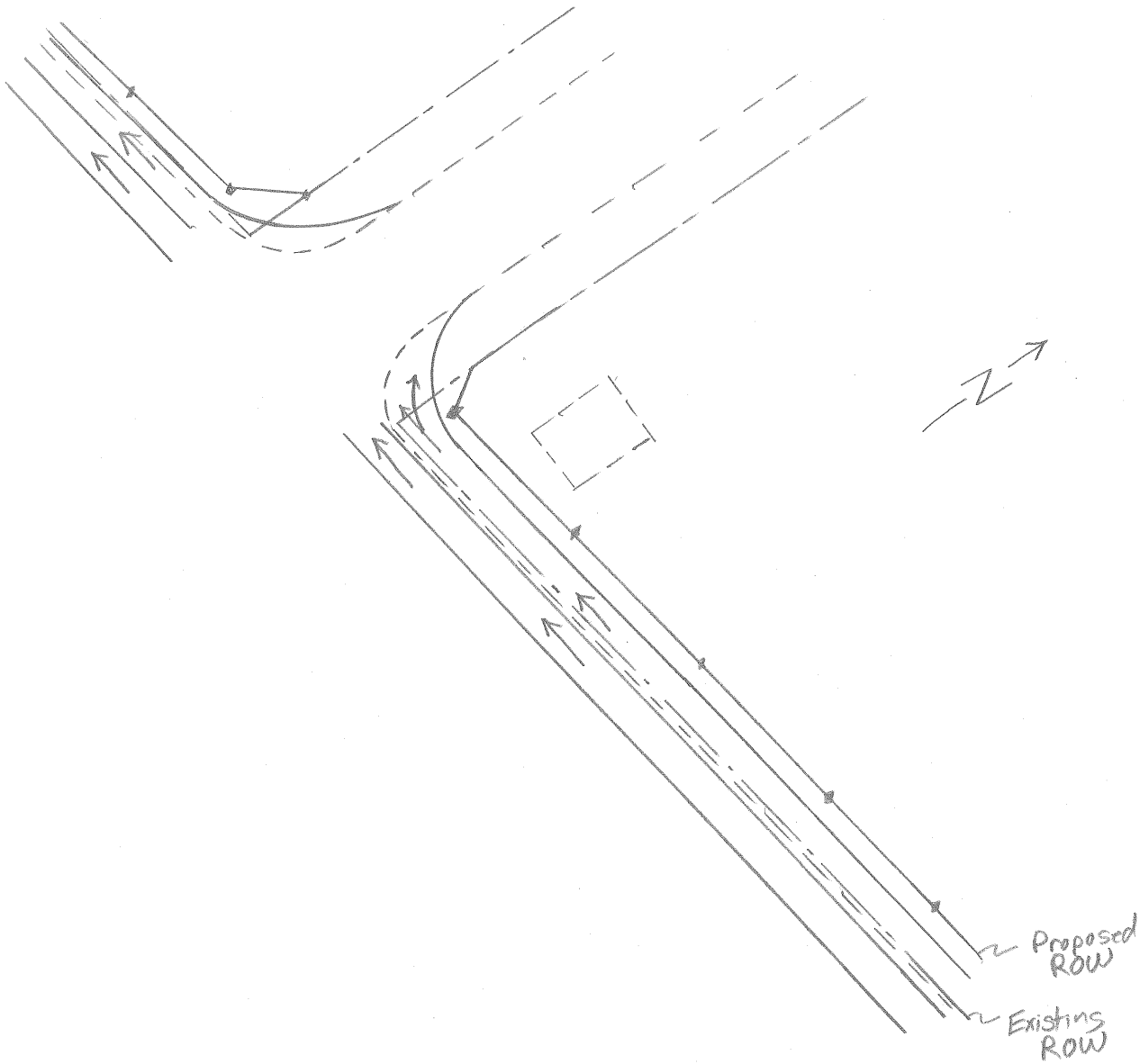
SKETCHES

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 25

☐ AS DESIGNED ☑ ALTERNATIVE

SHEET NO.: 3 of 5



NTS

CALCULATIONS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO.: 25

DESCRIPTION:

SHEET NO.: 4 of 5

Pavement:

230ft · 12ft = 2760 SF/9 = 307

Land:

2760 SF

Relocation:

1 @ $20,000

COST WORKSHEET

PROJECT: **TP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

ALTERNATIVE NO: 25

DESCRIPTION

SHEET NO.: 5 of 5

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Construction Costs							
Pavement	SY	307	37.40	11,482			
Subtotal				11,482			
Mark-up at 33.71%				3,871			
Subtotal Construction				**15,352**			
Right of Way Costs							
Land	SF	2,760	7.25	20,010			
Subtotal				20,010			
Mark-up at 247.20%				49,465			
Subtotal Construction				**69,475**			
Sub-total				84,827			
Mark-up at				Incl			
TOTAL				84,827			

PROJECT DESCRIPTION

NEED AND PURPOSES

The purpose of Project STP-8042(9), U.S. Interstate Highway 185 (I-185) at Buena Vista Road (City Street (CR) 2228) Interchange Reconstruction is to relieve traffic congestion and improve the operational efficiency at the interchange of I-185 at Buena Vista Road. The proposed project adds capacity to the interchange and CS 2228, improves access to and from the interchange, and provides a safer travel environment around the interchange. The proposed improvements add capacity, improve access, and provide safer access by separating via dedicated turning and through lanes and directional traffic along Buena Vista Road. The exit and entrance ramps of I-185 would also be upgraded in order to reduce weaving that could impact the interstate's levels of service. Project STP-8042(9) is included in the local long range and transportation improvement plans for the Columbus Metropolitan Planning Organization, the Columbus-Phenix City Transportation Study.

The 2006 average daily volume of traffic for Buena Vista Road within the project area is 41,600 with projected volume of 55,300 in 2026. There are four intersections along Buena Vista Road within the project limits operating at unacceptable levels of service: (1) Buena Vista at Brighton Road; (2) Buena Vista Road at Fairfield Drive; (3) Buena Vista Road at Linden Circle west of Pembrook Drive; and (4) Buena Vista Road at Pembrook Drive. In addition, several movements at the I-185 ramp intersections with Buena Vista Road also currently operate at unacceptable levels of service at current traffic volumes, as shown in the following table:

Intersection	Approach	Existing Conditions A.M. Peak Hour			Existing Conditions P.M. Peak Hour		
		Volume	Control Delay (sec/veh)	Level	Volume	Control Delay (sec/veh)	Level
Buena Vista Road at I-185 SB Ramps (Signalized)	EB Thru	715	42.3	D	1,425	71.8	**E**
	EB RT	110	32.7	C	110	68.1	**E**
	EB Total	825	41.2	D	1,535	71.6	**E**
	WB LT	340	3.7	A	335	19.3	B
	WB Thru	710	0.4	A	480	0.5	A
	WB Total	1,050	1.5	A	815	8.8	A
	SB LT	440	55.7	**E**	610	65.5	**E**
	SB RT	215	10.8	B	335	9.8	A
	SB Total	655	41.3	D	945	46.3	D
	Total	***2,530***	***23.8***	***C***	***3,295***	***48.3***	***D***
Buena Vista Road at I-185 NB Ramps (Signalized)	EB LT	370	4.3	A	400	3.7	A
	EB Thru	785	0.7	A	1,635	1.4	A
	EB Total	1,115	1.9	A	2,035	1.9	A
	WB Thru	950	29.9	C	650	61.0	**E**
	WB RT	635	23.4	C	700	46.2	D
	WB Total	1,585	27.5	C	1,350	53.7	D
	NB LT	100	60.2	**E**	165	92.2	**F**
	NB RT	305	9.2	A	470	16.6	B
	NB Total	405	23.4	C	635	36.8	C
	Total	***3,145***	***17.7***	***B***	***4,202***	***25.1***	***C***

Based on the projected traffic in the design year 2026, all intersections within the project corridor will operate at unacceptable levels of service without the proposed improvements. These intersections are: (1) Buena Vista Road at Brighton Road, (2) Buena Vista Road at Fairfield Drive, (3) Buena Vista Road at I-185 Southbound Ramps, (4) Buena Vista Road at I-185 Northbound Ramps, (5) Buena Vista Road at Linden Circle west of Pembrook Drive, (6) Buena Vista Road at Pembrook Drive, and (7) Buena Vista Road at Linden Circle and Shopping Center east of Pembrook Drive.

