Georgia Department of Transportation

US 1/SR 4 Widening and Oak Park Bypass

EDS-545(14)(17)(18) Toombs and Emanuel Counties

P.I. Nos. 522130, 221900, 221910

Value Engineering Study Report

Preliminary Design Stage

August 2007

Design Consultants

QK4 Architecture Engineering Construction

B&E JACKSON

Value Engineering Consultant

Lewis & Zimmerman Associates, Inc.

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August 22, 2007

Ms. Lisa L. Myers
Design Review Engineer Manager
Georgia Department of Transportation - General Office
No. 2 Capitol Square, Room 265
Atlanta, Georgia 30334

re: EDS-545(14) (17) (18) US 1/SR 4 Widening and Oak Park Bypass Project (P.I. Nos. 522130, 221900, 221910), Toombs and Emanuel Counties, Georgia
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. (LZA) is pleased to submit four hard copies and one CD of the referenced value engineering (VE) study report. The report documents the results of the VE study conducted August 7-10, 2007 with members of ARCADIS U.S., Inc., HNTB Corporation and Delon Hampton & Associates.

The VE team developed 14 alternatives and six design suggestions for consideration that generally fall into the following five categories:

1. Lowering the selected design speed;
2. Improving the project's eight side road intersections;
3. Improving the Oak Park bypass' ability to promote economic development;
4. Improving the three Oak Park side road connections; and
5. Improving the three independent alignments in the current design.

The VE alternatives have the potential to generate $3-11 million in capital cost savings for this $67 million project. Nearly $1 million in capital cost increases that could improve constructability, economic development and operations have also been suggested.

We thank you, other GDOT staff, and the design team for assisting the VE team in completing this assignment. Please do not hesitate to call upon LZA for assistance in implementing the alternatives presented.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

George Hunter, PE, PMP, CVS
Vice President

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report summarizes the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the EDS-545(14) (17) (18) US 1/SR 4 Widening and Oak Park Bypass project (P.I. No 522130, 221900, 221910) being designed by QK4, B&E Jackson, and associated firms. Contract (14) is currently at the Preliminary Field Plan Review (PFPR) stage with completed right-of-way plans, while Contracts (17) and (18) are at the preliminary plan design phase.

The VE study was conducted August 7-10, 2007 in the GDOT headquarters office in Atlanta using a multidisciplinary team comprised of highway design, structures and construction professionals. The team followed the six-phase VE Job Plan to guide its deliberations:

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

PROJECT DESCRIPTION

The EDS-545(14) (17) (18) US 1/SR 4 Widening and Oak Park Bypass project (P.I. No 522130, 221900, and 221910) is part of the Governor's Road Improvement Program (GRIP) that provides multi-lane access to areas not served by the interstate highway system. This project, consisting of three contracts covered under a single environmental document approved on February 12, 2007, proposes to convert a two-lane conventional highway to a divided four-lane facility with a grassed median varying in width from 32 ft. to 44 ft. It will serve a major north-south corridor in the eastern section of the state.

The southern project terminus in Contract (14) begins at SR 130 in Toombs County while the northern terminus in Contract (18) is located just south of Interstate 16 in Emanuel County. The project includes a 2-mile bypass, Contract (17), that avoids widening though the town of Oak Park. The total length of the project is 12.5 miles and the current estimated project cost is $60.6 million for construction costs and $6.7 million for right-of-way, for a total of $67.3 million. Contract (14) is scheduled to advertise first and will be followed by Contracts (17) and (18) one to two years later.

CONCERNS AND OBJECTIVES

The VE study focused on the following issues:

1. The impact of GDOT's decision to increase the design speed for the GRIP program from 55 mph to 65 mph at this project location.
2. Review of the project's eight side road intersections with the proposed four lane facility in terms of quality of connection, particularly the skew angle.
3. The effectiveness of the Oak Park bypass in promoting economic development within the US 1 corridor.
4. The quality and function of three proposed side road connections for the Oak Park bypass that tie US 1 (the proposed bypass) and BUS 1 (old US 1).
5. The independent alignments in Contract (14) due to the avoidance of the Union Camp Tax Department historical property, the curve correction at the Harrell Cemetery Road side road, and the curve correction at the Pine Log Road side road.

Since Contract (14) has completed right-of-way plans while Contracts (17) and (18) are at the preliminary plan phase, modifications to the footprint for Contract (14) may require right-of-way plan modifications. For this reason the design team and owner requested that the VE team concentrate on Contracts (17) and (18).

RESULTS

The VE team explored 38 ideas that could enhance the value of the project and address the project issues identified. Evaluation and research of the ideas yielded 14 technically feasible alternatives with definable cost implications, and six design suggestions that will improve the project in areas other than cost such as operations, safety, constructability, reliability, etc., or produce non-quantifiable cost reductions.

The key alternatives and design suggestions that address the key issues described above are described below.

- Alternative Number (Alt. No.) TS-1 reduces the current design speed selected for this project (and all GRIP projects) from 65 mph to 55 mph. This reduction would increase the amount of existing roadbed (especially in Contract (14)) to be retained and resurfaced, thereby reducing the overall project cost by approximately $11 million. The corridor north of I-16 is currently designed for 65 mph. However, the VE team believed that the physical boundary of I-16 is sufficient to impact driver perception for the 65 mph to 55 mph transition. Other speed management measures could also be employed to manage the speed reduction.
- Alt. No. B-1 revises the varying span arrangements at the Ohoopee River Bridge to consistent 60 ft. spacing and allows all pile intermediate bents. This arrangement avoids the existing footings, as is the intent in the current design, and simplifies the construction of the bents while reducing costs.
- Alt. No. RCR-2B proposes a consistent 32-ft.-wide median throughout the 12.5 miles (Contracts (14), (17) and (18)). The 32-ft. median is required wherever the permitting agencies have identified wetlands. This alternative would eliminate only the two-mile-long 44-ft.-wide median segment in Contract (14).

- Alt. Nos. MR-1/2, MR-3 and MR-4 revise the current independent alignments as follows:
  - Alt. No. MR-1/2 pulls in the proposed roadway alignment running east of the historical property at the Union Camp Tax Department by 88 ft. This new offset is achieved by flattening the curves to 5,000 ft. and eliminating the need for a superelevation that, in turn, allows a short tangent (500 ft.±) between reversing curves.
  - Alt. No. MR-3 similarly pulls in the east offset in front of the historic property by providing a gradual west side to east side widening transition at a location south of the current design's transition.
  - Alt. No. MR-4 keeps the alignment to the west by creating a long independent alignment between mainline curve #8 and mainline curve #11.
- Alt. Nos. MR-7 and MR-8 tighten the curves at the Pine Log Road and Harrell Cemetery Road curve correction locations with radii that conform to a 65 mph design speed and use a 6% maximum superelevation rate. This change reduces the amount of right-of-way purchased and reduces the maintenance and liability associated with retaining the old roadbed in operation.
- Modifications suggested to two of the three proposed side road connections for the Oak Park bypass that tie US 1 (the proposed bypass) and BUS 1 (old US 1) are as follows:
  - Alt. No. II-1b eliminates the southernmost connection (roadway not named on the plans) because it does not provide a logical connection between SR 86 (S), BUS 1 and US 1, whereas the next connection to the north, Railroad Avenue, does.
  - Alt. No. II-3 simplifies the connection between SR 86(N), BUS 1 and US 1 by moving the connection north of the current location and creating continuation (no intersections) between US 1 and SR 86 (N). An option within this alternative, is to retain J.M. Kersey Road with the condition that it terminates on each side of the proposed bypass (US 1). This alternative would save approximately $1 million in initial investment and improve the land development potential for the community of Oak Park at the north end of the bypass.

Alternatives that require more initial investment include:

- Alt. No. B-3 that proposes to reduce the number of bents on the Ohoopee River Bridge by using 120 spans to reduce schedule delay risks associated with construction in the floodplain.
- Alt. No. BOP-2 that suggests increasing the separation between US 1 and BUS 1 for the Oak Park Bypass. It requires an additional $350,000 in initial costs and a re-evaluation of the environmental document. This alternative's intent is to further enhance the potential for Oak Park economic development, a major objective of the GRIP program.
- Alt. No. II-4 that suggests signalizing the SR 130 intersection. The traffic movements appear high enough to warrant a signal.

Each of the alternatives and design suggestions are summarized on the attached Summary of Potential Cost Savings table. Note that the alternatives were developed independently of each other, thus the total potential cost savings achievable is dependent on the combination of alternatives selected for implementation.

The following sets of alternatives represent the range of cost savings available by combining some of the alternatives:

ALT. NO.	DESCRIPTION	INITIAL COST SAVINGS
VE SET 1: REDUCE DESIGN SPEED TO 55 MPH, MODIFY OHOOPEE BRIDGE SPAN ARRANGEMENTS, USE ONE MEDIAN WIDTH, AND MODIFY BYPASS CONNECTIONS		
TS-1	Reduce project design speed to 55 mph	$ 11,449,115
B-1	Create all equal span lengths and all pile intermediate bents at the US 1 bridge over the Ohoopee River	237,501
RCR-2B	Use a 32-ft median for the entire length of project	238,814
II-1B	Eliminate south SR 86/US 1 connection	253,654
II-3	Realign SR 86 (N) north of current design location and intersect US 1 at STA 204+00	1,108,412
	Subtotal:	**$ 13,287,496**
VE SET 2: MODIFY INDEPENDENT ALIGNMENTS, MODIFY OHOOPEE BRIDGE SPAN ARRANGEMENTS, USE ONE MEDIAN WIDTH, AND MODIFY BYPASS CONNECTIONS		
MR-1 & 2	Modify reversing curves near historic property (Union Camp Tax Department) by shortening tangents between STA 240+00 & STA 278+00 and flattening the curve	$ 750,000
MR-7	Tighten horizontal curve of independent alignment near Pine Log Road	526,713
MR-8	Tighten horizontal curve of independent alignment near Harrell Cemetery Road	128,450
B-1	Create all equal span lengths and all pile intermediate bents at the US 1 over the Ohoopee River bridge	237,501
RCR-2B	Use a 32-ft. median for the length of project	238,814
II-3	Realign SR 86 (N) north of current design location and intersect US 1 at STA 204+00	1,108,412
II-1B	Eliminate south SR 86/US 1 connection	253,654
	Subtotal:	**$ 3,243,544**
MISCELLANEOUS ADDED COST IMPROVEMENTS		
B-3	Minimize number of bents at bridge over Ohoopee River	$ (576,969)
BOP-2	Move Oak Park Bypass west	(346,522)
II-4	Signalize the SR 130/US 1 intersection	(70,000)
	Subtotal:	**$ (993,491)**

Note: The Potential Cost Savings indicated above takes into account the interrelations of the alternatives.

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **EDS-545(14)(17)(18) US 1/SR 4 WIDENING & BYPASS**
Georgia Department of Transportation

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	TYPICAL SECTION (TS)					
TS-1	Reduce project design speed to 55 mph	$ 31,336,985	$ 19,887,870	$ 11,449,115		$ 11,449,115
TS-2	Reduce travel lanes to 11 ft	$ 1,794,016	$ -	$ 1,794,016		$ 1,794,016
	BRIDGES (B)					
B-1	Use all equal span lengths and use all pile intermediate bents at the US 1 bridge over the Ohoopee River	$ 388,861	$ 151,360	$ 237,501		$ 237,501
B-3	Minimize number of bents at Bridge over Ohoopee River	$ 1,225,717	$ 1,802,680	$ (576,963)		$ (576,963)
	REDUCE CLEARZONE REQUIREMENTS (RCR)					
RCR-2B	Use a 32-ft. median for the length of project	$ 239,107	$ -	$ 239,107		$ 239,107
	BYPASS OAK PARK (BOP)					
BOP-2	Move Oak Park Bypass West	$ -	$ 346,522	$ (346,522)		$ (346,522)
	MAXIMIZE USE OF EXISTING RIGHT OF WAY (MR)					
MR-1 & 2	Modify reversing curves near historic property (Union Camp Tax Department) by shortening tangents between STA. 240+00 & STA. 278+00 and flattening the curve	$ 750,000	$ -	$ 750,000		$ 750,000
MR-3	Modify reversing curves near historic property (Union Camp Tax Department) by transitioning widening to the east and paralleling the existing alignment to the north	$ 750,000	$ -	$ 750,000		$ 750,000
MR-4	Modify reversing curves near historic property (Union Camp Tax Department) by placing the new alignment west of the historic property at STA. 245+00	Design Suggestion				
MR-7	Tighten horizontal curve of independent alignment near Pine Log Road	$ 526,713	$ -	$ 526,713		$ 526,713
MR-8	Tighten horizontal curve of independent alignment near Harrell Cemetery Road	$ 128,450	$ -	$ 128,450		$ 128,450

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **EDS-545(14)(17)(18) US 1/SR 4 WIDENING & BYPASS**
Georgia Department of Transportation

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	CONTRACT PACKAGING AND STAGING (CP)					
CP-1	Let Contracts (17) & (18) first followed by Contract (14)	Design Suggestion				
CP-3	Expedite Bypass Contract (17)	Design Suggestion				
CP-4	Let Contracts (14), (17) & (18) as one large contract	Design Suggestion				
	INTERSECTION IMPROVEMENTS (II)					
II-1B	Eliminate south SR 86/US 1 connection	$ 253,654	$ -	$ 253,654		$ 253,654
II-2	Design all "T" intersection approaches at 45 MPH	Design Suggestion				
II-3	Realign SR 86 (North) north of current design location and intersect US 1 at STA. 204+00	$ 1,665,768	$ 557,356	$ 1,108,412		$ 1,108,412
II-4	Signalize the SR 130/US 1 intersection	$ -	$ 70,000	$ (70,000)		$ (70,000)
II-6	Modify Hidden Acre Road intersection with US 1 to a 90 degree skew	Design Suggestion				
II-7	Line up driveway across from Rackett Town Road	Design Suggestion				
II-8	Eliminate the east leg of Pine Log Road and abandon old right-of-way	Design Suggestion				

STUDY RESULTS

GENERAL

The results are the major feature of this value engineering study conducted on the EDS-545(14)(17)(18) US 1/SR 4 Widening and Oak Park Bypass project since they portray the benefits that can be realized by GDOT and the designers. The results will directly affect the project's design and will require coordination between the owner and the design team to determine the disposition of each alternative.

During the VE study, many ideas for potential value enhancement were conceived and evaluated by the team for technical merit, applicability to the project, implementability considering the project's status, and the ability to meet the owner's project value objectives. Research performed on those ideas considered to have potential to enhance the value of the project resulted in the development of individual alternatives identifying specific changes to the project as a whole, or individual elements that comprise the project. These may be in the form of VE alternatives (accompanied by cost estimates) or design suggestions (typically without cost estimates). For each alternative developed the following information is provided:

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

The capital cost comparisons used unit quantities contained in the project cost estimate prepared by the designers, whenever possible. If unit quantities were not available, published data bases, such as the one produced by the RS Means Company, or team member or owner data bases were consulted. A composite markup of 10 %, as described in the Value Analysis and Conclusions section of the report, was used to generate an all-inclusive project cost for the construction items being compared.

Each design suggestion contains the same information as the VE alternatives, except that no cost information is usually included. Design suggestions are presented to bring attention to areas of the design that, in the opinion of the VE team, should be changed for reasons other than cost. Examples of these reasons include improved facility operation, ease of maintenance, ease of construction, safer working conditions, reduction in project risk, etc. In addition, some ideas cannot be quantified in terms of cost with the design information provided; these are also presented as design suggestions and are intended to improve the quality of the project.

Each alternative or design suggestion developed is identified with an alternative number (Alt. No.) to track it through the value engineering process, thus facilitating referencing between the Creative Idea

Listing and Evaluation worksheets, the alternatives, and the Summary of Potential Cost Savings table. The Alt. No. includes a prefix that refers to a category listed below:

Category	Prefix	No. of Ideas
Improve Intersections	II	9
Bypass Oak Park	BOP	5
Reduce Clear Zone Requirements	RCR	3
Maximize Use of Existing Right-of-Way	MR	8
Bridges	B	5
Typical Section	TS	2
Contract Packaging & Staging	CP	4
	Subtotal:	36

Summaries of the alternatives and design suggestions are provided on the Summary of Potential Cost Savings tables. The table is divided into categories for the convenience of the reviewer and divides the results section. The complete documentation of the developed alternatives and design suggestions follow each of the Summary of Potential Cost Savings tables.

KEY ISSUES

Project issues and constraints are listed below by contract:

Contract (14) – south to north:

1. Project and Contract (14) southern limit is adjacent to the Lyons Bypass project
2. SR 130 intersection upgrade and historic property at southeast quadrant of the intersection
3. CR 218 realignment and intersection upgrade
4. CR 219 intersection upgrade (includes wetlands within the vicinity)
5. East side independent alignment to avoid impacts to the Union Camp Tax Department historical property
6. Pendleton Creek Crossing (two parallel bridges for northbound and southbound lanes)
7. CR 220 (Rocket Town Rd.) intersection upgrade – a small lake is also impacted by the widened highway opposite the Rocket Town Road "T" intersection
8. CR 210 (Five Point Rd.) realignment and intersection upgrade
9. Pine Log Road intersection upgrade and connection to a new, west side independent alignment to correct the horizontal curves to accommodate the new 65 mph design speed; old roadbed is being retained
10. Wiggins Road intersection upgrade
11. Harrell Cemetery Road intersection upgrade and connection to a new, east side independent alignment to correct the horizontal curves to accommodate the new 65 mph design speed; old roadbed is being removed
12. Crossing of a substantial drainage system (possible wetlands impacts) opposite the orchard on the west side of the highway
13. Contract (14) northern limit and historical property on the east side of the road

Wetlands and lakes within Contract (14) limits are as follows:

- Between constraints 1 and 2, the alignment impacts a small lake
- Between constraints No. 3 and 8 (CR 218, McIntosh Street to CR 210, Five Points Road) the highway traverses through environmentally sensitive areas with wetlands; the new independent alignment impacts at least one small lake

Contract (17) – south to north:

1. Contract (17) southern project limit and beginning of bypass alignment
2. Bypass alignment crosses Reedy Creek
3. New bypass connection at south end between US 1 (new bypass) and BUS 1 (existing highway).
4. New connection between US 1 and BUS 1 at Railroad Avenue
5. New connection between US 1 and BUS 1 at Normanstown Spur Road
6. New connection between US 1 and SR 86 (N) along the current location J.M. Kersey Road
7. Bypass alignment returns to existing highway and northern contract limits

Wetlands and lakes within Contract (14) limits are as follows:

- The new bypass alignment, south of the south end bypass connection (see Constraint #3 above) traverses through a small lake
- The new bypass alignment, near the Railroad Avenue intersection, traverses through a small lake

The bypass avoids right-of-way impacts to the town of Oak Park, especially the Michael Griffin and J.M. Lindsey historical properties, which would need avoidance alternatives.

Contract (18) – south to north:

1. Contract (18) southern project limit demarcating the northern end of the bypass alignment
2. Southernmost Ohopee River Overflow Bridge
3. Ohopee River Bridge
4. Northernmost Ohopee River Overflow Bridge
5. Side Road A intersection upgrade
6. Northern project and contract limits (ties into four-lane condition just south of I-16)

The project's three independent alignments (alignments not parallel to the existing alignment) created in the current design, all in Contract (14), and described below were a major focus of the VE study:

- East side independent alignment to avoid impacts to the Union Camp Tax Department historical property; old roadbed being retained
- Pine Log Road intersection upgrade and connection to a new, west side independent alignment to correct the horizontal curves to accommodate the new 65 mph design speed; old roadbed being retained

- Harrell Cemetery Road intersection upgrade and connection to a new, east side independent alignment to correct the horizontal curves to accommodate the new 65 mph design speed. Old roadbed being removed.

Another key concern to the VE team is that the implementation of the 65 mph design speed causes the independent alignments and also the sag curve corrections. Retaining the existing highway design speed of 55 mph would eliminate most of the independent roadway alignments (or at least pull them in closer to the existing alignments) and allow for most of the existing roadbed to be overlaid in lieu of being reconstructed.

STUDY OBJECTIVES

Because Contract (14) has completed right-of-way plans while Contracts (17) and (18) plans are at the preliminary phase, the footprint for Contract (14) is not as flexible in terms of VE alternative changes as for Contracts (17) and (18). Thus, the design team and owner requested that the VE team concentrate its efforts on Contracts (17) and (18).

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of 14 alternatives and 6 design suggestions for consideration by GDOT and the design team. The alternatives and design suggestions address the following observations of the VE team:

1. The impact of the Department's decision to increase the highway's design speed for the GRIP program from 55 mph to 65 mph results in a significant impact at this location.
2. The project's eight side road intersections with the proposed four lane facility can be improved in terms of quality of connection, particularly the skew angle.
3. The effectiveness of the Oak Park bypass in promoting economic development within the US 1 corridor is suspect.
4. The quality and function of three proposed side road connections for the Oak Park bypass that tie US 1 (the proposed bypass) and the BUS 1 (old US) can be improved.
5. The independent alignments in Contract (14): Union Camp Tax Department historical property avoidance, the curve correction at the Harrell Cemetery Road side road and the curve correction at the Pine Log Road side road can be avoided or their impacts minimized.

Key alternatives and design suggestions that address these concerns are:

- Alt. No. TS-1 reduces the current design speed selected for this project (and all GRIP projects), from 65 mph to 55 mph. This reduction would increase the amount of existing roadbed (especially in Contract (14)) to be retained and resurfaced, thereby reducing the overall project cost by approximately $11 million. The corridor north of I-16 is currently designed for 65 mph. However, the VE team believed that the physical boundary of I-16 is sufficient to impact driver

perception for the 65 mph to 55 mph transition. Other speed management measures could also be employed to manage the speed reduction.

- Alt. No. B-1 revises the varying span arrangements at the Ohoopee River Bridge to consistent 60 ft. spacing and allows all pile intermediate bents. This arrangement avoids the existing footings, as is the intent in the current design, and simplifies the construction of the bents while reducing costs.
- Alt. No. RCR 2B proposes a consistent 32 ft.-wide median throughout the 12.5 miles (Contracts (14), (17) and (18)). The 32 ft. median is required wherever the permitting agencies have identified wetlands. This alternative would eliminate only the two-mile-long 44-ft.-wide median segment in Contract (14).
- Alt. Nos. MR-1/2, MR-3 and MR-4 revise the current independent alignments as follows:
  - Alt. Nos. MR-1/2 pulls in the proposed roadway alignment running east of the historical property at the Union Camp Tax Department by 88 ft. This new offset is achieved by flattening the curves to 5,000 ft. and eliminating the need for a super elevation that in turn allows a short tangent (500 ft.$\pm$) between reversing curves.
  - Alt. No. MR-3 similarly pulls in the east offset in front of the historic property by providing a gradual west side to east side widening transition at a location south of the current design's transition.
  - Alt. No. MR-4 keeps the alignment to the west by creating a long independent alignment between mainline curve #8 and mainline curve #11.
- Alt. Nos. MR-7 and MR-8 tighten the curves at the Pine Log Road and Harrell Cemetery Road curve correction locations with radii that conform to a 65 mph design speed and use a 6% maximum super elevation rate. This change reduces the amount of right-of-way purchased and reduces the maintenance and liability associated with retaining the old roadbed in operation.
- Modifications suggested to two of the three proposed side road connections for the Oak Park bypass that tie US 1 (the proposed bypass) and BUS 1 (old US 1) are as follows:
  - Alt. No. II-1b eliminates the southernmost connection (roadway not named on the plans) because it does not provide a logical connection between SR 86 (S), BUS 1 and US 1, whereas the next connection to the north, Railroad Avenue, does.
  - Alt. No. II-3 simplifies the connection between SR 86(N), BUS 1 and US 1 by moving the connection north of the current location and creating continuation (no intersections) between US 1 and SR 86 (N). An option within this alternative, is to retain J.M. Kersey Road with the condition that it terminates on each side of the proposed bypass (US 1). This alternative would save approximately $1 million in initial investment and improves the land development potential for the community of Oak Park at the north end of the bypass.

Alternatives that require more initial investment include:

- Alt. No. B-3 that proposes to reduce the number of bents on the Ohoopee River Bridge by using 120 spans to reduce schedule delay risks associated with construction in the floodplain.
- Alt. No. BOP-2 that suggests increasing the separation between US 1 and BUS 1 for the Oak Park Bypass. It requires an additional $350,000 in initial costs and a re-evaluation of the environmental document. This alternative's intent is to further enhance the potential for Oak Park economic development, a major objective of the GRIP program.
- Alt. No. II-4 that suggests signalizing the SR 130 intersection. The traffic movements appear high enough to warrant a signal.

Each of the alternatives and design suggestions are summarized on the table entitled Summary of Potential Cost Savings. Note that the alternatives were developed independently of each other, thus the total potential cost savings achievable is dependent on the combination of alternatives selected for implementation.

