

# VALUE ENGINEERING REPORT

SR 40 – Okefenokee Parkway  
STP00-0000-00(820), PI No. 0000820  
Charlton / Camden Counties

May 7, 2009

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## OWNER AND DESIGN TEAM:



Georgia Department of Transportation  
600 West Peachtree Street  
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## VALUE ENGINEERING CONSULTANT:



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SR 40 – Okefenokee Parkway  
Stp00-0000-00(820), P.I. No. 0000820

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# **EXECUTIVE SUMMARY**

# Executive Summary

## VALUE ENGINEERING STUDY

STP00-0000-00(820), PI No. 0000820

SR 40 – Okefenokee Parkway

April 14-17, 2009

### Introduction

This report presents the results of a value engineering (VE) study conducted for the proposed improvements to SR 40 in southeast Georgia. The SR 40 corridor has been identified for upgrading under the Governor’s Road Improvement Program (GRIP). This project will widen this corridor to four lanes with most of it having a divided median. The proposed project consists of widening two sections of SR 40. The first section is 1.9 miles long and runs between the east side of Folkston and the completed four-lane SR 40 section to the east. The second section is 11.5 miles long and goes east from the completed four-lane section. This route also serves as an east / west evacuation route. Major contract work items include roadway embankment, bituminous concrete pavement, drainage, curb and gutter, and sidewalk. The total estimated project cost including right-of-way (R/W) is \$55.5 million. The design is currently in the concept stage. The study was conducted on April 14-17, 2009, at the Georgia DOT General Office in Atlanta, using a five person VE team.

This report presents the Team’s recommendations and all back-up information, for consideration by the decision-makers. This **Executive Summary** includes a brief description of each recommendation. The **Study Identification** section contains information about the project and the team. The **Recommendations** section presents a more detailed description and support information about each recommendation. The VE team has included a “mark-up” calculation in the Recommendation Cost Worksheet. The “mark-up” calculation for this project is 26.2 percent and represents the cost of the additive items of Engineering and Inspection, Construction Contingency, Fuel Adjustment, Liquid AC Adjustment, and Utilities. Combining the “mark-up” costs with the construction and R/W costs provides a grand total cost equal to the State’s overall program cost. Lastly, the **Appendix** includes a complete record of the Team’s activities and findings. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

### Considerations

The project being evaluated under this study has an estimated construction cost of \$35.4 million (not including R/W). The VE team was advised of several constraints to consider when developing their recommendations. The constraints were; the project had to be widened to four lanes to comply with the GRIP, the project could not further impact the Ruhamah Baptist Church, and the project could not further impact any adjacent wetlands. The shorter 1.9-mile section entering Folkston falls within an area requiring monitoring / surveying for the endangered Indigo Snake. The Project Concept Reports have been approved and public informational hearings have been held.

## **Results Obtained**

The VE team focused their efforts on the high cost items of the project. Through the use of functional analysis and “brain storming” techniques, the team generated 53 ideas with 25 being identified for additional evaluation as possible recommendations or design suggestions. The VE team developed 15 independent recommendations and one optional recommendation. The implementation of the 15 independent recommendations has the potential to reduce the project cost by approximately \$8.33 million. A detailed write-up of each recommendation is contained in the respective portion of this report. A summary of the recommendations and design suggestions follows.

## **Recommendation Highlights**

### **Idea A-1: Construct 11-foot travel lanes in-lieu-of 12-foot travel lanes in the 5-lane urban roadway section between Station 690 and Station 721.**

The original design includes a 5-lane urban roadway between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders.

It is recommended that four 11-foot travel lanes be constructed in-lieu-of the four 12-foot travel lanes in the 5-lane section. Reducing the travel lane widths will reduce the amount of R/W needed for the project. State Route 40 has very low traffic volumes. The 11-foot lanes provide the same function as the current design, will accommodate future traffic demands, and will provide adequate safety for a roadway with a posted speed of 45 MPH.

**The total potential savings if accepted is \$92,000.**

### **Idea A-2: Reduce the length of the right turn lanes and tapers through-out the project.**

The current design includes right turn lanes throughout the project. Most of the right turn lanes have 350-foot long storage areas with 150-foot long tapers.

It is recommended that the length of the right turn lanes be reduced to use 250-foot long storage areas and 100-foot long tapers. State Route 40 has very low traffic volumes and will be posted for 55 MPH. Most of the right turn lanes have less than 450 ADT.

**The total potential savings if accepted is \$86,000.**

### **Idea A-3: Reduce the length of the left turn lanes and tapers through-out the project.**

The current design includes left turn lanes throughout the project. Most of the left turn lanes have 450-foot long storage areas with 150-foot long tapers.

It is recommended that the overall length of the left turn lanes be reduced to use 310-foot long storage areas with 100-foot long tapers. State Route 40 has very low traffic volumes and will be posted for 55 MPH. Most of the left turn lanes have less than 450 ADT.

**The total potential savings if accepted is \$226,000.**

### **Idea A-4: Reduce the full depth asphalt pavement thickness due to the low traffic volumes.**

The original pavement section includes 1.5 inches of 12.5 mm Superpave, 2 inches of 19 mm Superpave, 5 inches of 25 mm Superpave, and 10 inches of Graded Aggregate Base Course.

It is recommended that a thinner bituminous concrete pavement section be considered consisting of 1.5 inches of 12.5 mm Superpave, 2 inches of 19 mm Superpave, 4 inches of 25 mm Superpave, and 10 inches of Graded Aggregate Base Course. State Route 40 has very low traffic volumes. Based on traffic projections, the thickness of the full depth bituminous concrete pavement section can be reduced.

**The total potential savings if accepted is \$1,345,000.**

**Idea A-12: Eliminate the northern shift of the roadway away from the cemetery and use more of the existing roadway.**

The original design shifts the mainline alignment to the north side of the existing road to eliminate / reduce possible impacts to the cemetery at Station 750+00.

It is recommended that the shift be eliminated next to the cemetery and the existing road incorporated into the new roadway alignment. Eliminating this shift will provide a significant cost benefit. The video log of this route shows this area to be flat and wide open. If it is necessary to modify the right side shoulder and / or clear zone in this area to not acquire land from the cemetery, then a design variance or exception could be requested to cover the 500-foot frontage of the cemetery.