Without the proposed improvements, access to and from the interstate will be severely limited. There will be unacceptable levels of service at the ramp intersections with Buena Vista Road. The operations of the Interstate will be affected by the back-up of traffic from the southbound exit ramp to Buena Vista Road during peak hours. The Interstate would operate at a level of service F in the 2026 AM and PM peak hours at the diverge section of the southbound exit ramp.

Within the project area, I-185 operates as an urban interstate and Buena Vista Road operates as an urban arterial. Land use in the project corridor is highly developed and commercial and no major shifts in uses are anticipated; therefore, current traffic patterns are not expected to change. The nature of the development in the area with a high number of driveways has contributed to both the operational and safety problems currently being experienced along Buena Vista Road.

I-185 is experiencing accident and injury rates that are higher than the statewide average for an urban interstate. The proposed project would improve the safety of I-185 in the project area by improving the ramp alignments, adding additional ramp deceleration length, and avoiding queuing from Buena Vista Road back to the interstate.

Buena Vista Road is also experiencing high accident and injury rates within the project corridor compared with the statewide average for an urban principal arterial. The accident rates for Buena Vista Road currently exceed the statewide average for urban arterials; along the project, the accident rates are more than three times the statewide average in some locations. Injury rates are also well above the statewide average throughout the project. These high accident and injury rates can be attributed to the highly developed nature of the corridor, and the fact that left turns are allowed at all locations via a center two-way left turn lane.

The purpose of this project is to relieve traffic congestion and improve the operational efficiency of the I-185 at Buena Vista Road interchange, thereby improving access to and from the interstate.

DESCRIPTIONS OF THE PROPOSED PROJECT

The proposed project consists of improvements to the interchange of I-185 at Buena Vista Road. These improvements extend along Buena Vista Road from approximately 300 ft. west of Brighton Road to Dogwood Drive. Improvements along I-185 consist of the reconstruction of the entrance and exit ramps to Buena Vista Road.

Buena Vista Road, within the project area, currently consists of a five-lane typical section, with two through lanes in each direction and a two-way center turn lane. The proposed project adds a through lane in the eastbound direction from Brighton Road to Linden Circle. A raised median is also proposed through the project limits, with median openings at Brighton Road, the intersections at the southbound and northbound ramp termini, Linden Circle and Dogwood Drive. Left and right turn lanes are proposed at all intersections, with double left turn lanes proposed to southbound and northbound I-185. The existing traffic signals located at the intersections of the ramp termini, Linden Circle, and Dogwood Drive would be upgraded as part of the project. A proposal for a new signal at Brighton Road would be

considered pending a signal warrant study at that location.

As part of the project, the intersections of Buena Vista Road at Fairfield Drive and Pembrook Drive would become right-in, right-out only. In addition, the most western intersection of Linden Circle at Buena Vista Road would be closed with the construction of a cul-de-sac.

The entrance and exit ramps to and from I-185 at Buena Vista Road would be upgraded as part of the project. The improvements on the entrance ramps would include additional lanes to accommodate the double left turns from Buena Vista Road. Improvements to the exit ramps from I-185 would include additional deceleration length on the ramps as well as improved signage and sight distance from the interstate. All ramps are proposed to be reconstructed with concrete pavement.

COST DATA

The current probable cost of construction is $15,992,900 as noted on the STP-8042(9), P.I. No. 351190, Preliminary Cost Estimate, Muscogee County, contained in the August 31, 2005, Project Concept Report prepared by PBS&J. The project contains inflation at 5.00% per annum for four years (21.55%) and Engineering and Construction of 10.00%. In addition, $25,471,500 has been identified as the right-of-way costs with $238,000 in reimbursable utilities and $617,511 in non-reimbursable utilities. Therefore, the current grand total for the project is $42,319,911.

VALUE ANALYSIS AND CONCLUSIONS

GENERAL

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

- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Histograms
- Function Analysis
- Creative Idea Listing and Judgment of Ideas

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

PREPARATION EFFORT

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

VALUE ENGINEERING WORKSHOP EFFORT

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

- Information Phase
- Function Identification and Analysis Phase
- Creative Phase
- Evaluation Phase
- Development Phase
- Presentation Phase *(Not conducted)*

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

Value Engineering Study Task Flow Diagram

Preparation Effort

Coordinate Project

- Verify Schedule
- Suggest Format for Designer Presentation
- Outline Project Responsibilities
- Outline Needed Background Data
- Establish Performance and Acceptance Requirements
- Conduct Coordination Meeting
- Identify Project Constraints

→

Prepare for Workshop

- Collect Project Data
- Distribute Data to Team Members
- Team Members Become Familiar with Project
- Visit Project Site

→

Construct Cost, LCC, Energy Models

- Construct Models
- Identify High Cost and Consumption Areas

Workshop Effort

Information Phase

- VETL Opens Workshop
- Designer Gives Project Description/Presentation
- Discuss Owner Requirements
- Review Project Data
- Visit Project Site (Alt.)
- Finalize Cost, LCC, Energy Models

→

Function Identification and Analysis Phase

- Perform Function Analysis
- Calculate Cost/Worth Ratios

List Ideas Generated During Function Analysis

→

Creative Phase

- VETL Introduces Creative Thinking
- Prepare Creative Idea Listing. Seek:
  - Quantity of Ideas
  - Association of Ideas
- Brainstorm
- Do Creative Thinking
  - Group Thinking
  - Individual Thinking

→

Evaluation Phase

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

→

Development Phase

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

→

Presentation Phase

- Summarize Findings
- Present VE Ideas to Owner/User/Designer
- Prepare VE Report

Post-Workshop Effort

Implementation Phase

- Develop Implementation Plan
- Designer Prepares Responses to VE Report
- Participate in Implementation Meeting with Owner/User/ Designer/VE Team, as needed
- Owner Evaluates and Selects Preferred Alternatives

→

Final Acceptance

- Redesign by Designer

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:

- ***Aerial Map Depicting Conceptual Design*** for Project No. STP-8042(9), P. I. No. 351190 entitled I-185 at Buena Vista Road Interchange, Muscogee County; includes Typical Section, Buena Vista Road; prepared by PBS&J, undated;
- ***Aerial Map Depicting Alternative 1*** for Project No. STP-8042(9), P. I. No. 351190 entitled Buena Vista Road/I-185 to Dogwood Drive, Muscogee County; includes Typical [Road] Section, prepared by PBS&J, undated;
- ***Aerial Map Depicting Alternative 2*** for Project No. STP-8042(9), P. I. No. 351190 entitled Buena Vista Road/I-185 to Dogwood Drive, Muscogee County; includes Typical [Road] Section, prepared by PBS&J, undated;
- ***Aerial Map Depicting Alternative 2*** *(extended)* for Project No. STP-8042(9), P. I. No. 351190 entitled Buena Vista Road/I-185 to Dogwood Drive, Muscogee County; includes Typical [Road] Section, prepared by PBS&J, undated;
- ***Aerial Map Depicting Alternative 3*** for Project No. STP-8042(9), P. I. No. 351190 entitled Buena Vista Road/I-185 to Dogwood Drive, Muscogee County; includes Typical [Road] Section, prepared by PBS&J, undated;
- ***Draft Concept Report*** for Project Number: STP-8042(9); County: Muscogee; P. I. Number 351190; US Route Number: I-185; State Route Number: N/A; by PBS&J for the Department of Transportation, State of Georgia; undated; containing: Location Map, Need & Purpose Statement, Crash Data, Project Location and Description, Other Alternatives Considered, Estimate Summary, Preliminary Cost Estimate, Preliminary Right of Way Cost Estimate (February 12, 2004), Utility Cost Estimate (April 29, 2004), Typical Sections, Recommended Improvement Sketch, Traffic Count Exhibits, Three Mainline Conceptual Aerials, Initiate Concept Meeting Minutes (April 9, 2003), Concept Meeting Minutes (August 8, 2003), Concept Meeting Minutes (December 11, 2003), Meeting Minutes (December 12, 2003) Concept Meeting Minutes (February 23, 2004), Concept Team Meeting Minutes (May 31, 2005), PBS&J Memorandum (June 22, 2005);
- ***Plan and Elevation – Steam Mill Road Underpass,*** STA. 62 + 37 to STA. 64 + 63, Muscogee County, U. 106(1); dated December 1964, revised February 19,1965 and August 8, 1965;
- ***Plan and Elevation – Buena Vista Road Underpass,*** STA. 62 + 10.4 to STA. 66 + 44.9, Muscogee County, U. 106(1); dated December 1964;
- ***Plan and Elevation – Widening I-185 over Bull Creek,*** Muscogee County, NH-IM-185-1(310); dated January 1995;
- ***Special Detail, Driveways with Tapered Entrances, Concrete Valley Gutters;*** prepared by the Department of Transportation, State of Georgia; dated March 12, 2002, revised April 3, 2002 and April 11, 2002;
- ***Special Detail, Concrete Valley Gutter at Street Intersection, 6" or 8" Concrete Valley Gutter at Drive, Placing Pavement Adjacent to Gutter, Additional Paving at Street Intersection, 4 Corrugated Concrete Median;*** prepared by the Department of Transportation, State of Georgia; dated March 12, 2002, revised April 3, 2002 and April 11, 2002;
- ***Special Detail, Concrete Sidewalk Details, Curb Cut (Wheelchair) Ramps;*** prepared by the Department of Transportation, State of Georgia; dated March 12, 2002, revised March 28, 2002, April 2, 2002, April 11, 2002, April 29, 2002, May 13, 2002, May 23, 2003, May 28, 2002, July 29, 2002;
- ***Special Detail, Detectable Warning Surface, Truncated Dome Size, Spacing and Alignment Requirements;*** prepared by the Department of Transportation, State of Georgia; undated but revised July 29, 2002; and

- ***General Highway Map, Muscogee 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 1985.

Function Identification and Analysis Phase

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

Creative Phase

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

The Georgia Department of Transportation (GDOT) and the PBS&J representatives may wish to review the creative list since it may contain ideas that can be further evaluated for potential use in the design.

Evaluation Phase

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

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

The creative listing was re-evaluated frequently during the process of developing alternatives. As the relationship between creative ideas became more clearly defined, their importance and ratings may have changed, or they may have been combined into a single alternative. For these reasons, some of the originally highly-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 of the report.

Presentation Phase

The last phase of the VE study usually involves presentation of the study's findings; however, GDOT now conducts the presentation internally upon receipt of the report. The VE alternatives were screened by the VE team before draft copies of the *Summary of Potential Cost Savings* worksheets were provided to GDOT representatives. The VE alternatives were arranged in the same order as the idea listing sheets to facilitate cross-referencing.

POST-WORKSHOP EFFORT

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

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 24-hour Value Engineering (VE) study on the **STP-8042(9), P.I. No. 351190, U.S. Interstate Highway 185 (I-185) and Buena Vista Road (CS 2228) Interchange Reconstruction** project located in Muscogee, County, Georgia. It is expected the owner, the Georgia Department of Transportation (GDOT) will be available to make a formal presentation concerning the project at the beginning of the workshop and be available to answer questions during the VE study effort.

VE Study Agenda

The VE study will follow the outline described below and be conducted September 13 – 15, 2005. The study will be conducted in Rooms 274 in GDOT's General Office located at No. 2 Capitol Square Street, Atlanta, Georgia 30334. The point-of-contact is Ms. Lisa L. Myers, Design Review Engineer Manager, who can be reached at 404-651-7468.

Tuesday, September 13th

8:15 am - 8:30 am **General Introduction of all Parties and review of the VE Process**

8:30 am - 10:30 am **Owner's / Designer's Presentation**

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

10:30 am - 12:00 noon **Commence Function Analysis Phase**

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

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

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

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

Wednesday, September 14th

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

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

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

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

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

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

Thursday, September 15th

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

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

1:00 pm - 4:00 pm **Conclude Development Phase and Commence Summary Worksheets**

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

4:00 – 5:00 pm **Finalize Summary Worksheets**

The VE team will provide draft copies of the *Summary of Potential Cost Savings* worksheets to GDOT representatives and be available to clarify any points.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

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

Dominic F. Saulino	Transportation Engineering,	HNTB
Alex Pascual, PE	Structural/Bridge Engineer	HNTB
Jeffrey Dingle, PE	Construction Specialist	Delon Hampton and Associates
Luis M. Venegas, PE, CVS, LEED™ AP	Value Engineering Facilitator	Lewis & Zimmerman Associates, Inc.

OWNER'S/DESIGNER'S PRESENTATION

Representatives from the State of Georgia Department of Transportation (GDOT) administration and PBS&J, the designer, presented an overview of the project on Tuesday, September 13, 2005. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team "up-to-speed" regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING TEAM'S FINAL PRESENTATION

The VE team did not conduct a final, oral presentation on Thursday, September 15, 2005, to GDOT. However, copies of the draft *Summary of Potential Cost Savings* worksheets were provided for interim use by GDOT and PBS&J personnel.

A copy of the meeting participants is attached for reference.

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***		Date: **September 13 - 15, 2005**
NAME & E-MAIL (PLEASE PRINT)	**ORGANIZATION/TITLE**	**PHONE/FAX**
Lamar M. Pruitt, Jr. em: lamar.pruitt@dot.state.ga.us	Georgia Department of Transportation (GDOT), District 3 District Construction Engineer	ph: 404-656-3736 fx: 404-657-8482
Keith Collins em: keith.collins@dot.state.ga.us	GDOT, Urban Design Design Engineer II	ph: 404-656-5442 fx: 404-657-7921
Steven (Steve) K. Gaston, PE em: steve.gaston@dot.state.ga.us	GDOT, Bridge Design Bridge Design Engineer III	ph: 404-656-5197 fx: 404-651-7076
Ron Hardy em: ron.hardy@dot.state.ga.us	GDOT, Traffic Safety and Design Transportation Engineer Associate	ph: 404-635-8125 fx: 404-635-8116
Marc Mastronardi em: marc.mastronardi@dot.state.ga.us	GDOT, Construction Office Construction Liaison, District 3	ph: 404-656-5306 fx: 404-657-0783
Jennifer Mathis em: jennifer.mathis@dot.state.ga.us	GDOT, Office of Environmental Location Transportation Environmental Planner Associate	ph: 404-699-6882 fx: 404-699-4440
Lisa L. Myers em: lisa.myers@dot.state.ga.us	GDOT, General Office Design Review Engineer Manager	ph: 404-651-7468 fx: 404-463-6131
Wilhelmina Mueller em: wilhelmina.mueller@dot.state.ga.us	GDOT, Right-of-Way Appraisal and Review Manager	ph: 404-656-3736 fx: 404-657-8482
Neal O'Brien em: neal.obrien@dot.state.ga.us	GDOT, Urban Design Design Group Manager	ph: 404-656-5442 fx: 404-457-7921
Sal Pirzad em: sal.pirzad@dot.state.ga.us	GDOT, Urban Design Assistant Group Design Manager	ph: 404-656-5442 fx: 404-657-7921
David Painter, PE em: david.painter@fhwa.dot.gov	U.S. Department of Transportation, Federal Highway Administration Transportation Engineer	ph: 404-562-3658 fx: 404-562-3703