The following sets of alternatives represent the range of cost savings available by combining some of the alternatives:

ALT. NO.	DESCRIPTION	INITIAL COST SAVINGS
VE SET 1: REDUCE DESIGN SPEED TO 55 MPH, MODIFY OHOOPEE BRIDGE SPAN ARRANGEMENTS, USE ONE MEDIAN WIDTH, AND MODIFY BYPASS CONNECTIONS		
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B-1	Create all equal span lengths and all pile intermediate bents at the US 1 bridge over the Ohoopee River	237,501
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II-1B	Eliminate south SR 86/US 1 connection	253,654
II-3	Realign SR 86 (N) north of current design location and intersect US 1 at STA 204+00	1,108,412
	Subtotal:	**$ 13,287,496**
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MR-1 & 2	Modify reversing curves near historic property (Union Camp Tax Department) by shortening tangents between STA 240+00 & STA 278+00 and flattening the curve	$ 750,000
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II-1B	Eliminate south SR 86/US 1 connection	253,654
	Subtotal:	**$ 3,243,544**
MISCELLANEOUS ADDED COST IMPROVEMENTS		
B-3	Minimize number of bents at bridge over Ohoopee River	$ (576,969)
BOP-2	Move Oak Park Bypass west	(346,522)
II-4	Signalize the SR 130/US 1 intersection	(70,000)
	Subtotal:	**$ (993,491)**

Note: The Potential Cost Savings indicated above takes into account the interrelations of the alternatives.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

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

All alternatives and design suggestions were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some are "mutually exclusive," so acceptance of one may preclude the acceptance of another. In addition, some of the alternatives may be interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative. Design suggestions could also be interrelated thus precluding a part of one or more suggestions from being implemented if another design suggestion is also implemented.

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

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **EDS-545(14)(17)(18) US 1/SR 4 WIDENING & BYPASS**
Georgia Department of Transportation

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	TYPICAL SECTION (TS)					
TS-1	Reduce project design speed to 55 mph	$ 31,336,985	$ 19,887,870	$ 11,449,115		$ 11,449,115
TS-2	Reduce travel lanes to 11 ft	$ 1,794,016	$ -	$ 1,794,016		$ 1,794,016
	BRIDGES (B)					
B-1	Use all equal span lengths and use all pile intermediate bents at the US 1 bridge over the Ohoopee River	$ 388,861	$ 151,360	$ 237,501		$ 237,501
B-3	Minimize number of bents at Bridge over Ohoopee River	$ 1,225,717	$ 1,802,680	$ (576,963)		$ (576,963)
	REDUCE CLEARZONE REQUIREMENTS (RCR)					
RCR-2B	Use a 32-ft. median for the length of project	$ 239,107	$ -	$ 239,107		$ 239,107
	BYPASS OAK PARK (BOP)					
BOP-2	Move Oak Park Bypass West	$ -	$ 346,522	$ (346,522)		$ (346,522)
	MAXIMIZE USE OF EXISTING RIGHT OF WAY (MR)					
MR-1 & 2	Modify reversing curves near historic property (Union Camp Tax Department) by shortening tangents between STA. 240+00 & STA. 278+00 and flattening the curve	$ 750,000	$ -	$ 750,000		$ 750,000
MR-3	Modify reversing curves near historic property (Union Camp Tax Department) by transitioning widening to the east and paralleling the existing alignment to the north	$ 750,000	$ -	$ 750,000		$ 750,000
MR-4	Modify reversing curves near historic property (Union Camp Tax Department) by placing the new alignment west of the historic property at STA. 245+00	Design Suggestion				
MR-7	Tighten horizontal curve of independent alignment near Pine Log Road	$ 526,713	$ -	$ 526,713		$ 526,713
MR-8	Tighten horizontal curve of independent alignment near Harrell Cemetery Road	$ 128,450	$ -	$ 128,450		$ 128,450

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**TS-1**
DESCRIPTION:	**REDUCE PROJECT DESIGN SPEED FROM 65 MPH TO 55 MPH**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN:

The highway will be designed for 65 mph, but the posted speed will be 55 mph when opened to traffic.

ALTERNATIVE:

Use a project design speed of 55 mph, and post speed at 55 mph.

ADVANTAGES:

- Uses more of existing alignment
- Allows use of existing pavement with an overlay
- Safer speed
- Less right-of-way required
- Less wetland impacts
- Design matches posted speed

DISADVANTAGES:

- Goes against legislated, directed 65 mph GRIP "rules"

DISCUSSION:

This project starts at I-16, making it the beginning of the GRIP corridor. By implementing this change, the design speed would match the posted speed. A design speed of 65 mph is considered excessive for this area with and result in major modifications to the existing road and significant costs. This alternative has a pronounced impact on costs, especially for Contract (14).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 31,336,985	—	$ 31,336,985
ALTERNATIVE	$ 19,887,870	—	$ 19,887,870
SAVINGS (Original minus Alternative)	$ 11,449,115	—	$ 11,449,115

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: JS-1

Proposed By Project.

SHEET NO.: 2 of 4

→ Assume Simple widening to one side for #14

→ Assume No savings in #17 (Bypass) & #18 (Straight).

Per Detailed Estimate for #14

Pavement & Agg. = $1,061,055 + $5,904,970 + $28,380 + $318,800 + $2,245,490 + $6,533,509 + $2,743,355 + $138,228

= $18,973,787

Total Cut/Fill = $2,524,341 + $568,176

= $2,892,517.

C & G = $2,000,000

→ Assume No Appreciable cost savings on Erosion Control and Drainage.

R/W = $4,621,851

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: TS-1

SUGGESTED By V.E. TEAM.

SHEET NO.: 3 of 4

C & G $\cong$ 75% $\therefore$ $1,500,000

PAVEMENT$_1$ = (STA 115+11.96 − STA 579+04) (30') $(\frac{1}{9})$ (SINCE SAID PAVE IS THINNER)

= 154,640 SY

COST = (154,640)(34^{36} + 19^{30}) + (154,640)(15^{22}) (FULL DEPTH ← , OVERLAY ←)

= $ 10,617,582

EARTHWORK = (WIDTH = 24+32+10+6)(57904 − 11512)(3') $(\frac{1}{27})$ (LENGTH, AVG DEPTH.)

$\cong$ 371,150 CY

25% @ Borrow. $\cong$ $ 578,100

75% @ Excav $\cong$ $ 1,464,200

TOTAL $2,042,300

R/W = $3,920,000

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: TS-1
Georgia Department of Transportation

SHEET NO.: 4 of 4

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
PAVEMENT + AGG.	SEE CALCS			$18,973,800	SEE CALCS		$10,617,582
EARTHWORK	SEE CALCS			$2,892,517	SEE CALCS		$2,042,300
C & G	LS	2,000,000	1	$2,000,000	1,000,000	1	$1,500,000
R/W	LS	$4,621,851	1	$4,621,851	$3,920,000	1	$3,920,000
Subtotal				$28,488,168			$18,079,882
Markup (%) at 10%				$2,848,817			$1,807,988
TOTAL				$31,336,985			$19,887,870

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**TS-2**
DESCRIPTION:	**REDUCE TRAVEL LANES FROM 12 FEET TO 11 FEET WIDE**	SHEET NO.:	**1 of 6**

ORIGINAL DESIGN:

The original design has two 12-ft. travel lanes in each direction.

ALTERNATIVE: (Sketch attached)

Design for 11-ft. travel lanes (22 ft. total each direction).

ADVANTAGES:

- Less pavement. The pavement cost is ½ of overall cost

DISADVANTAGES:

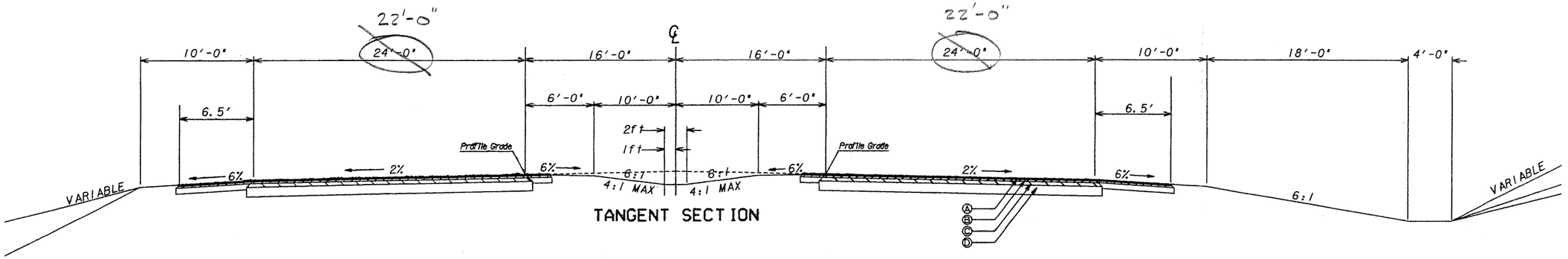
- Reduces safety

DISCUSSION:

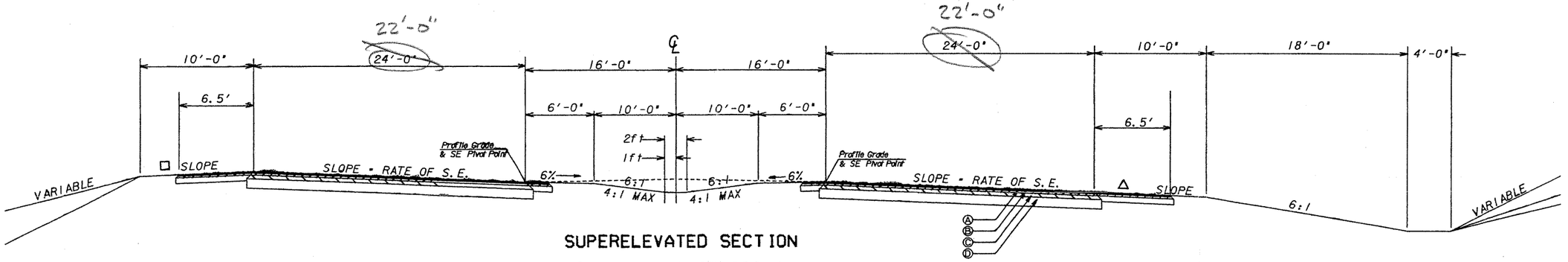
Eleven-ft. lanes, while slightly reducing safety, greatly reduce construction cost. The cost reduction makes this alternate worth investigating.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,794,016	—	$ 1,794,016
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 1,794,016	—	$ 1,794,016

TYPICAL SECTION NO. 3



TANGENT SECTION



SUPERELEVATED SECTION
STA. 144+00 TO 338+00
STA. 533+00 TO 576+00

SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	--	0-10'
3:1	--	--
2:1	ALL	OVER 10'

REQUIRED PAVEMENT
- Ⓐ ASPHALTIC CONCRETE 12.5 mm SUPERPAVE
- Ⓑ ASPHALTIC CONCRETE 19 mm SUPERPAVE
- Ⓒ ASPHALTIC CONCRETE 25 mm SUPERPAVE
- Ⓓ GRADED AGGREGATE BASE
- Ⓔ ASPHALTIC CONCRETE LEVELING, AS REQ'D

△ SLOPE 3/4" / 1'-0" OR RATE OF S.E. WHICHEVER IS GREATER

□ SLOPE AS FOLLOWS:
- S.E. RATE OF 0.03'/FT OR LESS USE 1/2" IN 1'-0"
- S.E. RATE OF 0.04'/FT, USE 3/8" IN 1'-0"
- S.E. RATE OF 0.05'/FT, USE 1/4" IN 1'-0"
- S.E. RATE OF 0.06'/FT, USE 1/8" IN 1'-0"
- S.E. RATE OF 0.08'/FT, USE +0.01'/FT

ALGEBRAIC DIFFERENCE IN PAVING AND SHOULDER SLOPES NOT TO EXCEED 0.08'/FT

ALTERNATIVE DESIGN

GEORGIA DEPARTMENT OF TRANSPORTATION

• Engineering
• Architecture
• Planning
• Construction Management
3169 Holcomb Bridge Road
Suite 455
Atlanta, Georgia 30071
(404) 239-5900

SCALE IN FEET
0 5 10 20

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN
TYPICAL SECTIONS

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$$

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: TS-2

SHEET NO.: 3 of 6

PROJECT (14) – ASSUME NEW PVMT

LENGTH OF ROADWAY 8.699 MILES

$$8.699 \text{ MILES} \times \frac{5280 \text{ ft}}{1 \text{ MILE}} = 45{,}930.72 \text{ LF}$$

ELIMINATE 4' OF PVMT, AND AGGREGATE

$$45{,}930.72 \text{ LF} \times 4 \text{ LF} = 183722.88 \text{ sf} \times \frac{1 \text{ SY}}{9 \text{ sf}} = 20413.65 \text{ SY}$$

PVMT

$$20413.65 \times \$34.36/\text{SY} = 701413.13$$

AGGREGATE

$$20413.65 \text{ SY} \times \frac{\$19.30}{\text{SY}} = 393983.51$$

$$\$1095396.64$$

ROW

$$183722.88 \text{ sf} \times \frac{1 \text{ AC}}{43{,}680 \text{ sf}} = 4.2 \text{ AC}$$

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: TS-2

SHEET NO.: 4 of 6

PROJECT (17)

$2.15 \text{ MILES} \times \frac{5280 \text{ LF}}{1 \text{ MI}} = 11352 \text{ LF} \times 4 \text{ LF} = 45408 \text{ sf}$

$45408 \text{ sf} \times \frac{1 \text{ SY}}{9 \text{ sf}} = 5045.33 \text{ SY}$

PVMT

$5045.33 \text{ SY} \times \frac{\$34.36}{1 \text{ SY}} = 173357.65$

AGG

$5045.33 \text{ SY} \times \frac{\$19.32}{1 \text{ SY}} = 97374.93$

$\$270732.58$

TOTAL AREA

$20413.65 + 1353.24 + 5045.33 = 26812.22 \text{ SY}$

ROW

$45408 \text{ sf} \times \frac{1 \text{ AC}}{43,630 \text{ sf}} = 1 \text{ AC}$

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: TS-2

SHEET NO.: 5 of 6

PROJECT (18)

LENGTH OF ROADWAY 1.73 MILES

$1.73 \text{ MI} \times \frac{5280 \text{ ft}}{1 \text{ MI}} = 9134.4 \text{ LF} \times 4 \text{ ft} = 36,537.6 \text{ sf}$

$36,537.6 \text{ sf} \times \frac{1}{9 \text{ sf}} = 1353.24 \text{ sy}$

PVMT

$1353.24 \text{ sy} \times \frac{34.36}{\text{sy}} = 46497.33$

AGG

$1353.24 \text{ sy} \times \frac{\$19.30}{1 \text{ sy}} = 26117.53$

$\$72,614.86$

ROW

$36,537.6 \text{ sf} \times \frac{1 \text{ AC}}{43,680 \text{ sf}} = 0.84 \text{ AC}$

TOTAL ROW – 6.04 AC

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: TS-2
Georgia Department of Transportation

PROPOSED SHEET NO.: ORIGINAL 6 of 6

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
ASPHALT	SY				26812.2	34.36	921,267
AGGREGATE	SY				26812.2	19.30	517,475
SUBTOTAL							1,438,742
10% MARK UP							143874
TOTAL							1582616
RIGHT OF WAY	AC				6.04	35,000	211,400
(INCLUDES MARKUP)							
Subtotal							1,794,016
Markup (%) at							
TOTAL							1,794,016

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**B-1**
DESCRIPTION:	**USE ALL EQUAL SPAN LENGTHS AND ALL PILE INTERMEDIATE BENTS AT THE US 1 BRIDGE OVER THE OHOOPEE RIVER**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The Ohoopee River Bridge has 5 spans at 58 ft., 3 spans at 70 ft., and 2 spans at 60 ft. for a total length of 620 ft. The bridges substructures include 4 concrete intermediate bents at bent numbers 6, 7, 8 and 9.

ALTERNATIVE: (Sketch attached)

Use a bridge span arrangement consisting of 10 spans at 60 ft. for a total length of 600 ft. and use all pile intermediate bents.

ADVANTAGES:

- Uniform span length lends to simpler design
- Reduces span length (60 ft. to 70 ft.)
- Allows more efficient beam design
- Reduces bent loads and allows the use of pile bents in lieu of concrete intermediate bents

DISADVANTAGES:

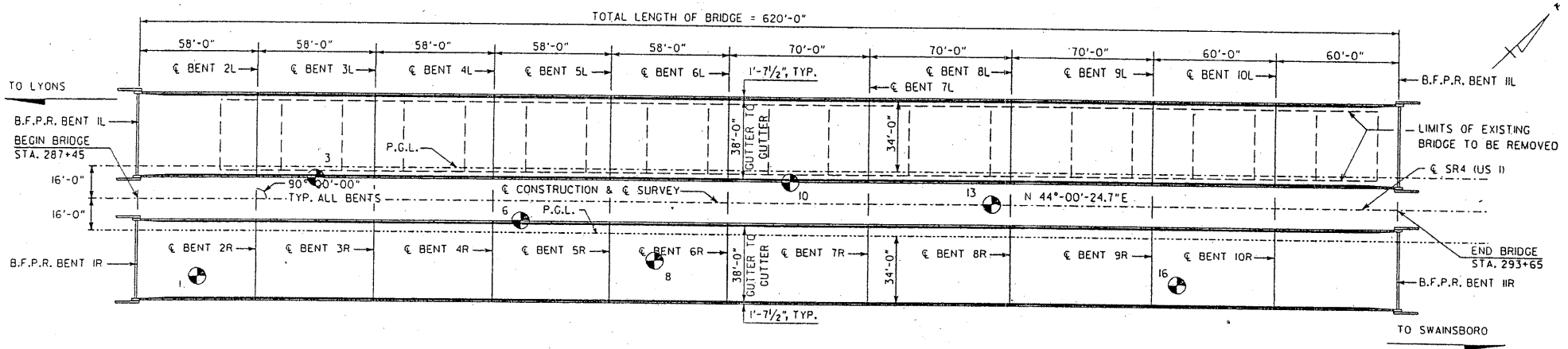
- None apparent

DISCUSSION:

By offsetting the beginning bent by 10 ft., all new bents miss the existing bents by at least 10 ft. Missing the bents seems to be the idea behind the multiple span arrangement in the original design and a uniform span length will satisfy this requirement. The bridge will be shorter by 20 ft. and bents 6 through 9 can be pile bents instead of the more expensive concrete intermediate bents.

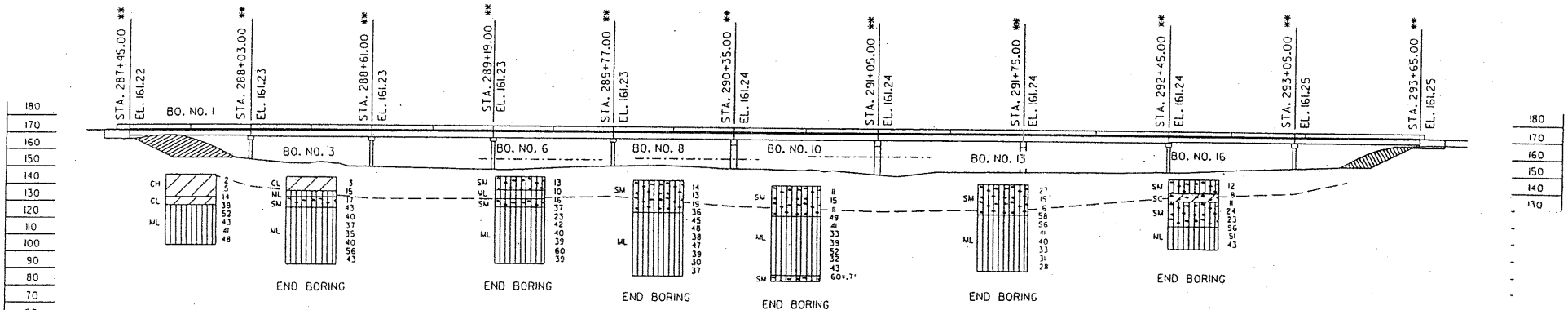
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 388,861	—	$ 388,861
ALTERNATIVE	$ 151,360	—	$ 151,360
SAVINGS (Original minus Alternative)	$ 237,501	—	$ 237,501

ALTERNATIVE NO. B-1
ORIGINAL DESIGN



** STATIONS AND ELEVATIONS ARE ALONG CONSTRUCTION CENTERLINE AT THE INTERSECTION OF CONSTRUCTION CENTERLINE AND B.F.P.R. OR CENTERLINE OF INTERMEDIATE BENT.

FLOW



CLASSIFICATION OF SOILS FOR REPORT PURPOSES
(UNIFIED CLASSIFICATION SYSTEM)

NAME	LETTER	NAME	LETTER
WELL-GRADED SILTY SAND	SW-SM	CLAYEY SAND	SC
WELL-GRADED SILTY GRAVEL	GW-GM	CLAYEY SAND, HIGH LIQUID LIMIT	SC-H
WELL-GRADED GRAVEL	GW	SILTY SAND, HIGH LIQUID LIMIT	SM-H
POORLY-GRADED GRAVEL	GP	ORGANIC SILT, LOW LIQUID LIMIT OR ORGANIC CLAY, LOW LIQUID LIMIT	OL
SILTY GRAVEL	GM	INORGANIC SILT, LOW LIQUID LIMIT	ML
CLAYEY GRAVEL	GC	INORGANIC SILTY LEAN CLAY	ML-CL
CLAYEY SILTY GRAVEL	GM-GC	LEAN CLAY	CL
WELL-GRADED SAND	SW	INORGANIC SILT, HIGH LIQUID LIMIT	MH
POORLY-GRADED SAND	SP	ORGANIC CLAY, HIGH LIQUID LIMIT OR ORGANIC SILT, HIGH LIQUID LIMIT	OH
POORLY-GRADED SILTY SAND	SP-SM	FAT CLAY	CH
SILTY SAND	SM	PEAT	PT
SILTY CLAYEY SAND	SM-SC	GROUND WATER LEVEL	

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This foundation investigation report is not considered as a part of the Plans and Specifications or Contract on the job.

BRIDGE NO. 2 LEFT & RIGHT

GEORGIA
DEPARTMENT OF TRANS
GEOTECHNICAL ENGINEERING BUR

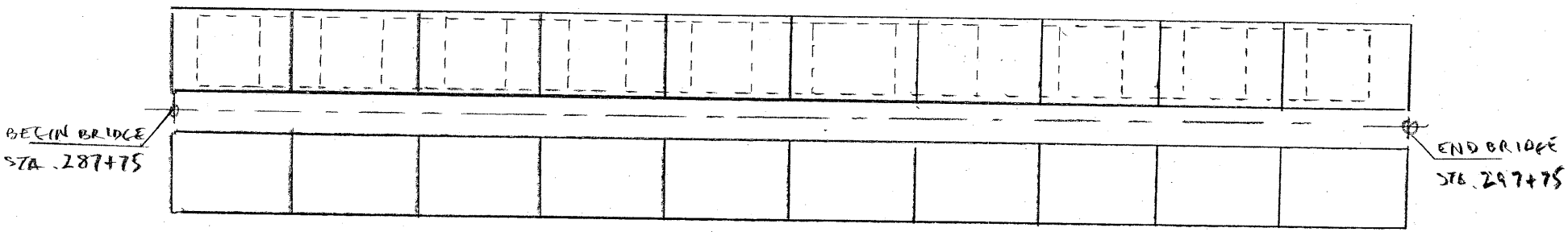
BORING LOCATION & SOIL
EDS-545 (18)
U.S. 1/ S.R. 4 OVER OHOOI
EMANUEL COUNTY
NO SCALE
DRAWN W.B.
P.I. NUMBER

DATE | REVISIONS | BY

ALT B-1
SHT 2 OF 5
ORIGINAL DESIGN

ALTERNATIVE NO. B-1

ALTERNATIVE:



10 SPANS @ 60'-0" = 600'

ALTERNATIVE DESIGN

ALT B-1
SHT 3 OF 5

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: B-1

SHEET NO.: 4 of 5

BRIDGE AREA = 2 x 41.25' x 620 = 51,150 SF
UNIT COST = 3,331,117.24 / 51,150 = $65.13 /SF

AREA OF 20' BRIDGE = 2 x 20' x 41.25' = 1,650 SF

VOLUME OF AN INTERMEDIATE BENT = 3'x3C'x4' + 2x3'x3'x20' +2x 8'x8'x 3'
= 43.6 CUBIC YARDS.

USE CLASS AA FOR CONC. INT. PIERS ($600/CY)
USE 200 LBS REBAR PER CU. YD. OF CONCRETE.

CONCRETE = 2 x 4 PTS. x 43.6 = 349 CYDS.
REBAR = (42700/615)(349) = 52,350 LBS

PILES = 2x 5 PILES x 80' x 4 PTS = 3200 LF

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: B-1
Georgia Department of Transportation

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
20 FT. OF BRIDGE	SF	1650	65.13	107,465	ϕ	65.13	ϕ
CL AA CONC.	CY	349	600	209,400			
BAR REINF. STEEL	LB	52,350	0.70	36,645			
PILING, PSC, 18" SQ.	LF				3200	43.00	137,600
Subtotal				353,510			137,600
Markup (%) at 10				35,351			13,760
TOTAL				388,861			151,360

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**B-3**
DESCRIPTION:	**MINIMIZE THE NUMBER OF BENTS AT THE US 1 BRIDGE OVER THE OHOOPEE RIVER**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The Ohoopee River bridge consists of 5 spans at 58 ft., 3 spans at 70 ft., and 2 spans at 60 ft. for a total length of 620 ft. There are four concrete intermediate bents at bent numbers 6, 7, 8 and 9 and pile bents at bent numbers 2 through 5 and 10.

