



Georgia Department of Transportation
District 3

SOUTH LAGRANGE LOOP
STP-2921(4), P. I. No. 350990
Troup County, Georgia

Value Engineering Study Report
Final Design Stage

April 2007

Design Team



Moreland Altobelli Associates, Inc.

Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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

May 11, 2007

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

Re: Project Number STP-2921(4), P. I. No. 350990, South LaGrange Loop in Troup County
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 project is focused on the construction of a rural two-lane roadway with open ditch drainage on a four-lane right-of-way. One major concern associated with the project is the acquisition of a four-lane right-of-way corresponding to a two-lane road project. Although this in and of itself is not an issue, the additional right-of-way may be unnecessary since this South LaGrange Loop is being designed for the year 2025 traffic loads. The anticipated principal traffic flow for the new Loop will primarily be eastbound to I-85 from the soon-to-be-constructed KIA Motor Corporation manufacturing plant. This plant is to be located on a tract of land north of the new Loop between the Tributary of the Blue John Creek and the CSX railroad line on the eastern end of the new Loop about 2.5 miles from I-85. As such, it appears this eastern end would be the only part of the new Loop warranting a four-lane right-of-way acquisition.

The objective of the VE study was to identify opportunities to create new capacity and accommodate growth through traffic flow diversion while improving safety and reducing capital cost where logically possible and warranted.

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

We look forward to working with you on future assignments and stand ready to provide additional value engineering services.

Sincerely Yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

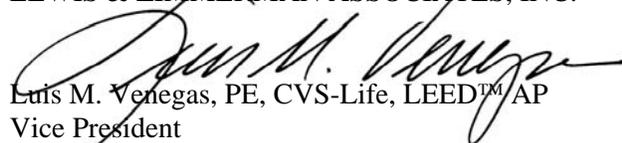

Luis M. Venegas, PE, CVS-Life, LEED™ AP
Vice President

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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 South LaGrange Loop, STP-2921(4), P. I. No. 350990 in Troup County, Georgia, being designed by Moreland Altobelli Associates, Inc. (MAAI).

PROJECT DESCRIPTION

The South LaGrange Loop begins at the intersection of State Route (SR) 109 and Fling Road/County Road (CR) 121 in Troup County and travels south to east to the intersection of Whitesville Road/SR 219 and Pegasus Parkway/CR 304. The proposed typical section is a rural, two-lane roadway with open ditch drainage on a four-lane right-of-way that averages 230 linear feet (LF) wide. At the beginning, the project extends southward just east of Fling Road on a new alignment crossing under the CSX Railroad and proceeds for approximately 2.8 miles to the intersection of United States Route (US) 29/SR 14 and Old West Point Road. It then proceeds eastward, bridging a second CSX Railroad line and a tributary of the Blue John Creek. Beyond this bridging, the project continues eastward to Pegasus Parkway/CR 304. At that point, the project widens on the north side of Pegasus Parkway/CR 304 to the end of the project. The total length of the concept is about 6.16 miles. However, the portion of the project between the Tributary of the Blue John Creek and just west of the Wiley Road intersection, a distance of about 2.081 miles, was excluded from this VE study. Thus, the total length of this specific project is 4.079 miles.

The project completes the connection between US 29/SR 14 and Whitesville Road/SR 219. In the city of LaGrange, Whitesville Road/SR 219 ties into US 27/SR 1, which is a Governor's Road Improvement Program (GRIP) route extending from the Georgia/Florida to the Georgia/Tennessee state lines. Furthermore, Whitesville Road/SR 219 connects to US Interstate Highway 85 (I-85), a northeast-southwest connector between Alabama and Virginia. The subject project will improve access to both the GRIP route for LaGrange's industries and their employees and I-85.

CONSTRUCTION COSTS

The probable cost of construction for the project based on MAAI's cost estimate dated March 2007 is \$23,343,881. This figure is comprised of a construction subtotal of \$14,777,360 and a right-of-way cost of \$8,566,521. However, the design team did not provide for two known and required markup factors: engineering and construction at 10.00% and escalation at 10.09% based on 8.00% per year for 1.25 years to the mid-point of construction. These markup factors increase the cost of construction to \$17,895,529 and, adding the aforementioned right-of-way cost of \$8,566,521, results in a grand total of \$26,461,781.

CONCERNS AND OBJECTIVES

The project is a relatively straightforward construction of a rural, two-lane roadway with open ditch drainage on a four-lane right-of-way. One of the concerns associated with the project is the acquisition of a four-lane right-of-way corresponding to a two-lane road project. Although this in and of itself is not an issue, the additional right-of-way may be unnecessary since this South LaGrange Loop is being designed for the year 2025 traffic loads. The anticipated principal traffic flow for the new Loop will primarily be eastbound to I-85 from the soon-to-be-constructed KIA Motor Corporation manufacturing plant. This plant is to be located on a tract of land north of the new Loop between the Tributary of the Blue John Creek and the CSX railroad line on the eastern end of the new Loop about 2.5 miles from I-85. As such, it appears this eastern end would be the only part of the new Loop warranting a four-lane right-of-way acquisition.

GDOT, under a heightened awareness of the lack of funds to construct the State's entire highway program, has started to take a more serious role of implementing value engineering ideas that are not only feasible, but also help in reducing the cost of the instant project in order to afford other more pressing issues.

The objective of the VE effort was to identify opportunities that would create new capacity and accommodate growth through traffic flow diversion while improving safety and, where logically possible and warranted, reducing capital cost.

HIGHLIGHTS OF THE STUDY

Although a considerable number of alternatives increase the cost of the project, several should be seriously considered. Regarding the heavy emphasis of industrial traffic on the eastern portion of the corridor, Alternative No. 31 would provide for a two-lane roadway and associated right-of-way of about 125 feet wide from the beginning of the project at SR 109 to the beginning of the "exception." The alternative then proposes a four-lane roadway and corresponding right-of-way averaging 230 feet wide from the end of the "exception" to Orchard Hill Road. This configuration, although increasing initial cost by approximately \$715,000, would accommodate the immediate industrial need and allow for a more cautious and measured widening of the northern portion of the project, if ever needed.

In a similar manner, Alternative No. 25 would grade separate the intersection of US 29/SR 14 and the new South LaGrange Loop in order to maintain the through traffic on the mainline. This too would improve the operational and safety aspects of this intersection by assuring continuous throughput and providing for right-turn to right-turn movements negating crossing traffic. However, the cost of accomplishing this improvement adds an additional \$2,300,000.

It is understood that GDOT's Office of Pavement Design is to undertake a detailed life cycle cost comparison between the use of asphaltic concrete and concrete pavement for this project. The outcome of that detailed comparison will determine the selection of the final pavement material. However, a quick analysis under Alternative No. 30 shows that the use of plain concrete is the better of the two materials over a 35-year life span. Notwithstanding, an additional initial investment of almost \$4,700,000 is necessary before the present worth savings of about \$3,600,000 can be realized.

Numerous alternatives explored the potential for cost reduction. Alternative No. 3 considers the possibility of purchasing a right-of-way swath of only about 125 feet wide in lieu of the proposed average width of 230 feet. Initial savings of close to \$3,900,000 are possible. Additionally, any future widening for four lanes is feasible within the 125-foot right-of-way; albeit with a 24-foot median and 12-foot shoulders. Other areas of potential savings can be found in Alternative No. 14 which reduces the number of dedicated lanes on US 29/SR 14), Alternative No. 20 which reduces the median to 24-feet, Alternative No. 1 which shortens/realigns the Pegasus Parkway to Whitesville Road/SR 219), and Alternative No. 17 which reduces the amount of improvements to SR 109.

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



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP Troup County, Georgia Department of Transportation, District 3 Final Design Stage						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW/LCC SAVINGS
1	Shorten/realign Pegasus Parkway to Whitesville Road/SR 219	\$ 540,893	\$ 256,700	\$ 284,193		\$ 284,193
2	Four-lane the entire project	\$ -	\$ 7,883,610	\$(7,883,610)		\$(7,883,610)
3	Buy right-of-way for only two-lanes	\$ 8,566,521	\$ 4,681,110	\$ 3,885,411		\$ 3,885,411
4	Clear right-of-way for four-lane	\$ -	\$ 305,172	\$ (305,172)		\$ (305,172)
5	Locate a utilidor to preclude conflicts	Design Suggestion				
6	In certain areas build new two-lanes in order to keep existing lanes for maintenance of traffic	\$ 346,346	\$ 382,485	\$ (36,139)		\$ (36,139)
7	Eliminate third lane from South LaGrange Loop between Old Hutchinson Road and Orchard Hill Road	\$ 109,542	\$ -	\$ 109,542		\$ 109,542
9	Reduce the width of Pegasus Parkway/CR 304 between Orchard Hill Road and Whitesville Road/SR 219	\$ 110,742	\$ -	\$ 110,742		\$ 110,742
10	Divide project into two project – either side of the “exception”	Design Suggestion				
13	Reconfigure US 29/SR 14 and Old West Point Road intersection	\$ 1,805,609	\$ 1,548,614	\$ 256,995		\$ 256,995
14	Minimize dedicated lanes at the US 29/SR 14 and South LaGrange Loop intersection	\$ 512,435	\$ -	\$ 512,435		\$ 512,435
15	Eliminate driveways into acquired properties	Design Suggestion				
17	Reduce the amount of improvements at the SR 109 and South LaGrange Loop intersection	\$ 193,355	\$ -	\$ 193,355		\$ 193,355
18	Eliminate crown on typical section	Design Suggestion				
19	Provide clearing, grading and drainage for four lanes	\$ -	\$ 5,836,229	\$(5,836,229)		\$(5,836,229)
20	Use a 24-foot median in lieu of 44-foot median	\$ 300,714	\$ -	\$ 300,714		\$ 300,714
24	Shorten CSX Railroad bridge for only two lanes	\$ 339,740	\$ -	\$ 339,740		\$ 339,740
25	Grade separate the new South LaGrange Loop and US 29 / SR 14 intersection	\$ 57,647	\$ 2,335,163	\$(2,277,516)		\$(2,277,516)

STUDY RESULTS

INTRODUCTION

The results are the major feature of a 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.

RESULTS OF THE STUDY

The VE team generated 30 ideas for improvement during the Function Identification and Analysis and Speculation/Creative 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 ideas generated, 17 were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 17 alternatives for change with an impact on project costs and four design suggestions. These alternatives and design suggestions are presented in detail following this narrative and on the Summary of Potential Cost Savings worksheets.

EVALUATION OF ALTERNATIVES

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

Cost is the primary basis of comparison for alternative designs. To ensure that costs are comparable within the alternatives proposed by the VE team, the designer's cost estimate, where possible, was used as the pricing basis. Where appropriate, the impact of energy costs, replacement costs, and effect on operations and maintenance are 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-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP Troup County, Georgia Department of Transportation, District 3 Final Design Stage						
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24	Shorten CSX Railroad bridge for only two lanes	\$ 339,740	\$ -	\$ 339,740		\$ 339,740
25	Grade separate the new South LaGrange Loop and US 29 / SR 14 intersection	\$ 57,647	\$ 2,335,163	\$(2,277,516)		\$(2,277,516)

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
1

DESCRIPTION: SHORTEN/REALIGN PEGASUS PARKWAY TO WHITESVILLE
 ROAD / STATE ROUTE 219

SHEET NO.: 1 of 5

ORIGINAL DESIGN:

The original design of Pegasus Parkway ties into Whitesville Road/State Route (SR) 219 approximately 2,000 feet from the southbound ramps intersection of U.S. Interstate Highway 85 (I-85).

ALTERNATIVE: (Sketch attached)

Realign (by shortening) Pegasus Parkway to tie into Whitesville Road/SR 219 approximately 1,400 feet from the southbound ramp intersections of I-85. This realignment would basically follow along an existing local road (what appears to be the continuation of Orchard Hill Road).

ADVANTAGES:

- Reduces construction cost
- Reduces construction time slightly
- Reduces distance to I-85
- Reduces travel time slightly

DISADVANTAGES:

- Moves intersection closer to the southbound ramp intersections of I-85
- Eliminates an existing asset – Pegasus Parkway
- Loss of known traffic pattern

DISCUSSION:

The relocated intersection would still be far ($\pm 1,400$ feet) enough from the southbound ramps intersection of I-85 to provide sufficient length on Whitesville Road/SR 219 to develop the double left turns from Whitesville Road / SR 219 onto the relocated Pegasus Parkway. The overall distance is shortened, thereby reducing travel time and access to I-85 on the eastern end of the new South LaGrange Loop.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 540,893	—	\$ 540,893
ALTERNATIVE	\$ 256,700	—	\$ 256,700
SAVINGS	\$ 284,193	—	\$ 284,193