**The total potential savings if accepted is \$745,000.**

**Idea A-14: Shift the roadway north and transition back to a two-lane roadway between Station 845 and Station 865 on the east end of project (820).**

The original design continues the 4-lane section to Colerain Road and then transitions to tie into the existing 2-lane SR 40 section. This concept requires the acquisition of two south side residences and part of the church parking lot on the north side.

It is recommended that the 4-lane section be shifted to the north side of the existing roadway and continued to Station 845+00 where it will then transition back to the existing 2-lane section. This would eliminate two south side residential displacements and the impacts to the church parking lot. This concept would allow for a variety of connection options to the future Kingsland Bypass.

**The total potential savings if accepted is \$1,521,000.**

**Idea A-15: Shift the start of the 45 MPH speed zone on the west end of project (821) from Station 75 to Station 87 to eliminate R/W relocation / acquisition.**

The speed limit for SR 40 is 45 MPH from the project beginning at Station 53+68 to Station 75+00 and then increases to 55MPH for the remainder of the corridor. The typical section for the 55 MPH part of the corridor consists of 4-lanes with a 32-foot depressed median.

It is recommended that the 45 MPH speed limit sign be moved from Station 75+00 to Station 87+00 and that a 5-lane roadway section with rural shoulders be constructed in this area. By shifting the 45 MPH speed limit sign and reducing the typical section accordingly, the R/W displacement on the north side may be avoided. The 5-lane section would reduce the median width from 32 feet to 14 feet and the clear zone from 32 feet to 20 feet.

**The total potential savings if accepted is \$620,000.**

**Idea A-16: Shift Willies Loop Road / SR 40 intersection about 200 feet west to eliminate R/W relocation / acquisition.**

The original concept proposes to realign Willie's Loop to tie into SR 40 at an unnamed south side road requiring the displacement of a residence (parcel 41).

It is recommended that the realignment be shifted approximately 200 feet to the west. This westward shift would avoid the displacement of the residence.

**The total potential savings if accepted is \$496,000.**

**Idea A-18: Eliminate the dual 3-foot bike lane through the 5-lane urban roadway section between Station 690 and Station 721.**

The original design includes a 5-lane urban roadway between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders.

It is recommended that the dual 3-foot bike lanes be eliminated from the 5-lane urban section. Eliminating the dual bike lanes would reduce the typical section width and reduce the project's impact on the area. Eliminating bike lanes from this section should not impact safety due to the very low traffic volumes and a posted speed of 45 MPH.

**The total potential savings if accepted is \$141,000.**

**Idea A-19: Option 1 Construct four 12-foot travel lanes, a 4-foot striped median and rural shoulders in-lieu-of the 5-lane urban roadway section between Station 690 and Station 721.**

The original design includes a 5-lane urban roadway between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders.

It is recommended that a modified 4-lane rural roadway be constructed in-lieu-of the 5-lane urban roadway. This modified 4-lane rural roadway would provide four 12-foot travel lanes, a 4-foot striped median, two 10-foot (6.5' paved) shoulders and two 10-foot ditches. This typical section eliminates the concrete curb & gutter, the concrete sidewalks, the dual bike lanes, and

reduces the total amount of pavement. It provides the same function and will accommodate the very low future traffic volume.

**The total potential savings if accepted is \$891,000.**

**Idea A-19.1: Option 2 Construct four 12-foot travel lanes, a 4-foot striped median with urban shoulders in-lieu-of the 5-lane urban roadway section between Station 690 and Station 721.**

The original design includes a 5-lane urban roadway between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders.

It is recommended that a modified 4-lane urban roadway be constructed in-lieu-of the 5-lane urban roadway. This modified 4-lane urban roadway section would provide four 12-foot travel lanes, a 4-foot striped median, and 12-foot urban shoulders. This concept would reduce the typical section width by 16 feet lessening the project's impact on the area. The 4-lane modified urban roadway provides the same function as the original design and would provide adequate safety for a roadway section with low traffic volumes and a posted speed of 45 MPH.

**The total potential savings if accepted is \$367,000.**

**Idea B-1: Buy R/W only out to the shoulder break and obtain any additional outside R/W through a permanent easement.**

The original design proposes to acquire R/W and no easements.

It is recommended that R/W be acquired out to the shoulder breakpoint and that permanent easements be acquired beyond the shoulder breakpoint as necessary. Permanent easements would allow for construction / maintenance of slopes and for drainage along the project corridor. The conversion of R/W acquisition to permanent easement will result in significant savings in R/W Cost.

**The total potential savings if accepted is \$356,000.**

**Idea G-1: Maintain the standard roadway crown on the existing roadway in-lieu-of building up the pavement to add reverse crown.**

The pavement cross slopes on the existing road will be adjusted from a standard normal crown to a reverse crown to accommodate reconstruction to a 4-lane section.

It is recommended that the standard normal crown section be maintained with no adjustment of cross slopes. The standard normal crown section will function adequately after traffic patterns are shifted from two-way to one-way after the new two lane section is completed. Although the presence of a 4 percent breakover between the adjacent travel lanes is not desirable, it is acceptable per AASHTO guidelines.

**The total potential savings if accepted is \$1,002,000.**

**Idea J-1: Shift the entire roadway alignment throughout the project to eliminate the need for full depth pavement widening on both sides of the existing roadway.**

The original design proposes to widen the existing road by adding 2-feet of full depth pavement on each side on the road before adding the paved shoulders.

It is recommended that the profile grade line be shifted so that no new subgrade and pavement (other than milling and overlaying existing pavement) is required to be placed on the inside (median side) of the existing section. Eliminating the narrow inside subgrade / pavement work will simplify construction and improve the quality of the work due to the wider single widening being more proportioned to standard compaction and paving equipment. This concept would accelerate construction and also eliminate the inside line of pavement reinforcing fabric strips.