ALTERNATIVE: (Sketch attached)

Use an alternative span arrangement of 5 spans at 120 ft. for a total length of 600 ft. and use four concrete intermediate bents.

ADVANTAGES:

- Fewer bents means a reduced amount of wetlands areas to disturb
- Less schedule risk due to less pile-driving and less floodway work

DISADVANTAGES:

- Requires longer spans with fewer number of concrete intermediate piers
- Requires deeper beams

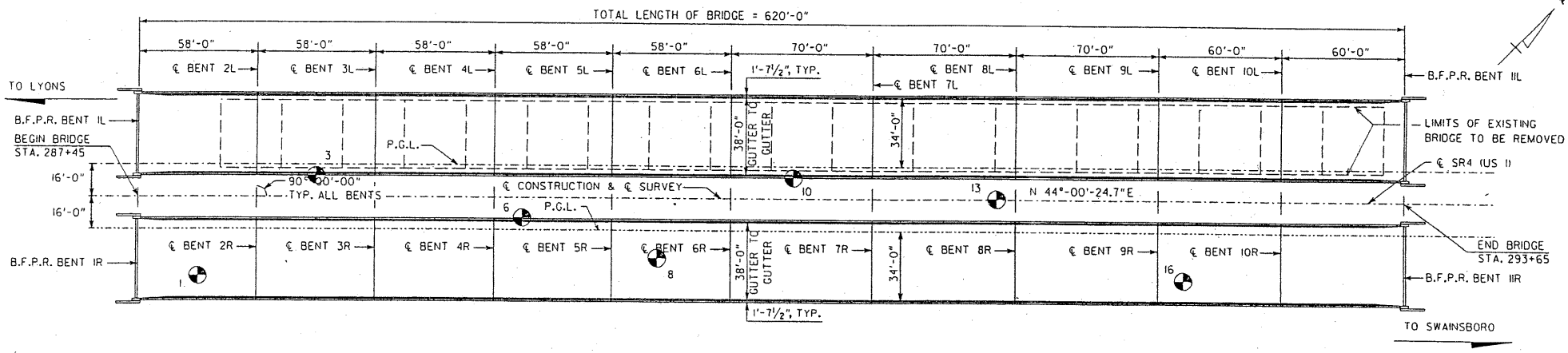
DISCUSSION:

Decreasing the number of intermediate bents from 9 to 4 means less area of disturbance. Although this would mean an increase in cost for PSC beams and bents, the cost increase will be offset by the elimination of the pile bents.

Although this alternative increases initial costs, it would reduce contract growth potential due to the minimization of driving piles and less construction time in the floodway.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,225,717	—	$ 1,225,717
ALTERNATIVE	$ 1,802,680	—	$ 1,802,680
SAVINGS (Original minus Alternative)	$ (576,963)	—	$ (576,963)

ALTERNATIVE NO. B-1
ORIGINAL DESIGN



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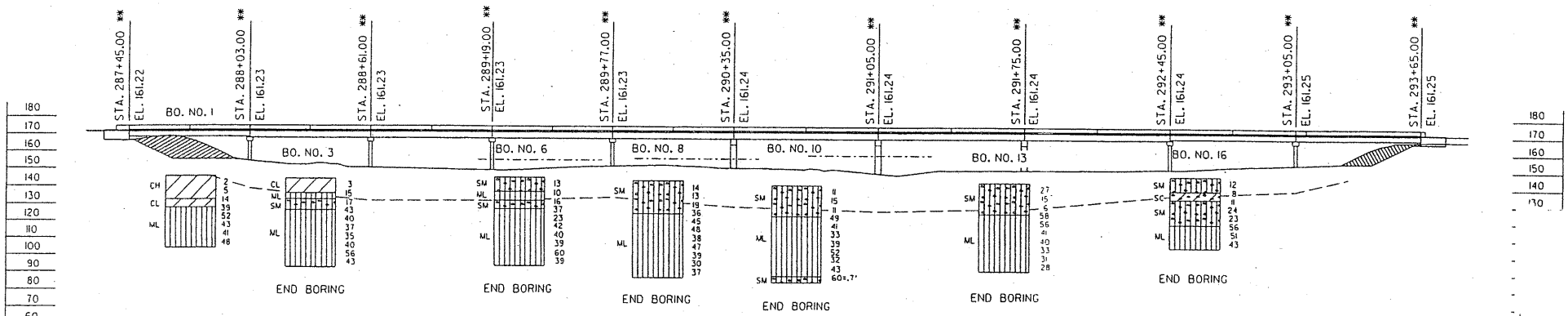
FLOW



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(UNIFIED CLASSIFICATION SYSTEM)

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WELL-GRADED SILTY GRAVEL	GW-GM	CLAYEY SAND, HIGH LIQUID LIMIT	SC-H
WELL-GRADED GRAVEL	GW	SILTY SAND, HIGH LIQUID LIMIT	SM-H
POORLY-GRADED GRAVEL	GP	ORGANIC SILT, LOW LIQUID LIMIT OR ORGANIC SILTY CLAY, LOW LIQUID LIMIT	OL
SILTY GRAVEL	GM	INORGANIC SILT, LOW LIQUID LIMIT	ML
CLAYEY GRAVEL	GC	INORGANIC SILTY LEAN CLAY	ML-CL
CLAYEY SILTY GRAVEL	GM-GC	LEAN CLAY	CL
WELL-GRADED SAND	SW	INORGANIC SILT, HIGH LIQUID LIMIT	MH
POORLY-GRADED SAND	SP	ORGANIC CLAY, HIGH LIQUID LIMIT OR ORGANIC SILT, HIGH LIQUID LIMIT	OH
POORLY-GRADED SILTY SAND	SP-SM	FAT CLAY	CH
SILTY SAND	SM	PEAT	PT
SILTY CLAYEY SAND	SM-SC	GROUND WATER LEVEL	

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BRIDGE NO. 2 LEFT & RIGHT

GEORGIA
DEPARTMENT OF TRANS
GEOTECHNICAL ENGINEERING BUR

BORING LOCATION & SOIL
EDS-545 (18)
U.S. 1/ S.R. 4 OVER OHOOI
EMANUEL COUNTY
NO SCALE

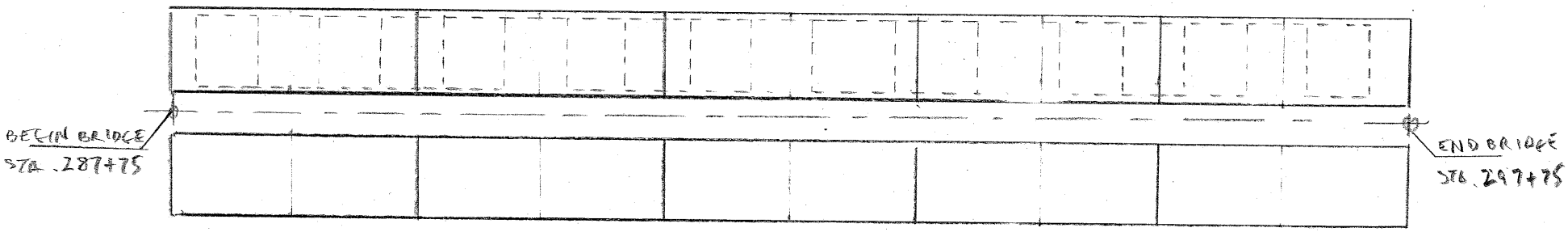
DATE | REVISIONS | BY

DRAWN W.B. P.I. NUMBER

ALT B-1
SHT 2 OF 5
ORIGINAL DESIGN

ALTERNATIVE NO. B-1

ALTERNATIVE:



5 SPANS @ 120'-0" = 600'

ALTERNATIVE DESIGN

ALT B-3
SHT 3 OF 5

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: B-3

SHEET NO.: 4 of 5

PSC BEAM TYPE II,
ASSUME 5 BEAM PER BRIDGE:
TOTAL LENGTH = 7'

DSC BEAM BT-63"
ASSUME 5 BEAMS PER BRIDGE.
TOTAL LENGTH = 2 x 5 x 600 = 6000 LF

COST PER INTERMEDIATE BENT = $50,000

COST PER PILE BENT

CONC. = 2 x 3 x 36 / 27 = 8 cy.	x 594.75	=	4,758
REBAR = 8 x 150 LBS/CY = 1200 cy	x 0.94	=	1,128
PILES: 5 x 20' = 100'	x 59.21	=	592
			6,478
		USE	6,500

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: B-3
Georgia Department of Transportation

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
PSC BEAM, TYPE IV	LF	6200	129.24	801,288			
PSC BT-63"	LF	6000			6000	189.80	1,138,800
INTERMEDIATE BTS.	LS	8	31,000	248,000	10	50,000	500,000
PILE BENTS	LS	10	6,500	65,000			
Subtotal				1,114,288			1,638,800
Markup (%) at 10				111,429			163,880
TOTAL				1,225,717			1,802,680

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**RCR-2B**
DESCRIPTION:	**USE A 32-FT. MEDIAN FOR THE LENGTH OF THE PROJECT**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN:

The original design has two 44-ft.-wide median sections along approximately 12,436 LF of Contract (18).

ALTERNATIVE: (Sketch attached)

Use a 32-ft.-wide median along the entire project.

ADVANTAGES:

- Reduces right-of-way takes
- Provides consistency throughout the length of the project

DISADVANTAGES:

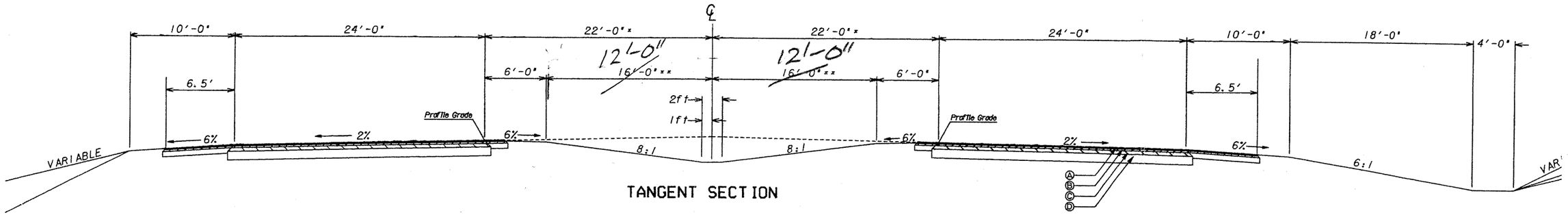
- Reduces safety

DISCUSSION:

Reducing the median to 32 ft. for the entire project greatly saves on the amount of right-of-way to acquire. It also provides consistency along the entire project.

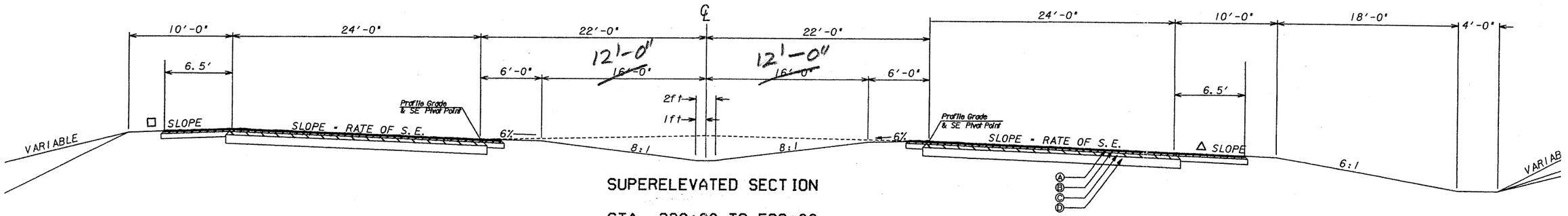
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 239,107	—	$ 239,107
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 239,107	—	$ 239,107

TYPICAL SECTION NO. 4



TANGENT SECTION

*Variable 16' to 22' from 338+00 to 342+00 and 529+00 to 533+00
** Variable 10' to 16' from 338+00 to 342+00 and 529+00 to 533+00



SUPERELEVATED SECTION

STA. 338+00 TO 533+00

△ SLOPE 3/4" / 1'-0" OR RATE OF S.E. WHICHEVER IS GREATER

□ SLOPE AS FOLLOWS:
S.E. RATE OF 0.03'/FT OR LESS USE 1/2" IN 1'-0"
S.E. RATE OF 0.04'/FT, USE 3/8" IN 1'-0"
S.E. RATE OF 0.05'/FT, USE 1/4" IN 1'-0"
S.E. RATE OF 0.06'/FT, USE 1/8" IN 1'-0"
S.E. RATE OF 0.08'/FT, USE +0.01'/FT

ALGEBRAIC DIFFERENCE IN PAVING AND SHOULDER SLOPES NOT TO EXCEED 0.08'/FT

REQUIRED PAVEMENT
- (A) ASPHALTIC CONCRETE 12.5 mm SUPERPAVE
- (B) ASPHALTIC CONCRETE 19 mm SUPERPAVE
- (C) ASPHALTIC CONCRETE 25 mm SUPERPAVE
- (D) GRADED AGGREGATE BASE
- (E) ASPHALTIC CONCRETE LEVELING, AS REQ'D

SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	--	0-10'
3:1	--	--
2:1	ALL	OVER 10'

ALTERNATIVE DESIGN

GEORGIA DEPARTMENT OF TRANSPORTATION

• Engineering
• Architecture
• Planning
• Construction Management
5180 Holcomb Bridge Road
Suite 455
Atlanta, Georgia 30071
(404) 239-5900

SCALE IN FEET
0 5 10 20

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN
TYPICAL SECTIONS

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$$

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: RCR 2B

SHEET NO.: 3 of 4

44' MEDIAN

STA	338+00	TO 369+60	3160 LF
STA	385+15	TO 413+94	2879 LF
STA	433+86	TO 460+50	2664 LF
STA	476+05	TO 493+95	1790 LF
STA	513+57	TO 533+00	1943 LF
			12,436

$12{,}436\ LF \times 12' = 149{,}232\ sf$

$149{,}232\ sf \times \frac{1\ ACRE}{43680} = 3.42\ AC$

FILL

ESTIMATE AVG OF 3' OF FILL ELIMINATED

$3' \times 12' \times 12{,}436' = 447{,}696\ cf \times \frac{1\ CY}{27\ cf} = 16581\ CY$

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: RCR 2B
Georgia Department of Transportation

SHEET NO.: 4 of 4

PROJECT ITEM		ORIGINAL ESTIMATE			~~PROPOSED~~ ORIGINAL ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
TEMPORARY GRASSING	AC				3.42	564.57	1930
PERM GRASSING	AC				3.42	971.51	3322
BORROW EXEC	CY				16581	6.23	103,300
							108,552
10% MARKUP							10,855
SUBTOTAL							119,407
RIGHT OF WAY (INCLUDES MARKUP)	AC				3.42	35000	119,700
Subtotal							239,107
Markup (%) ~~at~~ (INCL)							-
TOTAL							239,107

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**BOP-2**
DESCRIPTION:	**MOVE OAK PARK BYPASS WEST**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN:

The design relocates US 1 just west of the town of Oak Park thus impacting a lake at approximately STA. 145+00.

ALTERNATIVE: (Sketch attached)

Shift the US 1 alignment further west from the original design so as not to impact any of the lake visible on the aerial map. This shift may impact fewer properties and require fewer right-of-way acquisitions than the original design. Tie the north end of the proposed realignment back to the current design's alignment north of Normantown Spur Road.

ADVANTAGES:

- Avoids impacts to lake
- Increases width of developable land by up to 800 ft.
- Ties into original design at Normantown Spur Road

DISADVANTAGES:

- May need additional survey work
- May require large amounts of cut or fill
- May require environmental re-evaluation

DISCUSSION:

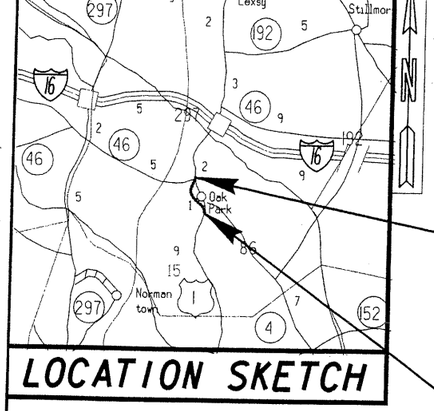
Shifting the Oak Park bypass westerly misses the large lake at STA. 145+00 +/–, yet only increases the roadway length by approximately 300 ft. This alternative was developed on the premise that a wider separation between US 1 and BUS 1 would benefit Oak Park's long-term growth.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 0	—	$ 0
ALTERNATIVE	$ 346,522	—	$ 346,522
SAVINGS (Original minus Alternative)	$ (346,522)	—	$ (346,522)

ALT EOP-2
SHT 2 OF 4

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED
US 1 / S.R. 4 OAK PARK BYPASS



LOCATION SKETCH

END
PROJ. EDS-545 (17)

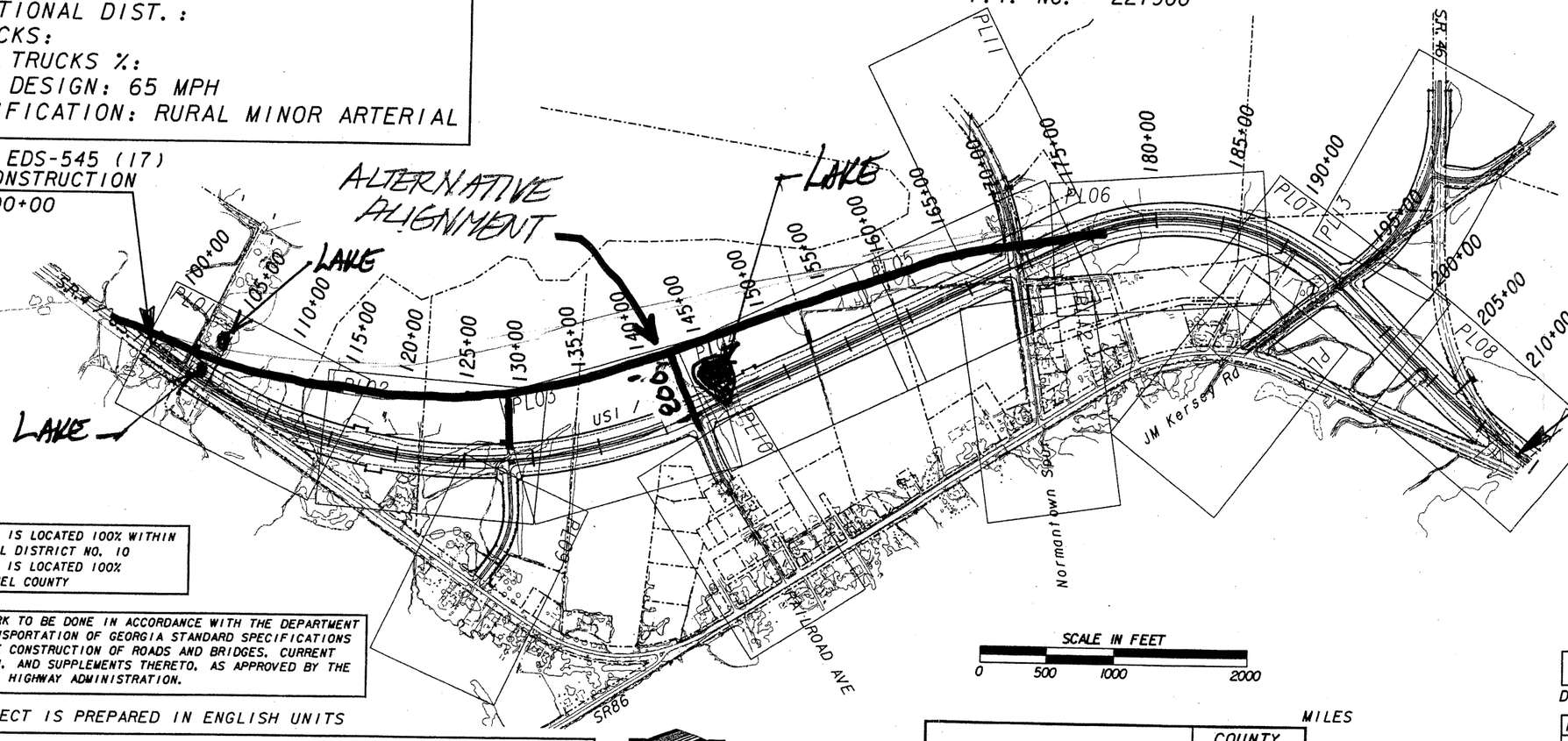
BEGIN
PROJ. EDS-545 (17)

DESIGN DATA:
TRAFFIC A.D.T.: (2006) 4000 VPD
TRAFFIC A.D.T.: (2026) 7000 VPD
TRAFFIC D.H.V.: (2026) 100 VPD
DIRECTIONAL DIST.:
% TRUCKS:
24 HR. TRUCKS %:
SPEED DESIGN: 65 MPH
CLASSIFICATION: RURAL MINOR ARTERIAL

PROJ. EDS-545 (17)
BEG. CONSTRUCTION
STA. 100+00

STATE AID PROJECT
EDS -545 (17)

FEDERAL ROUTE • F-38-1
STATE ROUTE • 4
P.I. NO. 221900



PROJ. EDS-545 (17)
END CONSTRUCTION
STA. 213+50
BEG. PROJ. EDS-545(18)

NOTE:
ALL REFERENCES IN THIS DOCUMENT, WHICH INCLUDES ALL PAPER DOCUMENTS, DRAWINGS, OR PHOTOGRAPHS USED, OR TO BE USED WITH THIS DOCUMENT, TO ' STATE HIGHWAY DEPARTMENT OF GEORGIA ', HIGHWAY DEPARTMENT ', GEORGIA STATE HIGHWAY DEPARTMENT ', DEPARTMENT ', OR ' DEPARTMENT ' WHEN THE CONTEXT THEREOF STATE HIGHWAY DEPARTMENT OF GEORGIA MEAN, AND SHALL BE DE THE DEPARTMENT OF TRANSPORTATION.

PREPARED BY: B&E JACKSON & ASSOCIATES

RECOMMENDED FOR SUBMISSION BY: _____
TRANSPORTATION ENGINEER

SUBMITTED BY: _____
OFFICE OF CONSULTANT DESIGN

DATE _____ CHIEF ENGINEER

THIS PROJECT IS LOCATED 100% WITHIN CONGRESSIONAL DISTRICT NO. 10
THIS PROJECT IS LOCATED 100% WITHIN EMANUEL COUNTY

NOTE: ALL WORK TO BE DONE IN ACCORDANCE WITH THE DEPARTMENT OF TRANSPORTATION OF GEORGIA STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF ROADS AND BRIDGES, CURRENT EDITION, AND SUPPLEMENTS THERETO, AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION.

THIS PROJECT IS PREPARED IN ENGLISH UNITS

THE DATA, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY, WHETHER BY DRAWINGS OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT OF TRANSPORTATION IN ANY WAY. THE ATTENTION OF BIDDER IS SPECIFICALLY DIRECTED TO ARTICLES 102.04, 102.05, AND 104.03 OF THE STANDARD SPECIFICATIONS OF THE DEPARTMENT OF TRANSPORTATION, STATE OF GEORGIA, FOR THE CONSTRUCTION OF ROADS AND BRIDGES, DATED CURRENT EDITION AND ANY MODIFICATION THEROF, WHICH WILL BE A PART OF THIS CONTRACT.

SCALE IN FEET
0 500 1000 2000

B&E JACKSON ENGINEERS
34 PEACHTREE ST., N.W.
SUITE 2100
ATLANTA, GEORGIA 30303
(404) 577-4914
FAX (404) 577-4419

LENGTH OF PROJECT	COUNTY NO. 107
	MILES
NET LENGTH OF ROADWAY	2.15
NET LENGTH OF BRIDGES	0.00
NET LENGTH OF PROJECT	2.15
NET LENGTH OF EXCEPTIONS	0.00
GROSS LENGTH OF PROJECT	2.15

MILES

PLANS COMPLETED - -	
REVISIONS	

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: BOP 2

SHEET NO.: 3 of 4

ORIGINAL DESIGN

LONGITUDINAL
- 4 LANE FROM STA 100+00 TO STA. 169+00
- 12' LANES
- 4 LANES OF PVMT

6900 LF x 12' LANES x 4 LANES = 331200 sf x $\frac{1\ sy}{9\ sf}$ = 36,800 sy

32' GRASSED MEDIAN

32' x 6900 LF = 220800 sf x $\frac{1\ sy}{9\ sf}$ = 24533

ALTERNATE DESIGN

LONGITUDINAL
- 7200 LF

7200 LF x 48 LF x $\frac{1\ sy}{9\ sf}$ = 38400 sy

GRASSED MEDIAN

32' x 7200 LF x $\frac{1\ sy}{9\ sf}$ = 25600 sy

CONNECTIONS

LENGTHEN SOUTHEN MOST CONNECTION 5' RAILROAD AVE CONNECTION

1600 LF x 24' x $\frac{1\ sy}{9\ sf}$ = 4266 sy

TOTAL:

DIFFERENCE IN AMOUNT OF PVMT.