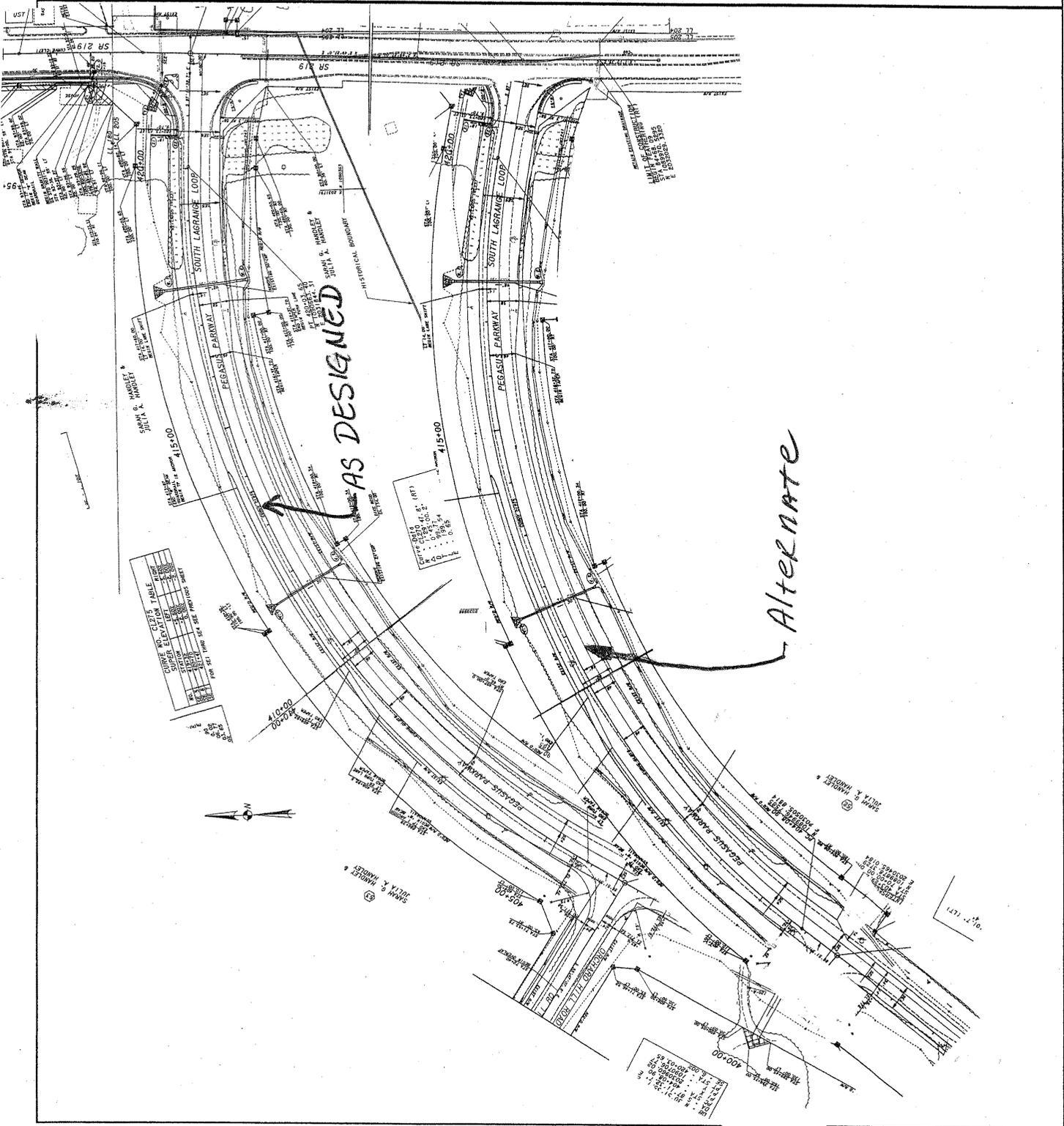
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ALTERNATIVE NO.:

1

SHEET NO.: 2 of 5

~~AS DESIGNED~~ ~~ALTERNATIVE~~



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
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ALTERNATIVE NO.: 1

SHEET NO.: 3 of 5

As Designed Roadway Length 2150' ±
 Alternative Roadway Length 1900' ±

SAVES 250' of 5 Lane Section

(Const. only) \$

$$\text{Lane-mi} = \frac{\$14,777,380}{13.62 \text{ Ln-mi}} = \$1,085,000 / \text{Lane-mi}$$

Project Lane mi =
$$\left[(4.1 \text{ mi} \times 2.5) + \left(\frac{2700' \times 3 \text{ Lanes}}{5,280' / \text{mi}} \right) + \left(\frac{1500' \times 2 \text{ Lanes}}{5,280' / \text{mi}} \right) \right] \times 1.1$$

 .5 for shoulders

Factor to include side R/ds

Lane mi =
$$(10.25 \text{ Ln-mi} + 1.53 \text{ Ln-mi} + .60 \text{ Ln-mi}) \times 1.1 =$$

Total Lane mi = 13.62 Lane mi
 (As designed)

Construction Cost Savings

Lane-miles saved:
$$\left(\frac{250' \times 4.5}{5,280} \right) = .213 \text{ Lane-miles}$$

 .5 for shoulders

R/W (As Designed)
$$\left[\frac{(130' \times 1820')}{43,560} + \frac{(110' \times 330')}{43,560} \right] = 6.265 \text{ AC}$$

R/W (Alternate)
$$\left[\frac{(170' \times 1570')}{43,560} + \frac{(110' \times 330')}{43,560} \right] = 6.961 \text{ AC}$$

Assume 60' of R/W prescriptive R/Ws ditch to ditch

$$230' (\text{Req'd R/W}) - 60' (\text{prescriptive R/W}) = 170'$$

CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

1

SHEET NO.: 4 of 5

Surplus R/W (Sell back Abandon R/W)

$$\left(\frac{2000' \times 230'}{43,560 \frac{\text{SF}}{\text{AC}}} \right) = 10 \text{ AC}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

2

DESCRIPTION: **FOUR LANE THE ENTIRE PROJECT**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The current design calls for the construction of a two-lane roadway for the entire length of the project, except the area between Orchard Hill Road and Whitesville Road/State Route (SR) 219. The total length is approximately three miles. The project also indicates the right-of-way being purchased will accommodate a four-lane rural road section.

ALTERNATIVE:

Since the right-of-way for four-lanes is already being purchased, construct a four-lane rural roadway section for the entire project length.

ADVANTAGES:

- Provides for future expansion
- Doubles capacity of new facility
- Improves level of service
- Precludes future encroachments

DISADVANTAGES:

- Increases cost
- Increases design and construction time

DISCUSSION:

Although the traffic does not warrant the use of a four-lane section, the volumes are in fact approaching the level where a four-lane section would be carefully contemplated. As such, and after the building-out of more industrial facilities following on the heels of the KIA Motors Corporation's new complex, the need for a four-lane facility becomes more urgent.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 7,883,610	—	\$ 7,883,610
SAVINGS	\$ (7,883,610)	—	\$ (7,883,610)

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
3

DESCRIPTION: BUY RIGHT-OF-WAY FOR TWO LANES IN LIEU OF FOUR

SHEET NO.: 1 of 2

ORIGINAL DESIGN:

The current design calls for the purchase of between 200 to 250 feet of right-of-way (ROW) with the anticipation that the proposed two-lane roadway will be expanded to four lanes in the near future.

ALTERNATIVE:

Purchase only the ROW necessary to construct the current two-lane facility.

ADVANTAGES:

- Reduces initial ROW costs
- May not be currently needed

DISADVANTAGES:

- Increases in future ROW cost
- Could create future encroachments if four lanes materialized
- May already be in the process of being purchased

DISCUSSION:

This alternative reduces the ROW width from an average of 230 feet wide to about 125 feet wide. The 125-foot width may be sufficiently wide for a four lane highway if 24-foot median and 12-foot shoulders are incorporated.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,566,521	—	\$ 8,566,521
ALTERNATIVE	\$ 4,681,110	—	\$ 4,681,110
SAVINGS	\$ 3,885,411	—	\$ 3,885,411

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
4

DESCRIPTION: **CLEAR RIGHT-OF-WAY FOR FOUR LANES**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The present design proposes to clear, grade, and drain a portion of the proposed four-lane ROW to accommodate only the two-lane facility.

ALTERNATIVE:

Clear the entire proposed ROW to accommodate the anticipated future four-lane facility in lieu of just the current two-lane roadway.

ADVANTAGES:

- Reduces future costs
- Acknowledges potential widening to accommodate four lanes
- Precludes future encroachment problems

DISADVANTAGES:

- Increases initial cost
- Aesthetics – wooded land would be cleared negating natural beauty
- Erosion controls may be required if clearing overdone
- Incurs costs that may not be needed

DISCUSSION:

Although the traffic does not warrant the use of a four-lane section, the volumes are in fact approaching the level where a four-lane section would be carefully contemplated. As such, and after the building-out of more industrial facilities following on the heels of the KIA Motors Corporation's new complex, the need for a four-lane facility may be reached sooner rather than later.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 305,172	—	\$ 305,172
SAVINGS	\$ (305,172)	—	\$ (305,172)

CALCULATIONS



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
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ALTERNATIVE NO.:

4

SHEET NO.: 2 of 3

Including shoulders, ditches & shoulders, you would have to clear an additional 100' of R/W width to accommodate four lanes.

The gross length of project is 4.079 miles. Subtract the length around intersections and the length from Orchard Hill to Whitesville (which is already stated to be 5 lanes), the total length of project for which you need to clear an additional 100' R/W is approximately 3 miles or 15,720 feet.

Thus total area that needs to be cleared for 2 more

$$\text{lanes} = \frac{15,720 \times 100}{43,560} = 36 \text{ acres}$$

For around \$7,000/acre, the cost will be:

$$\$7,000 \times 36 = 252,000$$

with 2110% of Engineering, Construction & Inflation factor, the cost to clear the land for 2 additional lanes will be: $252,000 \times 0.211 = \$305,172$

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
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ALTERNATIVE NO.:
5

DESCRIPTION: LOCATE A UTILITY CORRIDOR TO PRECLUDE FUTURE
 CONFLICTS

SHEET NO.: 1 of 2

ORIGINAL DESIGN:

The present design does not address the use of a utility corridor (utilidor).

ALTERNATIVE: (Sketch attached)

Since it is expected the South LaGrange Loop will become a four-lane limited access facility, it would be prudent to provide a utilidor, either in the center of the proposed 44-foot median or on the outside shoulder, to carry all known utilities such as water, sewer, sanitary, power, communications, etc.

ADVANTAGES:

- Avoids future cost of relocating utilities
- Precludes future conflicts
- Facilitates design and construction
- Common practice

DISADVANTAGES:

- Some loss of flexibility for future expansion
- Could result in higher future costs if utilidor has to be paved over due to road expansion

DISCUSSION:

The use of a utilidor to accommodate all, if not most, known utilities is commonly implemented to provide easy access and preclude future conflicts. Although some minor loss of flexibility can occur, the advantages outweigh this inconvenience. If future plans call for widening over the utilidor, the design can accommodate this added load.

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

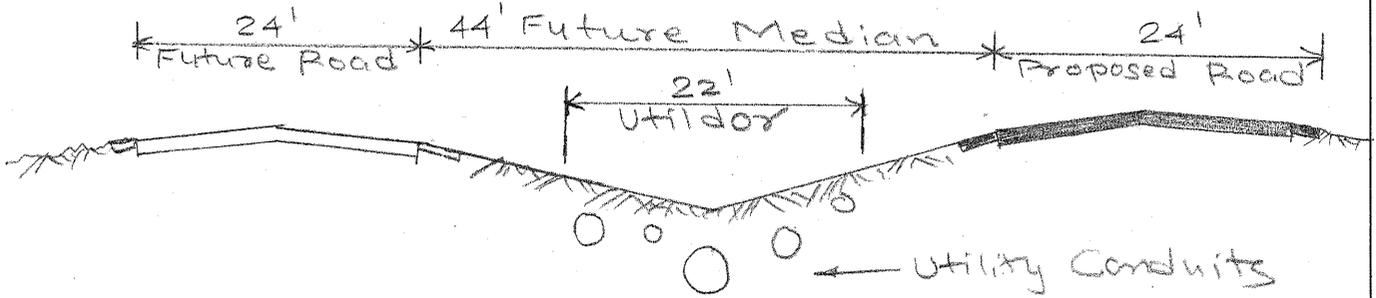
PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

5

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 2



VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

6

DESCRIPTION: **IN CERTAIN AREAS, BUILD NEW TWO LANES IN ORDER TO**
KEEP EXISTING LANES FOR MAINTENANCE OF TRAFFIC

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The present design proposes to build the new two-lane road “over” the existing lanes in several areas. This situation complicates constructability.

ALTERNATIVE: (Sketch attached)

The alternate would build the “other” two new lanes away from the existing roadway, in areas where the plans now propose to construct new two-lanes over the existing lanes.

ADVANTAGES:

- Reduces in construction time
- Facilitates construction
- Improves safety during construction
- Allows contractor additional lay-down area

DISADVANTAGES:

- Increases initial cost
- Requires the use of cross over
- Skews the angle of the intersection with US 29/SR 14

DISCUSSION:

This alternative would commence at the intersection with US 29 / SR 14 from Station (STA) 161+00 to STA 200+00. It is realized that there would be additional construction cost to facilitate constructability and maintenance of traffic. Although the cost summary does not show a cost savings, it is most likely that some savings would be generated for reduced construction time and safer stage construction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 346,346	—	\$ 346,346
ALTERNATIVE	\$ 382,485	—	\$ 382,485
SAVINGS	\$ (36,139)	—	\$ (36,139)