**The total potential savings if accepted is \$300,000.**

**Idea R-1: Eliminate the asphalt curb under the steel beam guardrail.**

The current design includes the construction of a 5-inch asphalt curb along all guardrail installations on the project.

It is recommended that the 5-inch asphalt curb to be constructed along all guardrail installations be eliminated. This project is located in an extremely flat area and it is unlikely that erosion problems would occur if this curb is eliminated. The existing guardrail installations do not have asphaltic curb behind them and no erosion or shoulder / slope instability was noticeable in the video logs.

**The total potential savings if accepted is \$369,000.**

**Idea U-1: Eliminate both sidewalks along the 5-lane urban roadway section.**

The original design includes a 5-lane urban roadway between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders.

It is recommended that both 5-foot concrete sidewalks be eliminated in the proposed 5-lane urban roadway section. This project will be constructed in a very rural area where pedestrian traffic is unlikely to occur. The anticipated amount of pedestrian traffic through this area is expected to be extremely small, so the need for sidewalks is unwarranted.

**The total potential savings if accepted is \$136,000.**

**SR 40 – Okefenokee Parkway**  
**SUMMARY OF POTENTIAL COST SAVINGS**

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS	SAVINGS POTENTIAL* (%)
	<b>RECOMMENDATIONS</b>						
<b>A-1</b>	Construct 11-foot travel lanes in-lieu-of 12-foot travel lanes in the 5-lane urban section from Station 690 to 721.	\$92,000	\$0	\$92,000	N/A	<b>\$92,000</b>	100%
<b>A-2</b>	Reduce the length of the right turn lanes and tapers through-out the project.	\$86,000	\$0	\$86,000	N/A	<b>\$86,000</b>	100%
<b>A-3</b>	Reduce the length of the left turn lanes and tapers through-out the project.	\$226,000	\$0	\$226,000	N/A	<b>\$226,000</b>	100%
<b>A-4</b>	Reduce the full depth asphalt pavement thickness due to the low traffic volumes.	\$6,730,000	\$5,385,000	\$1,345,000	N/A	<b>\$1,345,000</b>	100%
<b>A-12</b>	Eliminate the northern shift of the roadway away from the cemetery and use more of the existing roadway.	\$975,000	\$230,000	\$745,000	N/A	<b>\$745,000</b>	100%
<b>A-14</b>	Shift the roadway north and transition back to a two-lane roadway between Station 845 and Station 865 on the east end of project (820).	\$1,521,000	\$0	\$1,521,000	N/A	<b>\$1,521,000</b>	100%
<b>A-15</b>	Shift the start of the 45 MPH speed zone on the west end of project (821) from Station 75 to Station 87.	\$620,000	\$0	\$620,000	N/A	<b>\$620,000</b>	100%

**SR 40 – Okefenokee Parkway**  
**SUMMARY OF POTENTIAL COST SAVINGS**

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS	SAVINGS POTENTIAL* (%)
<b>A-16</b>	Shift Willies Loop Road / SR 40 intersection about 200 feet west to eliminate R/W relocation / acquisition.	\$496,000	\$0	\$496,000	N/A	<b>\$496,000</b>	100%
<b>A-18</b>	Eliminate the dual 3-foot bike lane through the 5-lane urban roadway section between Station 690 and Station 721.	\$141,000	\$0	\$141,000	N/A	<b>\$141,000</b>	100%
<b>A-19</b>	<b>Option 1</b> Construct four 12-foot travel lanes, a 4-foot striped median and rural shoulders in-lieu-of the 5-lane urban roadway section between Station 690 and Station 721.	\$1,010,000	\$119,000	\$891,000	N/A	<b>\$891,000</b>	100%
<b>A-19.1</b>	<b>Option 2</b> Construct four 12-foot travel lanes, a 4-foot striped median with urban shoulders in-lieu-of the 5-lane urban roadway section between Station 690 and Station 721.	\$367,000	\$0	\$367,000	N/A	<b>\$367,000</b>	100%
<b>B-1</b>	Buy R/W only out to the shoulder break and obtain any additional outside R/W through a permanent easement.	\$890,000	\$534,000	\$356,000	N/A	<b>\$356,000</b>	100%
<b>G-1</b>	Maintain the standard roadway crown on the existing roadway in-lieu-of building up the pavement to add reverse crown.	\$1,002,000	\$0	\$1,002,000	N/A	<b>\$1,002,000</b>	100%

**SR 40 – Okefenokee Parkway**  
**SUMMARY OF POTENTIAL COST SAVINGS**

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS	SAVINGS POTENTIAL* (%)
<b>J-1</b>	Shift the entire roadway alignment throughout the project to eliminate the need for full depth pavement widening on both sides of the existing roadway	\$965,000	\$665,000	\$300,000	N/A	<b>\$300,000</b>	100%
<b>R-1</b>	Eliminate the asphalt curb under the steel beam guardrail.	\$369,000	\$0	\$369,000	N/A	<b>\$369,000</b>	100%
<b>U-1</b>	Eliminate both sidewalks along the 5-lane urban roadway section.	\$136,000	\$0	\$136,000	N/A	<b>\$136,000</b>	100%
	* Note: Savings Potential represents how much of an individual item, exclusive of any overlapping dependent items, can be implemented.						

## **STUDY IDENTIFICATION**

## Study Identification

<b>Project:</b> SR 40 – Okefenokee Parkway	<b>Date:</b> April 14-17, 2009
<b>Location:</b> Southeast Georgia	

## VE Team Members

<b>Name:</b>	<b>Title:</b>	<b>Organization:</b>	<b>Telephone:</b>
Keith Borkenhagen PE, CVS	VE Team Facilitator	MACTEC	623-556-1875
George Obaranec PE	Roadway Design	MACTEC	770-421-3346
Stephen Gaines, PE	Roadway Design	Wolverton	770-447-8999
Greg Grant, PE	Structures	Wolverton	770-447-8999
Salvador Mercado, PE	Construction	MACTEC	956-286-8090

### **Project Description:**

The SR 40 corridor has been identified for upgrading under the Governor’s Road Improvement Program (GRIP). The GRIP will widen this corridor to four lanes with most of it having a divided median. The proposed project consists of widening two sections of SR 40. The first section is 1.9 miles long and runs between the east side of Folkston and the completed four-lane SR 40 section to the east. The second section is 11.5 miles long and goes east from the completed four-lane section. This route also serves as an east / west evacuation route. Major contract work items include roadway embankment, bituminous concrete pavement, drainage, curb and gutter, and sidewalk. The total estimated project cost including right-of-way (R/W) is \$55.5 million.