(38400 + 4266) - 36800 = 5866 sy

DIFFERENCE IN GRASSED MEDIAN

25600 - 24533 = 1067 sy x $\frac{1\ ac}{4380}$ = 0.2 ac

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: BOP-2
Georgia Department of Transportation

SHEET NO.: 4 of 4

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
PVMT	SY				5866	34.36	201 556
AGGREGATE	SY				5866	19.30	113 214
GRASSED MEDIAN	AC				0.2	500	250
Subtotal							315,020
Markup (%) at 10%							31,502
TOTAL							346,522

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**MR-1/ MR02**
DESCRIPTION:	**MODIFY REVERSING CURVES NEAR HISTORIC PROPERTY (UNION CAMP TAX DEPARTMENT) BY SHORTENING TANGENTS BETWEEN STA. 240+00 AND STA. 278+00 AND FLATTENING THE CURVE**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

Reversing curves are provided near the Union Camp Tax Department historic property. The tangents are currently set at 900 ft.+ for super-elevation transitions of less than 3%. The curve radius is also relatively tight for a 65 mph design speed.

ALTERNATIVE: (Sketch attached)

Shorten tangents to 300 ft. maximum and increase the curve radius so it flattens. The result will bring the new alignment in much closer to the existing alignment.

ADVANTAGES:

- Uses less right-of-way
- Provides a smoother drive

DISADVANTAGES:

- None apparent

DISCUSSION:

The tangent lengths cause excessive displacement from the old alignment and require more right-of-way than needed. A better alignment should be achieved without disturbing the historic property.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 750,000	—	$ 750,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 750,000	—	$ 750,000

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #8

Degree = 1°00'00.0"	Delta = 22°50'40.3"
Radius = 5729.58	Length = 2284.45
Tangent = 1157.60	Length of Cord = 2269.35
External = 115.77	S.E. Rate = 3.2%
PC Sta = 218+53.06	DB = N 27°48'56.6" E
North 820969.42	East 608199.96
PI Sta = 230+10.67	
North 821993.27	East 608740.13
PT Sta = 241+37.52	DA = N 50°39'36.9" E
North 822727.09	East 609635.42

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #10

Degree = 2°00'00.0"	Delta = -32°13'41.9"
Radius = 2864.79	Length = 1611.41
Tangent = 827.65	Length of Cord = 1590.26
External = 117.16	S.E. Rate = 5.8%
PC Sta = 250+93.01	DB = N 50°39'36.9" E
North 823332.80	East 610374.40
PI Sta = 259+20.65	
North 823857.45	East 611014.50
PT Sta = 267+04.42	DA = N 18°25'55.0" E
North 824642.64	East 611276.18

INCREASE RADIUS (FLATTEN)

CR220
CONSTRUCTION CENTERLINE
CURVE #12

Degree = 5°43'46.5"	Delta = -10°04'10.7"
Radius = 1000.00	Length = 175.75
Tangent = 88.10	Length of Cord = 175.52
External = 3.87	S.E. Rate = 6.8%
PC Sta = 67+49.76	DB = S 47°07'10.4" E
North 828161.70	East 612262.05
PI Sta = 68+37.86	
North 828101.75	East 612326.61
PT Sta = 69+25.50	DA = S 57°11'21.1" E
North 828054.01	East 612400.65

MATCH LINE STA. 215+00
SEE PLAN SHEET 11-1

N 27°48'56.6" E
CURVE #8

220.00 225.00 230.00 235.00 240.00 245.00 250.00 255.00 260.00 265.00 270.00 275.00 280.00 285.00 290.00 295.00 300.00 305.00

US 1/SR 4

PC 218+53.067
CURVE #8

S 59°43'32.7" E
PC 50+90.21
CURVE #9

PT 52+70.42
CURVE #9

S 85°32'23.4" E

END CONSTRUCTION 53+00
LOUIS STARRA (CR 219)

PT 241+37.512
CURVE #8

N 50°39'36.9" E

SHORTEN TANGENT TO 300' MAX

PC 250+93.009
CURVE #10

S 63°27'23.0" E

LIMIT OF CONSTRUCTION 56+60
HIDDEN ACRE RD (CR 356)

PT 267+04.423
CURVE #10

N 18°25'55.0" E

CONSTR ℄

BEGIN BRIDGE
278+90

CURVE #10

FLATTEN CURVE

SHORTEN TANGENT
500' MAX.

LIMITS OF CONSTRUCTION 62
RACKET TOWN (CR 220)

PT 69+25.51
CURVE #12

S 47°07'10.4" E

PC 67+49.76
CURVE #12

S 57°11'21.1" E

PC 296+92.912
CURVE #11

PT 309+64.352
CURVE #11

MATCH LINE
SEE

CR219
CONSTRUCTION CENTERLINE
CURVE #9

Degree = 14°19'26.2"	Delta = -25°48'46.0"
Radius = 400.00	Length = 180.21
Tangent = 91.66	Length of Cord = 178.69
External = 10.37	S.E. Rate = 5.0%
PC Sta = 50+90.21	DB = S 59°43'32.7" E
North 822080.98	East 609084.61
PI Sta = 51+81.87	
North 822034.77	East 609163.77
PT Sta = 52+70.42	DA = S 85°32'20.7" E
North 822027.64	East 609255.16

$I = 32.2283°$

$T = 600' + 827' \cong 1450'$

$R = \frac{1450'}{\tan\left(\frac{1}{2}(32.2283)\right)} \cong 5019.0'$

Use R = 5020 ⟶ e% = N.C.

$\Delta = 205 - 117 = 88'$

$\text{New "E"} = 5020\left[\frac{1}{\cos\left(\frac{32.2283}{2}\right)} - 1\right] = 205$

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #11

Degree = 2°00'00.0"	Delta = 25°25'43.6"
Radius = 2864.79	Length = 1271.44
Tangent = 646.36	Length of Cord = 1261.03
External = 72.01	S.E. Rate = 5.8%
PC Sta = 296+92.91	DB = N 18°25'55.0" E
North 827477.82	East 612221.08
PI Sta = 303+39.28	
North 828091.03	East 612425.45
PT Sta = 309+64.35	DA = N 43°51'38.6" E
North 828557.07	East 612873.32

GEORGIA
DEPARTMENT
OF
TRANSPORTATION

: Engineering
: Architecture
: Planning
: Construction Management
3150 Holcomb Bridge Road
Suite 400
Atlanta, Georgia 30071
(404) 239-5900

SCALE IN FEET
0 300 600 1200

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN
CONSTRUCTION LAYOUT

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: MR-1/2

SHEET NO.: 3 of 5

COST PER SY FOR PAVEMENT:

6" AGG BASE $ 13.65

12" AGG BASE $ 19.30

12.5 MM	165 LB/SY =	0.0825 TN/SY =	5.86 $/SY
19 MM	220 LB/SY =	0.110 TN/SY =	7.15 $/SY
25 MM	660 LB/SY	0.330 TN/SY =	21.35 $/SY

TOTAL = $ 34.36

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: MR-1/2

SHEET NO.: 4 of 5

CUT/FILL

STA 245+00 TO STA 270+00

$WIDTH_{TOP}$ 24' + 10' + 6' = 40'

FILL DEPTH AVG = 10'

AVG $WIDTH_{@2:1}$ = 50'

FILL SAVINGS = $(50')(10')(2500')\left(\frac{1}{27}\right)$

$\approx$ 46,300 CY

USE $6.23

R/W

BASED ON R/W ESTIMATE

~$35,000 PER ACRE FOR AGR./RESIDENTIAL

AREA $\approx (200')(2500')$ = ~~500,000~~ SF

$\approx$ 11.6 ACRE

$\approx$ $406,000

PAVEMENT AREA SAVINGS = $(200')(24')\frac{1}{9} \approx$ 535 SY

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: MR-1/2
Georgia Department of Transportation

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
PAVEMENT (SIDERD)	SY	535	$ 34.36	$ 18,383	ø	ø	ø
FILL/CUT	CY	46,300	$6.23	$ 288,450	ø	ø	ø
12" AGG.	SY	535	$ 19.30	$ 10,325			
SUB TOTAL				317,158			
MARKUP 10%				31,716			
TOTAL				348,874			
R-O-W	AC	11.6	$ 35,000	$ 406,000			
(INCLUDES MARKUP							
TOTAL							
Subtotal				754,874			
Markup (%) at				—			
TOTAL				754,874			

ROUGH ESTIMATE $ 750,000

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**MR-3**
DESCRIPTION:	**MODIFY REVERSING CURVES NEAR HISTORIC PROPERTY (UNION CAMP TAX DEPARTMENT) BY TRANSITIONING WIDENING TO THE EAST SIDE AND PARALLEL EXISTING ALIGNMENT TO THE NORTH**	SHEET NO.:	**1 of 3**

ORIGINAL DESIGN: (Sketch attached)

At the Union Camp Tax Department historic property, the road widening is to the west side of the existing pavement with three reversing curves used to circumvent the historic property.

ALTERNATIVE: (Sketch attached)

Transition the widening from the west side to the east side around STA. 200+00. Bring in the remaining length of the alignment to about STA. 290+00 to parallel the existing alignment along the east side.

ADVANTAGES:

- Eliminates the wide swath of land currently being used
- Less right-of-way required
- Smoother alignments
- Allows use of existing pavement
- Less wetlands disturbance
- Reduces costs

DISADVANTAGES:

- May impact properties on east side of existing highway at CR-219 intersection

DISCUSSION:

This alternative allows use of the existing pavement and brings the alignment in to parallel the existing alignment. Less right-of-way is required and less wetlands are disturbed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 750,000	—	$ 750,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 750,000	—	$ 750,000

ALT MR-3
SHT 2 OF 3

STA 216+55
REPLACE EXISTING
W/ 18" PIPE
DA - 4.90 Ac
C - 0.37
Q50 - 17.11 cfs
Q100 - 18.89 cfs

ADJUST CURVE

CR-216

HISTORIC PROPERTY

STA 226+18
REPLACE EXISTING
W/ 36" PIPE
DA - 28.73 Ac
C - 0.31
Q50 - 51.85 cfs
Q100 - 58.26 cfs

TRANSITION TO EAST SIDE WIDENING

SHIFT ALIGNMENT IN TO BE PARALLEL TO EXISTING.

TRANSITION BACK TO WEST SIDE WIDENING.

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: MR-3

SHEET NO.: 3 of 3

COST BASIS OF THIS ALTERNATIVE IS APPROXIMATELY THE SAME AS MR-1/2. The basis of estimates are very rough, therefore use $750,000 savings for all MR-5.

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**MR-4**
DESCRIPTION:	**MODIFY REVERSING CURVES NEAR HISTORIC PROPERTY (UNION CAMP TAX DEPARTMENT) BY PLACING THE NEW ALIGNMENT TO THE WEST OF HISTORIC PROPERTY AT STA. 245+00**	SHEET NO.:	**1 of 2**

ORIGINAL DESIGN: (Sketch attached)

The current roadway alignment goes to the east of the Union Camp Tax Department historic property at approximately STA. 245+00.

ALTERNATIVE: (Sketch attached)

Shift the alignment to pass to the west of the historic property at STA. 245+00.

ADVANTAGES:

- Smoother alignment
- Undeveloped right-of-way is used
- Further away from historic property
- Further away from wetlands

DISADVANTAGES:

- More right-of-way required
- Far away from properties that previously had access to US 1
- Reversal of view to highway from historical property may not be amenable to State Historical Preservation Officer (SHPO)

DISCUSSION:

It appears that options for the alignment have been limited to going east of the historic property. The VE team believes that an alternative alignment west of the historic property should be entertained to avoid wetlands and provide a less curvy alignment.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

DATETIME$$$
$USER$

COUNTY
TOOMBS / EMANUEL

ALT MR-4
SHT 2 OF 2

ALTERNATIVE DESIGN

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #8

Degree = 1°00'00.0"	Delta = 22°50'40.3"
Radius = 5729.58	Length = 2284.45
Tangent = 1157.60	Length of Cord = 2269.35
External = 115.77	S.E. Rate = 3.2%
PC Sta = 218+53.06	DB = N 27°48'56.6" E
North 820969.42	East 608199.96
PI Sta = 230+10.67	
North 821993.27	East 608740.13
PT Sta = 241+37.52	DA = N 50°39'36.9" E
North 822727.09	East 609635.42

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #10

Degree = 2°00'00.0"	Delta = -32°13'41.9"
Radius = 2864.79	Length = 1611.41
Tangent = 827.65	Length of Cord = 1590.26
External = 117.16	S.E. Rate = 5.8%
PC Sta = 250+93.01	DB = N 50°39'36.9" E
North 823332.80	East 610374.40
PI Sta = 259+20.65	
North 823857.45	East 611014.50
PT Sta = 267+04.42	DA = N 18°25'55.0" E
North 824642.64	East 611276.18

CR220
CONSTRUCTION CENTERLINE
CURVE #12

Degree = 5°43'46.5"	Delta = -10°04'10.7"
Radius = 1000.00	Length = 175.75
Tangent = 88.10	Length of Cord = 175.52
External = 3.87	S.E. Rate = 6.8%
PC Sta = 67+49.76	DB = S 47°07'10.4" E
North 828161.70	East 612262.05
PI Sta = 68+37.86	
North 828101.75	East 612326.61
PT Sta = 69+25.50	DA = S 57°11'21.1" E
North 828054.01	East 612400.65

MATCH LINE STA. 215+00
SEE PLAN SHEET 11-1

N 27°48'56.6" E
CURVE #8

220+00 225+00 230+00 235+00 240+00 245+00 250+00 255+00 260+00 265+00 270+00 275+00 280+00 285+00 290+00 295+00 300+00 305+00

US 1/SR 4

ALTERNATIVE ALIGNMENT

LIMIT OF CONSTRUCTION 56+60
HIDDEN ACRE RD (CR 356)

LIMITS OF CONSTRUCTION 62
RACKET TOWN (CR 220)

PENDLETON CRK

16.045° = I

PC 218+53.067
CURVE #8

S 59°43'32.7" E

PC 50+90.21
CURVE #9

PT 52+70.42
CURVE #9

END CONSTRUCTION 53+00
LOUIS STARRA (CR 219)

S 85°32'23.4" E

PT 241+37.517
CURVE #8

N 50°39'36.9" E

HISTORIC SITE

PC 250+93.009
CURVE #10

S 63°27'23.6" E

PT 267+04.423
CURVE #10

BB

EB

N 18°25'55.0" E

Pendleton Crk

Bridge

CONSTR ℄

CURVE #10

BB
278+90

EB.
286+10

PT 69+25.51
CURVE #12

S 47°07'10.4" E

PC 67+49.76
CURVE #12

S 57°11'21.1" E

PC 296+92.912
CURVE #11

N 43° 51' 38.6"

PT 309+64.352
CURVE #11

MATCH LINE
SEE

CR219
CONSTRUCTION CENTERLINE
CURVE #9

Degree = 14°19'26.2"	Delta = -25°48'46.0"
Radius = 400.00	Length = 180.21
Tangent = 91.66	Length of Cord = 178.69
External = 10.37	S.E. Rate = 5.0%
PC Sta = 50+90.21	DB = S 59°43'32.7" E
North 822080.98	East 609084.61
PI Sta = 51+81.87	
North 822034.77	East 609163.77
PT Sta = 52+70.42	DA = S 85°32'20.7" E
North 822027.64	East 609255.16

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #11

Degree = 2°00'00.0"	Delta = 25°25'43.6"
Radius = 2864.79	Length = 1271.44
Tangent = 646.36	Length of Cord = 1261.03
External = 72.01	S.E. Rate = 5.8%
PC Sta = 296+92.91	DB = N 18°25'55.0" E
North 827477.82	East 612221.08
PI Sta = 303+39.28	
North 828091.03	East 612425.45
PT Sta = 309+64.35	DA = N 43°51'38.6" E
North 828557.07	East 612873.32

GEORGIA DEPARTMENT OF TRANSPORTATION

: Engineering
: Architecture
: Planning
: Construction Management

3969 Holcomb Bridge Road
Suite 455
Atlanta, Georgia 30071
(404) 839-6900

SCALE IN FEET
0 330 660 1320

REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN
CONSTRUCTION LAYOUT

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$$$$

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**MR-7**
DESCRIPTION:	**TIGHTEN HORIZONTAL CURVE OF THE INDEPENDENT ALIGNMENT NEAR PINE LOG ROAD**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

Original mainline curve #14 has a radius of 5,729.58 ft. and a super-elevation of 3.2%.

ALTERNATIVE: (Sketch attached)

Push the super-elevation rate to 6% and reduce the radius approximately 1,500 ft. This will still accommodate the 65 mph design speed.

ADVANTAGES:

- Reduces curve length; puts the alignment closer to existing alignment
- Reduces costs by using existing roadbed
- Minimizes right-of-way take

DISADVANTAGES:

- Sharper curve with greater super-elevation rate

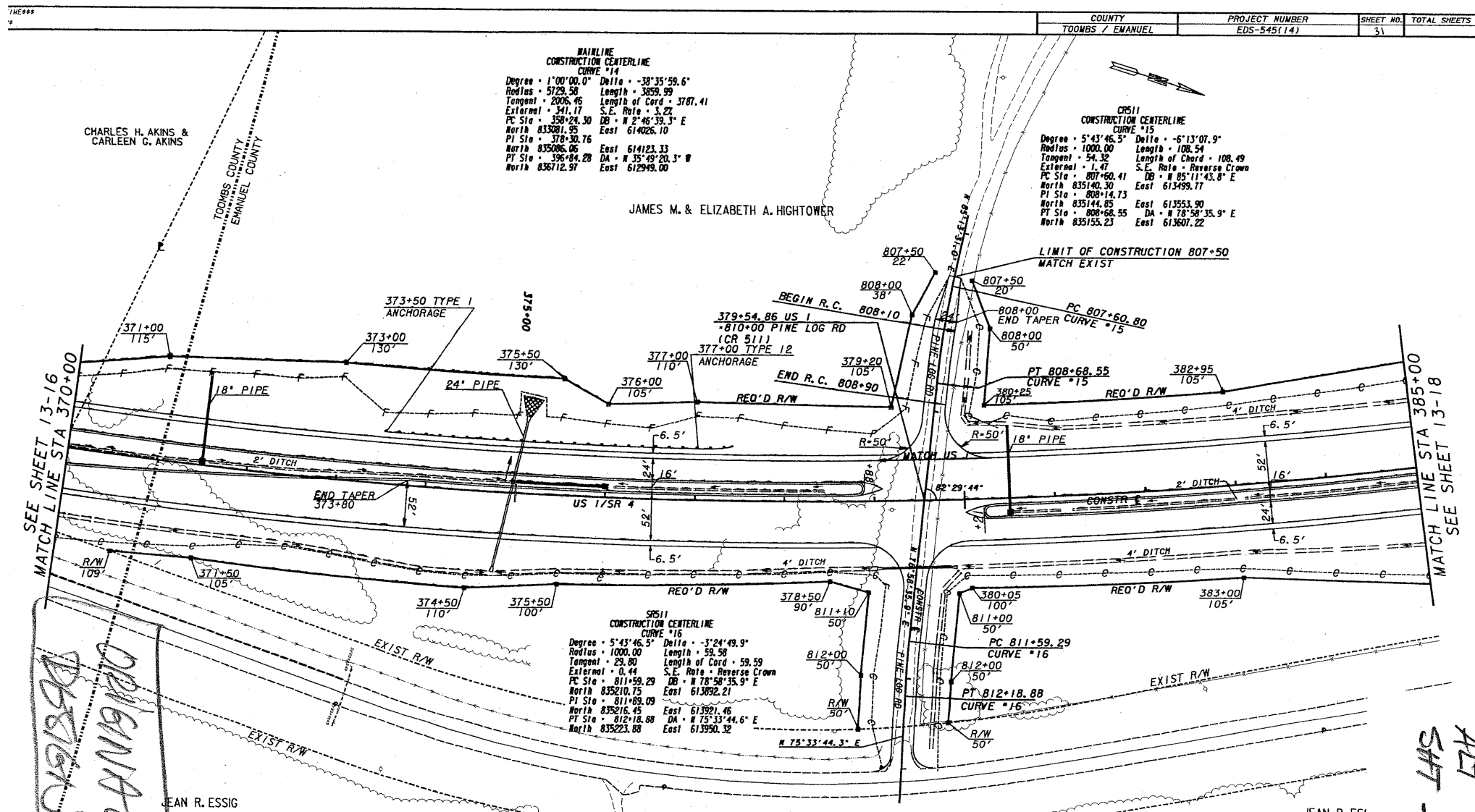
DISCUSSION:

Reducing the curve radius shifts the alignment to almost on top of the existing alignment. This will reduce the need for fill as well as the purchase of new right-of-way.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 526,713	—	$ 526,713
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 526,713	—	$ 526,713

ALTERNATE NO. MR-7
ORIGINAL DESIGN

COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
TOOMBS / EMANUEL	EDS-545(14)	31	



PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

EASEMENT FOR CONSTRUCTION OF TEMPORARY TRAFFIC DETOUR
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

GEORGIA DEPARTMENT OF TRANSPORTATION

SCALE IN FEET
0 50 100 200

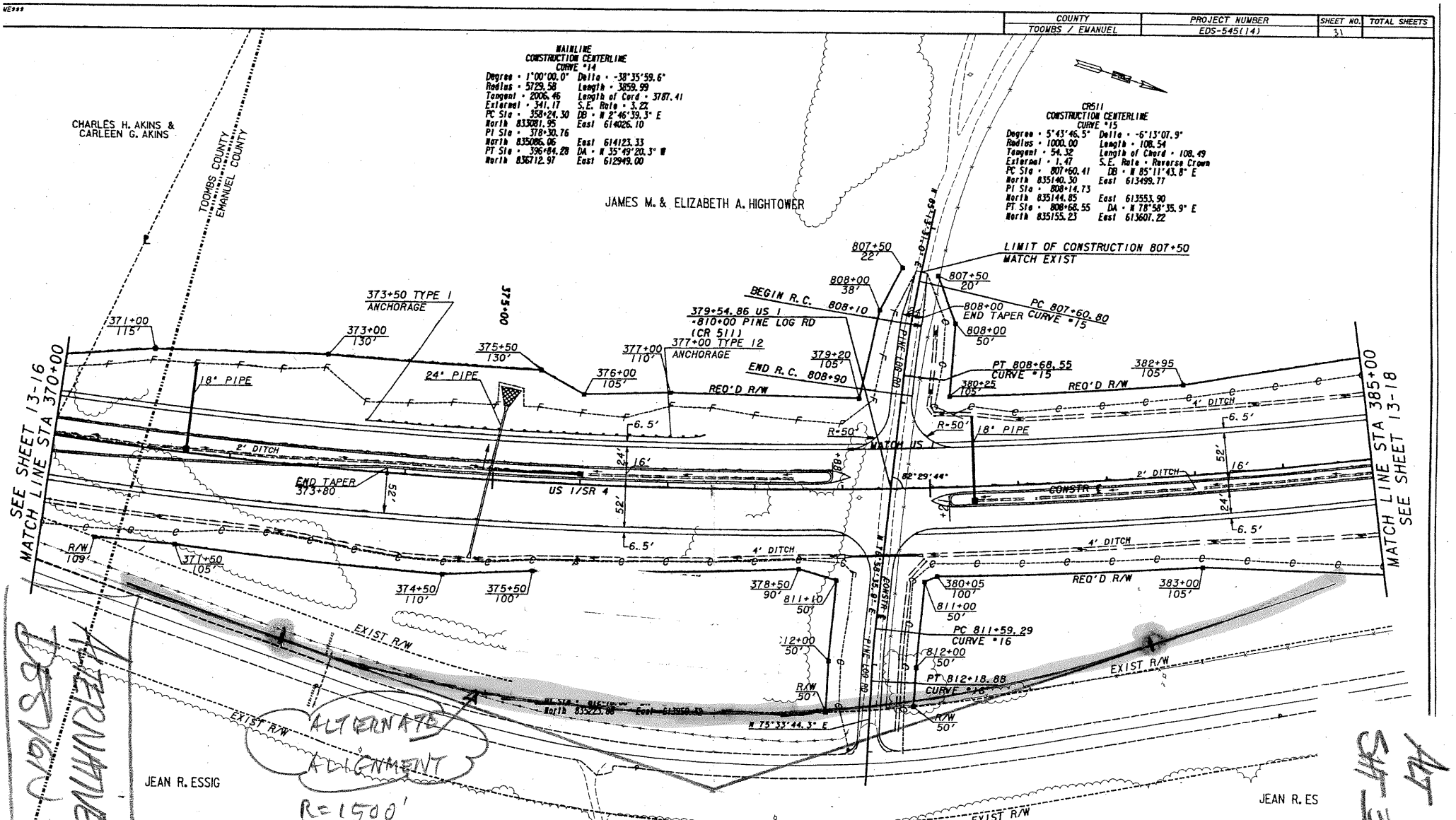
REVISION DATES

STATE OF GEO
DEPARTMENT OF TRAN
OFFICE: CONSULTANT DE
MAINLINE P
US 1

SHT 2 OF 5
MR-7

ALTERNATE NJ. MR-7
ALTERNATE

COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
TOOMBS / EMANUEL	EDS-545(14)	31	



ALT MR-7
SHT 31 OF 51

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: MR-7

SHEET NO.: 4 of 5

APPROXIMATE R-O/W SAVED

(391.17' - 89.32') (2000') x 0.5 x 2 = 503,700 SF = 11.55 AC.

APROXIMATE FILL SAVED.