375

SKETCHES



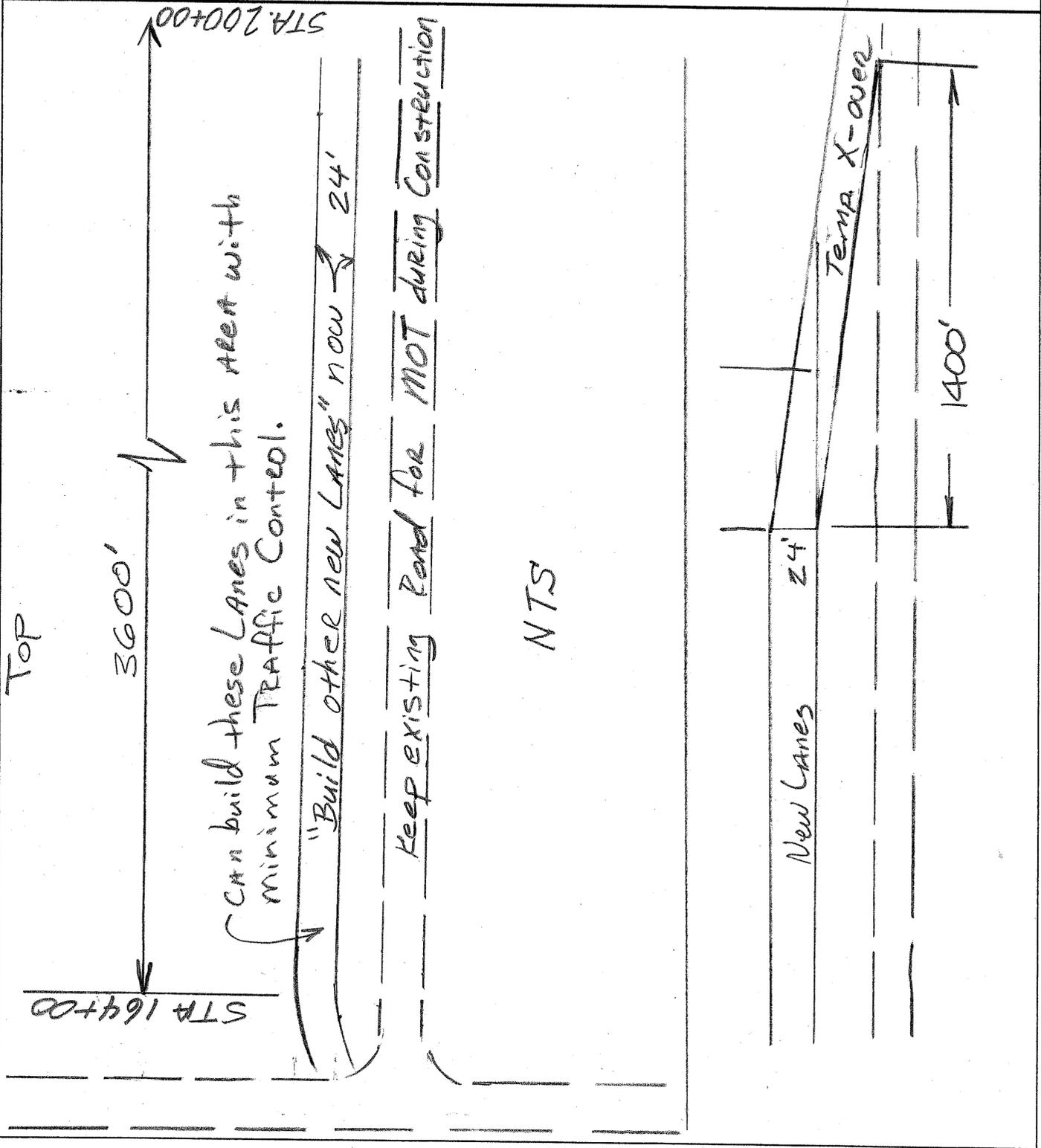
PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

AS DESIGNED ALTERNATIVE

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

6



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
 Final Design Stage

ALTERNATIVE NO.:

6

SHEET NO.: 3 of 4

Only REAL SAVINGS would be in TRAFFIC
 Control Costs

% of project that would save TRAFFIC Control

$$\left(\frac{3600' + 400'}{5,280' / \text{mi}} \right) = 0.78 \text{ miles}$$

$$\rightarrow \frac{.78 \text{ mi}}{(4.1 \times 1.1)} = .174 (17.4\%)$$

↑ factor to include intersection

(Total project T.C.) $\rightarrow \$286,000 \times .174 \approx \$50,000$
 $\$286,000 - 50,000 = \$236,000$

(1400' @ Two Lanes) CONSTR. COST for cross-over from
 existing Lanes to "new Lanes" during construction

40' x 35 mph = 1400' (use Temp Section of 1 1/2" 12.5mm;
 Reduce by 400' (2" 19mm 6" GAB)

Tons for 12.5mm: $\bullet 125' \times 24' \times 1000' \times .076 = 274 \text{ tons}$

Tons for 19mm: $\bullet 167' \times 24' \times 1000' \times .076 = 343 \text{ tons}$

(GAB 6") in S.Y. $\left(\frac{24' \times 1000'}{9} \right) = 2667 \text{ tons}$

for full depth pavement that will PART of the full
 depth PAVEMENT

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
7

DESCRIPTION: ELIMINATE THE THIRD LANE ON SOUTH LAGRANGE LOOP
 BETWEEN OLD HUTCHINSON ROAD AND ORCHARD HILL
 ROAD

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The original configuration has a 12-foot lane in the middle of the roadway that is striped-off.

ALTERNATIVE: (Sketch attached)

Eliminate the striped-off lane and construct a narrower section.

ADVANTAGES:

- Reduction in construction time
- Facilitates construction
- Reduces initial cost

DISADVANTAGES:

- None apparent

DISCUSSION:

Consider eliminating the striped-off area between opposing traffic and narrowing the construction width between Old Hutchison Road and Orchard Hill Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 109,542	—	\$ 109,542
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 109,542	—	\$ 109,542

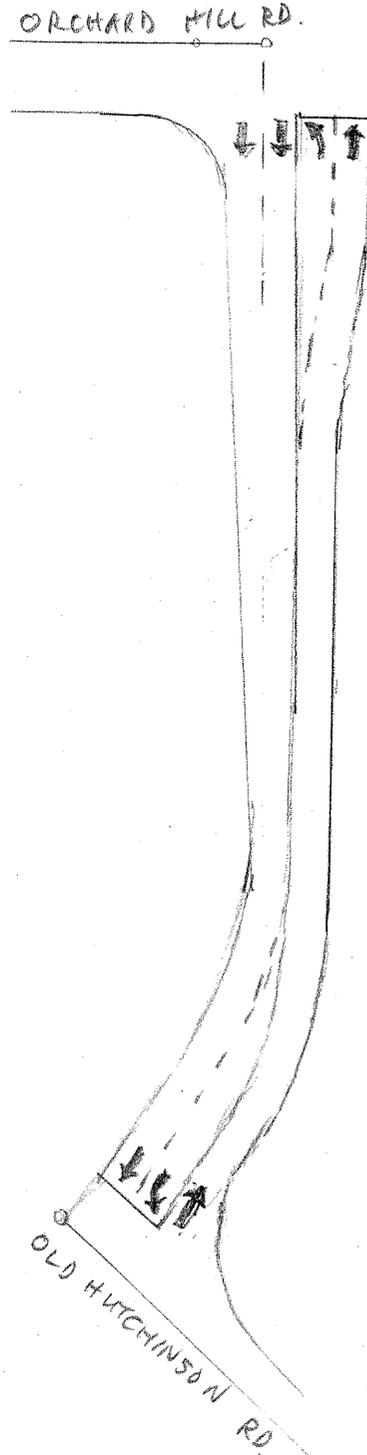
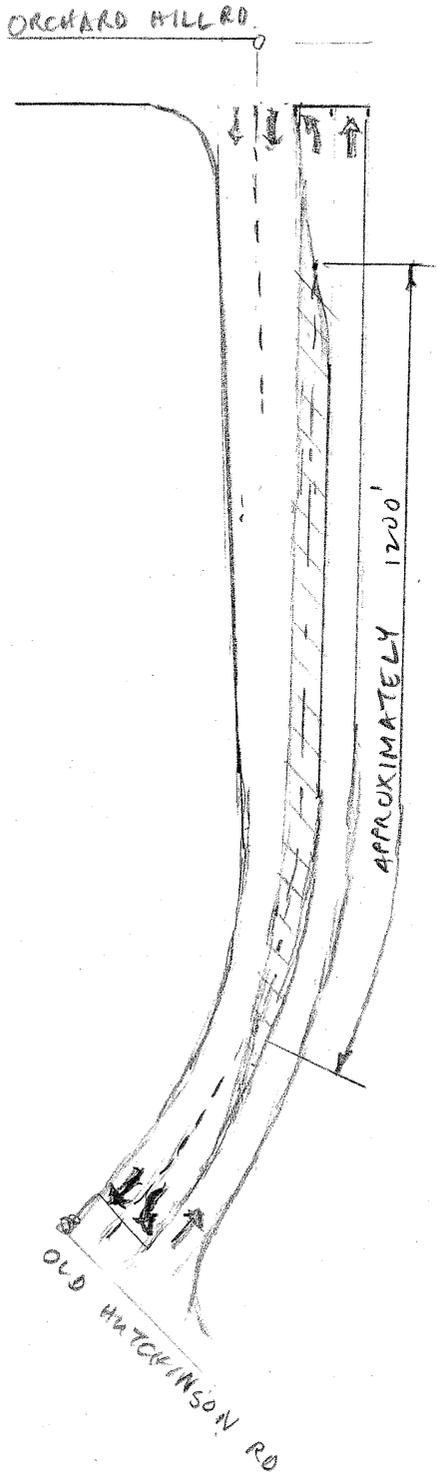
PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

7

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

7

SHEET NO.: 3 of 4

WIDTH OF 1 LANE = 12 FT.

APPROXIMATE LENGTH OF STRIPED OFF LANE = 1200 FT.

AREA = $12' \times 1200'$ = 14400 SF = 1600 SY (FAS)

ASPH. CONC. 25 MM

WT. = $1600 \text{ SY} \times 660 \div 2000$ = 528 TONS

ASPH. CONC. 19 MM

WT. = $1600 \text{ SY} \times 220 \div 2000$ = 176 TONS

ASPH. CONC. 12.5 MM

WT. = $1600 \text{ SY} \times 165 \div 2000$ = 132 TONS

DET. "B" YELLOW THERMO PLASTIC = 438 SY

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
9

DESCRIPTION: REDUCE THE WIDTH OF PEGASUS PARKWAY/CR 304 BETWEEN
 ORCHARD HILL ROAD AND WHITESVILLE ROAD/SR 219

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The original configuration has a 12-foot lane in the middle of the roadway that is striped-off.

ALTERNATIVE: (Sketch attached)

Eliminate the striped-off lane and construct a narrower section.

ADVANTAGES:

- Reduces construction time
- Facilitates construction
- Reduces initial cost

DISADVANTAGES:

- None apparent

DISCUSSION:

Consider eliminating the striped-off area between opposing traffic and narrowing the construction width on Pegasus Parkway between Orchard Hill Road and Whitesville Road/SR 219.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 110,742	—	\$ 110,742
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 110,742	—	\$ 110,742

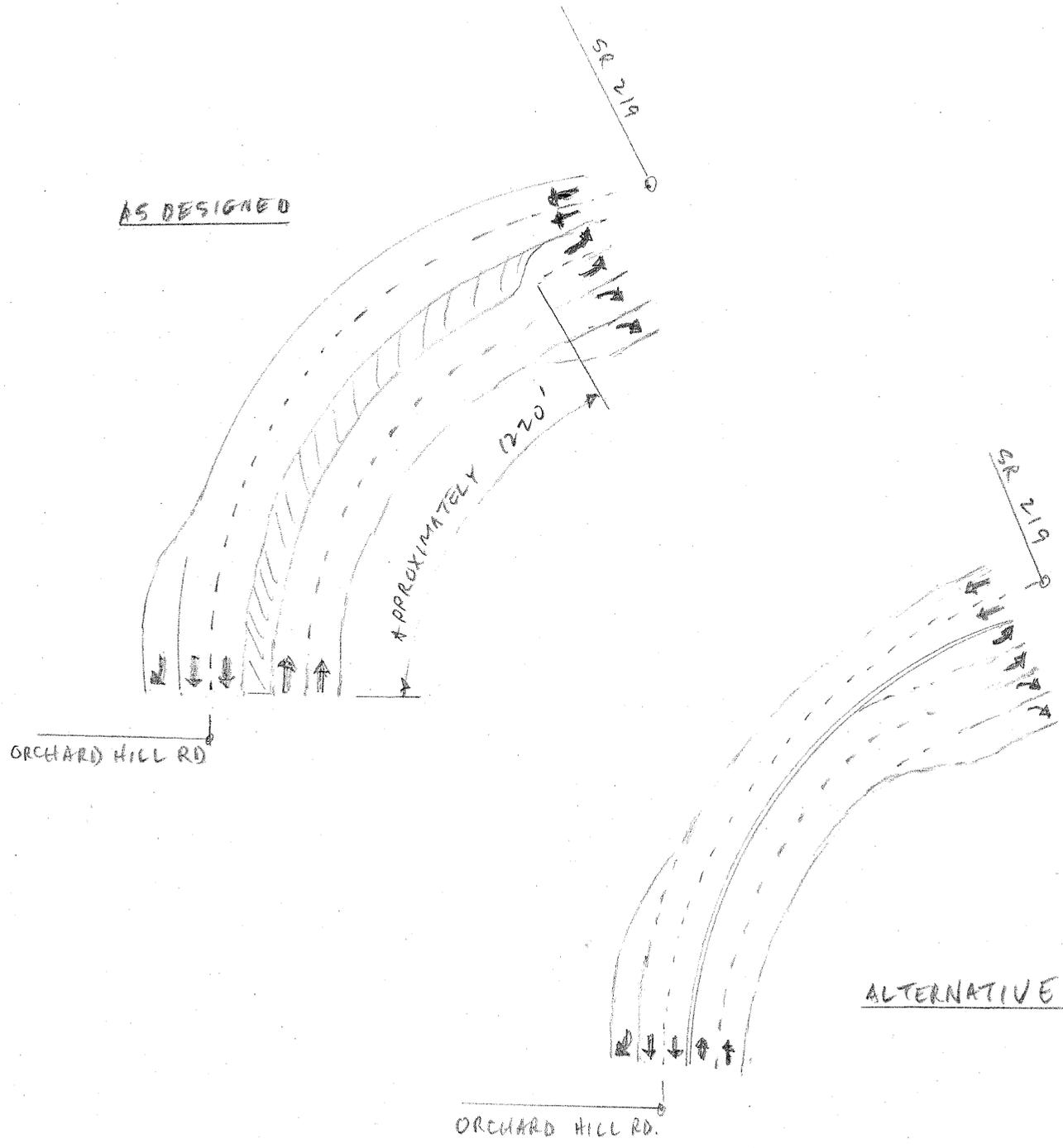
PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

9

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

9

SHEET NO.: 3 of 4

WIDTH OF 1 LANE = 12 FT.

APPROXIMATE LENGTH OF STRIPED OFF LANE = 1220 FT.