### **Project Constraints:**

The VE team was given the following constraints:

- The project has to be widened to a four-lane roadway.
- The project should not further impact the Ruhamah Baptist Church.
- The project should not further impact adjacent wetlands.
- To be aware of the monitoring requirement for the Indigo Snake.

## **Project Briefing:**

Prior to beginning the study, the VE team was briefed on the current design status of the project. The following items were discussed:

- The SR 40 corridor is in the Governor’s Road Improvement Program (GRIP) and therefore has to be upgraded to a four-lane roadway.
- The SR 40 corridor is an east / west emergency evacuation corridor.
- The two projects being reviewed tie to a completed 2 1/2-mile four-lane section between them. This completed section was constructed in a low area that often flooded so its grade was raised about 5 feet above the previous existing roadway.
- The current projects will incorporate the existing roadway into the ultimate divided four-lane roadway.
- The city limits of Folkston are at the west end of the (821) project. The speed limit at the city limits is 35 MPH. The (821) project speed limit will vary from 45 MPH to 55 MPH.
- Both projects have a design speed of 65 MPH but will be posted for 55 MPH, except for the five lane center section in (820) which will be posted at 45 MPH.
- The center five-lane section was a result of comments from local residents who didn’t want a roadway with a wide open median through their town.
- The (821) project traverses an area that has to be surveyed for the endangered Indigo Snake.
- The project contains a historic cemetery. The roadway has been shifted away from the cemetery.
- The project traverses a very flat area. The roadside ditches serve essentially as storage areas and usually have water in them.
- The environmental assessment is on hold while waiting for a final decision on “logical termini.” The construction of the project is not currently funded.



## **VE RECOMMENDATIONS**

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> A-1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Construct 11-foot travel lanes in-lieu-of 12-foot travel lanes in the 5-lane urban section between Station 690 and Station 721.
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Comp By: G.O. Date: 04/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The original roadway design includes a 5-lane urban section between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders on both sides. The 12-foot urban shoulder includes a concrete curb and gutter, a 5-foot concrete sidewalk, and grass offsets on both sides of the sidewalk.

**Proposed Change:**

It is recommended that the four 12-foot travel lanes be reduced to four 11-foot travel lanes in the 5-lane section between Station 690 and Station 721.

**Justification:**

Reducing the travel lane widths from 12 feet to 11 feet will reduce the typical section, the amount of R/W needed for the project and the project’s impact on the surrounding area.

State Route 40 has very low traffic volumes and is only being widened to comply with the State’s GRIP program. The 11-foot lanes provide the same function as the current design and will accommodate current and future traffic demands. This concept provides adequate safety for a roadway section with a posted speed of 45 MPH and will result in cost savings.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$92,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$92,000		\$92,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$92,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-1  
Client: GDOT  
Sheet 3 of 3

Length of 5-Lane Roadway Section 3,100 feet

### SR 40 Pavement Calculations

Pavement Layer	Tons/SY	Overlay	Mainline &	
			Inside Shld	Outside Shld
165# 12.5mm	0.0825	0.0825	0.0825	0.0825
220# 19mm	0.11	0.11	0.11	0.11
550# 25mm	0.275	-	0.275	-
8" GAB	0.472	-	-	0.472
10" GAB	0.59	-	0.59	-

Pavement width reduction:

3,100 ft x 1 ft x 4 lanes = 12,400 SF / 9 = 1,378 SY Say 1,380

12.5 mm Superpave = 1,380 SY x 0.0825 = 113.85 Tons

19 mm Superpave = 1,380 SY x 0.11 = 151.8 Tons

25 mm Superpave = 1,380 SY x 0.275 = 379.5 Tons

10" Graded Aggregate Base = 1,380 SY x 0.59 = 814.2 Tons

R/W Needs:

Current design: 12 ft x 4 + 14 ft x 1 + 3 ft x 2 + 12 ft x 2 = 92 ft

VE design: 11 ft x 4 + 14 ft x 1 + 3 ft x 2 + 12 ft x 2 = 88 ft

Difference = 92 ft – 88 ft = 4 ft

3,100 ft x 4 ft = 12,400 SF

Borrow:

Volume = 3,100 ft x 4 ft x 2 ft = 24,800 / 27 = 918.5 CY Say 920 CY

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR40 -Okefenokee Parkway**

**IDEA No.:**  
A-2

**Sheet No.:**  
1 of 3

**CREATIVE IDEA:**  
Reduce the length of the tapers and right turn lanes throughout the project

Comp By: S.A.M. Date: 4/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The current design includes right turn lanes throughout the project. Most of the right turn lanes have 350-foot long storage areas and 150-foot long tapers.

**Proposed Change:**

It is recommended that the overall length of the right turn lanes be reduced by using a 250-foot long storage area with 100-foot tapers.