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION** **Muscogee County, Georgia Department of Transportation** ***Concept Design Development***		Date: **September 13 - 15, 2005**
NAME & E-MAIL (PLEASE PRINT)	**ORGANIZATION/TITLE**	**PHONE/FAX**
Taylor P. Wright, PE em: tpwright@pbsj.com	PBS&J Project Manager	ph: 770-993-0280 fx: 770-993-1920
Jeffery G. Dingle, PE em: jdingle@delonhampton.com	Delon Hampton & Associates, Chartered Vice President, Southern Regional Office	ph: 404-524-8030 fx: 404-524-2575
Alex Pascual, PE em: apascual@hntb.com	HNTB Structural Engineering/Bridge Engineer	ph: 404-946-5700 fx: 404-841-2820
Dominic (Dom) F. Saulino em: dsaulino@hntb.com	HNTB Director of Transportation	ph: 404-946-5700 fx: 404-841-2820
Luis M. Venegas, PE, CVS-Life, LEED™ AP em: lvenegas@lza.com	Lewis & Zimmerman Associates, Inc. VE Facilitator	ph: 770-992-3032 fx: 770-435-2666
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ECONOMIC DATA

The VE team developed economic criteria used for evaluation with information gathered from the State of Georgia Department of Transportation and PBS&J. 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:	2005
Construction Start-Up:	2008
Construction Duration:	±36 Months (2008 – 2011)
Economic Planning Life: Economic Planning Life:	35 years for Pavement 50 years for Bridges
Discount Rate/Interest:	1.70% (Latest United States Office of Management and Budget Circular A-94)
Inflation/Escalation Rate:	5.00% (Per PBS&J)
Uniform Present Worth (UPW) Factor:	26.2160 for 35 years 33.5012 for 50 years
Cost of Power:	$0.07/kWHr (kilowatt hour) (assumed)
Operation and Maintenance Costs *(Industry Norms)*:	
Equipment - With Many Moving Parts	5.00%-5.50%+ of Capital Cost
Equipment - With Minimal Moving Parts	3.50%-4.00% of Capital Cost
Equipment - Electronic	3.00% of Capital Cost
Structural	1.00%-2.00% (or less) of Capital Cost
Composite Mark-Up (Construction): *(Composed of: Inflation [based on 5.00% per annum for four years] at 21.55%; and Engineering and Construction at 10.00 %.)*	33.71% (1.3371)
Composite Mark-Up (Right-of-Way): *(Composed of: Scheduling Contingency at 55.00%; Administration/Court Costs at 60.00%; and Inflation Factor at 40.00 %.) [Prepared by Property Acquisition Consultants, LLC]*	247.20% (3.472)

COST ESTIMATE SUMMARY AND COST HISTOGRAMS

The VE team prepared several cost models for the project that are included following this page. The cost models are arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas and are based on the *STP-8042(9) – P.I. No. 351190 Cost Estimate* prepared by PBS&J, the design consultant. As can be expected, judgments at this stage of the study are based on experience and intuition rather than facts, which are not uncovered until well along in the analysis of function. As a result of these qualified hypotheses, there appears to be a potential for initial savings in the following areas:

- Major Structures
  - Bridge – Buena Vista Road over I-185
  - Retaining Walls
  - Bridge I-185 over Bull Creek

- Base and Paving
  - 12-inch Portland Cement Concrete (PCC) Pavement
  - Aggregate Base
  - PCC Subbase

- Traffic Control

- Sign/Stripe/Signal
  - Traffic Signals
  - Highway Signs

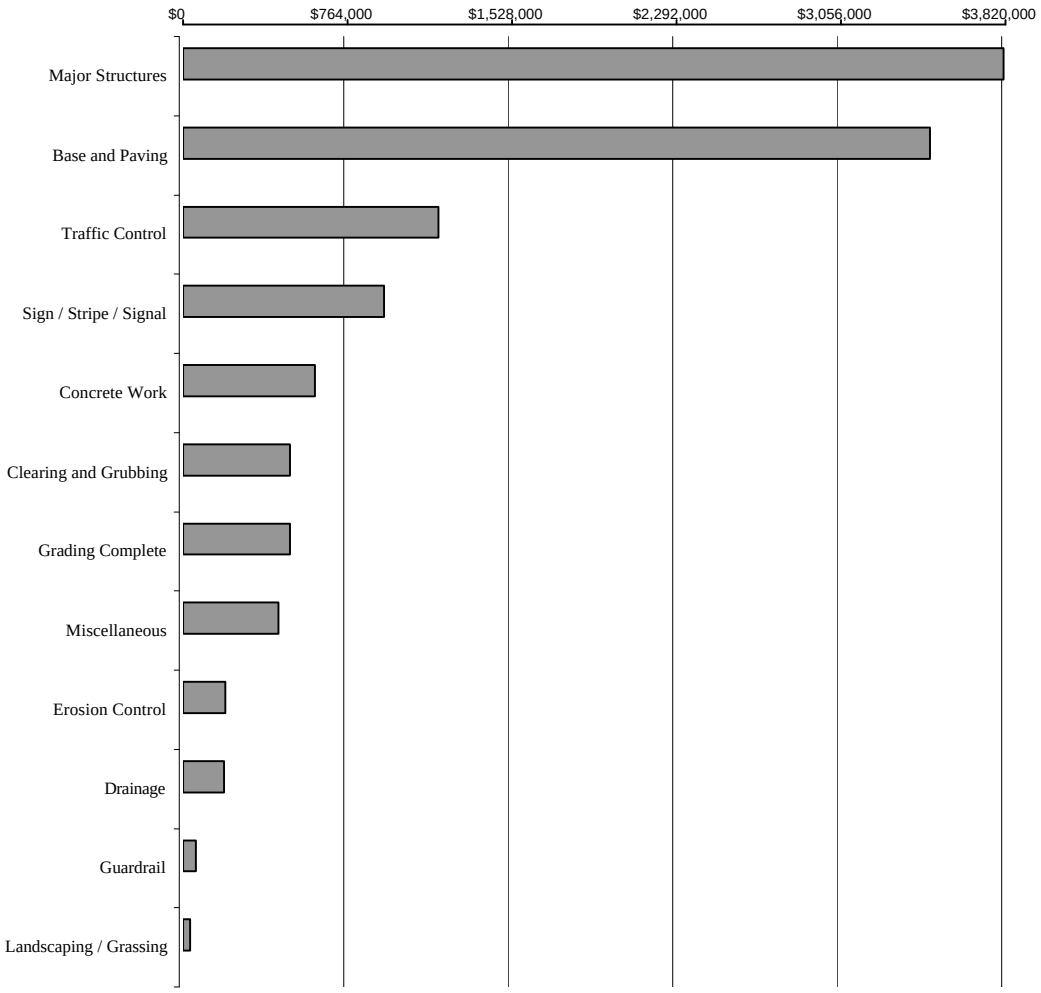
DESIGNER'S COST ESTIMATE

The cost estimate, as described above, contained sufficiently detailed information to perform a VE evaluation.