0.5(3860) 10' x 0.5 x 50' = 482 500 CFT = 17,870 CY.

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: MR-7
Georgia Department of Transportation

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
R-O-W-	AC	11.55	$35,000	$404,250			
BORROW EXCAV	CY	17870	6.23	111,330			
MARKUP 10%				11,133			
TOTAL				122,463			
Subtotal				$526,713			∅
Markup (%) at				—			—
TOTAL				$526,713			∅

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**MR-8**
DESCRIPTION:	**TIGHTEN HORIZONTAL CURVE OF INDEPENDENT ALIGNMENT NEAR HARRELL CEMETERY ROAD**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

Original mainline curve #20 has a radius of 4,500 ft. and a super-elevation of 4%.

ALTERNATIVE: (Sketch attached)

Reduce mainline curve #20 radius to approximately 3,350 ft. and increase the super-elevation rate to 6%.

ADVANTAGES:

- Reduced curve length shifts the alignment closer to existing alignment
- Reduces costs by using existing roadbed
- Minimizes right-of-way takes

DISADVANTAGES:

- Sharper curve with greater super-elevation rate

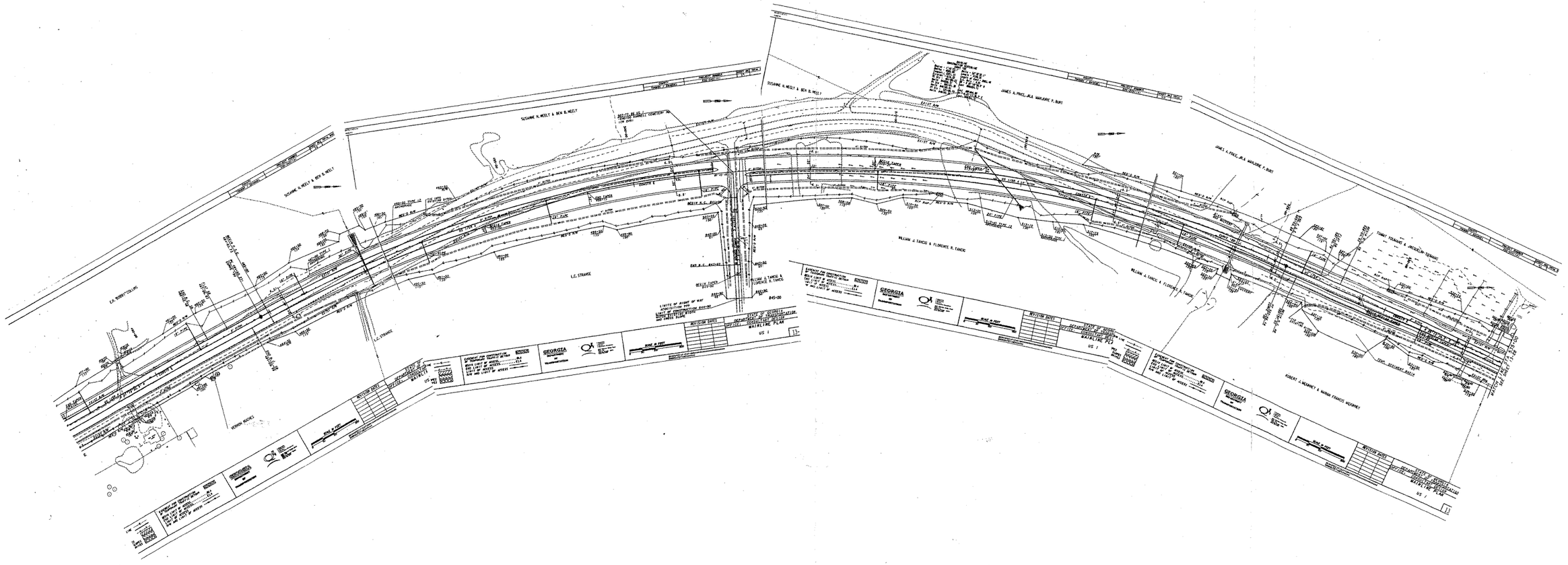
DISCUSSION:

The 3,350 ft. radius at the mainline curve #20 is acceptable with a 65 mph design speed. Reducing the curve radius shifts alignment to almost on top of the existing alignment. This will reduce the need for fill as well as purchase of the new right-of-way.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 128,450	—	$ 128,450
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 128,450	—	$ 128,450

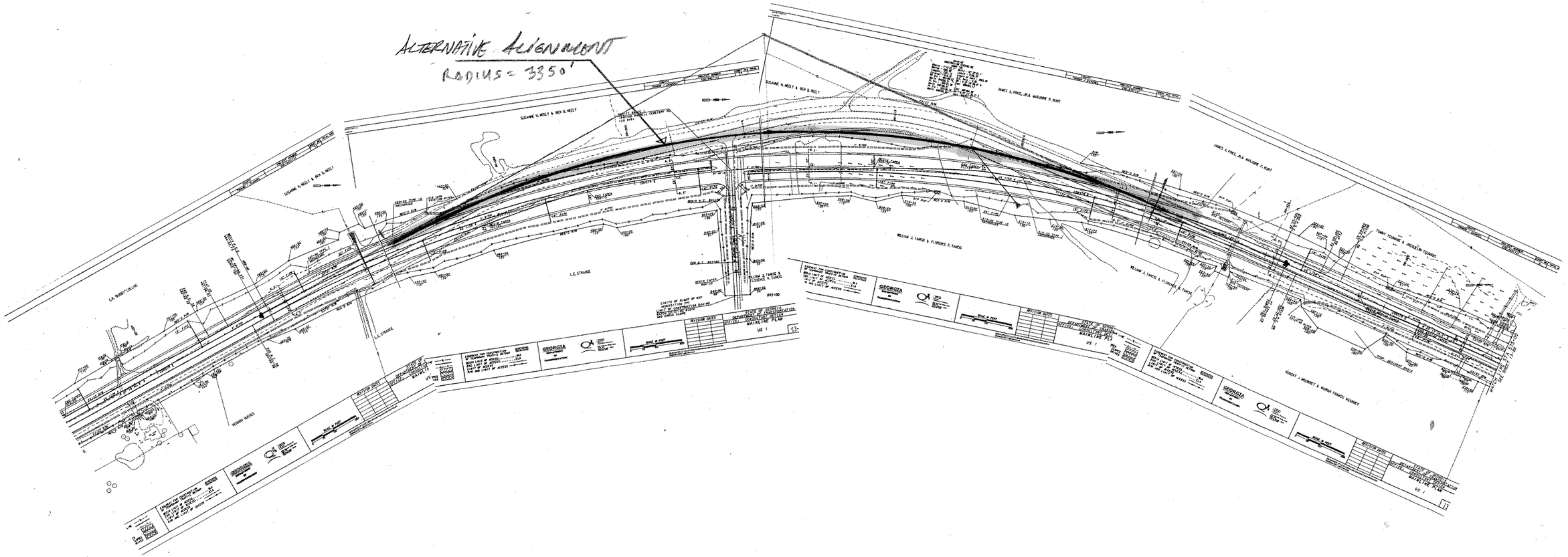
ORIGINAL ALT. MR-8 DESIGN

SHEET 2 OF 5



ALT. MR-8
ALTERNATIVE DESIGN
SHEET 3 OF 5

ALTERNATIVE ALIGNMENT
RADIUS = 3350'



CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: MR-8

SHEET NO.: 4 of 5

APPROXIMATE R-O-W SAVED

$\approx 200' \times 800' = 160{,}000\ SF = 3.67\ AC$

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: MR - 8
Georgia Department of Transportation

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
R-O-W	AC	3.67	35000	128450			
Subtotal				128450			
Markup (%) at INCL				—			
TOTAL				128450			

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **EDS-545(14)(17)(18) US 1/SR 4 WIDENING & BYPASS**
Georgia Department of Transportation

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	CONTRACT PACKAGING AND STAGING (CP)					
CP-1	Let Contracts (17) & (18) first followed by Contract (14)	Design Suggestion				
CP-3	Expedite Bypass Contract (17)	Design Suggestion				
CP-4	Let Contracts (14), (17) & (18) as one large contract	Design Suggestion				
	INTERSECTION IMPROVEMENTS (II)					
II-1B	Eliminate south SR 86/US 1 connection	$ 253,654	$ -	$ 253,654		$ 253,654
II-2	Design all "T" intersection approaches at 45 MPH	Design Suggestion				
II-3	Realign SR 86 (North) north of current design location and intersect US 1 at STA. 204+00	$ 1,665,768	$ 557,356	$ 1,108,412		$ 1,108,412
II-4	Signalize the SR 130/US 1 intersection	$ -	$ 70,000	$ (70,000)		$ (70,000)
II-6	Modify Hidden Acre Road intersection with US 1 to a 90 degree skew	Design Suggestion				
II-7	Line up driveway across from Rackett Town Road	Design Suggestion				
II-8	Eliminate the east leg of Pine Log Road and abandon old right-of-way	Design Suggestion				

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**CP-1**
DESCRIPTION:	**LET CONTRACTS (17) AND (18) FIRST FOLLOWED BY CONTRACT (14)**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

As of now, right-of-way for Contract (14) is being acquired and the design has progressed farther for Contracts (17) and (18). Contracts (17) and (18) will be bid one to two years after Contract (14).

ALTERNATIVE:

Begin construction on projects (17) and (18) first, followed by Contract (14).

ADVANTAGES:

- Sequences SR 1/4 improvements
- Avoids four-lane segment in the middle of two-lane sections
- Convenient for deliveries from I-16
- Allows smaller contractors to participate

DISADVANTAGES:

- Could delay construction since (17) and (18) are not as far into design

DISCUSSION:

Staging the project starting with Contract (18) followed by Contract (17) and then Contract (14) will allow for smoother construction, and permit drivers to move from I-16 in a more logical sequence.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**CP-3**
DESCRIPTION:	**EXPEDITE BYPASS CONTRACT (17)**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

The roadway layout requires negotiation with a large number of property owners for obtaining right-of-way.

ALTERNATIVE: (Sketch attached)

Expedite the right-of-way acquisition for Contract (17) bypass.

ADVANTAGES:

- Allows time for negotiations with the large number of property owners

DISADVANTAGES:

- Project design has not been updated recently; final design needs to occur

DISCUSSION:

With Contract (17) being in the middle of the other two projects, it is important to ensure right-of-way acquisition does not hold up the construction of the other two projects. Beginning the right-of-way acquisition early would allow for negotiation with multiple property owners.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**CP-4**
DESCRIPTION:	**LET CONTRACTS (14), (17) AND (18) AS ONE LARGE CONTRACT**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

The project will be let using at least two contracts: first Contract (14) then Contracts (17) and/or (18).

ALTERNATIVE: (Sketch attached)

Stage one large project as follows:

1. Construct bypass, minus pavement, and use as a bypass.
2. Construct Contract (14) contract limits and delay Contract (18) due to deterioration of pavement. Maintain traffic on existing lanes during construction.
3. Open traffic on Contract (14) limits, maintain both directions on northbound lanes as a two-lane conventional road.
4. Complete Contracts (14), (17) and (18) in their entirety and open to traffic.

ADVANTAGES:

- Allows logical construction staging (north to south)
- One large contractor would possibly have more available resources

DISADVANTAGES:

- Large amounts of earth moving on entire project for one contractor
- The number of available contractors to bid on project may be affected (depending on local market)

DISCUSSION:

Bidding this as one contract would eliminate the State trying to coordinate three separate contracts and contractor(s). It would reduce the coordination of the Contract (17) contractor which will have construction on each side of its project. However, using one large contractor may increase cost due to the limited number of contractors that may bid the job.

Ultimately this alternative's viability hinges on weighing contract administration efficiency versus available bidder's pool.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**II-1B**
DESCRIPTION:	**ELIMINATE SOUTH SR 86/US 1 CONNECTION**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN:

Original design has two turns off old US 1 to get to new US 1. The first route gives access to approximately ten residences that are just north of the beginning project (where the new roadway leaves the existing roadway).

ALTERNATIVE: (Sketch attached)

Do not build the southernmost old US 1 access and allow residents to the north to access it using Railway Avenue.

ADVANTAGES:

- No cost to construct roadway
- No cost for right-of-way
- Residents can travel on a paved road; plans show it as gravel

DISADVANTAGES:

- Residents have to drive a short distance further to gain access to US 1

DISCUSSION:

The new roadway gives the residents direct access to US 1, but they can travel a short distance to Railway Avenue for access to US 1. This alternative eliminates the need for acquiring right-of-way and provides a more logical connection to US 1 via BUS 1.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 253,654	—	$ 253,654
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 253,654	—	$ 253,654

ALT II-1B
SHT 2 OF 4

MATCH LINE - STA 130+00
SEE SHEET 3

25+00

N 855599.90
E 610357.51

STA 128+13
150.00' LT

STA 128+13
125.00' LT

STA 127+68
150.00' LT

STA 127+68
125.00' LT

SIDEROAD 1
STA 20+00

UST/SR4
STA 128+20

REOD R/W

R=15'

R=50'

19' RT

60.27'

EXIST SR4

REOD R/W

R=50

23+39.59

PC

Curve Data
N : KC11000
D : 9°32'57.5"
T : 215.35
L : 413.52
R : 37.48
R : 600.00
PI STA : 25+53.71
N : 855715.22
E : 610905.80

EXIST SR4

REOD R/W

PT 27+53.11

REOD R/W

30+00

PT 30+00.91

GAS

VERLIE Y. POWELL
60.95 AC. SHOWN ON PLAT
DEED BOOK 67/521-122
PLAT BOOK D5/291

US1 / SR4

GAS

REMOVE CONNECTION

REOD R/W

+65'
48'

125+00

+82'
24'

15" RCP

CONST ℄

VERLIE Y. POWELL

VERLIE Y. POWELL

24' 24' 24'

ALTERNATIVE DESIGN

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: II-1B

SHEET NO.: 3 of 4

ELIMINATION OF ROADWAY

APPROX 1000 LF

ASPHALT ROAD 24' WIDE

$1000\ LF \times 24ft\ WIDE = 24{,}000\ SF \times \frac{SY}{9sf} = 2666.67\ SY$

ROW

$1000\ LF \times 120\ FT = 120{,}000\ sf \times \frac{1\ AC}{43560} = 2.75\ AC$

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: II-1B
Georgia Department of Transportation

SHEET NO.: 4 of 4

PROJECT ITEM		~~ORIGINAL~~ PROPOSED ESTIMATE			ORIGINAL ~~PROPOSED~~ ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
PVMT	SY				2666.7	34.36	91628
12" AGG	SY				2666.7	19.30	51467
SUB TOTAL							143095
10% MARKUP							14309
TOTAL							157404
RIGHT OF WAY (INCLUDES MARKUP)	AC				2.75	35,000	96250
Subtotal							253,659
Markup (%) at							—
W/ MARKUPS TOTAL				0			253,659

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**II-2**
DESCRIPTION:	**DESIGN "T" INTERSECTION APPROACHES FOR 45 MPH**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

"T" intersection approaches along the corridor appear to be designed for speeds in excess of 55 mph (it appears to be 65 mph). All these intersections are regulated by stop signs with associated warning signs.

ALTERNATIVE:

Design "T" intersection for approaching roads to a maximum speed of 45 mph.

ADVANTAGES:

- Tighter curves, reduces right-of-way needs
- Slows down traffic on streets – safer
- Allows for relocation of roadways to tighter locations

DISADVANTAGES:

- None apparent

DISCUSSION:

The design speeds for these side roads promotes speeding, often through more densely populated areas. A reduction in design speed for the terminus of the side road seems warranted.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**II-3**
DESCRIPTION:	**REALIGN SR 86 (NORTH) NORTH OF CURRENT DESIGN'S LOCATION AND INTERSECT US 1 AT STATION 204+00**	SHEET NO.:	**1 of 4**

ORIGINAL DESIGN:

SR 86 (N) at the north end of the bypass is realigned approximately along the J.M. Kersey Road's current alignment. J.M. Kersey Road is then realigned and teed (90-degree) into the new, realigned SR 86 alignment. The old SR 86 roadbed and the old J.M. Kersey Road roadbed are to be removed.

ALTERNATIVE: (Sketch attached)

Realign the beginning SR 86 (N) north of the location proposed in the current design. Thus, US 1 will transition to SR 86 (N) as a continuous roadway at the north end of the bypass.

ADVANTAGES:

- Uninterrupted US 1/SR 86 (N) flow
- Less roadway realignment
- Less right-of-way impact
- Increases development potential for the north end of Oak Park
- Possibility to retain portions of the J.M. Kersey Road

DISADVANTAGES:

- None apparent

DISCUSSION:

This alternative will retain more of existing US 1 (BUS 1) at the north end of the bypass, allowing better future development of the triangular piece of land between BUS 1, US 1, and SR 86. The J.M. Kersey Road is being removed, in this concept because leaving it would violate the 1,360-ft. minimum median opening spacing requirement. The current intersection of SR 86 with J.M. Kersey Road would remain in its current location.

Options could be entertained to leave portions of J.M. Kersey Road in place and cul-de-sac it at the proposed US 1 roadbed for access to properties. In the case of the east leg, the road may be of value to Oak Park as part of the town roadway network.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,665,768	—	$ 1,665,768
ALTERNATIVE	$ 557,356	—	$ 557,356
SAVINGS (Original minus Alternative)	$ 1,108,412	—	$ 1,108,412

STATE GA.

ALT II-3
SHT 2 OF 4

J.M. KERSEY ROAD

CURRENT DESIGN

SR-86

US-1

BUS-1

160+00 165+00 175+00 180+00 185+00 190+00 195+00 200+00 205+00 215+00

C1 C2 C3 C4

REMOVE J.M. KERSEY ROADBED & DEED LAND TO LANDOWNERS

OPTION RETAIN ROADBED & CUL-DE-SAC @ US-1

VE ALTERNATIVE
REALIGN SR-86
45 MPH DESIGN SPEED
R = 660'

STOP SIGN INTERSECTION STA 204+00

REMOVE ROADBED & DEED TO LANDOWNERS

0 200 500 800
SCALE: 1" = 200'

DATE	REVISIONS

B&E JACKSON ENGINEERS
34 PEACHTREE ST., N.W.
SUITE 2100
ATLANTA, GEORGIA 30303
(404) 577-4914
FAX (404) 577-4419

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTA

ALTERNATIVE DESIGN

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: II-3.

SHEET NO.: 3 of 4

→ REMOVE JAKESBURY RD → NO CHANGE BETWEEN TWO OPTIONS

→ PROPOSED PAVEMENT. $2600' \times 24' \times \frac{1}{9} \cong$ 6950 SY

$900' \times 24' \times \frac{1}{9} \cong$ 2400 SY

NEW PAVEMENT $1100' \times 24' \times \frac{1}{9} \cong$ 2950 SY

→ R/W OLD $[(2600' - 300')(100') + (900')(100')]$

$=$ 7.35 ACRE.

NEW $[(1100')(100')] =$ 2.53 ACRE.

→ EARTHWORK OLD $\left[(2600' - 300')(75')(14') + (900')(75')(14')\right]\left(\frac{1}{27}\right) =$ 125,000 CY

NEW $[(1100')(75')(14')]\left(\frac{1}{27}\right) =$ 43,000 CY

COST WORKSHEET

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS** ALTERNATIVE NO.: II-3
Georgia Department of Transportation

SHEET NO.: 4 of 4

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
PAVEMENT	SY	9350	$34.36	$321,266	2950	$34.36	$101,362
EARTHWORK	CY	125,000	$6.23	$778,750	43,000	$6.23	$267,890
AGGREGATE 12"	SY	9350	$19.30	$180,455	2950	$19.30	$56,935
SUBTOTAL				1,280,471			426,187
MARKUP 10%				128,047			42,619
				1,408,518			468,806
R-O-W (INCLUDES MARKUP)	ACRE	7.35	$35,000	$257,250	2.53	$35,000	$88,550
Subtotal				1,665,768			557,356
Markup (%) at 10%.				—			—
TOTAL				1,665,768			557,356

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**II-4**
DESCRIPTION:	**SIGNALIZE THE SR 130/US 1 INTERSETION**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

The SR 130/US 1 intersection will be reconfigured with unknown traffic control (a stop sign is anticipated).

ALTERNATIVE:

Use signalized control for the intersection. The cost is minimal for the safety and value added.

ADVANTAGES:

- Enhances safety
- Improves traffic control
- Inexpensive for value added

DISADVANTAGES:

- Adds costs

DISCUSSION:

There is too much traffic going through this intersection that will be dramatically modified. Traffic coming out of Vidalia making a left turn onto US 1 will likely warrant a left-turn signal. The cost is based on recent cost data book.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 0	—	$ 0
ALTERNATIVE	$ 70,000	—	$ 70,000
SAVINGS (Original minus Alternative)	$ (70,000)	—	$ (70,000)

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**II-6**
DESCRIPTION:	**MODIFY HIDDEN ACRE ROAD INTERSECTION WITH US 1 TO A 90 DEGREE SKEW**	SHEET NO.:	**1 of 3**

ORIGINAL DESIGN:

Hidden Acre Road does not tie into US 1 at 90 degrees.

ALTERNATIVE: (See attached)

Align Hidden Acre Road with US 1 at 90 degrees by moving tie-in to US 1 south.

ADVANTAGES:

- Ties into US 1 at a better angle
- Requires no additional right-of-way

DISADVANTAGES:

- None apparent

DISCUSSION:

Shifting Hidden Acre Road to south does not impact cost and is a logical way to intersect the "T" approach of Hidden Acre Road and US 1.

(Costs Equal)

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

COUNTY	PROJECT NUMB
TOOMBS / EMANUEL	EDS-545(14

ALT II-6

SHT 2 of 3

B.L. POWELL

ONE-STORY WOOD

POOL

B.L. POWELL

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #10

Degree = 2°00'00.0"	Delta = -32°13'41.9"
Radius = 2864.79	Length = 1611.41
Tangent = 827.65	Length of Cord = 1590.26
External = 117.16	S.E. Rate = 5.8%
PC Sta = 250+93.01	DB = N 50°39'36.9" E
North 823332.80	East 610374.40
PI Sta = 259+20.65	
North 823857.45	East 611014.50
PT Sta = 267+04.42	DA = N 18°25'55.0" E
North 824642.64	East 611276.18

SEE SHEET 13-8
MATCH LINE STA 250+00

PC 250+93.01
CURVE #10

LIMIT OF CONSTRUCTION 56+60
MATCH EXISTING WIDTH
AND CROSS SLOPE

BEGIN N.C.
57+00

EXIST R/W

EXIST R/W

EXIST R/W

EXIST R/W

255+00

260+00

+50

+84

6.5'

24'

18" PIPE

10'

46'

6.5'

4' DITCH

END N.C.
58+75

R-50'

18" PIPE

MATCH U.S. 1
90°

4' DITCH

2' DITCH

RIP RAP

BEGIN TAPER
264+85

6.5'

46'

24'

10'

6.5'

18" PIPE

4' DITCH

SEE SHEET 13-10
MATCH LINE STA 265+00

251+50
108'

252+75
98'

252+60
108'

253+20
96'

253+15
106'

254+95
95'

256+ 60±
~~257+14.87~~ US 1
~60+00 HIDDEN ACRE RD
(CR 356)

REQ'D R/W
257+50
92'

258+00
107'

264+90
128'

265+00 TYPE 12
ANCHORAGE

RIP RAP

260+15
135'

B.L. POWELL

JAMES K. BRAY, GEORGE T. GRAY & BETTY G. GRAY

258+00
190'

259+50
190'

TEMP. SEDIMENT BASIN

ALTERNATIVE DESIGN

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

EASEMENT FOR CONSTRUCTION OF TEMPORARY TRAFFIC DETOUR
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

GEORGIA DEPARTMENT OF TRANSPORTATION

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SCALE IN FEET
0 50 100 200

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: CONSULTANT DESIGN

MAINLINE PLAN

US 1

13-9

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$
SHOWDATETIME$$$$$$$

...\Drawings\13813905P10.dgn 3/7/2007 8:33:31 PM

CALCULATIONS

PROJECT: **EDS-545(14)(17)(18) US-1/SR-4 WIDENING & BYPASS**
Georgia Department of Transportation

ALTERNATIVE NO.: II-6

SHEET NO.: 3 of 3

HIDDEN ACRE RD IS STA 59+54 TO STA 56+60

$$294\ LF \times 12'\ PVMT \times \frac{SY}{9\ sf} = 392\ SY$$

ALTERNATE DESIGN – SHIFT HIDDEN ACRE RD TO SOUTH

300 LF IN LENGTH

NO COST ADDITION OR SAVINGS!

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**II-7**
DESCRIPTION:	**LINE UP DRIVEWAY ACROSS FROM RACKETT TOWN ROAD**	SHEET NO.:	**1 of 2**

ORIGINAL DESIGN:

The driveway north of Rackett Town Road is extended to join US 1 where U-turns are completed on the new alignment.

ALTERNATIVE: (Sketch attached)

Align the terminus of the driveway directly across from Rackett Town Road.