AREA = 12' x 1220' = 14,640 SF = 1627 SY (GAB)

ASPH CONC, 25 mm

WT = 1627 SY x 660 ÷ 2000 = 537 TN

ASPH CONC, 19 mm

WT = 1627 SY x 220 ÷ 2000 = 179 TN

ASPH CONC, 12.5 mm

WT = 1627 SY x 165 ÷ 2000 = 134 TN

DET. 'B' YELLOW THERMOPLASTIC = 796 SY

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
10

DESCRIPTION: DIVIDE THE PROJECT IN TWO – EITHER SIDE OF THE
 “EXCEPTION”

SHEET NO.: 1 of 1

ORIGINAL DESIGN:

The present design calls for a continuous project to be bid by a single entity and continued without any interruptions within a specified period of time.

ALTERNATIVE:

Divide the project into two separate construction projects. The first one would begin at the SR 109 and South LaGrange Loop intersection and continue to the west end of the “exception”, a distance of about 15,320 feet. The second would commence at the east end of the “exception” and conclude at the intersection of Pegasus Parkway and Whitesville Road/SR 219.

ADVANTAGES:

- Funding could be handled in two different stages
- Smaller and mid-sized contractors could bid on the separate projects
- Each project could result in a shortened construction period
- May increase good neighbor relations with known industrial clients

DISADVANTAGES:

- Costs could increase due to two mobilization/demobilizations
- Economy of scale may be compromised
- Increases GDOT’s administration due to two contracts in lieu of one
- Could result in longer construction durations

DISCUSSION:

It appears the primary reason for the South LaGrange Loop is to accommodate known industrial development at the eastern end of the corridor, particularly with the new KIA Motors Corporation complex immediately north of the “exception” area. As such, advancing the eastern end of the corridor would be prudent as a separate project to assure speedier access to I-85 from Whitesville Road/SR 219, a distance of just over 7,000 feet.

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

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
13

DESCRIPTION: RECONFIGURE THE INTERSECTION OF US ROUTE 29/STATE
 ROUTE 14 AND OLD WEST POINT ROAD

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The present design realigns the South LaGrange Loop with a “new” roadway section to achieve a 90° intersection at the US Route 29 (US 29)/State Route 14 (SR 14) and Old West Point Road intersection.

ALTERNATIVE: (Sketch attached)

Use the existing Old West Point Road pavement and maintain the existing 61° skew at the US 29 / SR 14 and the new South LaGrange Loop.

ADVANTAGES:

- Reduces initial cost
- Facilitates construction
- Simplifies design and construction
- Reduces right-of-way costs

DISADVANTAGES:

- 61° skew angle requires a GDOT variance
- Perceived loss of operational capability with a 61° skew

DISCUSSION:

Construction costs can be reduced since this alternative would use the existing Old West Point Road pavement and the overall project length.

It is important to note this intersection is signalized, facilitating all turning movements, even if the skew angle is greater than preferred.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,805,609	—	\$ 1,805,609
ALTERNATIVE	\$ 1,548,614	—	\$ 1,548,614
SAVINGS	\$ 256,995	—	\$ 256,995

PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
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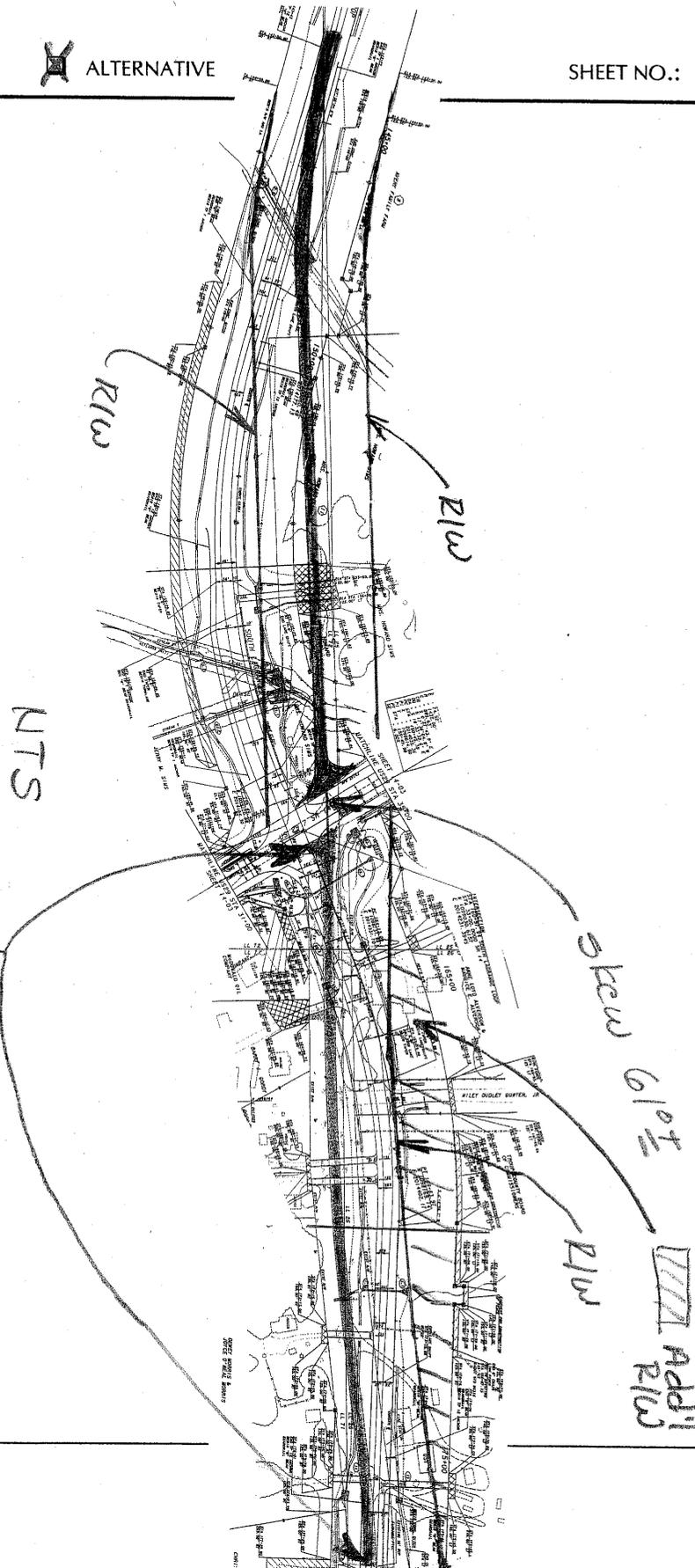
ALTERNATIVE NO.:

13

 AS DESIGNED

 ALTERNATIVE

SHEET NO.: 2 of 4



Utilize existing portion
 of Old West Point Rd.
 At existing skew.

TOP



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
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ALTERNATIVE NO.: 13

SHEET NO.: 3 of 4

Length of Reduced Roadway as a Result of Using Existing Alignment.

Original length = (Sta. 143+00 to Sta. 177+30) = 3430'

Alternate length = 3360' = 3360'

Const. Cost for Original Design for 2 Lane Roadway Along this section of Roadway. It is assumed that both designs (Original & Alternate) will propose the same turn lanes at the SR14/US29 inter section. Therefore the turn lanes are included in the cost comparison.

Original Roadway Ln-mi $(2 \text{ Lanes} \times \left(\frac{3430'}{5,280'}\right)) = 1.30 \text{ Ln-mi.}$

Alternate Const. Cost for 2 Lanes along the same section with the existing Old West Point Rd Alignment.

Length = 3360' of which 1740' is full depth Pavement & 1620' is existing pavement being overlaid with minor grading.

Alternate full depth pavement: $(2 \text{ Lanes} \times \left(\frac{1740'}{5,280'}\right)) = 0.659 \text{ Ln-mi.}$

Alternate overlaid Roadway: $(2 \text{ Lanes} \times \left(\frac{1620'}{5,280'}\right)) = 0.614 \text{ Ln-mi.}$

Ln-mi Cost adjusted for overlaid section:

$\$1,085,000 / \text{Ln-mi.} - \left[\left(\frac{24 \times 1620}{954} \right) \times \frac{\$20}{54} \right] - \left(15,000 \text{ cu. y.} \times \frac{\$5.36}{24} \right) = \$918,200$

Less GAB

Less grading

Additional Req'd RLW Req'd for Original Design / Alignment
 $\left(\frac{900' \times \frac{125'}{2}}{43,560} \right) + \left(\frac{700' \times \frac{130'}{2}}{43,560} \right) = 1.292 \text{ Ac} + 1.045 = 2.337 \text{ Ac}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
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ALTERNATIVE NO.:
14

DESCRIPTION: MINIMIZE THE DEDICATED LANES AT THE INTERSECTION OF
 US ROUTE 29/STATE ROUTE 14 AND SOUTH LAGRANGE LOOP

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The present design proposes separate left and through lanes on all approaches at the intersection of US Route 29 (US 29) / State Route 14 (SR 14) and the new South LaGrange Loop.

ALTERNATIVE: (Sketch attached)

Combine the proposed left-turn lanes and the through-lanes into one lane at the US 29/SR 14 and the new South LaGrange Loop intersection.

ADVANTAGES:

- Reduces construction cost
- Facilitates construction
- Narrower intersection
- Not needed

DISADVANTAGES:

- Reduces traffic operations to some extent due to a single lane handling two movements

DISCUSSION:

The provided traffic documentation indicates that separate left-turns are not needed for long periods of time; even the design year traffic shows that only two approaches would need a separate left turn in the future.

It is important to note this intersection is signalized, facilitating all turning movements, even those lanes that handle two movements simultaneously.

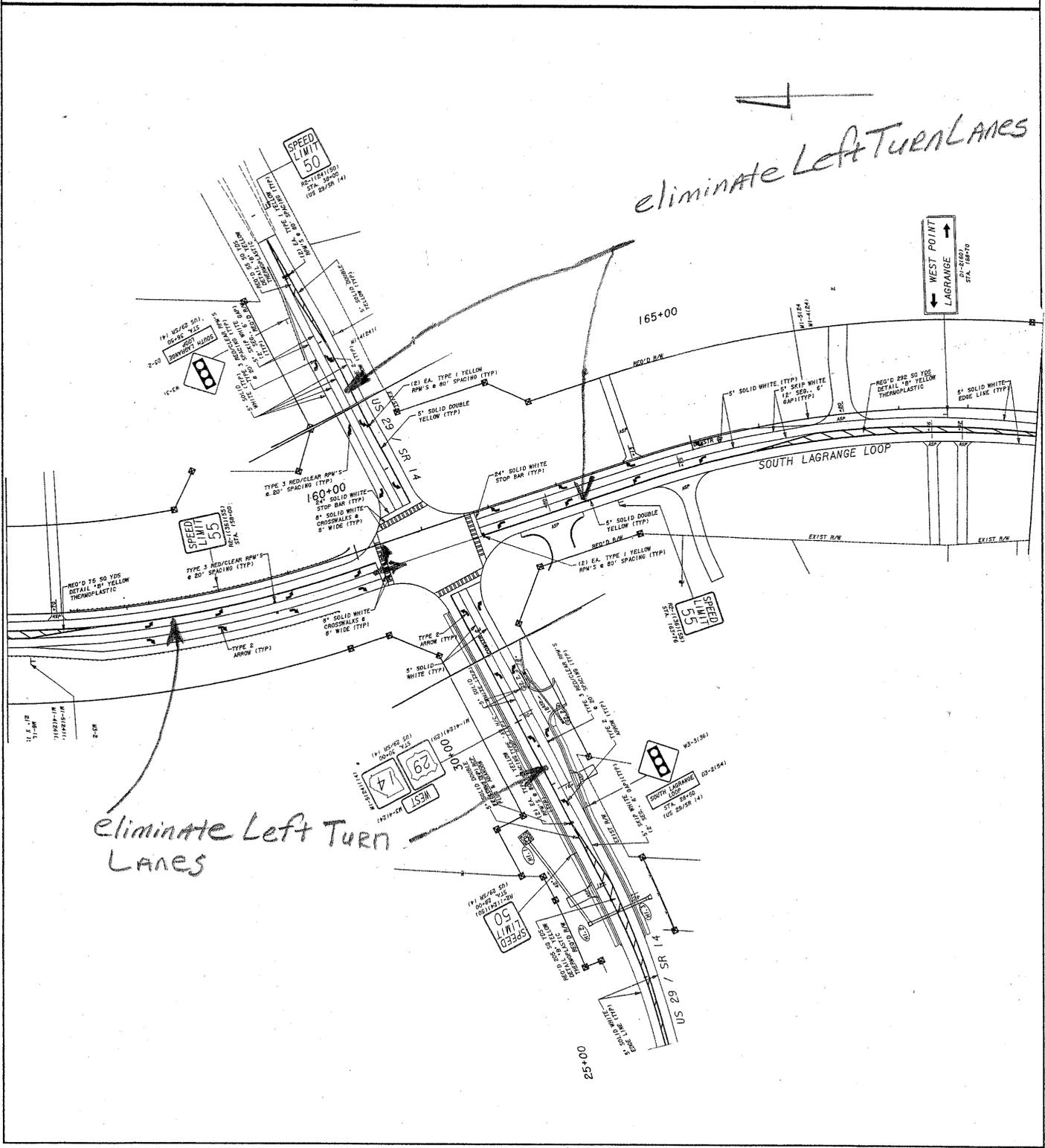
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 512,435	—	\$ 512,435
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 512,435	—	\$ 512,435

PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
14

AS DESIGNED ALTERNATIVE

SHEET NO.: **2** of 4



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

14

SHEET NO.: 3 of 4

Length of 4-Left Turns at intersection with
SR14/US29 = $\frac{(1050' + 1000')}{5280'/mi} = .39 \text{ miles}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
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ALTERNATIVE NO.:
15

DESCRIPTION: ELIMINATE THE DRIVEWAYS FROM THE ACQUIRED PROPERTIES

SHEET NO.: 1 of 1

ORIGINAL DESIGN:

The current design documents indicate that new driveways are proposed for four acquired properties. These properties are: (1) Mrs. Howard Sims, (2) Ann Loyd Alverson and Maurice E. Alverson, (3) Troup County Board of Commissioners, and (4) E. H. Baker. These properties are on the north side of the South LaGrange Loop between US Route 29 / State Route 14 and Old West Point Road.

ALTERNATIVE:

Eliminate the driveways, as the structures on the properties are to be demolished.