COST HISTOGRAM

Project: STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION
Muscogee County, Georgia Department of Transportation
Concept Design Development

TOTAL PROJECT	COST	PERCENT	CUM. PERCENT
Major Structures	3,815,000	31.90%	31.90%
Base and Paving	3,471,000	29.02%	60.91%
Traffic Control	1,190,000	9.95%	70.86%
Sign / Stripe / Signal	936,000	7.83%	78.69%
Concrete Work	615,000	5.14%	83.83%
Clearing and Grubbing	500,000	4.18%	88.01%
Grading Complete	500,000	4.18%	92.19%
Miscellaneous	445,000	3.72%	95.91%
Erosion Control	200,000	1.67%	97.58%
Drainage	192,000	1.61%	99.19%
Guardrail	62,000	0.52%	99.71%
Landscaping / Grassing	35,000	0.29%	100.00%
Construction Subtotal	**$ 11,961,000**	**100.00%**	
Inflation - Based on 5.00% per annum for 4 years@ 21.55%	$ 2,578,000		
Engineering and Construction @ 10.00%	$ 1,453,900		
Construction Total	**$ 15,992,900**		
Right-Of-Way	$ 25,471,500		
Reimbursable Utilities	$ 238,000		
Non-Reimbursable Utilities	$ 617,511		
GRAND TOTAL	**$ 42,319,911**	Comp Mark-Up:	33.71%

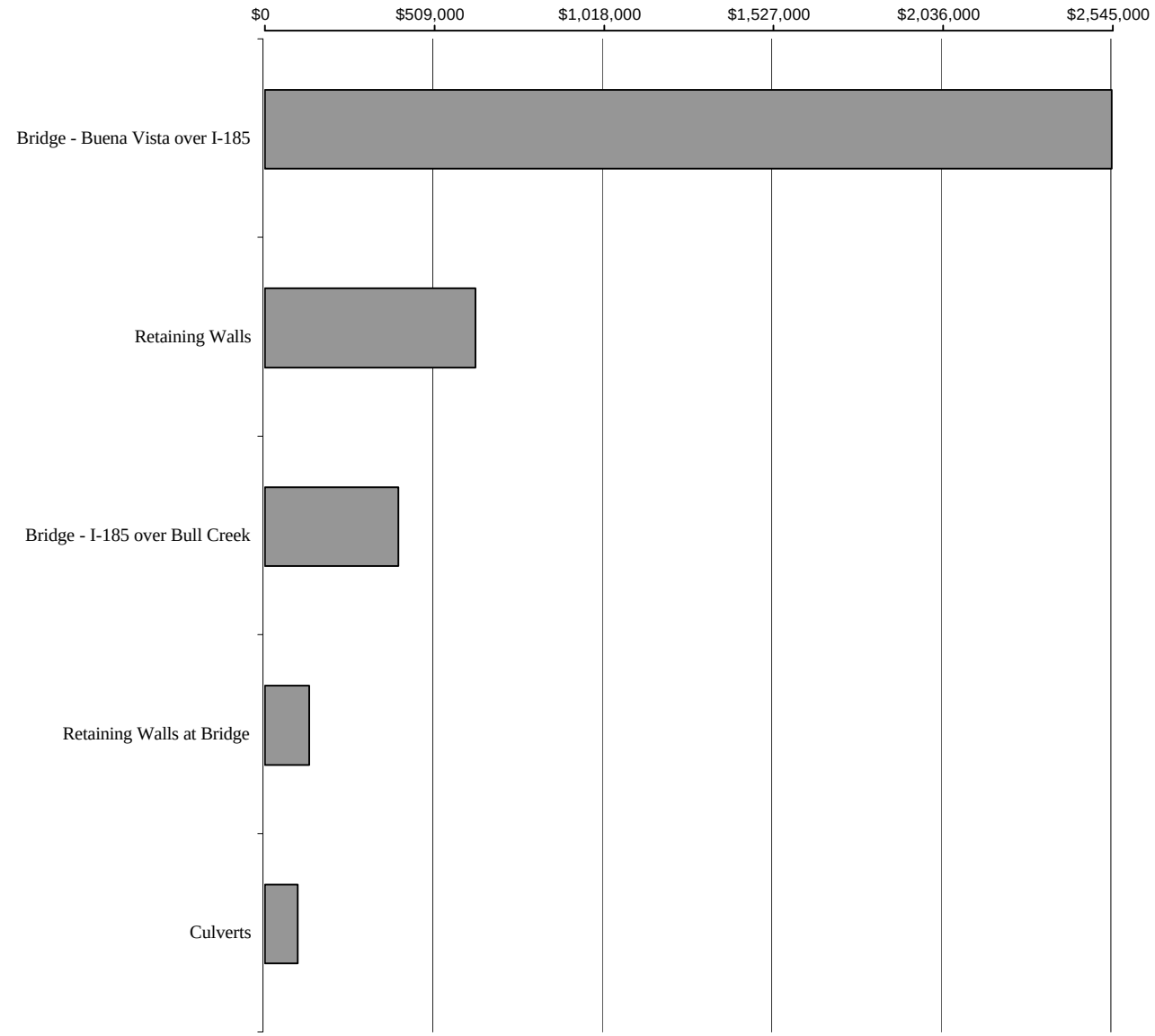


Costs in graph are not marked-up.

COST HISTOGRAM

Project: STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION
Muscogee County, Georgia Department of Transportation
Concept Design Development

MAJOR STRUCTURES		COST	PERCENT	CUM. PERCENT
Bridge - Buena Vista over I-185		2,544,000	66.70%	66.70%
Retaining Walls		633,150	16.60%	83.30%
Bridge - I-185 over Bull Creek		402,000	10.54%	93.84%
Retaining Walls at Bridge		135,000	3.54%	97.38%
Culverts		100,000	2.62%	100.00%
Construction Subtotal		**$ 3,814,150**	**100.00%**	
Inflation - Based on 5.00% per annum for 4 years@	21.55%	$ 822,078		
Engineering and Construction @	10.00%	$ 463,623		
Construction Total		**$ 5,099,851**	Comp Mark-Up:	33.71%