ADVANTAGES:

- Safer tie-in point
- More controlled single access point
- Allows left turns for driveway

DISADVANTAGES:

- More work (temporary easement) on private property
- Relocation of proposed sediment basin is required

DISCUSSION:

The proposed connection point is unsafe and too close to the intersection. Also, it is not prudent to put a deep sediment basin at the end of a "T" intersection.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

DATETIME$$$
$USER$

COUNTY	PROJECT NUMBER	SHEET NO.	TOT
TOOMBS / EMANUEL	EDS-545(14)	26	

ALT II-7
SHT 2 of 2

ALTERNATIVE DESIGN

SEE SHEET 14-2
MATCH LINE STA 67+00

CR220
CONSTRUCTION CENTERLINE
CURVE #12

Degree = 5°43'46.5"	Delta = -10°04'10.7"
Radius = 1000.00	Length = 175.75
Tangent = 88.10	Length of Cord = 175.52
External = 3.87	S.E. Rate = 6.8%
PC Sta = 67+49.76	DB = S 47°07'10.4" E
North 828161.70	East 612262.05
PI Sta = 68+37.86	
North 828101.75	East 612326.61
PT Sta = 69+25.50	DA = S 57°11'21.1" E
North 828054.01	East 612400.65

S.A. AARON

S.A. AARON

OBSCURED AREA

WOOD BARN

ONE-STORY WOOD

ONE-STORY BRICK

POLE

CONSTR ℄

RACKET TOWN RD

67+45 55'

PC 67+49.76 CURVE #12

BEGIN F.S.E 68+09.76

END F.S.E 68+30.00

68+55 50'

PT 69+25.51 CURVE #12

304+50 100'

305+45 103'

308+00 90'

BEGIN TAPER 308+30

END F.S.E 309+15.71

REQ'D R/W

4' DITCH

RIP RAP

6.5'

EXIST R/W

MATCH US 1

S 57°11'21.1" E

87°24'07"

US 1/SR 4

18" PIPE

24'

56'

52'

10'

MATCH LINE STA 310+00
SEE SHEET 14-2

SEE SHEET 13-11
MATCH LINE STA 295+00

295+40 R/W

295+75 100'

297+50 110'

298+60 90'

299+20 90'

299+25 100'

299+70 100'

299+70 90'

301+50 90'

68+60 100'

68+50 100'

68+20 100'

297+41.55 BEGIN F.S.E.

R=50'

END TAPER 295+19

18" PIPE

N 18°25'55.0" E

ASPHALT

6.5'

2' DITCH

46'

298+60 P.I. 100'

296+60 94'

295+05 74'

BEGIN R.C. 295+82.22

PC 296+92.912 CURVE #11

298+60 P/L

P/L 95'

301+80 82'

301+80 180'

302+81.96 US 1
+70+00 RACKET TOWN RD
(CR 220)

303+60 98'

303+75 100'

303+85 133'

303+60 190'

304+20 105'

304+20 118'

305+00 113'

306+70 90'

308+80 93'

ONE-STORY BRICK

DRIVE

ORCHARD

TEMP. SEDIMENT BASIN

WHY IS THIS AT THE END OF THE 'T' INTERSECTION?

PT 309+64.352 CURVE #11

MAINLINE
CONSTRUCTION CENTERLINE
CURVE #1

Degree = 2°00'00.0"	Delta = 25°25'43.6"
Radius = 2864.79	Length = 1271.44
Tangent = 646.36	Length of Cord = 1261.03
External = 72.01	S.E. Rate = 5.8%
PC Sta = 296+92.91	DB = N 18°25'55.0" E
North 827477.82	East 612221.08
PI Sta = 303+39.28	
North 828091.03	East 612425.45
PT Sta = 309+64.35	DA = N 43°51'38.6" E
North 828557.07	East 612873.32

LINE UP DRIVEWAY W/ RACKET TOWN RD. PROPERTY APPEARS TO HAVE ROOM TO DO THIS.

JAMES LARRY JORDAN

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

EASEMENT FOR CONSTRUCTION OF TEMPORARY TRAFFIC DETOUR
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

GEORGIA DEPARTMENT OF TRANSPORTATION

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Atlanta, Georgia 30071
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SCALE IN FEET
0 50 100 200

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN

MAINLINE PLAN

US 1

1

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$$

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**EDS-545 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	ALTERNATIVE NO.:	**II-8**
DESCRIPTION:	**ELIMINATE THE EAST LEG OF PINE LOG ROAD AND ABANDON OLD RIGHT-OF-WAY**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN:

The current design extends Pine Log Road east of the new US 1/SR 4 alignment to connect to existing US 1 and retains the old US 1 roadbed from STA. 361+00 to 402+00 +/–. No access is provided to any of the properties from this roadway.

ALTERNATIVE: (Sketch attached)

Eliminate the east leg of Pine Log Road and deed the excess property to the adjacent land owners. Allow limited driveway access onto new US 1 alignment in the future.

ADVANTAGES:

- Eliminates cross traffic at intersection
- No additional roadbed to maintain (old US 1 roadway)
- No additional right-of-way to maintain

DISADVANTAGES:

- Additional driveway access is provided on limited access corridor
- There will be a roadway bed removal cost

DISCUSSION:

At this time, the old roadbed, which this roadway will access, serves no purpose and will be both an eyesore and safety liability since abandoned roadbeds tend to be used for dangerous "sports." Future access needs can be developed at the time they are needed. This concept, i.e., removing the old US 1 roadbed, can be applied to all of the project's independent alignments.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

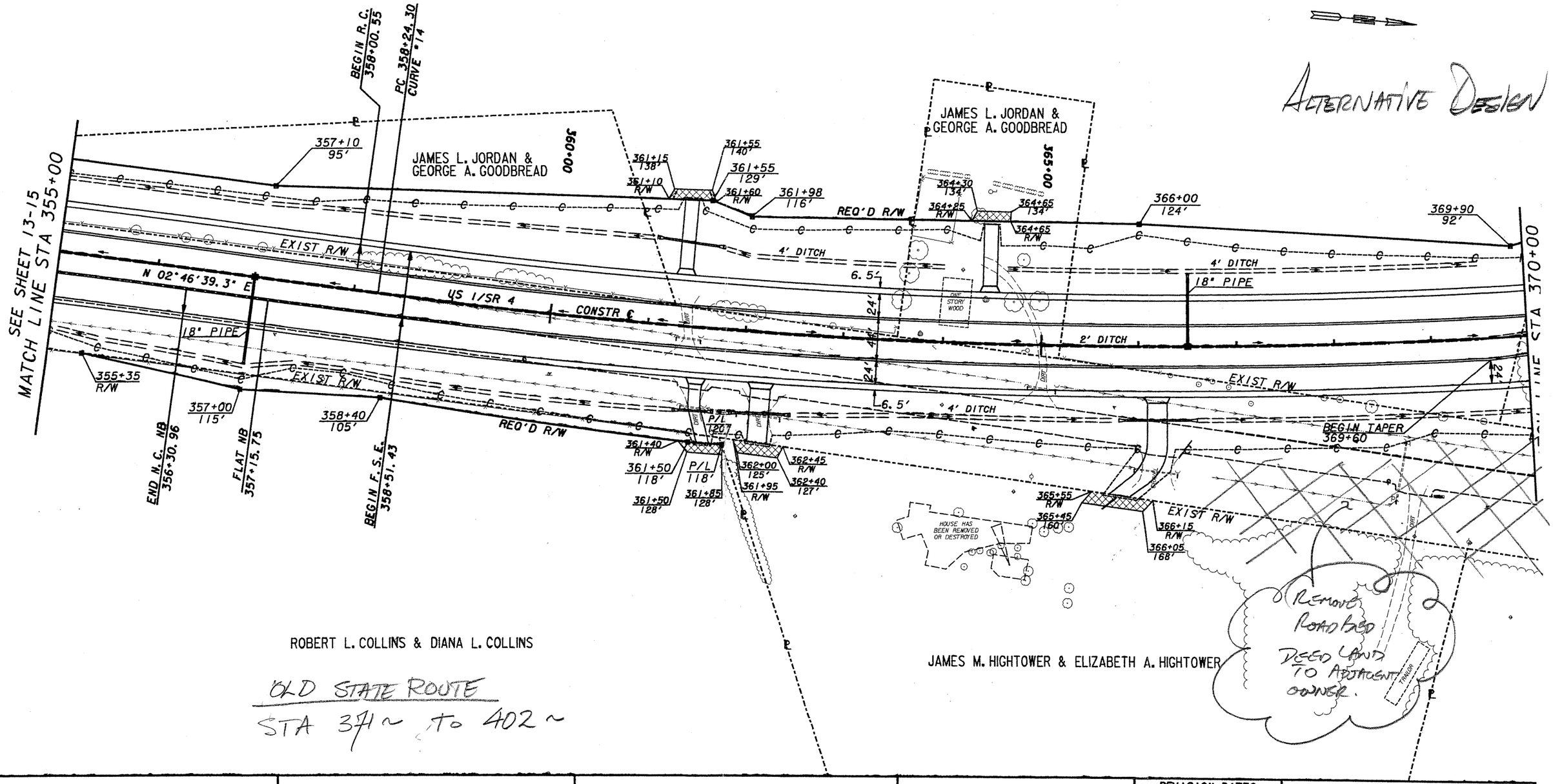
DATETIME$$$
$USER$

COUNTY	PROJECT NUMBER	SHEET NO.	TOT
TOOMBS / EMANUEL	EDS-545(14)	30	

ALT II-8
SHT 2 OF 5

CHARLES H. AKINS & CARLEEN G. AKINS

ALTERNATIVE DESIGN



OLD STATE ROUTE
STA 371~ to 402~

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

EASEMENT FOR CONSTRUCTION OF TEMPORARY TRAFFIC DETOUR
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

GEORGIA DEPARTMENT OF TRANSPORTATION

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SCALE IN FEET
0 50 100 200

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN

MAINLINE PLAN

US 1

1
86

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$

DATETIME$$$
$USER$

COUNTY	PROJECT NUMBER	SHEET NO.	TOT
TOOMBS / EMANUEL	EDS-545(14)	31	

ALT II-8.
SHT 3 OF 5

ALTERNATIVE DESIGN

MAINLINE CONSTRUCTION CENTERLINE CURVE #14

Degree = 1°00'00.0"	Delta = -38°35'59.6"
Radius = 5729.58	Length = 3859.99
Tangent = 2006.46	Length of Cord = 3787.41
External = 341.17	S.E. Rate = 3.2%
PC Sta = 358+24.30	DB = N 2°46'39.3" E
North 833081.95	East 614026.10
PI Sta = 378+30.76	
North 835086.06	East 614123.33
PT Sta = 396+84.28	DA = N 35°49'20.3" W
North 836712.97	East 612949.00

CR511 CONSTRUCTION CENTERLINE CURVE #15

Degree = 5°43'46.5"	Delta = -6°13'07.9"
Radius = 1000.00	Length = 108.54
Tangent = 54.32	Length of Chord = 108.49
External = 1.47	S.E. Rate = Reverse Crown
PC Sta = 807+60.41	DB = N 85°11'43.8" E
North 835140.30	East 613499.77
PI Sta = 808+14.73	
North 835144.85	East 613553.90
PT Sta = 808+68.55	DA = N 78°58'35.9" E
North 835155.23	East 613607.22

SR511 CONSTRUCTION CENTERLINE CURVE #16

Degree = 5°43'46.5"	Delta = -3°24'49.9"
Radius = 1000.00	Length = 59.58
Tangent = 29.80	Length of Cord = 59.59
External = 0.44	S.E. Rate = Reverse Crown
PC Sta = 811+59.29	DB = N 78°58'35.9" E
North 835210.75	East 613892.21
PI Sta = 811+89.09	
North 835216.45	East 613921.46
PT Sta = 812+18.88	DA = N 75°33'44.6" E
North 835223.88	East 613950.32

CHARLES H. AKINS & CARLEEN G. AKINS

TOOMBS COUNTY
EMANUEL COUNTY

JAMES M. & ELIZABETH A. HIGHTOWER

JEAN R. ESSIG

JEAN R. ESSIG

SEE SHEET 13-16
MATCH LINE STA 370+00

MATCH LINE STA 385+00

371+00 115'
373+00 130'
373+50 TYPE I ANCHORAGE
375+00
375+50 130'
376+00 105'
377+00 110'
377+00 TYPE 12 ANCHORAGE
379+20 105'
379+54.86 US 1
810+00 PINE LOG RD (CR 511)
382+95 105'
380+25 105'
374+50 110'
375+50 100'
378+50 90'
380+05 100'
383+00 105'
371+50 105'
R/W 109'
807+50 22'
808+00 38'
807+50 20'
808+00 50'
811+00 50'
812+00 50'
R/W 50'

18" PIPE
24" PIPE
2' DITCH
4' DITCH
6.5'
52'
24'
16'
12'
R=50'
END TAPER 373+80
BEGIN R.C. 808+10
END R.C. 808+90
PC 807+60.80 CURVE #15
PT 808+68.55 CURVE #15
PC 811+59.29 CURVE #16
PT 812+18.88 CURVE #16
REQ'D R/W
EXIST R/W
LIMIT OF CONSTRUCTION 807+50 MATCH EXIST
MATCH US 1
US 1/SR 4
CONSTR ℄
PINE LOG RD
82°29'44"
N 75°33'44.3" E
N 78°58'35.9" E
REMOVE ROAD BED DEED PROPERTY
ELIMINATE EAST LEG

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

EASEMENT FOR CONSTRUCTION OF TEMPORARY TRAFFIC DETOUR
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

GEORGIA DEPARTMENT OF TRANSPORTATION

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SCALE IN FEET
0 50 100 200

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN

MAINLINE PLAN

US 1

1
87

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$$

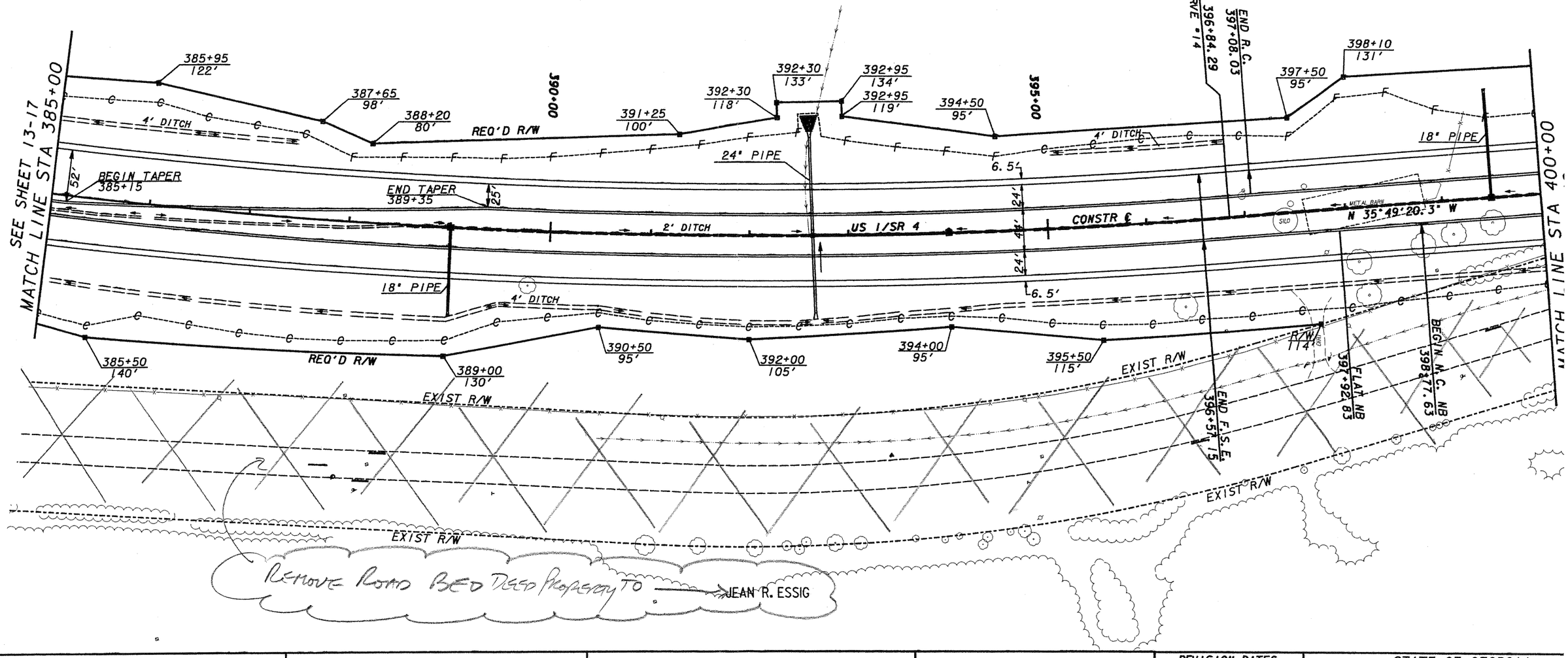
DATETIME$$$
$USER$

COUNTY	PROJECT NUMBER	SHEET NO.	TOT
TOOMBS / EMANUEL	EDS-545(14)	32	

ALT II-8
SHT 4 OF 5

JAMES M. & ELIZABETH A. HIGHTOWER

ALTERNATIVE DESIGN



PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

EASEMENT FOR CONSTRUCTION OF TEMPORARY TRAFFIC DETOUR
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

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• Planning
• Construction Management
3189 Holcomb Bridge Road
Suite 455
Atlanta, Georgia 30071
(404) 552-6950

SCALE IN FEET
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REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN
MAINLINE PLAN
US 1

1
88

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$$

DATETIME$$$
$USER$

COUNTY	PROJECT NUMBER	SHEET NO.	TO
TOOMBS / EMANUEL	EDS-545(14)	33	

ALT II-8
SHT 5 of 5
ALTERNATIVE DESIGN

JAMES M. & ELIZABETH A. HIGHTOWER

MARIE S. SAMPLES

SEE SHEET 13-18
MATCH LINE STA 400+00

MATCH LINE STA 415+00

405+00

410+00

403+65
122'

405+55
92'

406+70
120'

REQ'D R/W

408+10
120'

409+00
95'

414+35
150'

4' DITCH

18" PIPE

6.5'

24'

US 1/SR 4

N 35°49'20.3" W

EXIST R/W

2' DITCH

CONSTR ℄

BEGIN TAPER
413+94

412+30
R/W

412+80
R/W

411+35
115'

411+70
R/W

411+70
113'

411+30
R/W

412+35
120'

412+75
121'

RUINS

WOOD BARN

DIRT

ONE STORY BRICK

Remove Road Bed Desd Property To

JEAN R. ESSIG

FRANK J. & CAROLYN W. DIMOLFETTO

WILLIAM L. WALDREP, JR. & SARAH E. DONNER

PROPERTT AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

EASEMENT FOR CONSTRUCTION OF TEMPORARY TRAFFIC DETOUR
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

GEORGIA DEPARTMENT OF TRANSPORTATION

: Engineering
: Architecture
: Planning
: Construction Management

3169 Holcomb Bridge Road
Suite 455
Atlanta, Georgia 30071
(404) 239-2600

SCALE IN FEET
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REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATI
OFFICE: CONSULTANT DESIGN

MAINLINE PLAN

US 1

1
89

DGN$SPECIFICATION$$$$$$$$$$$$$$$$$$$$$$

PROJECT DESCRIPTION

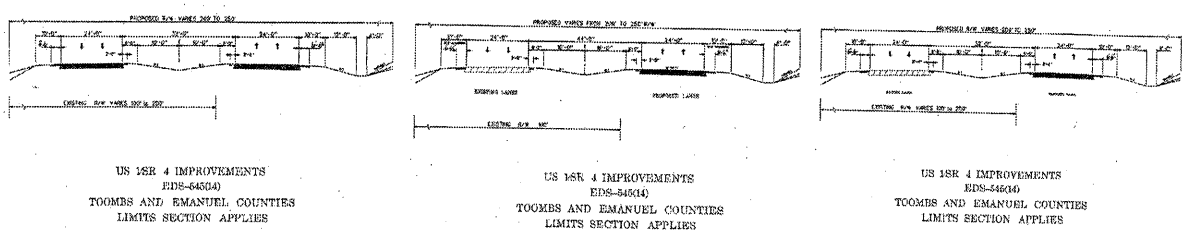
INTRODUCTION

The EDS-545(14) (17) (18) US 1/SR 4 Widening & Oak Park Bypass project (P.I. No. 522130, 221900, 221910) is part of the Governor's Road Improvement Program which provides multi-lane access to areas not served by the interstate highway system. This project, consisting of three contracts covered under a single environmental document approved on February 12, 2007, proposes to convert a two-lane conventional highway to a divided four-lane facility with a grassed median varying in width from 32 ft. to 44 ft. to serve a major north-south corridor in the eastern section of the state.

The southern project terminus, Contract (14), begins at SR 130 in Toombs County, while the northern terminus is just south of Interstate 16 in Emanuel Country, Contract (18). The project includes a 2-mile bypass, Contract (17), that avoids widening though the Town of Oak Park. The total length of the project is 12.5 miles and the current probable cost is $60.6 million for construction and $6.7 million for right-of-way for a total cost of $67.3 million. Contract (14) is scheduled to be advertised first and will be followed by Contracts (17) and (18) one to two years later.

PROJECT DESCRIPTION

The project will be designed for a 65 mph design speed. The project typical section is depicted below. The bulk of the project will consist of the reconstruction of the existing pavement and the addition of two lanes separated by a divided median that for the most part is 32 ft.-wide to lessen the impacts to wetlands. Only a small portion of the project will retain the existing pavement and the wider, 44 ft. median that is typical for most GRIP projects.

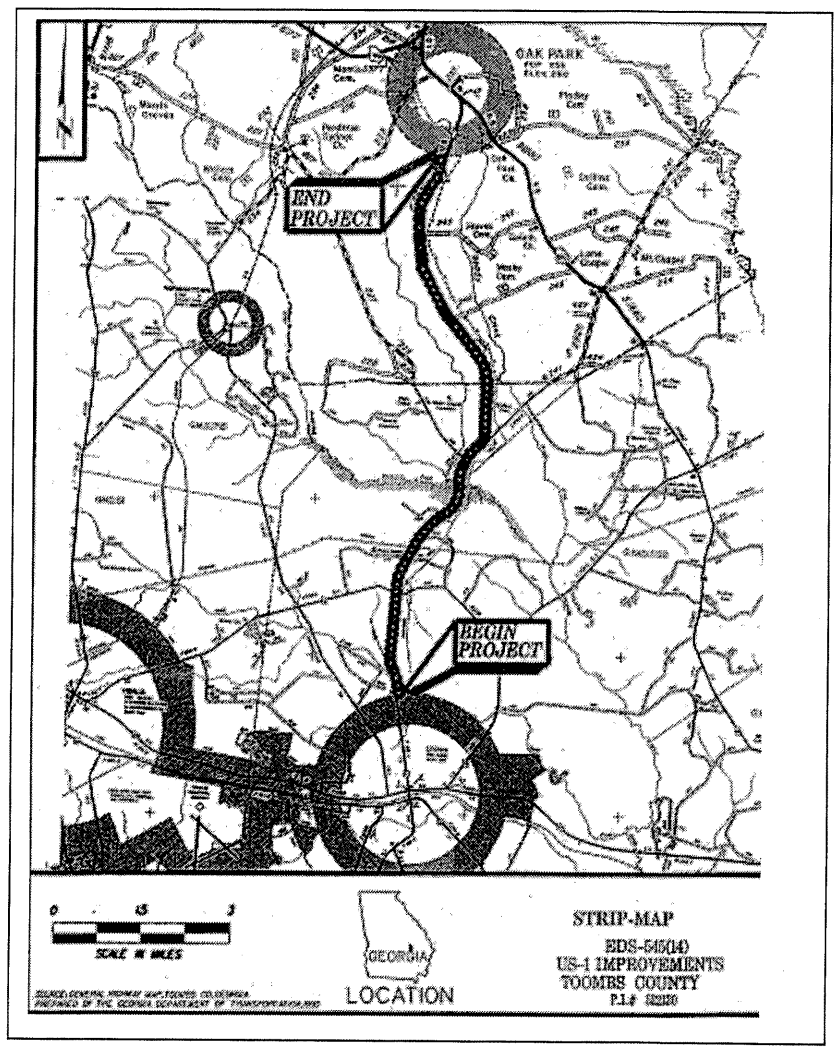


Project Typical Section

The following describes the individual contracts:

Contract (14)

The approved concept for EDS-545(14) in Toombs and Emanuel Counties proposes to widen and reconstruct US 1/SR 4 from SR 130 in Toombs County to the south city limits of Oak Park in Emanuel County. The project begins just north of the existing US 1/SR 4 bridge spanning Swift Creek at mile post 21.13 in Toombs County, and immediately transitions from the existing US 1/SR 4 two-lane typical section to a proposed four lane, 32-ft. grassed median typical section. As the approved concept transitions typical sections, it simultaneously transitions to the west side widening without holding the existing US 1/SR 4 right-of-way.



Proceeding north, west side widening continues to SR 130. Just north of CR 219/Louis Starra road the proposed alignment transitions to east side widening, holding existing lanes to avoid impacting an eligible historic resource. Continuing north, the road bridges over Pendleton Creek as east side widening, holding existing lanes, and then transitions to west side widening, holding existing lanes just south of CR 220 Rocket Town Road.