**Justification:**

State Route 40 has very low traffic volumes and is only being widened to comply with the State's GRIP program. This route will be posted for 55 MPH and most of the right turn lanes have less than 450 ADT. Reducing the length of the right turn lanes would meet the GDOT Design criteria for Right Turn Lane Lengths for 55 mph.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$86,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$86,000		\$86,000
<b>FUTURE COST: - Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$86,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-2  
 Client: GDOT  
 Sheet 3 of 3

Proposed Right Turn Lanes (average size)

Taper length 150 LF

$$150 \text{ ft} \times 12 \text{ ft} / (2)(9) = 100.00 \text{ SY}$$

Storage length 350 LF

$$350 \text{ ft} \times 12 \text{ ft} / 9 = 466.7 \text{ SY}$$

$$\text{Site total} = 100 + 467 = 567 \text{ SY}$$

$$\text{Area for 10 sites} = 5,670 \text{ SY}$$

Revised Right Turn Lanes (average size)

Taper length 100 LF

$$100 \text{ ft} \times 12 \text{ ft} / (2)(9) = 66.7 \text{ SY}$$

Storage length 250 LF

$$250 \text{ ft} \times 12 \text{ ft} / 9 = 333.3 \text{ SY}$$

$$\text{Site total} = 66.7 + 333.3 = 400 \text{ SY /Site}$$

$$\text{Area for 10 sites} = 4,000 \text{ SY}$$

### SR 40 Pavement Calculations

Pavement Layer	Tons/SY	Overlay	Mainline &	
			Inside Shld	Outside Shld
165# 12.5mm	0.0825	0.0825	0.0825	0.0825
220# 19mm	0.11	0.11	0.11	0.11
550# 25mm	0.275	-	0.275	-
8" GAB	0.472	-	-	0.472
10" GAB	0.59	-	0.59	-

$$\text{Reduced area for 10 sites} = 5,670 \text{ SY} - 4,000 \text{ SY} = 1,670 \text{ SY}$$

Pavement adjustments:

$$12.5 \text{ mm Superpave} = 1,670 \text{ SY} \times 0.0825 = 137.8 \text{ Tons}$$

$$19 \text{ mm Superpave} = 1,670 \text{ SY} \times 0.11 = 181.5 \text{ Tons}$$

$$25 \text{ mm Superpave} = 1,670 \text{ SY} \times 0.275 = 459.3 \text{ Tons}$$

$$10'' \text{ Graded Aggregate Base} = 1,670 \text{ SY} \times 0.59 = 985.3 \text{ Tons}$$

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: SR-40 Okefenokee Parkway**

<b>IDEA No.:</b> A-3	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Reduce Tapers & Left Turn Storage Lanes
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Comp By: S.M. Date: 4/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The current design includes left turn lanes throughout the project. Most of the left turn lanes have 450-foot long storage areas and 150-foot long tapers.

**Proposed Change:**

It is recommended that the overall length of the left turn lanes be reduced by using a 310-foot long storage area with 100-foot tapers.

**Justification:**

State Route 40 has very low traffic volumes and is only being widened to comply with the State's GRIP program. This route will be posted for 55 MPH and most of the left turn lanes have less than 450 ADT. Approximately half of the left turn lanes are for turnaround purposes only. Reducing the length of the left turn lanes would meet the GDOT Design criteria for Left Turn Lane Lengths for 55 mph.

<b>LIFE CYCLE COST SUMMARY</b>	<b>CAPITAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL COST</b>
<b><u>INITIAL COST:</u> - Original</b>	\$226,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$226,000		\$226,000
<b><u>FUTURE COST:</u> - Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$226,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-3  
 Client: GDOT  
 Sheet 3 of 3

### Proposed Left Turn Lanes

Taper 150 LF

$$150 \text{ ft} \times 12 \text{ ft} / (2)(9) = 100 \text{ SY}$$

Average Storage length 450 LF

$$450 \text{ ft} \times 12 \text{ ft} / 9 = 600 \text{ SY} \quad \text{total /site} = 700 \text{ SY}$$

Based on 20 sites = 14,000 SY

### Revised Left Turn Lanes

Taper 100 LF

$$100 \text{ ft} \times 12 \text{ ft} / (2)(9) = 66.7 \text{ SY}$$

Average Storage length 310 LF

$$310 \text{ ft} \times 12 \text{ ft} / 9 = 413 \text{ SY} \quad \text{total / site} = 480 \text{ SY}$$

Based on 20 sites = 9,600 SY

### SR 40 Pavement Calculations

Pavement Layer	Tons/SY	Overlay	Mainline &	
			Inside Shld	Outside Shld
165# 12.5mm	0.0825	0.0825	0.0825	0.0825
220# 19mm	0.11	0.11	0.11	0.11
550# 25mm	0.275	-	0.275	-
8" GAB	0.472	-	-	0.472
10" GAB	0.59	-	0.59	-

Reduced area for 10 sites = 14,000 SY – 9,600 SY = 4,400 SY

Pavement adjustments:

$$12.5 \text{ mm Superpave} = 4,400 \text{ SY} \times 0.0825 = 363 \text{ Tons}$$

$$19 \text{ mm Superpave} = 4,400 \text{ SY} \times 0.11 = 484 \text{ Tons}$$

$$25 \text{ mm Superpave} = 4,400 \text{ SY} \times 0.275 = 1,210 \text{ Tons}$$

$$10'' \text{ Graded Aggregate Base} = 4,400 \text{ SY} \times 0.59 = 2,596 \text{ Tons}$$

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 40 – Okefenokee Parkway**

<b>IDEA No.:</b> A-4	<b>Sheet No.:</b> 1 of 2	<b>CREATIVE IDEA:</b> Reduce the full depth asphalt pavement thickness due to the low traffic volumes.
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Comp By: S.A.M. Date: 4/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The original pavement section consists of 1.5 inches of 12.5 mm Superpave, 2 inches of 19 mm Superpave, 5 inches of 25 mm Superpave, and 10 inches of Graded Aggregate Base Course.

**Proposed Change:**

It is recommended that a thinner bituminous concrete pavement section be considered consisting of 1.5 inches of 12.5 mm Superpave, 2 inches of 19 mm Superpave, 4 inches of 25 mm Superpave, and 10 inches of Graded Aggregate Base Course.

**Justification:**

State Route 40 has very low traffic volumes and is only being widened to comply with the State’s GRIP program. Based on traffic projections, the thickness of the full depth bituminous concrete pavement section can be reduced. The reduced section results in a 1-inch reduction in asphaltic concrete base (25 mm Superpave) course. Reducing the thickness of this lift may also simplify construction and reduce the construction time.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$6,730,000.00		
<b>- Proposed</b>	\$5,385,000.00		
<b>- Savings</b>	\$1,345,000.00		\$1,345,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$1,345,000</b>



**DEVELOPMENT AND RECOMMENDATION PHASE**

**SR 40; Charlton / Camden Counties**

<b>IDEA No.:</b> A - 12	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Eliminate alignment shift at cemetery.
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Comp By: G.A.O. Date: 4-15-09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The original design shifts the mainline alignment to the north side of the existing road to eliminate / reduce possible impacts to the cemetery right of Station 750+00.