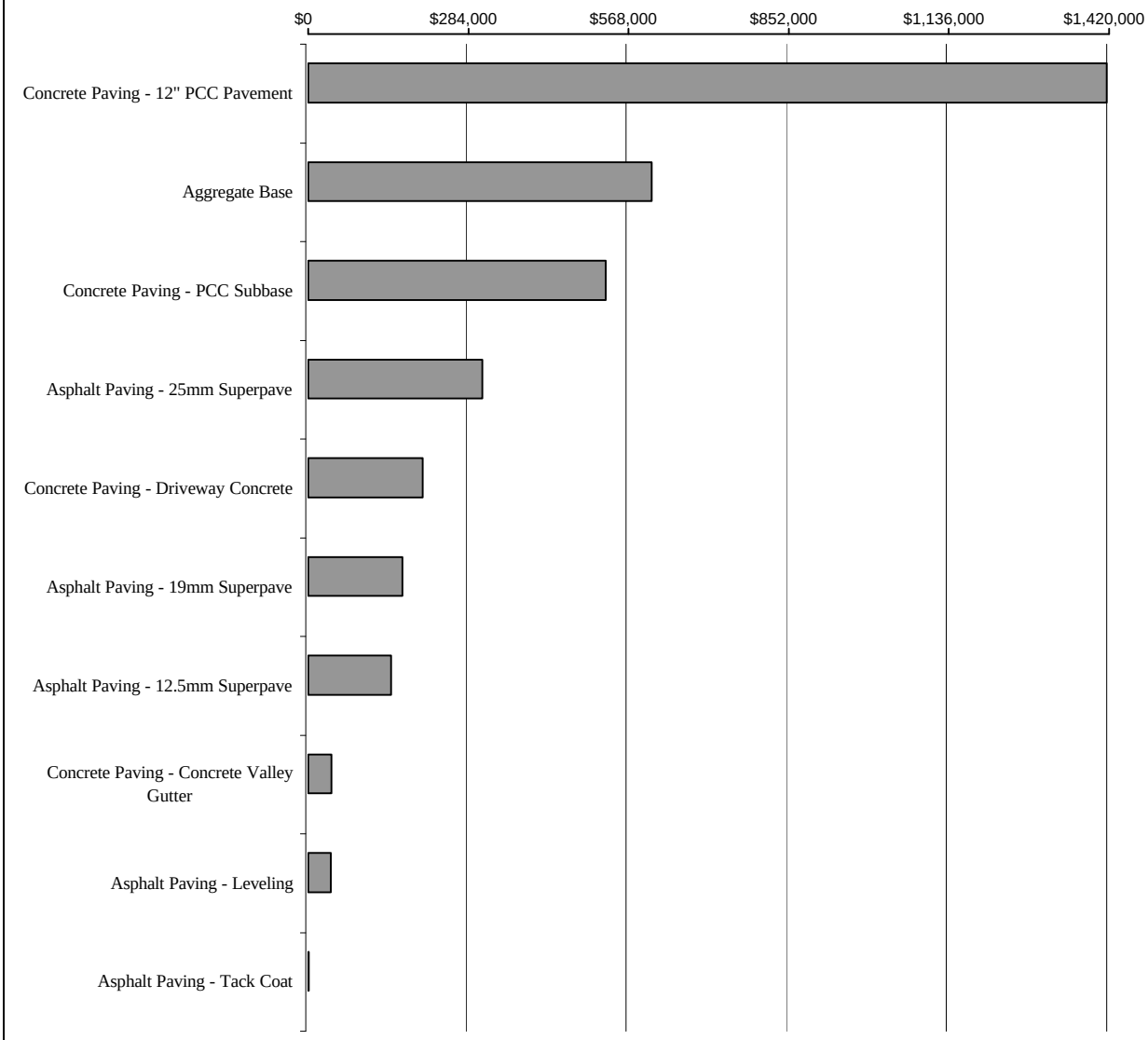


Costs in graph are not marked-up.

COST HISTOGRAM

Project: STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION
Muscogee County, Georgia Department of Transportation
Concept Design Development

BASE AND PAVING	COST	PERCENT	CUM. PERCENT
Concrete Paving - 12" PCC Pavement	1,417,050	40.84%	40.84%
Aggregate Base	609,675	17.57%	58.41%
Concrete Paving - PCC Subbase	528,750	15.24%	73.64%
Asphalt Paving - 25mm Superpave	309,600	8.92%	82.57%
Concrete Paving - Driveway Concrete	204,000	5.88%	88.44%
Asphalt Paving - 19mm Superpave	167,700	4.83%	93.28%
Asphalt Paving - 12.5mm Superpave	148,000	4.27%	97.54%
Concrete Paving - Concrete Valley Gutter	42,000	1.21%	98.75%
Asphalt Paving - Leveling	41,000	1.18%	99.93%
Asphalt Paving - Tack Coat	2,290	0.07%	100.00%
Construction Subtotal	**$ 3,470,065**	**100.00%**	
Inflation - Based on 5.00% per annum for 4 years@ 21.55%	$ 747,916		
Engineering and Construction @ 10.00%	$ 421,798		
GRAND TOTAL	**$ 4,639,779**	Comp Mark-Up:	33.71%

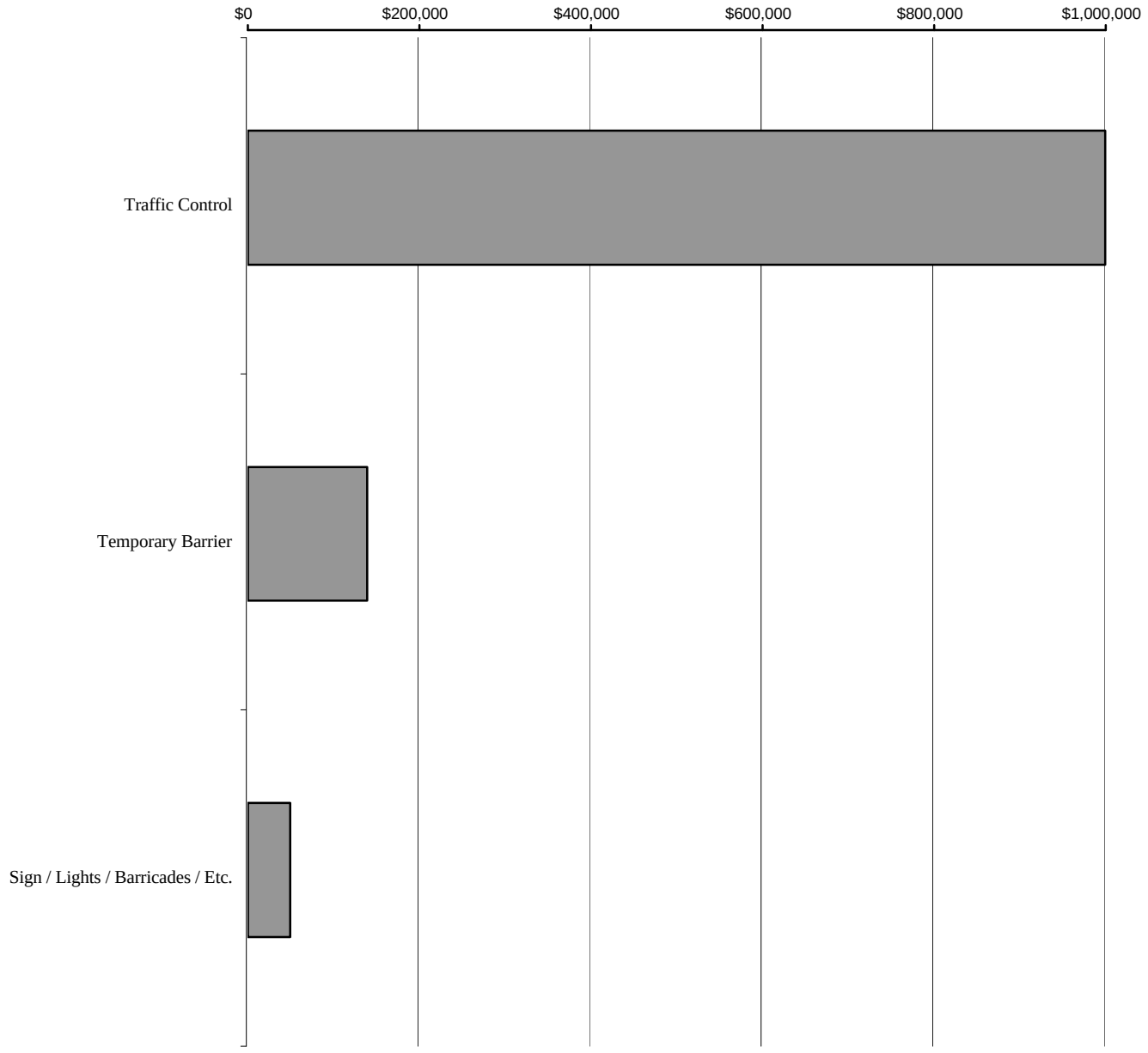


Costs in graph are not marked-up.