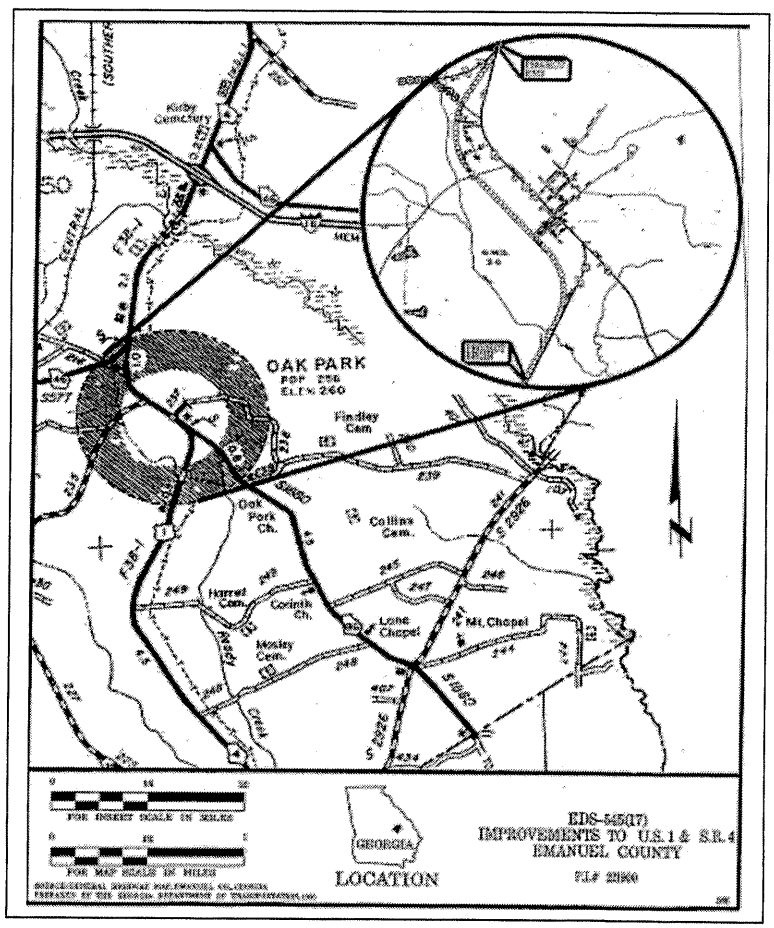
Continuing further north, east side widening and holding existing lanes occurs to just south of CR 210/Five Point Road, where the project transitions to west side widening, holding existing lanes. Approximately 1,600 ft. north of the CR 210/North Point Road intersection, the grassed median transitions from 32 ft. wide to 44 ft. wide. Proceeding north, the approved concept maintains west side widening until approximately 1,600 ft. south of CR 249/Harrell Cemetery Road, where the project proceeds onto a new alignment for approximately 0.75 miles on the east side of existing US 1/SR 4 to eliminate the existing substandard horizontal curvature on US 1/SR 4.

The project then proceeds forward as west side widening, holding the existing lanes until the project's end at the Oak Park south city limits. The total length of the project is 8.5 miles. The 2026 design year traffic forecasts 7,700 ADT for this stretch of US 1/SR 4.

The proposed right-of-way will vary from 238 ft. to 532 ft. for the length of the project. The right-of-way acquisition includes 87 acres of residential, agricultural and timberland relocating two commercial and five residential properties. The current cost estimate for Contract (14) is $33.3 million for construction and $4.6 million for right-of-way.

Contract (17)

The approved concept begins at the Oak Park south city limits where widening is proposed on the west side of US 1/SR 4 to a point approximately 0.3 miles north of the south city limits. The alignment then moves onto a new location, paralleling existing US 1/SR 4 approximately 0.2 miles west of US 1/SR 4 and SR 46/SR 86. At this point, the alignment ties back into US 1/SR 4 with the widening proposed on the east side.

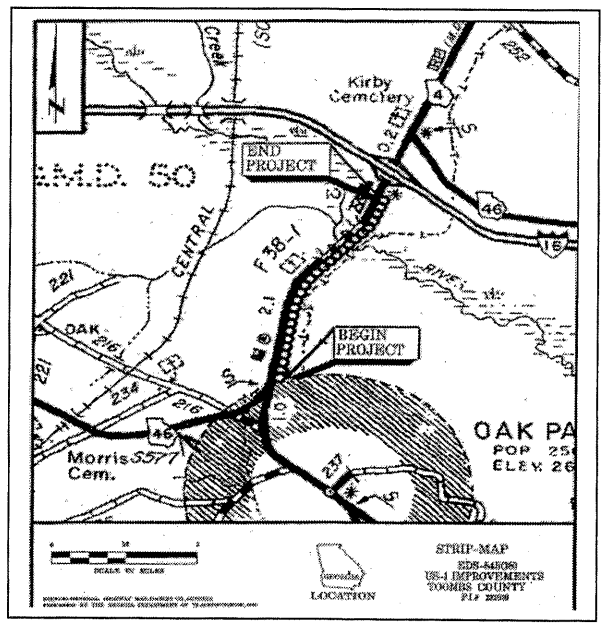


The length of this contract is 2.2 miles. The proposed typical section is four lanes with a 32-ft. grassed median on right-of-way that would vary from 209 ft. wide along the existing roadway to 250 ft. at the new location. The standard 44-ft. median was reduced to 32 ft. to reduce impacts to wetlands. The existing right-of-way along US 1/SR 4 varies from 60 ft. to 130 ft. The design year 2017 AADT is 5,700 ft. for this portion of US 1/SR 4.

The proposed right-of-way acquisition for Contract (17) is 73 acres of residential land with one residential relocation required. The current cost estimate for Contract (17) is $11.1 million for construction and $1.7 million for right-of-way.

Contract (18)

EDS-545 (18) begins at the Oak Park north city limits and extends 1.8 miles to I-16. Throughout the project US 1/SR 4 is widened on the east to provide four lanes and a 32-ft. grassed median. The project requires three bridges over the Ohoopee River, one for the main channel and two overflows on each side of the main channel. The first river overflow bridge is 240 ft. long, the main channel bridge is 570 ft. long and the second overflow bridge is 150 ft. long. The proposed typical section requires a right-of-way that varies from 209 ft. to 259 ft. wide. The existing right-of-way along US1/SR 4 varies from 100 ft. to 200 ft. wide. The AADT traffic in the design year 2017 is 4,000 AADT along this stretch of US 1/SR 4. The length of the contract is 1.8 miles.



The proposed right-of-way acquisition for Contract (18) is 20 acres of residential land with no residence relocation required. The current cost estimate for Contract (17) is $16.0 million for construction costs, of which approximately $7.9 million is in structures costs, and $0.4 million for right-of-way.

VALUE ANALYSIS AND CONCLUSION

GENERAL

This section describes the procedures used during the value engineering study on the EDS-545(14) (17) (18) US 1/SR 4 Widening & Oak Park Bypass project conducted by Lewis & Zimmerman Associates, Inc. for GDOT. The workshop was performed during the week of August 7-10, 2006, in the GDOT office in Atlanta, Georgia. The QK4 and B&E Jackson design firms were selected by the owner to assist with the development of the project and have provided information for the VE team to use as the basis of the study.

A systematic approach was used in the VE study. The key steps taken were organized into three distinct parts: 1) pre-study preparation; 2) VE orientation/kickoff meeting and workshop; and 3) post-study reporting and implementation. A Task Flow Diagram, which outlines each of the procedures included in the VE study, is attached for reference.

In the sections following the VA procedure, separate narratives and supporting documentation identify the following:

- Value Engineering Study Agenda
- Value Engineering Workshop Participants
- Cost Model(s) developed for use in the workshop
- Function Analysis performed by the team
- Creative Ideas and Evaluation of the ideas performed by the team

PREPARATION EFFORT

A workshop format was used to conduct the study. Pre-study preparation for the workshop consisted of scheduling study participants and tasks and gathering necessary project documents to distribute to team members for review prior to attending the workshop. Throughout the study the following documents were used as the basis for generating alternative approaches for achieving project functions and for determining the cost implications of the alternatives that have potential for enhancing the value of the project.

Contract (14)

- Contract (14) – Notification of Concept Revision, dated October 31, 2006, prepared by the Georgia Department of Transportation
- Contract (14) – Revised Project Concept Report, dated March 21, 2002, prepared by the Georgia Department of Transportation
- Contract (14) – Project Concept Approval Report, dated September 14, 1992, prepared by the Georgia Department of Transportation

Value Engineering Study Task Flow Diagram

Preparation Effort

Coordination Project
- Verify Schedule
- Suggest Format for Designer Presentation
- Outline Project Responsibilities
- Outline Needed Background Data
- Define *Project Value Objectives*
- Identify Project Constraints

→

Prepare for Workshop
- Collect Project Data
- Distribute Data to Team Members
- Team Members Become Familiar with Project

→

Construct Cost Models
- Construct Cost Models
- Construct Graphic Function Analysis
- Outline High Cost Areas

→

LCC Model
- Roadway
- Bridges
- MOT
- Energy
- User Impact

Workshop Effort

Information Phase
- Introduction by VETL
- Project Description and Presentation by Designer
- Outline Owner Requirements
- Review Project Data
- Visit Project Site (Alt.)

→

Function Identification and Analysis Phase
- Analyze Project Costs and Energy Usage
- Perform Function Analysis and FAST Diagram
- Identify High Cost and Energy Areas
- Calculate Cost/Worth Ratios
- Identify Paradigms

List Ideas Generated During Function Analysis

→

Speculation Phase
- Introduction by VETL
- Creative Idea Listing:
  - Quantity of ideas
  - Association of Ideas
- Brainstorm
- Do Creative Thinking
  - Group Thinking
  - Individual Thinking
- Use Checklist for Ideas

→

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

→

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

→

Presentation Phase
- Summarize Findings
- Present VE Ideas to Owner/ User/Designer
- Oral Presentation

Post-Workshop Effort

VE Study Report
- Develop Implementation VE Report
- Designer Prepares Responses to VE Report
- Owner Evaluates Recommendations

→

Implementation Phase
- Participate in Implementation Meeting with Owner/User/ Designer/ VE Team, as needed
- Prepare Final VE Report

→

Final Acceptance
- Redesign by Designer

- Contract (14) – Estimate Report, dated April 3, 2007, prepared by the Georgia Department of Transportation
- Contract (14) – Right-of-Way Cost Estimate, dated April 11, 2007, prepared by the Georgia Department of Transportation

Contract (17)

- Contract (17) – Revised Project Concept Report, dated March 21, 2002, prepared by the Georgia Department of Transportation
- Contract (17) – Revised Project Concept Report, dated July 8, 1998, prepared by the Georgia Department of Transportation
- Contract (17) – Project Concept Approval Report, dated August 12, 1992, prepared by the Georgia Department of Transportation
- Contract (17) – Estimate Report, dated April 3, 2007, prepared by the Georgia Department of Transportation
- Contract (17) – Right-of-Way Cost Estimate, dated February 7, 2007, prepared by the Georgia Department of Transportation

Contract (18)

- Contract (18) – Revised Project Concept Report, dated March 21, 2002, prepared by the Georgia Department of Transportation
- Contract (18) – Project Concept Approval Report, prepared by the Georgia Department of Transportation
- Contract (18) – Estimate Report, dated July 15, 1992, prepared by the Georgia Department of Transportation, dated January 22, 2007
- Contract (18) – Right-of Way Cost Estimate, dated February 7, 2007, prepared by the Georgia Department of Transportation

Plan Sets (14), (17) and (18)

- Contract (14) Plans are at the Preliminary Field Plan Review (PFPR) with completed stage, right-of-way plans not dated, prepared by QK4
- Contracts (17) and (18) plans at the preliminary plan phase of development (on hold for approximately five years) with various dates of preparation in 2002 and 2003, prepared by B&E Jackson

Other Data Collection

- Hydraulic and Hydrology Reports for SR 4(US 1) Bridge over Pendleton Creek, dated January 2004, prepared by Moreland Altobelli Associates
- Hydraulic and Hydrology Reports for SR 4(US 1) Ohoopee River Bridge Replacement revised July 15, 2004, prepared by B&E Jackson and Associates
- Bridge Foundation Reports for SR 4 (US 1) Ohoopee River Overflow dated March 15, 2004, prepared Georgia Department of Transportation

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

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

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop effort consisted of a 4-day workshop beginning with an orientation/kickoff meeting August 7, 2007, and concluding with the final VE Presentation on August 10, 2007. During the workshop, the VE Job Plan was followed in compliance with FHWA and SAVE International guidelines for conducting a VE study. The job plan guided the search for alternatives to mitigate or eliminate high cost drivers, support functions providing little or no value, and potential project risk elements. Alternatives to specifically address the owner's project concerns and enhance value by improving operations, reducing maintenance requirements, enhancing constructibility, and providing missing or less than optimum functionality were also entertained. The Job Plan includes six phases:

- Information Gathering Phase (without site visit)
- Function Identification and Analysis Phase
- Speculation Phase
- Evaluation of Creative Ideas Phase
- Alternative Development Phase
- Presentation Phase

Information Gathering Phase

At the beginning of the study, the decisions that have influenced the project's design and proposed construction methods had to be reviewed and understood. For this reason GDOT and the design teams sent information (described above) to the VE team prior to the study and, following a short orientation session, the workshop was kicked off with a presentation of the project to the team. The presentation highlighted the information provided in the written documentation and expanded on that information to include a history of the project's development and any underlying influences that caused the design to develop to its current state. During this presentation, VE team members were given the opportunity to ask questions and obtain clarifications of the information provided.

Function Identification and Analysis Phase

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

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

After identifying the functions, the team classified the functions according to the following:

Abbreviation	Type of Function	Definition
HO	Higher Order	The primary reason the project is being considered or project goal
B	Basic	A function the must occur for the project to meet its higher order functions
S	Secondary	A function that occurs because of the concept or process selected and may or may not be necessary
R/S	Required Secondary	A secondary function that may not be necessary to perform the basic function but must be included to satisfy other requirements or the project cannot proceed
G	Goal	Secondary goal of the project
O	Objective	Criteria to be meet
LO	Lower Order	A function that serves as a project input

Higher order and basic functions provide value while secondary functions tend to reduce value. Thus the team works in future phases to reduce the impact of secondary functions and thus enhance project value.

To further clarify the impact of the various functions, the team assigned costs to provide the functions or group of functions provided by a specific project element using the cost estimate and cost model(s). Where possible they seek to benchmark the costs for providing functions, i.e. finding the lowest cost, or worth, to perform the function, using published data from other sources or team knowledge obtained from working on other similar projects to establish cost goals and then comparing them to the current costs. By identifying the cost and worth of a function or group of functions, cost/worth ratios were calculated. Cost/worth ratios greater than 1 indicated that less than optimum value was being provided. Those project functions or elements with high cost/worth ratios became prime targets for value improvement.

As well as looking at areas with high cost/worth ratios, the team used the cost model(s) to seek out the areas where most of the project funds are being applied. Because of the absolute magnitude of these high cost elements or functions, they too became initial targets for value enhancement.

Overall, these exercises stimulated the VE team members to focus on apparently low value areas and initially channel their creative idea development in these places.

Speculation Phase

This VE study phase involved the creation and listing of ideas. Starting with the functions or project elements with high cost/worth ratios, a high absolute cost compared to other elements in the project, and secondary functions providing little or no value, the VE team generated as many ideas as possible to provide the necessary functions at a lower total life cycle cost, or to improve the quality of the project. Ideas for improving operation and maintenance, reducing project risk, and simplifying constructibility were also encouraged. At this stage of the process the VE team was looking for a large quantity of ideas and free association of ideas. Creative Idea Listing worksheets were generated and organized by the function or project element being addressed.

GDOT and the design teams may wish to review these creative lists since they may contain ideas that were not pursued by the VE but can be further evaluated for potential use in the design.

Evaluation/Judgment Phase

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

Based on the team's understanding of the owner's value objectives, each idea was compared with the present design concept and the advantages and disadvantages of each idea were discussed (and recorded on the Creative Idea Listings). How well an idea met the design criteria was also reviewed. Based on the results of these reviews, the VE team rated the idea by consensus using a scale of 1 to 3, with 3 indicating an idea with the greatest potential to be technically sound and provide cost savings or improvements in other areas of the project, 2 indicating an idea that provides moderate value improvement and 1 indicating an idea with a major technical flaw that does not respond to project requirements. Generally, ideas rated 2 and 3 are continued in the next phase and presented during the presentation phase.

The team also used the designation "DS" to indicate a Design Suggestion, which is an idea that may not have specific quantifiable cost savings, but may reduce project risk, improve constructibility, help to minimize claims, enhance operability, ease maintenance, reduce schedule time or enhance project value in other ways. Design suggestions could also increase a project's cost but provide value in areas not currently addressed. These are also developed in the next phase of the VE process.

Development Phase

In this phase, each highly-rated idea was expanded into a workable solution designated as a Value Engineering Alternative. The development consists of describing the current design and the alternative solution, preparing a life cycle cost comparison where applicable, describing the advantages and disadvantages of the proposed alternative solution, and a writing a brief narrative to compare the original design to the proposed change and provide a rationale for implementing the idea into the design. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The Value Engineering Alternatives are included in the report section entitled, Study Results. Design suggestions include the same information as the alternatives except that no cost analysis is performed. They too are included in the report section entitle, Study Results.

Presentation Phase

The last phase of the workshop was to summarize the results of the study and prepare Summary of Potential Cost Saving worksheets to handout at the presentation and the design teams. The purpose of the presentation meeting was to provide the attendees with an overview of the suggestions for value enhancement resulting from the VE study, and afford them the opportunity to ask questions to clarify specific aspects of the alternatives presented. Procedures for implementing the results of the study were discussed and arrangements were made for the reviewers of the VE report to contact the VE Team in order to obtain further clarifications, if necessary.

POST WORKSHOP EFFORT

The post-study portion of the VE study consisted of the preparation of this Value Engineering Study Report. Personnel from GDOT and the design teams will analyze each alternative and prepare a short response, recommending incorporation of the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. LZA 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.

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

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. will conduct a four-day value engineering (VE) workshop on the US-1/SR-4 Bypass project (EDS-545(17)), US-1/SR-4 Widening from Oak Park to I-16(EDS-545(18)), Widening & Reconstruction of US-1 from the City of Lyons to the City of Oak Park (EDS-545(14)) in Toombs and Emanuel counties for the Georgia Department of Transportation concurrently from August 7-10, 2007.

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

Georgia Department of Transportation
Room 264
No. 2 Capitol Square
Atlanta, GA 30334

The QK4 Designers will present the EDS-545(14) followed by the B&E Jackson Designers who will present the EDS-545 (17) & (18) projects at the beginning of the VE workshop, Tuesday morning. The Designers will be available to answer questions during the study effort. A suggested outline for the Designer's presentation follows the agenda. Georgia Department of Transportation (GDOT) staff are encouraged to attend.

AGENDA

Tuesday, August 7, 2007

9:00 am - 9:15 am **Welcome, Introduction and Objectives** **(All Participants)**

Welcome; Opening Remarks and Introduction of Participants: Owner, Designer, VE Team members

Overview of the VE Process, Workshop Organization and Agenda

Review VE Workshop Objectives and Goals

9:15 am – 9:30 am **Introductory Comments** **(All Participants)**

History and Background of the project and available project funds

9:30 am – 11:00 am **Design Team Detailed Presentation** **(All Participants)**

Overview, Scope, and Project Requirements

Key Design Issues for all Disciplines

Construction Phasing and most recent Project Cost Estimate

Design Team fields VE Team questions

Tuesday, August 7, 2007 (Continued)

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

VE team identifies the project risks, project issues and constraints based on Designer's Briefing and plan review.

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

1:00 pm – 2:00 pm **Cost Model Analysis** **(VE Team)**

VE team develops cost histogram(s) from the project estimate.

2:00 pm – 3:00 pm **Functional Analysis Phase.** **(VE Team)**

Identify basic and secondary functions.

3:00 pm – 5:00 pm **Creative Phase** **(VE Team)**

Brainstorm to generate ideas through free association. Defer judgment.

Select targets established in the previous phase.

Wednesday, August 8, 2007

8:00 am – 12:00 pm **Creative Phase (continued)** **(VE Team)**

Continue brainstorming against selected targets.

12:00 pm – 1:00 pm **Lunch**

1:00 pm – 3:00 pm **Evaluation Phase** **(VE Team)**

Establish the criteria for evaluation and rate each idea on a scale of 1 to 5, identifying the "best" ideas for development. Highly rated ideas are assigned to team members for development into VE alternatives.

3:00 pm – 5:00 pm **Development Phase (continued)** **(VE Team)**

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

Thursday, August 9, 2007

8:00 am – 12:00 pm **Development Phase (continued)** **(VE Team)**

The VE team continues developing creative ideas into value engineering alternatives

12:00 pm – 1:00 pm **Lunch**

Thursday, August 9, 2007 (Continued)

1:00 pm – 4:00 pm **Development Phase (continued)** **(VE Team)**

VE Team continues developing creative ideas into value engineering alternatives.

4:00 pm – 5:00 pm **Development Phase (continued)** **(VE Team)**

VE Team closes out the Development Phase by summarizing the findings onto the Summary of Potential Cost Savings and weighting and rating the VE alternatives on an Evaluation Matrix .

Friday, August 10, 2007

8:00 am – 9:00 am **Development Phase (continued)** **(VE Team)**

VE Team prepares for the presentation of the VE findings.

9:00 am – 11:00 am **Presentation Phase** **(All Participants)**

The VE team presents the value engineering alternatives to the Designers and GDOT representatives. A draft copy of the Summary of Potential Cost Savings will be distributed.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise in the unique project elements involved with the EDS-545(14) (17) (18) US 1/SR 4 Widening & Oak Park Bypass project. Team members consisted of a multidisciplinary group with professional highway design, structures and construction experience and a working knowledge of VE procedures. The VE Team included the following:

Participant	Specialization	Affiliation
Joseph Leoni, PE	Highway Design	ARCADIS U.S., Inc.
Dan Hood, PE	Highway Design	HNTB Corporation
Dion Moten, PE	Constructability	Delon Hampton & Associates
Alexander Pascual, PE	Structures	HNTB Corporation
George Hunter, PE, PMP,CVS	VE Team Leader	Lewis & Zimmerman Associates

DESIGNER'S PRESENTATION

An overview of the project was presented on August 7, 2007 by representatives from the owner and the design teams. 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 specifics. Additionally, the meeting afforded the owner and design staff the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention. An attendance list for the meeting entitled Designer's Presentation Meeting Participants is attached.

VALUE ENGINEERING TEAM'S PRESENTATION

A VE presentation was conducted on August 10, 2007 at the Georgia Department of Transportation Headquarters offices in Atlanta, Georgia to review VE alternatives with the owner and representatives from the design teams. Copies of the Draft Summary of Potential Cost Savings were provided to the attendees. An attendance list for the meeting entitled VE Team Presentation Meeting Participants is attached.

Aug 10 Attendance

VE STUDY SIGN-IN SHEET

Project No.: EDS-545(14)(17)(18(County: Toombs Emanuel PI No.: 522130, 221900, 221910 Date: August 7-10, 2007

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
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COST MODEL

The VE team leader prepared Pareto Charts, or cost histograms, for each project that follow this page. The cost histogram, display the major construction elements identified in the cost estimate prepared by the designers in descending order of magnitude and thus identifies the high cost areas in the project and provides the VE team with a focus for its work during the study. For this project, approximately 15% of the construction items represent about 80% of the project costs. They are, by contract:

Contract (14), 5 of 30 items (84% of costs):

1. Pavement (recycled asphalt concrete, superpave)
2. Unclassified excavation
3. Bridge
4. Clearing & grubbing

Contract (17) 4 of 25 items (79 % of costs)

1. Pavement (recycled asphalt concrete, superpave)
2. Clearing & grubbing
3. Unclassified excavation
4. Borrow excavation, incl. material

Contract (18) 3 of 24 items (86 % of costs)

1. (3) Bridges over Ohoopee River
2. Pavement (recycled asphalt concrete, superpave)
3. Clearing & grubbing

From the whole project perspective the contracts' construction costs are allocated as follows:

1.	Contract (14) US 1/SR 4 Widening (SR 130 to Oak Park)	$30,499,559	55.4 % construction costs
2.	Contract (18) US 1/SR 4 Widening (Oak Park to I-16)	$14,540,530	26.4 % construction costs
3.	Contract (17) US 1/SR 4 Oak Park Bypass	$10,065,494	18.3 % construction costs
	Sub-total:	**$60,616,141**	100 % construction costs

The engineering and construction markup adds $5.5 million and right-of-way adds another $6.7 million for a total $67.3 million estimated project cost.