ADVANTAGES:

- Reduces cost
- Minimizes coordination work
- Simplifies design and construction

DISADVANTAGES:

- None apparent

DISCUSSION:

Constructing access driveways to acquired properties and demolished structures serve no apparent useful purpose. Therefore, driveways should not be constructed.

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

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
17

DESCRIPTION: **REDUCE THE AMOUNT OF IMPROVEMENTS AT THE**
INTERSECTION OF STATE ROUTE 109 AND SOUTH LAGRANGE
LOOP

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The original design proposes separate left turn only lanes from both westbound (WB) and eastbound (EB) traffic at the intersection of State Route 109 (SR 109) and the new South LaGrange Loop, even though the future EB left turn lane will be striped-out under this project.

ALTERNATIVE: (Sketch attached)

Eliminate the two left turn lanes on both approaches on SR 1090 at the South LaGrange Loop. The left-turn-only lane on South LaGrange Loop will remain, due to left turn volumes.

ADVANTAGES:

- Reduces construction cost
- Facilitates construction
- Narrower intersection
- Not needed
- Reduces right-of-way costs

DISADVANTAGES:

- Combines through and left turns in same lane
- Perceived reduction in safety associated with turning movements

DISCUSSION:

The provided traffic documentation indicates that separate left turns are not needed at this intersection in the noted directions. Furthermore, the intersection is signalized, allowing enough time to “empty” the through and left turn lanes from one lane.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 193,355	—	\$ 193,355
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 193,355	—	\$ 193,355

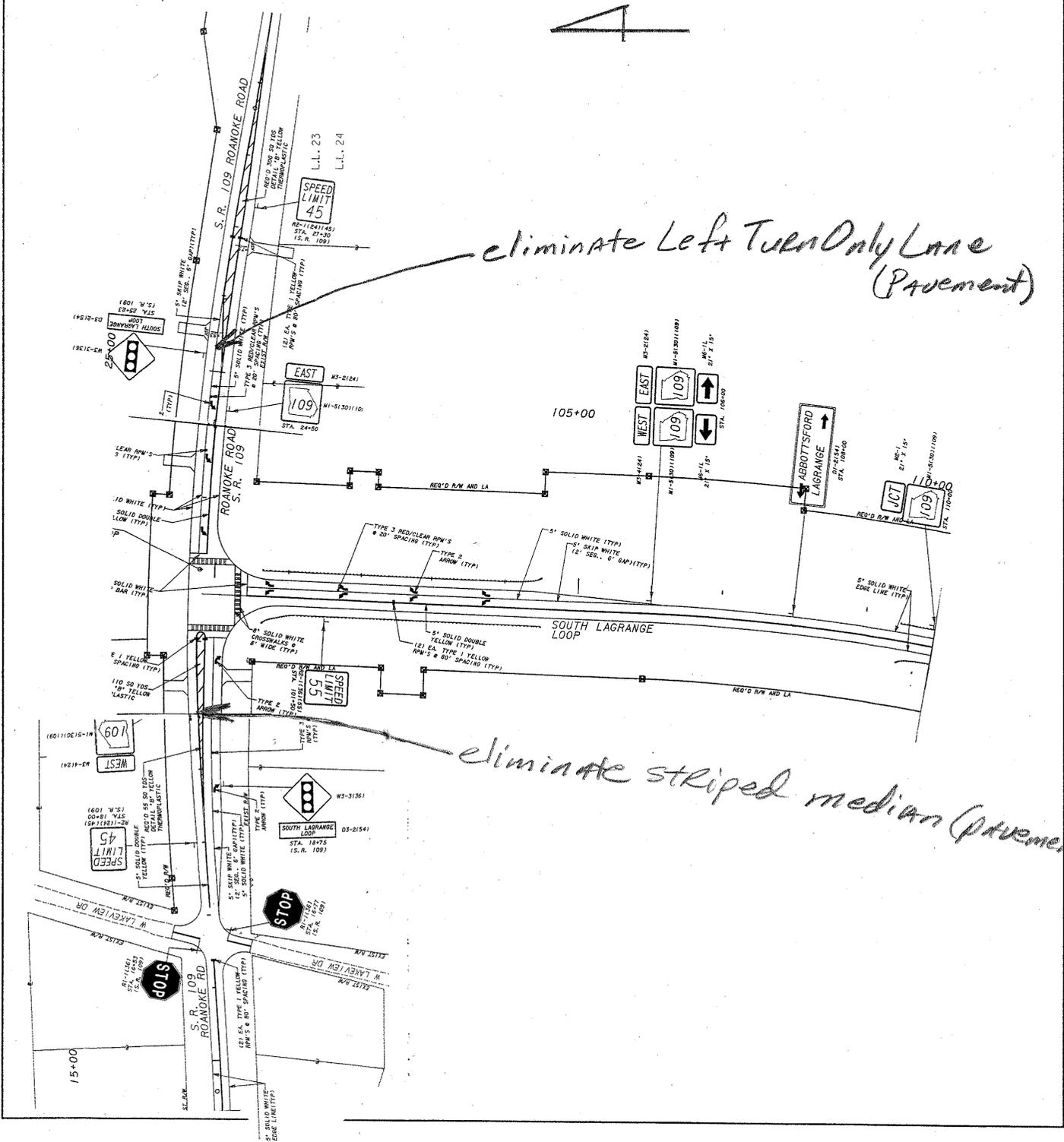
PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
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ALTERNATIVE NO.:

17

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
 Final Design Stage

ALTERNATIVE NO.:

17

SHEET NO.: 3 of 4

Length of SR 109 West bound Approach Left Turn Only
 Lane = 400' + shift + Taper = 500'
 (Left Turn Lane) Ln-mi = $\left(\frac{400' + 500'}{5,280'/mi} \right) = 0.123 \text{ Ln-mi}$

(opposite striped median) = 100' + 200' shift + Taper
 Lane

$$\rightarrow \left(\frac{100' + 200'}{5,280'/mi} \right) = \rightarrow = \rightarrow 0.038 \text{ Ln-mi}$$

Total Ln-mi 0.161 Ln-mi
 eliminated

Use \$918,200 Ln-mile cost from ALTERNATE 13
 for ROADWAY sections to be RESURFACED.
 (see Cost work sheet)

EXTRA R/W needed for Left Turn Only Lanes which
 not be needed under this Alternate.

$$\left(\frac{1,000' \times 15'}{43,560 \frac{SF}{AC}} \right) = 0.344 \text{ AC}$$

COST WORKSHEET

PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP Troup County, Georgia Department of Transportation, District 3 <i>Final Design Stage</i>	ALTERNATIVE NO: 17 SHEET NO.: 4 of 4
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CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Right-of-Way Costs							
Additional ROW for left turn lanes	AC	0.3440	12,000	4,128			
Subtotal ROW				4,128			
ROW Markup at 247.20%				10,204			
Total ROW				14,332			
Construction Costs							
Needed Lane Miles - Overlay	LM*	0.161	918,200.00	147,830			
Construction Subtotal				147,830			
Construction Markup at 21.10%				31,192			
Total Construction				179,022			
*LM = Lane Mile, see Alternative No. 13 for unit cost development							
Sub-total				193,355			
Mark-up at				INCL			
TOTAL				193,355			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
18

DESCRIPTION: **ELIMINATE CROWN ON TYPICAL SECTION**

SHEET NO.: **1 of 1**

ORIGINAL DESIGN:

The proposed roadway is crowned in the middle so that storm water flows to each side of the road.

ALTERNATIVE:

Eliminate the crown and slope the road section toward the proposed median or to the outside of the roadway.

ADVANTAGES:

- Could be less costly to install storm sewers
- Easier to design, construction and maintain storm sewer
- Common practice

DISADVANTAGES:

- Roadway may look unconventional until another lane is constructed
- Aesthetics
- Potential drainage issues at super-elevated sections

DISCUSSION:

Eliminating the crown throughout the length of the project is visually unappealing; however, draining to one side or the other of the proposed roadway facilitates installation of the drainage system by keeping it to one side only. There is a possibility that some issues may arise at the super-elevated sections.

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

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
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ALTERNATIVE NO.:
19

DESCRIPTION: PROVIDE CLEARING, GRADING AND DRAINAGE FOR FOUR
 LANES

SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The present design proposes to clear, grade, and drain a portion of the proposed four-lane right-of-way to accommodate only the two-lane facility.

ALTERNATIVE:

Clear, grade, and drain the proposed right-of-way to accommodate the anticipated future four-lane facility in lieu of just the current two-lane roadway.

ADVANTAGES:

- Reduces future costs
- Acknowledges potential widening to accommodate four lanes
- Precludes future encroachment problems

DISADVANTAGES:

- Increases initial cost
- Aesthetics – wooded land would be cleared ,negating natural beauty
- Erosion controls may be required if clearing/grading overdone
- Incurs costs that may not be needed

DISCUSSION:

Although the traffic does not warrant the use of a four-lane section, the volumes are in fact approaching the level where a four-lane section would be carefully contemplated. As such, and after the building-out of more industrial facilities following on the heels of the KIA Motors Corporation’s new complex, the need for a four-lane facility may be reached sooner rather than later.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 5,836,229	—	\$ 5,836,229
SAVINGS	\$ (5,836,229)	—	\$ (5,836,229)

CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
 Final Design Stage

ALTERNATIVE NO.:

19

SHEET NO.: 2 of 3

* See calculation sheet for Alternative #4.

The Clearing & Grubbing cost for 2 additional lanes will be \$305,172

The Grading cost for 2-lane 4.089 miles is \$4,896,381
 For 3-miles it would be \$3,592,356

(For discussions, see calculation sheet for Alt. #4)

The Drainage cost for 2-lane 4.089 miles is \$1,256,439
 For 3-miles it would be \$921,819

Adding 21.10% for Engineering, Construction and Inflation factor, the total cost for grading & drainage for four lanes would be:

$$1.211 [305,172 + 3,592,356 + 921,819] = \$5,836,228$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
20

DESCRIPTION: USE A 24-FOOT MEDIAN IN LIEU OF A 44-FOOT MEDIAN

SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The present design proposes a right-of-way width averaging 230 feet to accommodate a future four-lane facility.

ALTERNATIVE:

Restrict the width of the proposed median to 24 -feet instead of 44 feet and consequently reduce the right-of-way width by 20-feet. This is proposed between SR 190 and Orchard Hill Road.

Note: Calculations do not include the “exception” area of the South LaGrange Loop or lengths at intersections.

ADVANTAGES:

- Reduces right-of-way cost

DISADVANTAGES:

- Restricts future expansion of the median for additional travel and turn lanes (however, could expand to the outside)
- Not a preferred median width
- Right-of-way may already have been purchased

DISCUSSION:

A narrower median will allow a corresponding reduction in the overall right-of-way requirements, thus minimizing capital expenditure.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 300,714	—	\$ 300,714
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 300,714	—	\$ 300,714

CALCULATIONS



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
 20

SHEET NO.: 2 of 3

The total length of the project for which median width could be reduced is approximately 3 miles or 15,720 feet. Thus the total area saved =
 $15,720 \times 20' = 314,400 \text{ sf}$ or 7.2176 acres.

Agricultural land sells about \$12,000 per acre in this area. Hence, the money saved =
 $7.2176 \times 12,000 = \$86,611$

with R/W mark-up of 247.20%, total money saved
 $3.472 \times 86,611 = 300,714$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
24

DESCRIPTION: **SHORTEN THE CSX RAILROAD BRIDGE FOR TWO LANES ONLY** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The proposed design is a 20-foot wide railroad bridge with four spans at 70 feet each. The proposed new two-lane South LaGrange Loop is noted to go under Span No. 2, while the future additional two-lanes are designated to go under Span No. 3.

ALTERNATIVE: (Sketch attached)

Construct a three span railroad bridge with each span at 70 feet and retain newly proposed two-lane South LaGrange Loop under Span No. 2.

ADVANTAGES:

- Reduces initial cost
- Facilitates construction
- Simplifies design and construction
- May not be needed

DISADVANTAGES:

- Loss of amenity
- Lost opportunity to construct a longer railroad bridge "today"
- If future lanes are needed in the immediate future, costs would escalate

DISCUSSION:

The north end of the project appears to have the least likelihood of requiring an expansion to four lanes, as most of the industrial development tends to be at the easternmost section of this corridor. However, if the future lanes are in fact a certainty, construction of a longer railroad bridge makes sense at this time. Notwithstanding, expenditure of capital today for an uncertainty is not prudent, as said funds could be used for other needed amenities or projects. In value engineering, if a needed function is to occur five years beyond the completion of the current project, then the follow-on project shall handle the lengthening or augmentation required and reserve scarce capital funds.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 339,740	—	\$ 339,740
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 339,740	—	\$ 339,740

PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

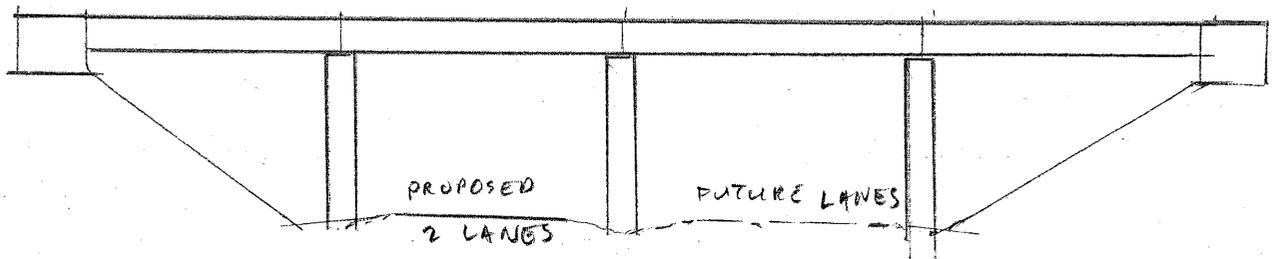
24

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4

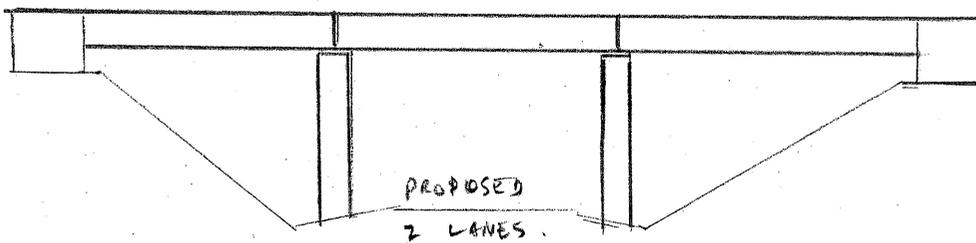
ORIGINAL DESIGN:

4 SPANS @ 70' = 280'



ALTERNATIVE:

3 SPANS @ 70' = 210'



CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:

24

SHEET NO.: 3 of 4

BRIDGE WIDTH = 20' OUT-TO-OUT

SPAN = 70 FT.