COST HISTOGRAM

Project: STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION
Muscogee County, Georgia Department of Transportation
Concept Design Development

TRAFFIC CONTROL		COST	PERCENT	CUM. PERCENT
Traffic Control		1,000,000	84.03%	84.03%
Temporary Barrier		140,000	11.76%	95.80%
Sign / Lights / Barricades / Etc.		50,000	4.20%	100.00%
Construction Subtotal		**$ 1,190,000**	**100.00%**	
Inflation - Based on 5.00% per annum for 4 years@	21.55%	$ 256,485		
Engineering and Construction @	10.00%	$ 144,649		
GRAND TOTAL		**$ 1,591,134**	Comp Mark-Up:	33.71%

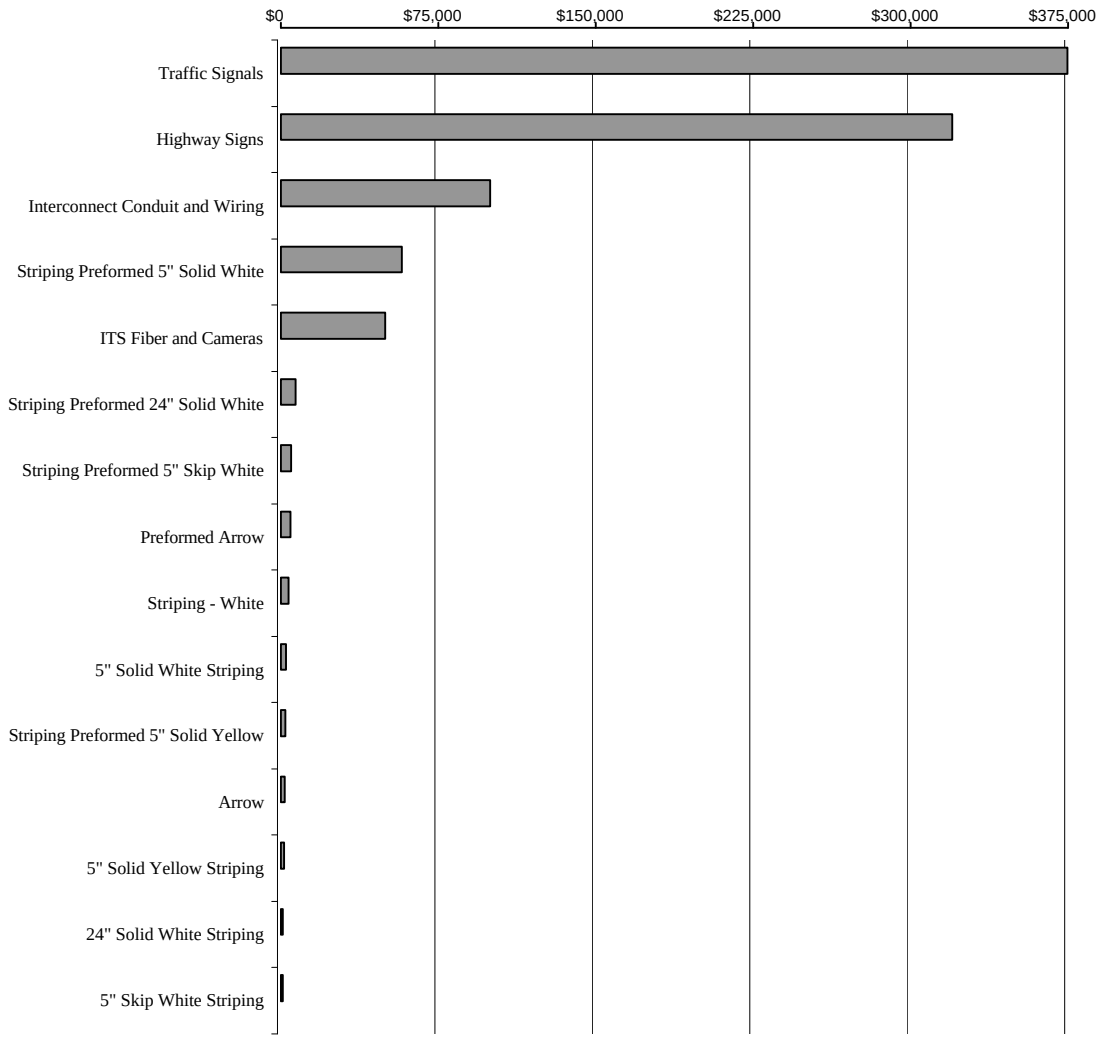


Costs in graph are not marked-up.

COST HISTOGRAM

Project: STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION
Muscogee County, Georgia Department of Transportation
Concept Design Development

SIGN / STRIPE / SIGNAL	COST	PERCENT	CUM. PERCENT
Traffic Signals	375,000	40.08%	40.08%
Highway Signs	320,000	34.20%	74.27%
Interconnect Conduit and Wiring	100,000	10.69%	84.96%
Striping Preformed 5" Solid White	57,920	6.19%	91.15%
ITS Fiber and Cameras	50,000	5.34%	96.49%
Striping Preformed 24" Solid White	7,220	0.77%	97.26%
Striping Preformed 5" Skip White	5,040	0.54%	97.80%
Preformed Arrow	4,845	0.52%	98.32%
Striping - White	3,900	0.42%	98.74%
5" Solid White Striping	2,875	0.31%	99.04%
Striping Preformed 5" Solid Yellow	2,440	0.26%	99.31%
Arrow	2,160	0.23%	99.54%
5" Solid Yellow Striping	1,775	0.19%	99.73%
24" Solid White Striping	1,353	0.14%	99.87%
5" Skip White Striping	1,215	0.13%	100.00%
Construction Subtotal	**$ 935,743**	**100.00%**	
Inflation - Based on 5.00% per annum for 4 years@ 21.55%	$ 201,684		
Engineering and Construction @ 10.00%	$ 113,743		
GRAND TOTAL	**$ 1,251,170**	Comp Mark-Up:	33.71%