**Proposed Change:**

It is recommended that the shift be eliminated next to the cemetery and the existing road be incorporated into the new roadway alignment similar to the way it is in the rest of the project.

**Justification:**

The overall project widening scheme of maintaining the existing roadway and constructing a new adjacent roadway is not continued in this area. The proposed roadway alignment is shifted north to minimize possible impacts to the cemetery. Eliminating this shift will provide a significant cost benefit.

Incorporating the existing roadway into the mainline alignment next to the cemetery might compromise the right side shoulder and / or clear zone area due to the R/W restriction from the cemetery, however, based on the video log, this area is flat and wide open. The overall frontage of the cemetery is less than 500 feet and if absolutely necessary, a design variance or exception could be requested.

<b>LIFE CYCLE COST SUMMARY</b>	<b>CAPITAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL COST</b>
<b><u>INITIAL COST:</u> - Original</b>	\$975,000		
<b>- Proposed</b>	\$230,000		
<b>- Savings</b>	\$745,000		\$745,000
<b><u>FUTURE COST:</u> – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$745,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-12  
Client: GDOT  
Sheet 3 of 3

Pavement:

### SR 40 Pavement Calculations

Pavement Layer	Tons/SY		Mainline &		Outside
			Overlay	Inside Shld	Shld
165# 12.5mm	0.0825		0.0825	0.0825	0.0825
220# 19mm	0.11		0.11	0.11	0.11
550# 25mm	0.275		-	0.275	-
8" GAB	0.472		-	-	0.472
10" GAB	0.59		-	0.59	-

Mainline:

$$26 \text{ ft} \times 5,000 \text{ ft} (1/9) = 14,444 \text{ SY}$$

Shoulder:

$$6.5 \text{ ft} \times 5,000 \text{ ft} (1/9) = 3,611 \text{ SY}$$

Asphalt:

$$12.5\text{mm}: (14,444 + 3,611) 0.0825 \text{ Tons/SY} = 1,490 \text{ Tons}$$

$$19.5\text{mm}: (14,444 + 3,611) 0.11 \text{ Tons/SY} = 1,986 \text{ Tons}$$

$$25\text{mm}: (14,444) 0.275 \text{ Tons/SY} = 3,972 \text{ Tons}$$

GAB

$$14,444 \times 0.59 \text{ Tons/SY} + 3,611 \times 0.472 \text{ Tons/SY} = 10,226 \text{ Tons}$$

R/W

$$[(1/2 \times 2) 2,000 + 1,000] 40 \text{ ft wide} = 200,000 \text{ SF}$$

Overlay existing road

$$26 \text{ ft} \times 5,000 \text{ ft} (1/9) \times 0.1925 \text{ Tons/SY} = 2,780 \text{ Tons}$$

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> A-14	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Shift the roadway north and transition back to a two-lane roadway between Station 845 and Station 865 on the east end of project (820).
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Comp By: S.W.G. Date: 04/16/09 Checked By: K.B. Date:

**Original Concept:**

The original design continues the 4-lane section to Colerain Road and then transition to tie into the existing 2-lane SR 40 section. The proposed new alignment follows a gentle curve to the south to connect to existing SR 40. The widening has also been shifted to the south side of the existing roadway prior to the transition.

**Proposed Change:**

It is recommended that the 4-lane roadway section be shifted to the north side of the existing roadway and continue to Station 845+00 and then transition to tie back into the existing 2-lane SR 40 section.

**Justification:**

The original concept requires two residential displacements on the south side of SR 40 in order to avoid additional impacts to the Ruhamah Baptist Church (a portion of their parking lot is being taken). Shifting the road alignment north and transitioning back to a two-lane roadway east of Station 845 avoids impacting the church, the south side R/W displacements, and allows for an array of connection options to the future Kingsland Bypass.

Constructing the proposed divided 4-lane roadway past the church and Colerain Road will complicate its direct connection with the future Kingsland Bypass. Colerain Road connects to SR 40 from the north at an angle of approximate 45 degrees. As currently designed, any direct connection to the future Kingsland Bypass would require the current SR 40 design to be completely realigned and reconstructed east of Station 660. This would probably require taking not only residential properties on the south side but the Baptist Church as well.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$1,521,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$1,521,000		\$1,521,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$1,521,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-14  
Client: GDOT  
Sheet 3 of 3

Original Concept:

R/W

Parcel 59 Displacement Cost (Unadjusted) = \$230,000

Parcel 61 Displacement Cost (Unadjusted) = \$180,000

Total Cost (Unadjusted) = \$230,000 + \$180,000 = \$410,000

Adjusted Cost (Including Factors) = (\$410,000)(1.55)(1.60) = \$1,016,800

Pavement:

Assume 3000 lf reduction (Station 845+00 to 875+00) of 4-lane widening (addition of 2 lanes & shoulders)

Mainline Pavement Area = (3000)(26) = 78,000 SF = 8,667 SY

Shoulder Pavement Area = (3000)(6.5) = 19,500 SF = 2,167 SY

Wt (12.5mm) = (8,667 SY + 2,167 SY)(0.0825 tons/SY) = 894 tons

Wt (19mm) = (8,667 SY + 2,167 SY)(0.11 tons/SY) = 1,192 tons

Wt (25mm) = (8,667 SY)(0.275 tons/SY) = 2,383 tons

Wt (GAB) = (8,667 SY)(0.59 tons/SY) + (2,167 SY)(0.47 tons/SY) = 6,132 tons

**Proposed Change**

Displacement Cost = \$0

Wt (12.5mm) = 0

Wt (19mm) = 0

Wt (25mm) = 0

Wt (GAB) = 0

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> A-15	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Shift the start of the 45 MPH speed zone on the west end of project (821) from Station 75 to Station 87 to eliminate R/W relocation / acquisition.
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Comp By: S.W.G. Date: 04/16/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The existing 45mph speed limit sign is located at Station 75+00. The speed limit for SR 40 is 45 MPH from the start of the project(Station 53+68) to Station 75+00 where it increases to 55MPH for the remainder of the corridor. The typical section for this roadway east of Station 75+00 is 4-lanes with a 32-foot depressed median and a speed design of 65MPH.