AREA = 20' X 70' = 1400 SF

EXCAVATION

AREA = $(17.75' + 5.5')$ 70' = 1627.5 SF

VOL. = $1627.5' \times 500' \div 27 = 30,139$ CY

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
25

DESCRIPTION: GRADE SEPARATE THE NEW SOUTH LAGRANGE LOOP AND US
 ROUTE 29/STATE ROUTE 14 INTERSECTION

SHEET NO.: 1 of 5

ORIGINAL DESIGN: (Sketch attached)

The original configuration is an at-grade, signal-controlled intersection with South LaGrange Loop twisting to intersect US Route (US) 29/State Route (SR) 14 at 90°.

ALTERNATIVE: (Sketch attached)

Realign South LaGrange Loop back to provide a straighter alignment commencing above the existing Old West Point Road and bridge over SR 29/SR 14.

ADVANTAGES:

- Smoother So LaGrange Loop alignment
- Improves through traffic efficiency on both roads
- Improves safety of both roads
- Locates alignment further away from residential area in the southwest quadrant of the intersection

DISADVANTAGES:

- Increases initial costs
- May increase construction time

DISCUSSION:

This alternative would further stress the limited access nature of the proposed South LaGrange Loop while provide a smoother traffic flow and reduce the number conflict points along the corridor. In addition, grade separating this intersection would greatly improve turning movements and overall safety.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 57,647	—	\$ 57,647
ALTERNATIVE	\$ 2,335,163	—	\$ 2,335,163
SAVINGS	\$ (2,277,516)	—	\$ (2,277,516)

CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
 Final Design Stage

ALTERNATIVE NO.:

SHEET NO.: 4 of 5

$$\text{WIDTH OF BRIDGE} = 2 \times 12' + 10' + 6.5' + 2(1.625') = 43.75' \text{ OUT-TO-OUT}$$

$$\text{APPROX. LENGTH} = 2 \times 70' \div \sin(60^\circ) = 242.5'$$

$$\text{BRIDGE AREA} = 242.5' \times 43.75' = 10,610 \text{ SF.}$$

$$\text{ADDITIONAL RAMPS} - \text{APPROXIM } 2 \times 2 \times 800' = 3,200 \text{ ft.}$$

$$\text{AT } \$1,085,000 / \text{LANE MILE} = 5205 / \text{LF} \quad (\text{AVG. FM. TOTAL COSTS})$$

↪ from Alt. 1

$$\text{RIGHT OF WAY: ADD'L} = 2 \times 400' \times 400' = 320,000 \text{ SF} \approx 43560 \text{ sq/AC}$$

↪
2 quadrants

$$\approx 8 \text{ AC } \frac{1}{5} \quad (\text{AGRICULTURAL})$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
27

DESCRIPTION: SIGNALIZE THE NEW SOUTH LAGRANGE LOOP AND OLD
 WEST POINT ROAD INTERSECTION

SHEET NO.: 1 of 2

ORIGINAL DESIGN:

The present design calls for a stop sign at the new South LaGrange Loop and Old West Point Road intersection. The current traffic count for left-turn movements from Old West Point Road onto South LaGrange Loop is 150 vehicles per hour (VPH) at peak times and is expected to rise to 350 VPH during peak times in the design year. Similarly, left-turn movements from South LaGrange Loop onto Old West Point Road at peak time is 110 VPH with an expected rise to 370 VPH in the design year at peak times.

ALTERNATIVE:

Install a traffic signal to manage all turning movements at the new South LaGrange Loop and Old West Point Road intersection.

ADVANTAGES:

- Better traffic control
- Improves intersection safety
- Reduces potential accidents
- Common practice

DISADVANTAGES:

- Increases initial cost
- Increases O&M costs

DISCUSSION:

A traffic induced signal system is recommended for the new South LaGrange Loop and Old West Point Road intersection so that during off-peak hours, when there is little or no traffic from Old West Point Road, vehicles can move smoothly on South LaGrange Loop.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 90,825	—	\$ 90,825
SAVINGS	\$ (90,825)	—	\$ (90,825)

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP**
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
30

DESCRIPTION: **USE CONCRETE VERSUS ASPHALTIC CONCRETE PAVEMENT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current project proposes to use asphaltic concrete pavement throughout the project. Typical sections are noted on Drawing Sheet Nos. E-01 through E-11.

ALTERNATIVE:

Use plain concrete pavement throughout the project limits in lieu of asphaltic concrete. See the attached Calculation Sheet for a typical cross section of the proposed pavement that is based on the anticipated truck traffic for this corridor.

ADVANTAGES:

- Increases structural capacity of the road
- Reduces O&M costs (see LCC sheet)
- Increases the lifespan of the facility
- Appropriate application for this material

DISADVANTAGES:

- Greatly increases initial costs
- Could increase construction time
- Increases freeze/thaw issues

DISCUSSION:

Although the traffic volume does not appear to justify the use of concrete pavement, the anticipated heavy industrial truck traffic for this Loop may warrant a further study. The tremendous increase in initial cost could easily be off-set if the softer asphaltic concrete material is exposed to a greater than anticipated amount of heavy truck traffic turning movements during maintenance and repaving.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 6,706,692	\$ 10,219,543	\$ 16,926,235
ALTERNATIVE	\$ 11,371,978	\$ 1,981,468	\$ 13,353,446
SAVINGS	\$ (4,665,286)	\$ 8,238,075	\$ 3,572,789

CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
 Final Design Stage

ALTERNATIVE NO.:
 30

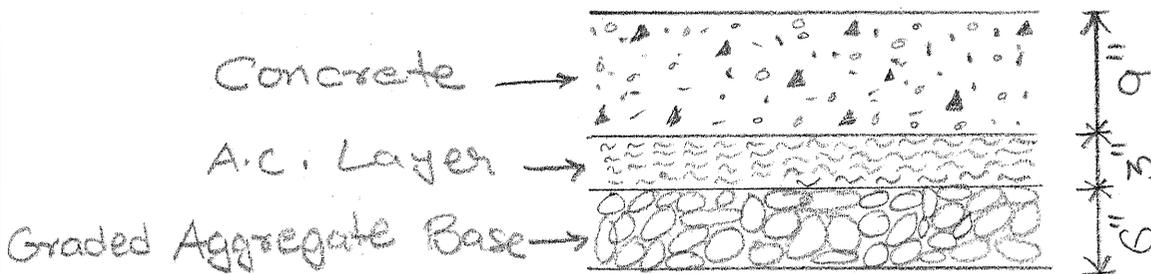
SHEET NO.: 2 of 4

Cost Estimate already shows 6" Graded Aggregate Base (G.A.B.) to be \$14.11

12.5 mm 1.5" A.C. layer is shown in the cost estimates to be 9,550 tons. At 0.078 t/cf, The total cubic feet of 12.5 mm A.C. layer as proposed = 122,436

∴ Total Square feet of 12.5 mm A.C. pavement
 $= 122,436 \div \frac{1.5}{12} = 979,487 \text{ sf} = 108,832 \text{ sy.}$

Porp. concrete section will have 3" thick 12.5" A.C. layer.
 ∴ total tonnage will be $9,550 \times 2 = 19,100$



LIFE CYCLE COST WORKSHEET



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP Troup County, Georgia Department of Transportation, District 3 <i>Final Design Stage</i>						ALTERNATIVE NO. 30	
LIFE CYCLE PERIOD: <u>35</u> years						SHEET NO. 4 of 4	
INTEREST RATE: <u>2.50%</u> ESCALATION RATE:						ORIGINAL	PROPOSED
A. INITIAL COST						6,706,692	11,371,978
Useful Life (Years)							
INITIAL COST SAVINGS							(4,665,286)
B. RECURRENT COSTS (Annual Expenditures)							
1. Maintenance: Assume 1.00% of initial cost for asphaltic concrete							
2. $((\$3,551,555 + 21.20\%) \times 0.005) =$						43,009	
3. Maintenance: Assume 0.5% of initial cost for concrete							
4. $((\$6,529,920 + 21.20\%) \times 0.005) =$							39,539
5.							
6.							
Total Annual Costs						43,009	39,539
<i>(An effective rate of 2.50% with 0.00% Interest and 2.50% Escal.)</i> Present Worth Factor						23.1452	23.1452
Present Worth of RECURRENT COSTS						995,458	915,129
C. SINGLE EXPENDITURES							
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)	Year	Amount	PW factor	Present Worth	Present Worth
x		1. Resurface AC (\$2,037,552 + 21.10%)	7	2,467,475	0.8413	2,075,801	-
x		2. Mill & Resurface (\$3,880,229 + 21.10%)	14	4,698,957	0.7077	3,325,580	-
x		3. Resurface AC (\$2,037,552 + 21.10%)	21	2,467,475	0.5954	1,469,101	-
x		4. Mill & Resurface (\$3,880,229 + 21.10%)	28	4,698,957	0.5009	2,353,603	-
	x	5. Replace of 25% of Concrete Pavement (\$6,529,920 + 21.20%)	25	1,976,933	0.5394	-	1,066,339
		6.			1.0000	-	-
		7.			1.0000	-	-
		8.			1.0000	-	-
D. SALVAGE VALUE							
		1.			1.0000	-	-
		2.			1.0000	-	-
Present Worth of SINGLE EXPENDITURES						9,224,085	1,066,339
E. Total Recurrent Costs & Single Expenditures (B + C)						10,219,543	1,981,468
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS							8,238,075
TOTAL PRESENT WORTH COST (A + D)						16,926,235	13,353,446
TOTAL LIFE CYCLE SAVINGS							3,572,789

VALUE ENGINEERING ALTERNATIVE



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
Final Design Stage

ALTERNATIVE NO.:
31

DESCRIPTION: PROVIDE A TWO-LANE RIGHT-OF-WAY AND ROADWAY FROM
 STATE ROUTE 109 TO THE BEGINNING OF THE “EXCEPTION”
 AND A FOUR-LANE RIGHT-OF-WAY AND ROADWAY FROM
 “EXCEPTION” TO ORCHARD HILL ROAD

SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The current project proposes to construct a two-lane rural, limited access roadway with a four-lane right-of-way from State Route (SR) 109 to Orchard Hill Road. For Orchard Hill Road the project proposes a four-lane road with a four-lane right-of-way to the end of the project at Whitesville Road/SR 219.

ALTERNATIVE:

Construct a two-lane roadway with a two-lane right-of-way from the beginning of the project at SR 109 to the beginning of the “exception” and then construct a four-lane road with a four-lane right-of-way from the end of the “exception” to Old Orchard Road. It is noted that Pegasus Parkway is already designed for a four-lane road to the end of the project at Whitesville Road/SR 219.

ADVANTAGES:

- Capacity matches expected traffic volumes
- Reduces right-of-way requirements
- May reduce construction time

DISADVANTAGES:

- Increases initial costs
- More difficult to expand the two-lane section in the future (although it may not be needed)

DISCUSSION:

Instead of the proposed average 230-foot right-of-way width, the use of a 125-foot wide right-of-way for the two-lane section would still allow the expansion to four lanes in the future if a 24-foot median, 12-foot shoulder, and a right-turn lane are employed. This configuration will not allow for two travel lanes in the median, as it has been shrunk from 44 feet to 24 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,831,341	—	\$ 1,831,341
ALTERNATIVE	\$ 2,546,406	—	\$ 2,546,406
SAVINGS	\$ (715,065)	—	\$ (715,065)

CALCULATIONS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP
 Troup County, Georgia Department of Transportation, District 3
 Final Design Stage

ALTERNATIVE NO.:

31

SHEET NO.: 2 of 3

Instead of acquiring 250' of R/W, acquire only half the R/W width (125') from beginning of the project to the beginning of Exception. The length of this segment is 15,317.34'. Total area saved = $125 \times 15,317.34 = 43,955 \text{ AC}$
 43,560

THE AVERAGE LAND VALUE IS ~ \$12,000/AC.

the savings will be: \$527,460 At 247% mark-up,
 the saving will be: \$1,831,341.

The cost to construct one lane, one mile is \$1,085,000 [See Alternate #1].

The length from end of Exception to Orchard Hill Road is 5,081 feet. The cost to 4 lane it will be

$$1,085,000 \times 2 \times \frac{5081}{5240} = \$1,085,000 \times 2 \times 0.969 = \$2,102,730$$

with 21.10% mark-up, the cost will be: \$2,541,406

Thus, the net cost for this alternate suggestion is = $1,831,341 - 2,541,406 =$
 (\$715,065)

PROJECT DESCRIPTION

PROJECT LOCATION AND DESCRIPTION

STP-2921(4), P. I. No. 350990 known as the South LaGrange Loop, begins at the intersection of State Route (SR) 109 and Fling Road/County Road (CR) 121 in Troup County. The project then travels south to east, to the intersection of Whitesville Road/SR 219 and Pegasus Parkway/CR 304. The proposed typical section for the South LaGrange Loop is a rural two-lane roadway with open ditch drainage on a four-lane right-of-way that averages 230 linear feet (LF) wide. At the beginning, the project extends southward just east of Fling Road/CR 121 on a new alignment crossing under the CSX Railroad and proceeds for approximately 2.80 miles to the intersection of United States Route (US) 29/SR 14 and Old West Point Road. It then proceeds eastward, bridging a second CSX Railroad line and a tributary of the Blue John Creek. Beyond this bridging, the project continues eastward to Pegasus Parkway. At that point the concept would widen on the north side of Pegasus Parkway/CR 304 to the end of the project. The total length of the concept is about 6.16 miles. However, the portion of the project between the Tributary of the Blue John Creek and just west of the Wiley Road intersection, a distance of about 2.081 miles, is excluded from this Value Engineering Study.