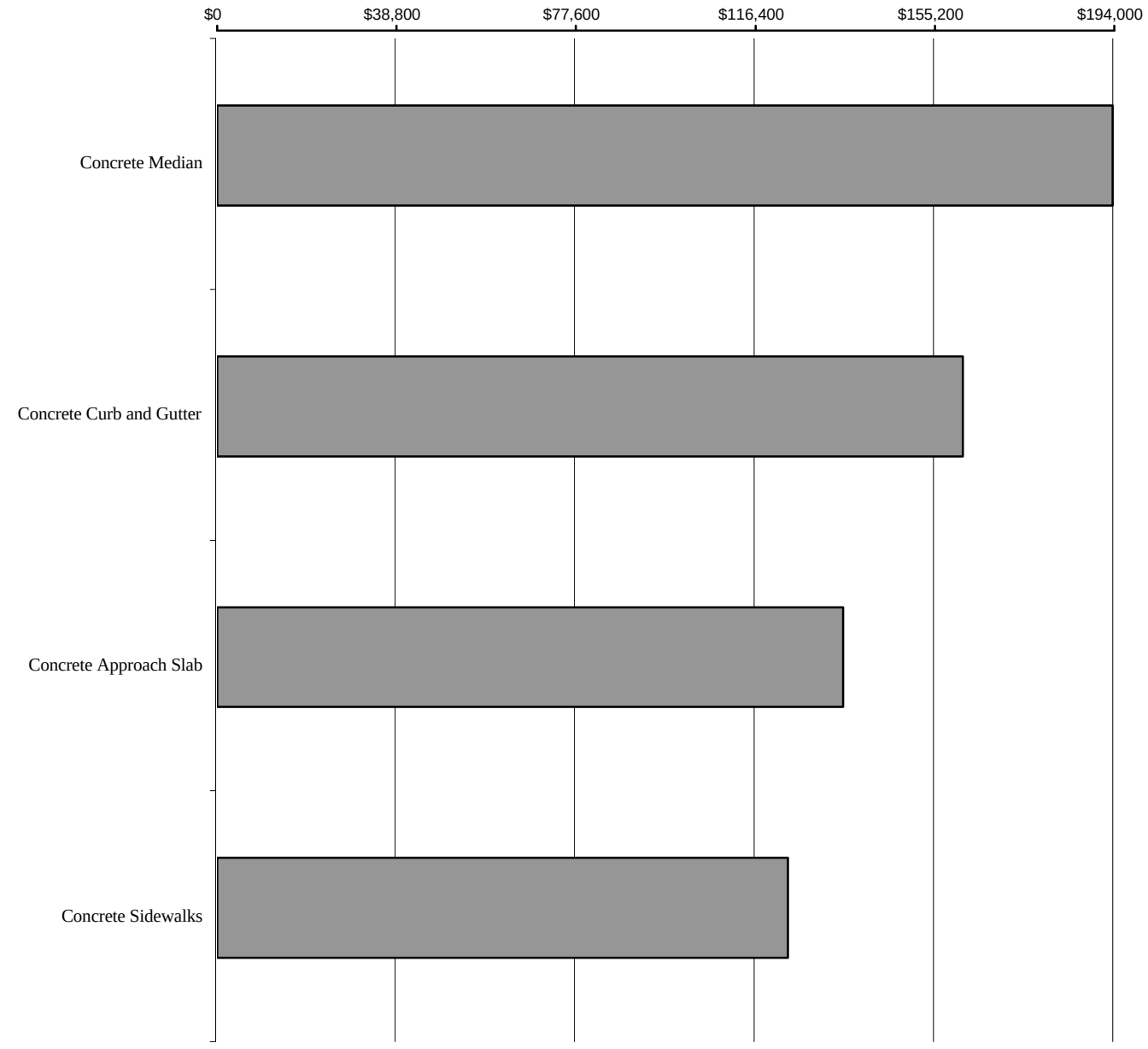


Costs in graph are not marked-up.

COST HISTOGRAM

Project: STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION
Muscogee County, Georgia Department of Transportation
Concept Design Development

CONCRETE WORK	COST	PERCENT	CUM. PERCENT
Concrete Median	193,750	31.54%	31.54%
Concrete Curb and Gutter	161,400	26.28%	57.82%
Concrete Approach Slab	135,520	22.06%	79.89%
Concrete Sidewalks	123,543	20.11%	100.00%
Construction Subtotal	**$ 614,213**	**100.00%**	
Inflation - Based on 5.00% per annum for 4 years@ 21.55%	$ 132,384		
Engineering and Construction @ 10.00%	$ 74,660		
GRAND TOTAL	**$ 821,256**	Comp Mark-Up:	33.71%



Costs in graph are not marked-up.

FUNCTION ANALYSIS

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

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

The Random Function Analysis effort identified the project's basic functions as: Improving/Safety and Improving/Interchange Operation by Reducing/Congestion, Travel Time, and Accident Rate and Improving/Traffic Flow and Bridge.

RANDOM FUNCTION ANALYSIS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
I-185 and BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION	**Improve**	**Safety**	**B**
	Improve	**Interchange Operations**	**B**
	Minimize	**Congestion**	**B_1**
	Reduce	**Travel Time**	**B_1**
	Reduce	**Accident Rate**	**B_1**
	Allow	Pedestrian Safe Passage	RS
	Reduce	Commercial Access	U
	Improve	**Traffic Flow**	**B_1**
	Displace	Owners	U
	Take	Right-of-Way (ROW)	S
	Improve	**Level of Service (LOS)**	**B_1**
	Provide	Jobs	S
	Improve	**Sight Distance**	**B_1**
	Span	Bull Creek	S
	Span	**Interstate**	**B**
	Improve	Image	HO
	Disrupt	Lives	U
	Increase	**Lanes**	**B_1**
	Improve	**Bridge**	**B_1**
	Reduce	Bridge Maintenance	G/O
	Add	Cost	U

Function defined as: Action Verb, Measurable Noun

Kind: B = Basic; S = Secondary; RS = Required Secondary; HO = Higher Order; LO = Lower Order; O = Objective; G = Goal; U = Unwanted

RANDOM FUNCTION ANALYSIS

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

SHEET NO.: 2 of 2

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
I-185 and BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION (Continued)	Spend	Money	U
	Improve	Neighborhood Access	HO
	Change	Traffic Patterns	S
	Decrease	Tax Revenue	U
	Decrease	Revenue	U
	Decrease	Jobs	U
	Provide	New Capacity	LO/RS

Function defined as: Action Verb, Measurable Noun

Kind: B = Basic; S = Secondary; RS = Required Secondary; HO = Higher Order; LO = Lower Order; O = Objective; G = Goal; U = Unwanted

CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

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

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

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

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

The reader is encouraged to review the *Creative Idea Listing and Evaluation* worksheets since they may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING

PROJECT: **STP-8042(9), PI No. 351190, I-185 AT BUENA VISTA ROAD INTERCHANGE RECONSTRUCTION**
Muscogee County, Georgia Department of Transportation
Concept Design Development

SHEET NO.: 1 of 1

NO.	IDEA DESCIRPTION	RATING
1	Eliminate the right turn lane from Rosewood Drive onto Buena Vista Road	4
2	Add a left turn and a straight through/right turn lanes at the Linden Circle intersection	4
3	Start the westbound Buena Vista Road to northbound I-185 lane beyond the main entrance to the shopping center	5
4	Reduce the width of the raised median where feasible (Combine with No. 19)	3
5	Displace the business at the southwest corner of Buena Vista Road and Dogwood Drive	4
6	Allow right turn only onto Buena Vista Road from Linden Circle currently being converted to a cul-de-sac	2
7	Increase project limits to Floyd Road	DS
8	Increase project limits to the Hunt Avenue/Wright Drive intersection	4
9	Shift I-185 southbound exit to use more of the existing pavement	5
10	Eliminate parallel I-185 northbound exist ramp	4
11	Improve shoulder for the I-185 northbound exist ramp	4
12	Reconfigure the I-185 northbound on-ramp to eliminate the Bull Creek bridge widening	5
13	Reduce the bridge with at the Buena Vista/I-185 interchange (Combine with No. 16)	5
14	Eliminate southbound dual turning lanes from Buena Vista Drive onto I-185	1
15	Move westbound Buena Vista Drive through lanes further south quicker	3
16	Eliminate free Buena Vista Road lane eastbound to southbound I-185 lane (Combine with No. 13)	5
17	Provide sidewalks on one side only	1
18	Use concrete barriers in lieu of a raised median on Buena Vista Road	1
19	Use a four-foot concrete median in lieu of a raised median on Buena Vista Road (Combined with No. 4)	3
20	Turn bridge over I-185 to contractor and divert traffic during shortened construction period	1
21	Eliminate Pembrook Drive improvements	3
22	Cul-de-sac Pembrook Drive	4
23	Close-off Fairfield Drive onto Buena Vista Road	5
24	Provide access to Orkin® business	2
25	Eliminate westbound Buena Vista Road to northbound Brighton Road right turn lane	4

Function defined as: Action Verb, Measurable Noun

Kind: B = Basic; S = Secondary; RS = Required Secondary; HO = Higher Order; LO = Lower Order; O = Objective; G = Goal; U = Unwanted