**Proposed Change:**

It is recommended that the 45 MPH speed limit sign be moved from Station 75+00 to Station 87+00 and to reduce the design speed to 45 MPH in this area. The slower speed limit and design speed would allow for the construction of a 5-lane section with rural shoulders through this area.

**Justification:**

The original design concept results in the displacement of the residence at Station 84+50. By shifting the 45 MPH speed limit sign and reducing the design speed accordingly, the displacement may be avoided. The median width could be reduced from 32 feet to 14 feet and the clear zone could be reduced from 32 feet to 20 feet. This change avoids the displacement of this residence and results in significant savings in R/W costs.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$620,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$620,000		\$620,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$620,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-15  
Client: GDOT  
Sheet 3 of 3

### General Assumptions

The removal of pavement for the turn lanes, tapers and offset from the original concept is offset by the addition of a center turn lane in the revised concept. Additional savings in R/W, embankment and other incidental items have not been included in the calculations.

### Original Concept

Parcel 54

Displacement Cost (Unadjusted) = \$250,000

Adjusted Cost (Including Factors) =  $(\$250,000)(1.55)(1.60) = \$620,000$

### Proposed Change

Displacement Cost = \$0

**DEVELOPMENT AND RECOMMENDATION PHASE**

**SR 40 – Okefenokee Parkway**

<b>IDEA No.:</b> A-16	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Shift Willies Loop Road / SR 40 intersection about 200 feet west to eliminate R/W relocation / acquisition.
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Comp By: S.W.G. Date: 04/16/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The original concept proposes to realign Willie’s Loop to tie into SR 40 at an unnamed side road. This realignment causes the displacement of a residence (parcel 41).

**Proposed Change:**

The revised concept proposes to shift the realignment approximately 200 feet to the west. This change avoids the displacement of the residence.

**Justification:**

The apparent reason for the realignment shown in the original concept is to realign Willie’s Loop to tie into SR 40 across from the unnamed side road on the south side. This realignment allows both roads to access a median opening. The proposed change would allow only one of the side roads to access the median opening. Both of these roads have very low traffic volumes and are dirt roads. The proposed change results in significant savings in R/W costs.

<b>LIFE CYCLE COST SUMMARY</b>	<b>CAPITAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL COST</b>
<b>INITIAL COST: - Original</b>	\$496,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$496,000		\$496,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$496,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-16  
Client: GDOT  
Sheet 3 of 3

### Original Concept

Displacement Cost (Unadjusted) = \$200,000 (*Approximate Based on Other Displacement Costs Provided*)

Adjusted Cost (Including Factors) =  $(\$200,000)(1.55)(1.60) = \$496,000$

### Proposed Change

Displacement Cost = \$0

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> A-18	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Eliminate the dual 3 foot outside bike lane from the 5-lane urban roadway section between Station 690 and Station 721.
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Comp By: G.C.G. Date: 4/15/09 Checked By: K.B. Date:

**Original Concept:**

The original roadway design includes a 5-lane urban section between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders on both sides. The 12-foot urban shoulder includes a concrete curb and gutter, a 5-foot concrete sidewalk, and grass offsets on both sides of the sidewalk.

**Proposed Change:**

It is recommended that the dual 3-foot bike lanes be eliminated from the 5-lane urban section.

**Justification:**

The proposed 5-lane urban roadway design results in a total typical section width of 92 feet. The reported reason for using a 5-lane urban section in this area is to reduce the width of the roadway to lessen the project’s impact on the area. Eliminating the dual bike lanes would reduce the total section width further lessening the project’s impact on the area.

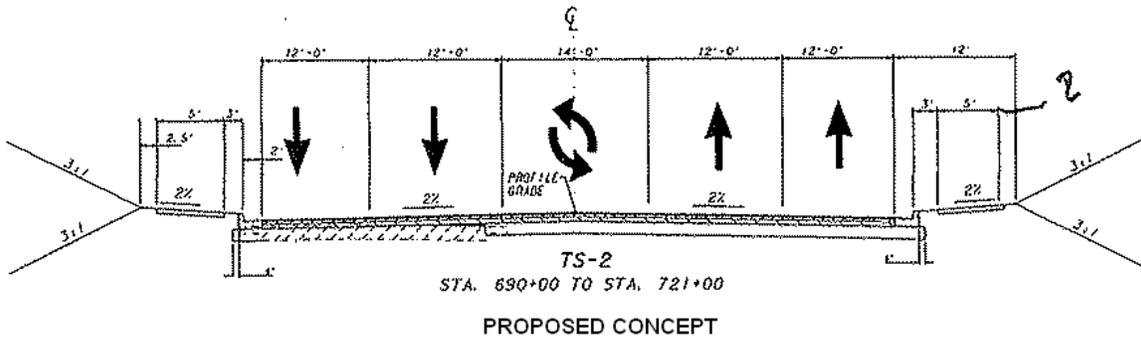
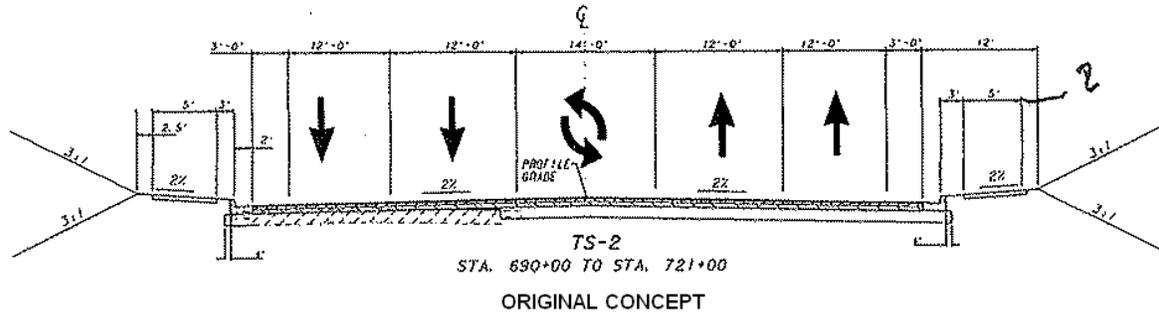
Eliminating the bike lanes from this section should not impact safety due to the very low traffic volumes in this corridor. State Route 40 has very low traffic volumes and is only being widened to comply with the State’s GRIP program. The VE concept provides adequate safety for a roadway section with low traffic volumes and a posted speed of 45 MPH.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$141,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$141,000		\$141,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$141,000</b>