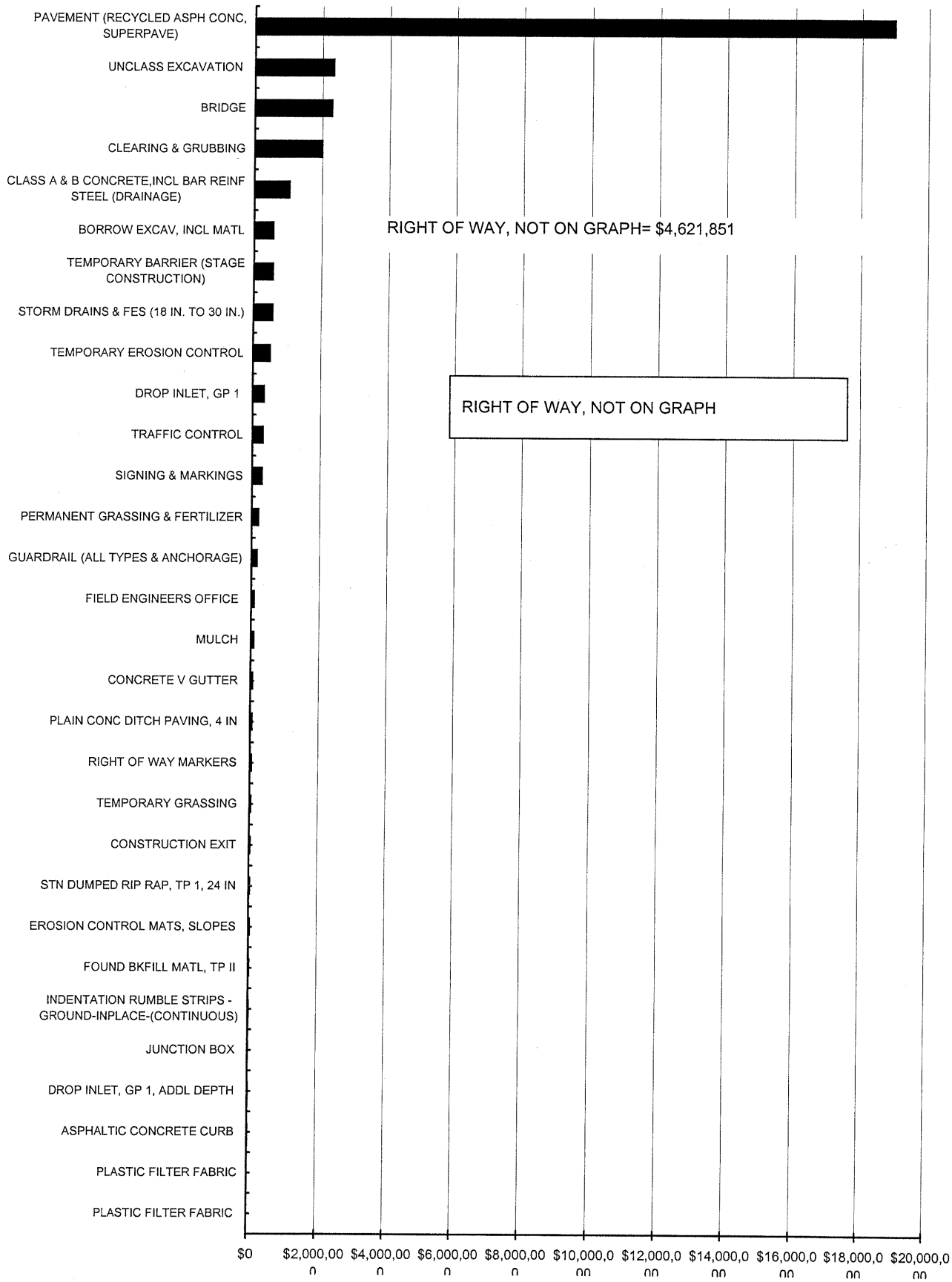
COST HISTOGRAM

PROJECT: EDS-545 (14) US 1/SR 4 (Widening North Lyons to Oak Park)

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
PAVEMENT (RECYCLED ASPH CONC, SUPERPAVE)	$18,973,790	62.21%	62.21%
UNCLASS EXCAVATION	$2,324,341	7.62%	69.83%
BRIDGE	$2,276,395	7.46%	77.29%
CLEARING & GRUBBING	$2,000,000	6.56%	83.85%
CLASS A & B CONCRETE,INCL BAR REINF STEEL (DRAINAGE)	$1,029,011	3.37%	87.23%
BORROW EXCAV, INCL MATL	$568,176	1.86%	89.09%
TEMPORARY BARRIER (STAGE CONSTRUCTION)	$559,950	1.84%	90.92%
STORM DRAINS & FES (18 IN. TO 30 IN.)	$558,734	1.83%	92.76%
TEMPORARY EROSION CONTROL	$497,906	1.63%	94.39%
DROP INLET, GP 1	$326,793	1.07%	95.46%
TRAFFIC CONTROL	$300,000	0.98%	96.44%
SIGNING & MARKINGS	$280,824	0.92%	97.37%
PERMANENT GRASSING & FERTILIZER	$185,288	0.61%	97.97%
GUARDRAIL (ALL TYPES & ANCHORAGE)	$150,366	0.49%	98.47%
FIELD ENGINEERS OFFICE	$76,260	0.25%	98.72%
MULCH	$74,670	0.24%	98.96%
CONCRETE V GUTTER	$57,214	0.19%	99.15%
PLAIN CONC DITCH PAVING, 4 IN	$48,915	0.16%	99.31%
RIGHT OF WAY MARKERS	$42,279	0.14%	99.45%
TEMPORARY GRASSING	$31,616	0.10%	99.55%
CONSTRUCTION EXIT	$25,711	0.08%	99.64%
STN DUMPED RIP RAP, TP 1, 24 IN	$24,985	0.08%	99.72%
EROSION CONTROL MATS, SLOPES	$24,600	0.08%	99.80%
FOUND BKFILL MATL, TP II	$24,256	0.08%	99.88%
INDENTATION RUMBLE STRIPS - GROUND-INPLACE-(CONTINUC	$15,657	0.05%	99.93%
JUNCTION BOX	$6,221	0.02%	99.95%
DROP INLET, GP 1, ADDL DEPTH	$5,583	0.02%	99.97%
ASPHALTIC CONCRETE CURB	$5,180	0.02%	99.98%
PLASTIC FILTER FABRIC	$2,420	0.01%	99.99%
PLASTIC FILTER FABRIC	$2,420	0.01%	100.00%
Subtotal	**$ 30,499,559**	**100.00%**	
E&C 10.00%	**$ 3,049,956**		
SUBTOTAL CONSTRUCTION	**$ 33,549,515**	**Comp Mark-up:**	10%
Right of Way	$4,621,851		
Reimbursable Utilities	$ -		
TOTAL PROJECT COSTS	**$ 38,171,366**		

5 of 30 items, 84% of costs

Pareto (14) Chart 1



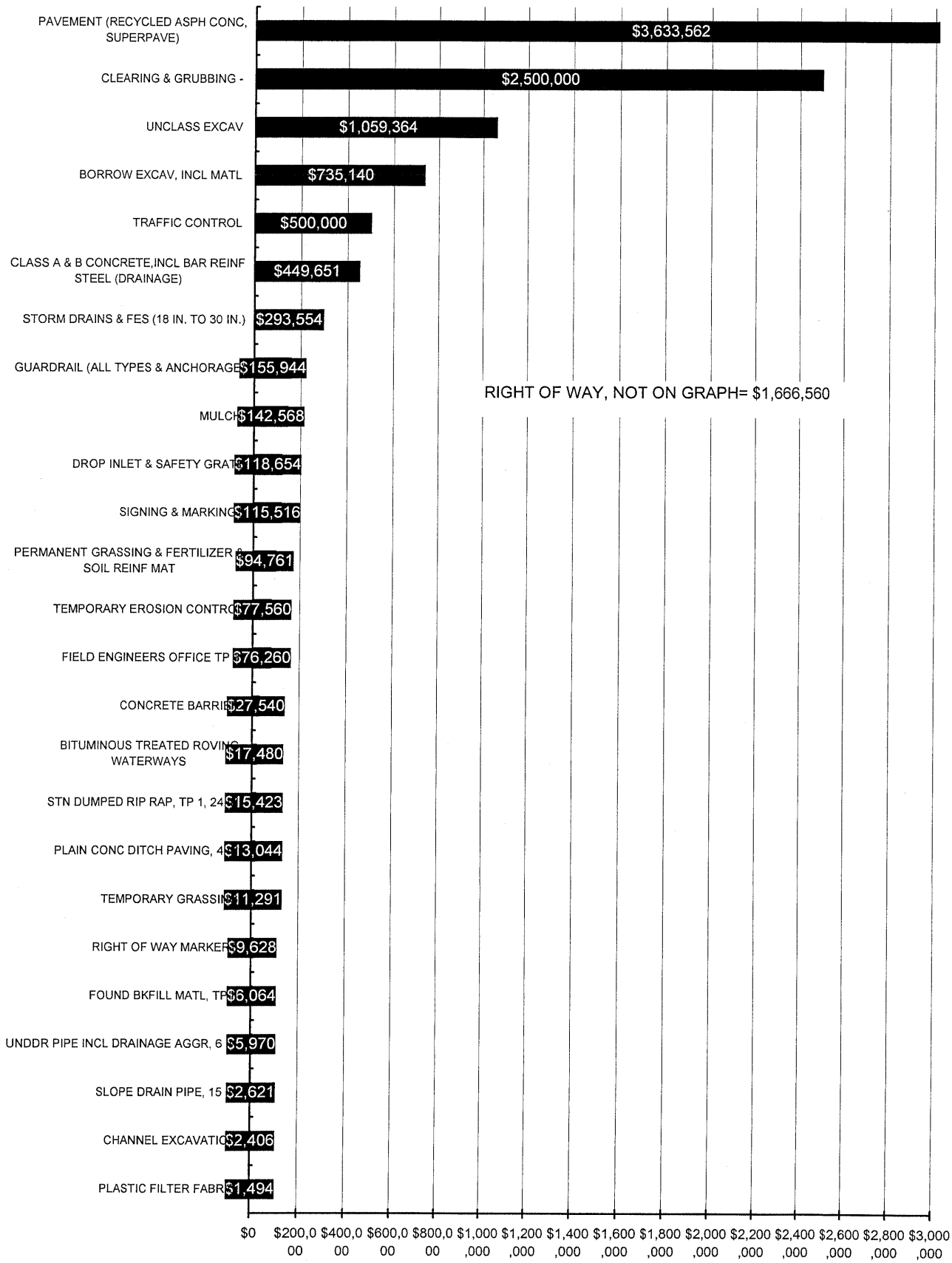
COST HISTOGRAM

PROJECT: EDS-545(17) US 1/SR 4 Widening (Oak Park to I 16):

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
PAVEMENT (RECYCLED ASPH CONC, SUPERPAVE)	$3,633,562	36.10%	36.10%
CLEARING & GRUBBING -	$2,500,000	24.84%	60.94%
UNCLASS EXCAV	$1,059,364	10.52%	71.46%
BORROW EXCAV, INCL MATL	$735,140	7.30%	78.76%
TRAFFIC CONTROL	$500,000	4.97%	83.73%
CLASS A & B CONCRETE,INCL BAR REINF STEEL (DRAINAGE)	$449,651	4.47%	88.20%
STORM DRAINS & FES (18 IN. TO 30 IN.)	$293,554	2.92%	91.12%
GUARDRAIL (ALL TYPES & ANCHORAGE)	$155,944	1.55%	92.67%
MULCH	$142,568	1.42%	94.08%
DROP INLET & SAFETY GRATE	$118,654	1.18%	95.26%
SIGNING & MARKINGS	$115,516	1.15%	96.41%
PERMANENT GRASSING & FERTILIZER & SOIL REINF MAT	$94,761	0.94%	97.35%
TEMPORARY EROSION CONTROL	$77,560	0.77%	98.12%
FIELD ENGINEERS OFFICE TP 3	$76,260	0.76%	98.88%
CONCRETE BARRIER	$27,540	0.27%	99.15%
BITUMINOUS TREATED ROVING, WATERWAYS	$17,480	0.17%	99.33%
STN DUMPED RIP RAP, TP 1, 24 IN	$15,423	0.15%	99.48%
PLAIN CONC DITCH PAVING, 4 IN	$13,044	0.13%	99.61%
TEMPORARY GRASSING	$11,291	0.11%	99.72%
RIGHT OF WAY MARKERS	$9,628	0.10%	99.82%
FOUND BKFILL MATL, TP II	$6,064	0.06%	99.88%
UNDDR PIPE INCL DRAINAGE AGGR, 6 IN	$5,970	0.06%	99.94%
SLOPE DRAIN PIPE, 15 IN	$2,621	0.03%	99.96%
CHANNEL EXCAVATION	$2,406	0.02%	99.99%
PLASTIC FILTER FABRIC	$1,494	0.01%	100.00%
MILL ASPH CONC PVMT, VARIABLE DEPTH	$224		
Subtotal	**$ 10,065,494**	**100.00%**	
E&C 10.00%	**$ 1,006,549**		
SUBTOTAL CONSTRUCTION	**$ 11,072,043**	Comp Mark-up:	10%
Right of Way	**$416,640**		
Reimbursable Utilities	**$ -**		
TOTAL PROJECT COSTS	**$ 11,488,683**		

4 of 25 items = 79 % of costs

Pareto (17) Chart 1



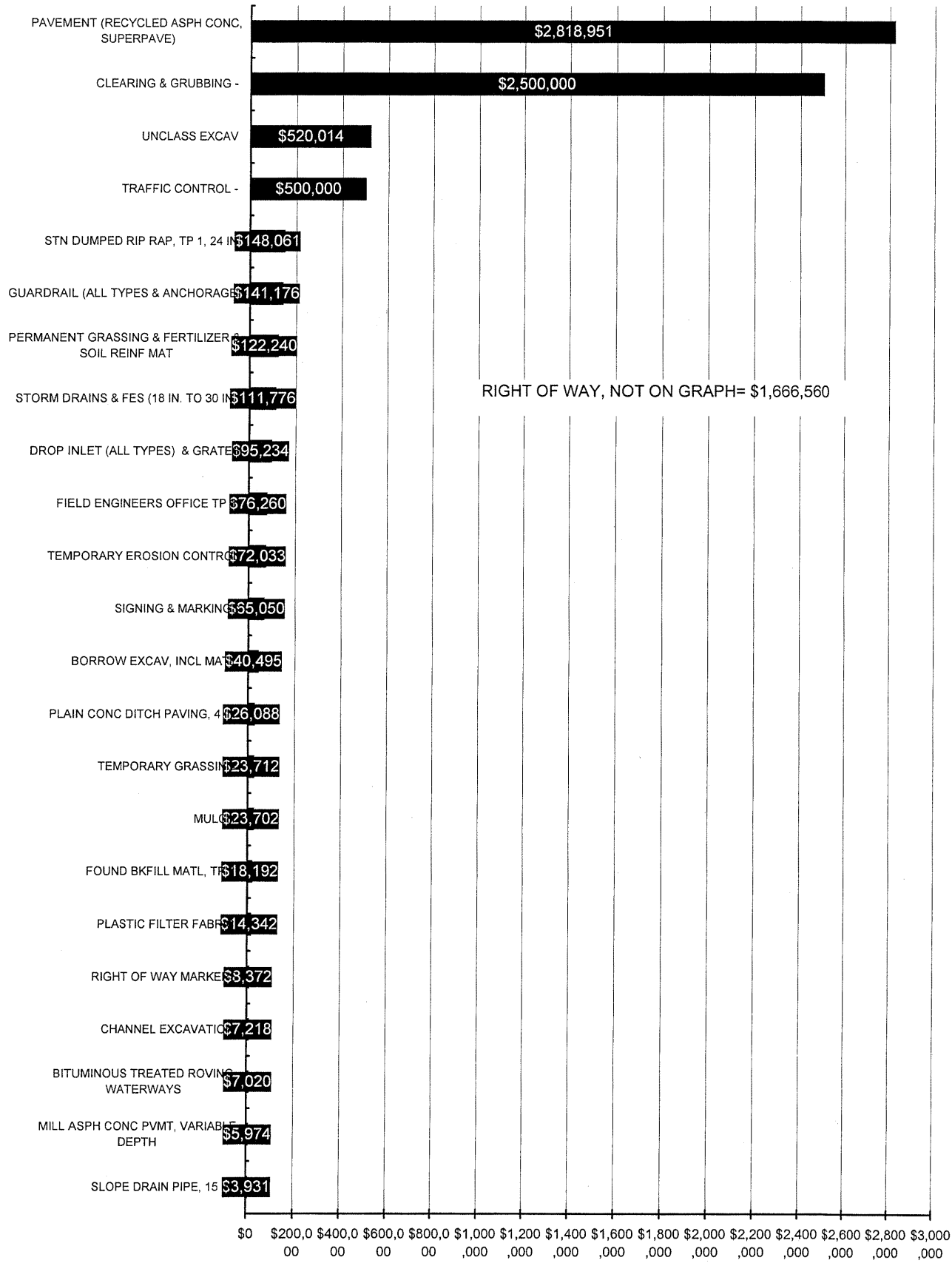
COST HISTOGRAM

PROJECT: EDS-545 (18) US 1/SR 4 Bypass

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
BRIDGES OVER OHOPEE RIVER	$7,190,688.07	49.45%	49.45%
PAVEMENT (RECYCLED ASPH CONC, SUPERPAVE)	$2,818,951	19.39%	68.84%
CLEARING & GRUBBING -	$2,500,000	17.19%	86.03%
UNCLASS EXCAV	$520,014	3.58%	89.61%
TRAFFIC CONTROL -	$500,000	3.44%	93.05%
STN DUMPED RIP RAP, TP 1, 24 IN	$148,061	1.02%	94.07%
GUARDRAIL (ALL TYPES & ANCHORAGE)	$141,176	0.97%	95.04%
PERMANENT GRASSING & FERTILIZER & SOIL REINF MAT	$122,240	0.84%	95.88%
STORM DRAINS & FES (18 IN. TO 30 IN.)	$111,776	0.77%	96.65%
DROP INLET (ALL TYPES) & GRATES	$95,234	0.65%	97.30%
FIELD ENGINEERS OFFICE TP 3	$76,260	0.52%	97.83%
TEMPORARY EROSION CONTROL	$72,033	0.50%	98.32%
SIGNING & MARKINGS	$65,050	0.45%	98.77%
BORROW EXCAV, INCL MATL	$40,495	0.28%	99.05%
PLAIN CONC DITCH PAVING, 4 IN	$26,088	0.18%	99.23%
TEMPORARY GRASSING	$23,712	0.16%	99.39%
MULCH	$23,702	0.16%	99.55%
FOUND BKFILL MATL, TP II	$18,192	0.13%	99.68%
PLASTIC FILTER FABRIC	$14,342	0.10%	99.78%
RIGHT OF WAY MARKERS	$8,372	0.06%	99.83%
CHANNEL EXCAVATION	$7,218	0.05%	99.88%
BITUMINOUS TREATED ROVING, WATERWAYS	$7,020	0.05%	99.93%
MILL ASPH CONC PVMT, VARIABLE DEPTH	$5,974	0.04%	99.97%
SLOPE DRAIN PIPE, 15 IN	$3,931	0.03%	100.00%
Subtotal	**$ 14,540,530**	**100.00%**	
E&C 10.00%	**$ 1,454,053**		
SUBTOTAL CONSTRUCTION	**$ 15,994,583**	Comp Mark-up:	10%
Right of Way	$1,666,560		
Reimbursable Utilities	**$ -**		
TOTAL PROJECT COSTS	**$ 17,661,143**		

3/24 items= 86% of costs

Pareto (18) Chart 1



FUNCTION ANALYSIS

A function analysis of the project was prepared to: (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain the given project purpose and need, (4) identify other public goals, and (5) identify secondary functions that should be addressed by the VE team. The Random Function Analysis worksheets completed by the team for the project in its entirety and the various elements follow.

The result of the function analysis exercise identified that the basic functions of the project are to increase the roadway capacity, divide the new four-lane roadbed and reduce and control the access. In order to carry out the above basic functions, Oak Park must be bypassed, the bridges that would otherwise be widened will have to be completely replaced providing brand new service life. In addition, all the intersections will need to be upgraded.

RANDOM FUNCTION ANALYSIS

PROJECT: **EDS-545(14) (17) (18) US 1/SR 4 WIDENING & BYPASS**
Georgia Department of Transportation

SHEET NO.: **1 of 1**

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
Global Project (14) (17) (18)	Move	Goods	HO
	Improve	Safety	HO
	Develop	Economy	HO
	Increase	Capacity`	B
	Divide	Roadbeds	B
	Reduce/Control	Access	B
	Extend	Bridge Service Life	RS
	Improve	Intersection Geometry	RS
	Bypass	Oak Park	RS
	Avoid	Historic Property	RS
	Minimize	Wetland Impacts	RS
	Increase	Design Speed	S
	Impact	Surface Waters	U
	Abandon	Existing Alignment	U
	Abandon	Existing Pavement	U

Function defined as: Action Verb, Measurable Noun

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

CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

During the creative phase, numerous ideas were generated for the this project using conventional brainstorming techniques as recorded on the following pages. For the convenience of tracking an idea through the VE process, the ideas were grouped into the following categories and numbered according to the order in which they were conceived. The following letter prefixes were used to identify the categories.

Prefix	Category	No. of Ideas
II	Improve Intersections	9
BOP	Bypass Oak Park	5
RCR	Reduce Clearzone Requirements	3
MR	Maximize Use of Existing Right of Way	8
B	Bridges	5
TS	Typical Section	2
CP	Contract Packaging & Staging	4
	Subtotal:	**36**

Creative Idea Evaluation

The ideas were then ranked on a qualitative scale of one to three on how well the VE team believed the idea met the project purpose and need criteria. To assist the team in evaluating the creative ideas, the advantages and disadvantages of each new idea were compared to the existing design solution based on the following criteria obtained through discussions with GDOT during the project briefings:

- Capital Costs
- Access Control
- Highway User Safety
- Crossings of Side Roads
- Contractor Risk (to deliver the project scope on time and within budget)
- Wetlands and Lake Impacts
- Economic Development Impacts

After discussing each idea, the then evaluated the idea by consensus. This produced 14 ideas evaluated as 2s and 3s to carry forward for research and development into formal Value Engineering Alternatives and 6 ideas to develop as Design Suggestions to be included in the Study Results section of the report. When this is not the case, an idea may have been combined with another related idea or discarded as a result of the additional research that indicated the concept as not being cost-effective or technically feasible. The reader is encouraged to review the Creative Idea Listing and Evaluation worksheets since they may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING

PROJECT:	**EDS-546 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	SHEET NO.:	**1 of 2**

NO.	IDEA DESCRIPTION	RATING
REDUCE CLEARZONE REQUIREMENTS (RCR)		
RCR-1	Use 4:1 Foreslope with 4 ft. ditch and 2:1 Backslope (55 mph) (saves 6 ft +/– per side)	See TS-1
RCR-2A	Design for 55mph with 32 ft. median throughout project	See TS-1
RCR-2B	Use 32 ft. median throughout project (consistency)	3
IMPROVE INTERSECTIONS (II)		
II-1A	SR 86/US 1 (south) move to STA. 125+-00 and continue connection along property line to SR 86	1
II-1B	Eliminate south SR 86/US 1 connection	2
II-2	Design T-intersections to 45 mph	DS
II-3	SR 86/US 1 (north tie-in) realigns SR 86 at STA. 195.00 to STA. 200.00. Eliminate SR 86 and improve J.M. Kersey Road	2
II-4	SR 130/US 1 intersection signalize	2
II-5	Realign CR-219 to 90° skew	1
II-6	Hidden Acre Road: intersect with 90° skew	2
II-7	Line-up Rockettown Driveway Road	DS
II-8	Eliminate east leg of Pine Log Road connection and abandon old right-of-way	DS
II-9	Eliminate Railroad Avenue connection	1
BYPASS OAKPARK (BOP)		
BOP-1	Reduce bypass to 2-lane conventional highway with ultimate right-of-way purchase	1
BOP-2	Separate bypass more (development consideration) – stay east of stream and miss lake	3
MODIFY REVERSING (MR)		
MR-1	STA. 240.00 (new alignment) – shorten tangent between reversing curves	2
MR-2	STA. 240.00 – flatten curve/pull-in alignment closer to existing	2
MR-3	At STA. 200.00 +/– transition to east side and parallel existing alignment to north	DS
MR-4	Place new alignment on west side of existing alignment	DS

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

CREATIVE IDEA LISTING

PROJECT:	**EDS-546 (14) (17) (18) US 1/SR 4 WIDENING & BYPASS** *Georgia Department of Transportation*	SHEET NO.:	**2 of 2**

NO.	IDEA DESCRIPTION	RATING
MODIFY REVERSING (MR) (continued)		
MR-5	Realign curve correction at Pine Log Road (closer to existing), STA. 380.00 – consider east side widening at north end of curve	1
MR-6	At Pine Log Road – correct reversing curves correction	1
MR-7	At Pine Log Road – tighten radius – emax = 6%	2
M-8	Curve correction at Harrell Cemetery Road – tighten curve, emax = 6%	2
BRIDGES (B)		
B-1	Study span arrangements and structure types at Ohoopee River	2
B-2	Maximize spans over waterways – constructability and permitting and schedule/delay risk improvement	1
B-3	Minimize number of piles in foundation	DS
B-4	Use H-Piles at Pendleton	1
B-5	Use PSC Piles at Ohoopee River	2
TYPICAL SECTIONS (TS)		
TS-1	Design whole project for 55 mph. Maximize reuse of existing roadbed Start of corridor – document/justify	3 (Combine RCR-1 & RCR-2
TS-2	Use Eleven foot lanes	
CONTRACT PACKING AND STAGING (CP)		
CP-1	Build Contracts (17) & (18) first and Contract (14) last.	DS
CP-2	Speed management conforms at Contract (14)	DS
CP-3	Expedite Contract (17) – bypass contract (right-of-way sensitive)	DS
CP-4	Bid one large contract	DS

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