NEED AND PURPOSE

The proposed project, STP-2921(4), involves the construction of 4.079 miles of a two-lane connector route on new location from the intersection of SR 109 and Fling Road/CR 121 to Pegasus Parkway/CR 304 in LaGrange. This route will provide vital connectivity and access between the industrial areas on the west and south sides of the city. The Chattahoochee-Flint Regional Development Center has confirmed that growth in this industrial sector of LaGrange has met or exceeded the expectations for future growth that were made in the early 1990s. The subject project was identified in the 1990 Troup County transportation study, and as a result, was listed as one of the county's top priorities. Construction of the South LaGrange Loop will assist in providing improved access and connectivity of this area of the city.

Project STP-2921(4) completes a connection between US 29/SR 14 and Whitesville Road/SR 219. In the city of LaGrange, Whitesville Road / SR 219 ties into US 27/SR 1; this is a Governor's Road Improvement Program (GRIP) route that extends from the Georgia/Florida to the Georgia/Tennessee state lines. Furthermore, Whitesville Road/SR 219 also connects to US Interstate Highway 85 (I-85), a north-south connector between Virginia and Alabama. The subject project will improve access to both the GRIP route for LaGrange's industries, its employees, and I-85.

CONSTRUCTION COSTS

The probable cost of construction for STP-2921(4), P. I. No. 350990, project is based on Moreland Altobelli Associates, Inc.'s cost estimate dated March 2007 and is listed as \$23,343,881. This figure is comprised of: (1) construction subtotal at \$14,777,360 and (2) right-of-way costs of \$8,566,521.

However, the design team did not provide for two important markup factors: engineering and construction at 10.00% and escalation at 10.09% based on 8.00% per year for 1.25 years to the mid-point of construction. These markup factors increase the cost of construction to \$17,895,529 and by adding the aforementioned right-of-way cost of \$8,566,521, a resultant grand total of \$26,461,781 is attained.

VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

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

- Value Engineering Study Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Histograms
- Function Analysis
- Creative Idea Listing and 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

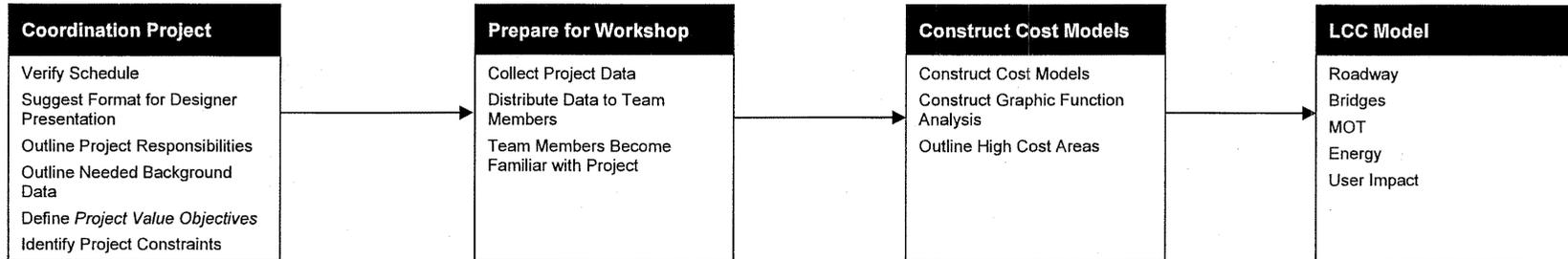
The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It includes six phases:

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

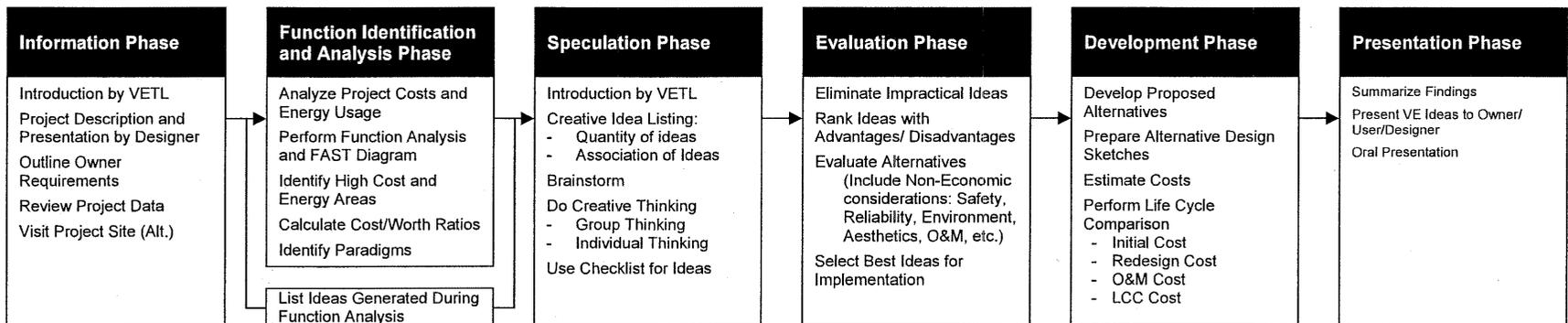


Value Engineering Study Task Flow Diagram

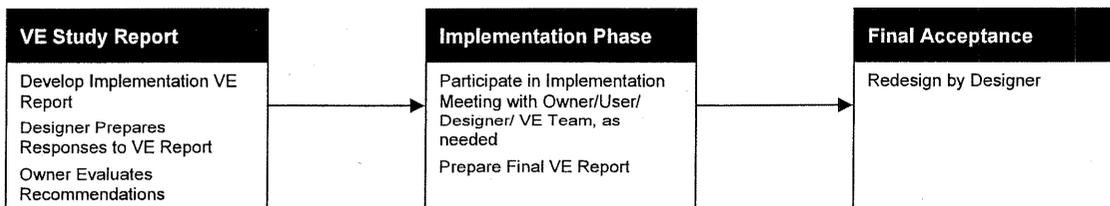
Preparation Effort



Workshop Effort



Post-Workshop Effort



Information Phase

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

- Approved Project Concept Report, Department of Transportation, State of Georgia, Office of Preconstruction for ST-00MS(54), Troup County, P. I. No. 350990, South LaGrange Loop; dated March 5, 1998
- Half Size Drawings, entitled Plan and Profile of Proposed South LaGrange Loop; Troup County, Georgia; Federal Aid Project STP-2921-(4); Project No. 350990; prepared by the Moreland Altobelli Associates, Inc. for the State of Georgia Department of Transportation; undated
- General Highway Map, Troup 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
- Preconstruction Status Report for South LaGrange Loop from SR 109SE along Fling and Pegasus to SR 219 – Phase II; Troup County, Georgia; Project ID 350990; run date April 24, 2007
- Preconstruction Status Report for Proposed South LaGrange Loop from Wiley Road to Wiley Road – Phase I; Troup County, Georgia; Project ID 0008292; run date April 24, 2007
- Environmental Commitments/Requirements for project STP-2921(4) and CSSTP-0008-00(292), Troup, P. I. No. 350990 & 0008292, Reevaluation of ROW; prepared by the State of Georgia Department of Transportation Office of Environmental/Location; dated March 3, 2007
- Preliminary Right of Way Cost Estimate for project STP-2921(4), Troup, P. I. No. 350990, South LaGrange Loop 5; prepared by the State of Georgia Department of Transportation office of Right of Way; dated April 11, 2007 and
- Construction Cost Estimate for South LaGrange Loop (Phase I), Project No. STP-2921(4), Troup County, Length 4.079 miles; Phase II VE Study; dated March 2007.

Function Identification and Analysis Phase

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

Speculation/Creative Phase

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

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

Evaluation Phase

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

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

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

Development Phase

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

Presentation Phase

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

POST-WORKSHOP EFFORT

The post-study portion of the VE study includes the preparation of this Value Engineering Study Report. Personnel from GDOT and MAAI will analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before

implementation, or presenting reasons for rejection. Lewis & Zimmerman Associates, Inc. is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 28-hour Value Engineering (VE) study on the following projects: **STP-2921(4), P. I. No. 350990, South LaGrange Loop** from SR 109 to the intersection with SR 219 with Pegasus Parkway. The project is located in the Troup County, Georgia. It is expected the owner, the Georgia Department of Transportation (GDOT) and the design consultant, Moreland Altobelli Associates, Inc. (MAAI), 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 April 24 - 27, 2007. The study will be conducted in the Engineering Services' Conference Room, Room 264 of GDOT's General Office located at No. 2 Capitol Square Street, Atlanta, Georgia 30334. The point-of-contact is Ms. Lisa L. Myers, Design Review Engineer Manager, and Value Engineering Coordinator, who can be reached at 404-651-7468.

Tuesday, April 24th

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

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

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

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

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

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

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

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

Wednesday, April 25th

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, April 26th

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

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

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

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

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

Friday, April 27th

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

9:00 am – 11:00 am **Informal Oral Presentation**

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

11:00 am **Adjourn**

VALUE ENGINEERING WORKSHOP PARTICIPANTS

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

Joseph A. Leoni, PE	Highway Engineer	ARCADIS
Paresh J. Parikh, PE	Construction Specialist / Transportation Engineer	Delon Hampton and Associates
Alex Pascual, PE	Bridge Engineer	HNTB
Luis M. Venegas, PE, CVS-Life, LEED® AP	Value Engineering Facilitator	Lewis & Zimmerman Associates, Inc.

OWNER/DESIGNER PRESENTATION

GDOT, the owner, and the MAAI, design team presented an overview of the project on Tuesday, April 24, 2007. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team “up-to-speed” regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING TEAM'S FINAL PRESENTATION

The VE team conducted an informal oral presentation on Friday, April 27, 2007 to GDOT and MAAI representatives. Copies of the draft Summary of Potential Cost Savings worksheets were provided for interim use by GDOT and MAAI personnel.

A copy of the meeting participants is attached for reference.

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP Troup County, Georgia Department of Transportation, District 3 Final Design Stage		Date: April 24 – 27, 2007
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Marc Mastronardi GDOT Employee No.: em: marc.mastronardi@dot.state.ga.us	Organization: Georgia Department of Transportation (GDOT), Office of Construction Title: Construction Liaison	ph: 404-656-5306 cell: fx: 404-657-0783
Name: M. Brad McManus, PE GDOT Employee No.: em: brad.mcmanus@dot.state.ga.us	Organization: GDOT, Office of Road & Airport Design Title: Design Group Manager	ph: 404-656-5407 cell: fx: 404-657-0653
Name: Lisa L. Myers GDOT Employee No.: em: lisa.myers@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Design Review Engineer Manager, Value Engineering Coordinator	ph: 404-651-7468 cell: fx: 404-463-6131
Name: Lamar M. Pruitt, Jr. GDOT Employee No.: em: lamar.pruitt@dot.state.ga.us	Organization: GDOT, District 3 Title: Assistant District Engineer / District Construction Engineer	ph: 706-646-6569 cell: 404-274-9199 fx: 706-646-6594
Name: Nasser Rad GDOT Employee No.: em: nasser.rad@dot.state.ga.us	Organization: GDOT, Office of Road & Airport Design Title: Assistant Group Leader	ph: 404-656-5407 cell: fx: 404-657-0653
Name: Laura Rish GDOT Employee No.: em: laura.rish@dot.state.ga.us	Organization: GDOT, Office of Environment / Location Title: NEPA / Environmental Analyst	ph: 404-699-4439 cell: fx: 404-699-4440
Name: Brian K. Summers, PE GDOT Employee No.: em: brian.summers@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Project Review Engineer	ph: 404-656-6846 cell: fx: 404-463-6131
Name: Ken Werho GDOT Employee No.: em: ken.werho@dot.state.ga.us	Organization: GDOT, Office of Traffic Safety and Design Title: Design Review Engineer	ph: 404-635-8144 cell: fx: 404-635-8116
Name: Ron Wishon GDOT Employee No.: em: ron.wishon@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Assistant Project Review Engineer	ph: 404-651-7470 cell: fx: 404-463-6131
Name: Stephen (Steve) W. Wyche GDOT Employee No.: em: steve.wyche@dot.state.ga.us	Organization: GDOT, Office of bridge Design Title: Bridge Design Group Leader	ph: 404-656-5289 cell: fx: 404-451-7076

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP Troup County, Georgia Department of Transportation, District 3 <i>Final Design Stage</i>		Date: April 24 – 27, 2007
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Terry McCollister GDOT Employee No.: em: terrymacarmy@mindpsring.com	Organization: Appraisal Review & Consultants of Georgia, Inc. Title: President, Georgia Certified Appraiser	ph: 404-702-3959 cell: fx:
Name: Shurjal H. Admin, PE GDOT Employee No.: em: samin@maai.com	Organization: Moreland Altobelli Associates, Inc. Title: Project Manager	ph: 770-263-5945 cell: 404-840-2741 fx: 707-263-0166
Name: Joseph (Joe) A. Leoni, PE GDOT Employee No.: em: joe.leoni@arcadis-us.com	Organization: ARCADIS Title: Project Manager, Roadway QA/ QC	ph: 770-431-8666 cell: fx: 777-435-2666
Name: Paresh J. Parikh, PE GDOT Employee No.: em: pparikh@delonhampton.com	Organization: Delon Hampton & Associates, Chartered Title: Manager of Engineering Services	ph: 404-524-8030 cell: fx: 404-524-2575
Name: Alex Pascual, PE GDOT Employee No.: em: apascual@hntb.com	Organization: HNTB Title: Structural Engineering / Bridge Engineer	ph: 404-946-5738 cell: 404-683-0608 fx: 404-841-2820
Name: Luis M. Venegas, PE, CVS-Life LEED® AP GDOT Employee No.: em: lvenegas@lza.com	Organization: Lewis & Zimmerman Associates, Inc. Title: Value Engineering Facilitator	ph: 770-992-3032 cell: 678-488-4287 fx: 770-435-2666
Name: GDOT Employee No.: em:	Organization: Title:	ph: cell: fx:
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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 the Moreland Altobelli Associates, Inc. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for planning project period interest rates are based on the following parameters:

Year of Analysis:	2007
Construction Start Up:	±2008 (April)
Construction Duration:	±30 Months (October 2010)
Mid Point of Construction:	±15 Months (July 2009)
Economic Planning Life:	35 years for Pavement
Economic Planning Life:	50 years for Bridges
Discount Rate/Interest:	2.50% (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2007)
Inflation/Escalation Rate:	8.00% (Per GDOT)
Uniform Present Worth (UPW) Factor:	23.1452 for 35 years 28.3623 for 50 years
Cost of Power:	\$0.07 / kWhr (kilowatt hour) (assumed)
Operation and Maintenance Costs (<i>Industry Norms</i>):	
Equipment - With Many Moving Parts	5.00%-5.50%+ of Capital Cost
Equipment - With Minimal Moving Parts	3.50%-4.00% of Capital Cost
Equipment - Electronic	3.00% of Capital Cost
Structural	1.00%-2.00% (or less) of Capital Cost
Composite Mark-Up for Construction:	21.10% (1.2110)
<i>(Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 1.25 years) at 10.09%.)</i>	
Composite Mark-Up (Right-of-Way):	247.20% (2.4720)
<i>(Composed of: Scheduling Contingency at 55.00%; Administration / Court Costs at 60.00%; and Inflation Factor at 40.00 %.)</i>	

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 *South LaGrange Loop (Phase I), STP-2921(4)* construction cost estimate, which was prepared by Moreland Altobelli Associates, Inc. dated March 2007. 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:

- Base and Paving
 - Recycled Asphaltic Concrete
 - Aggregate Base Course
- Grading
 - Unclassified Excavation
 - Borrow Excavation
- Drainage
 - Storm Piping
 - Stone Dumped Rip Rap

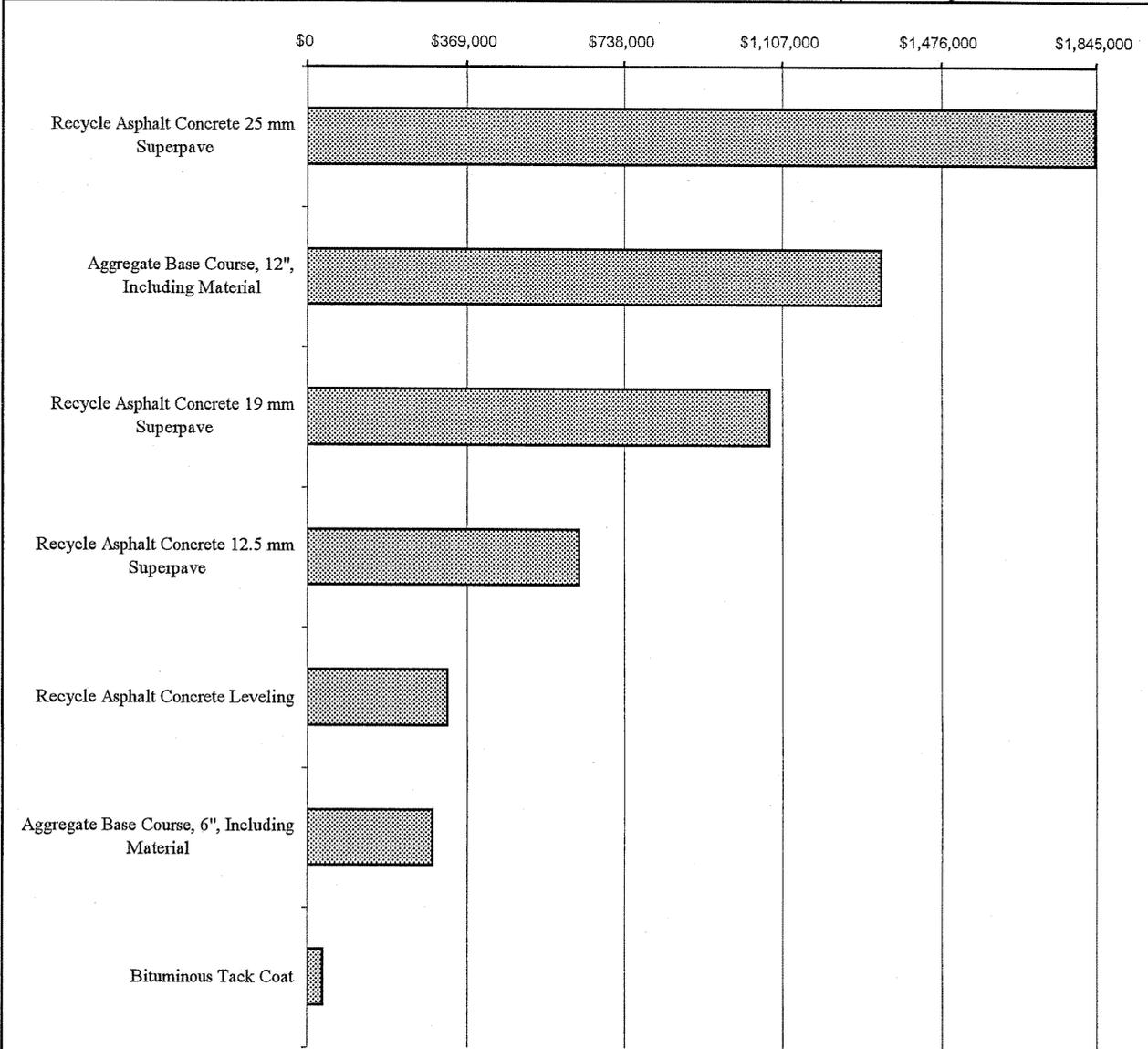
DESIGNER'S COST ESTIMATE

The cost estimate, as described above, did contain sufficiently detailed information to perform a VE when considering the current preliminary design stage.

COST HISTOGRAM

Project: STP-2921(4). P. I. No. 350990, SOUTH LAGRANGE LOOP
Troup County, Georgia Department of Transportation, District 3
Final Design Stage

BASE PAVING AND PAVING	COST	PERCENT	CUM. PERCENT
Recycle Asphalt Concrete 25 mm Superpave	1,842,677	33.27%	33.27%
Aggregate Base Course, 12", Including Material	1,335,961	24.12%	57.40%
Recycle Asphalt Concrete 19 mm Superpave	1,076,764	19.44%	76.84%
Recycle Asphalt Concrete 12.5 mm Superpave	632,115	11.41%	88.25%
Recycle Asphalt Concrete Leveling	325,000	5.87%	94.12%
Aggregate Base Course, 6", Including Material	289,255	5.22%	99.34%
Bituminous Tack Coat	36,373	0.66%	100.00%
Construction Subtotal	\$ 5,538,145	100.00%	
Engineering and Construction at	10.00%	\$ 553,815	
Inflation Rate at 8.00%* per annum for 1.25 years to mid point of construction	10.09%	\$ 614,679	Construction
Construction Total	\$ 6,706,638	Mark-Up:	21.10%



Costs in graph are not marked-up. Inflation rate established by GDOT based on recent experience.

FUNCTION ANALYSIS

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

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

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

This F.A.S.T. diagram notes the critical function paths and identifies the projects' basic functions as ACCOMMODATING/KNOWN GROWTH and by Creating/New Capacity and Diverting Traffic Flow. The F.A.S.T. diagram is included at the end of this section of the report.

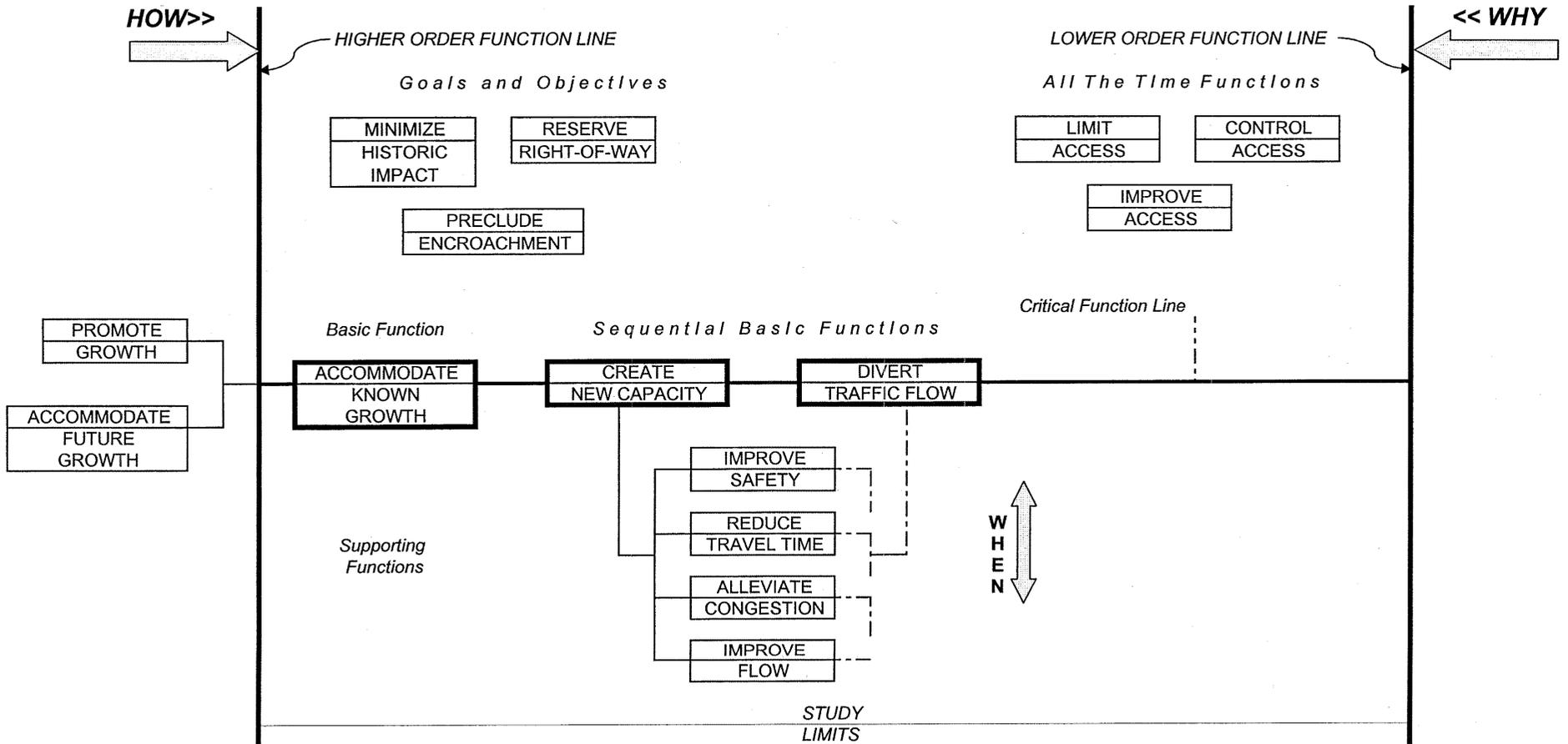
FUNCTION ANALYSIS SYSTEMS TECHNIQUE (F. A. S. T.)



SOUTH LAGRANGE LOOP

STP-2921(4), P. I. No. 350990

Georgia Department of Transportation, District 3
Troup County, Georgia



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

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

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

CREATIVE IDEA LISTING



NO.	IDEA DESCRIPTION	RATING
<div style="display: flex; justify-content: space-between;"> <div style="width: 70%;"> PROJECT: STP-2921(4), P. I. No. 350990, SOUTH LAGRANGE LOOP Troup County, Georgia Department of Transportation, District 3 <i>Final Design Stage</i> </div> <div style="width: 25%; text-align: right;"> SHEET NO.: 1 of 2 </div> </div>		
1	Shorten the end of Pegasus Parkway / CR 304 to Whitesville Road / SR 219	4
2	Four-lane the entire project	3
3	Buy only two-lane right-of-way	3
4	Clear and grub the right-of-way for four lanes	4
5	Locate a utilidor to preclude future conflicts	DS
6	Build new two-lanes and keep existing for MOT [Maintenance of Traffic]	5
7	Eliminate third lane from Pegasus Parkway / CR 304 between Old Hutchison Road and Orchard Hill Road	4
8	Reconfigure terminus at US 29 / SR 14 – provide for a continuous bypass	2
9	Reduce the width of Pegasus Parkway / CR 304 between Orchard Hill Road and Whitesville Road / SR 219	4
10	Divide project into two project – either side of “exception”	DS
11	Allow left turn movement from Old Hutchison Road onto Pegasus Parkway / CR 304	4
12	Widen railroad bridge over the mainline	1
13	Reconfigure US 29 / SR 14 and Old West Point Road intersection	4
14	Minimize dedicated lanes at the US 29 / SR 14 and Old West Point Road intersection	4
15	Eliminate driveways into acquired properties	4
16	Reconfigure the beginning of the project – tie into Old West Point Road farther west on SR 109	2
17	Reduce the amount of improvements on SR 109	4
18	Eliminate the crown on typical section	DS
19	Provide grading for four lanes	4
20	Use 24-foot median in lieu of 44-foot median	5
21	Design project as an Urban Section	2
22	Provide a multiuse trail	1
23	Have the mainline go over the CSX Railroad	2+
24	Shorten CSX Railroad bridge for only two lanes vs. four lanes	3
25	Grade separate the Old West Point Road and US 29 / SR 14 intersection	4
26	Bridge over Orchard Hill Road	2

Rating: 1 → 2 = Not to be Developed; 3 – 4 = Varying Degree of Development Potential; 5 = Most Likely to be Developed;
 DS = Design Suggestion; ABD = Already Being Done; N/A = Not Applicable