# SKETCH

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-18  
Client: GDOT  
Sheet 2 of 4





## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-18  
Client: GDOT  
Sheet 4 of 4

Length of (2) - 3 foot shoulders to remove: Station 690+00 to 721+00 = 3100 feet

Width of shoulders to remove: 2 shoulders x 3 feet wide per shoulder = 6 feet wide

Total square yards of shoulder to remove

Total Area = 3100 feet long x 6 feet wide = 18,600 square feet = 2067 square yards

Material used in shoulders:

**(See separate calculation to determine Tons/SY of pavement & GAB)**

Pavement:

165# 12.5 mm    0.0825 Tons/SY x 2067 sq yards = 170.5 Tons

220# 19 mm     0.011 Tons/SY x 2067 sq yards = 22.7 Tons

550# 25 mm     0.275 Tons/SY x 2067 sq yards = 568.4 Tons

Graded Aggregate Base:

10" GAB        0.59 Tons/SY x 2067 sq yards = 1219.5 Tons

Right of Way:

Reduced required right of way by 3 feet each side.

3 feet x 2 sides x 3100 feet long = 18,600 square feet.

Use commercial price for R/W = \$0.35 / SQ. FT. x 2.5 multiplier = \$0.88

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> A-19	<b>Sheet No.:</b> 1 of 5	<b>CREATIVE IDEA: <u>Option 1</u></b> Construct four 12-foot travel lanes with rural shoulders in-lieu-of the 5-lane urban roadway section between Station 690 and Station 721.
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Comp By: G.O. Date: 04/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The original roadway design includes a 5-lane urban section between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders on both sides. The 12-foot urban shoulder includes a concrete curb and gutter, a 5-foot concrete sidewalk, and grass offsets on both sides of the sidewalk.

**Proposed Change:**

It is recommended that a modified 4-lane rural roadway be constructed in-lieu-of the 5-lane urban roadway. This modified 4-lane rural roadway would provide four 12-foot travel lanes, a 4-foot striped median, two 10-foot (6.5' paved) shoulders and two 10-foot ditches.

**Justification:**

The proposed 5-lane urban roadway design results in a total typical section width of 92 feet. The reported reason for using a 5-lane urban section in this area is to reduce the width of the roadway to lessen the project's impact on the area. While the modified 4-lane roadway section has the same total section width, it eliminates the concrete curb & gutter, the concrete sidewalks, the dual bike lanes, and reduces the total amount of pavement.

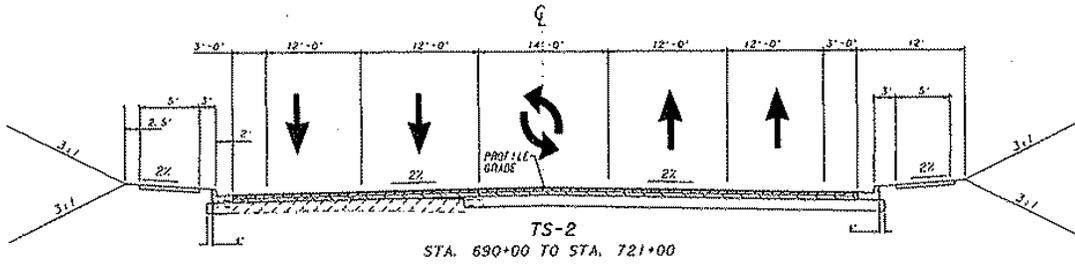
The VE concept provides the same function as the current design and accommodates current and future traffic demands. State Route 40 has very low traffic volumes and is only being widened to comply with the State's GRIP program. This concept provides adequate safety for a roadway section with low traffic volumes and a posted speed of 45 MPH. This concept results in significant cost savings and would simplify / accelerate construction.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b><u>INITIAL COST:</u> - Original</b>	\$1,010,000		
<b>- Proposed</b>	\$119,000		
<b>- Savings</b>	\$891,000		\$891,000
<b><u>FUTURE COST:</u> – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$891,000</b>

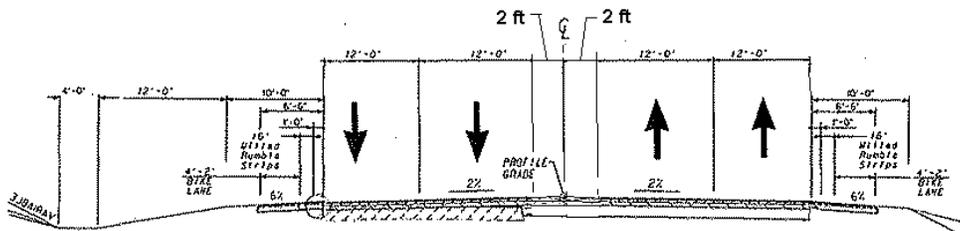
# SKETCH

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-19  
 Client: GDOT  
 Sheet 2 of 5



ORIGINAL CONCEPT



PROPOSED CONCEPT



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-19  
Client: GDOT  
Sheet 4 of 5

Length of 5-Lane Roadway Section 3,100 feet

### SR 40 Pavement Calculations

Pavement Layer	Tons/SY	Overlay	Mainline &	
			Inside Shld	Outside Shld
165# 12.5mm	0.0825	0.0825	0.0825	0.0825
220# 19mm	0.11	0.11	0.11	0.11
550# 25mm	0.275	-	0.275	-
8" GAB	0.472	-	-	0.472
10" GAB	0.59	-	0.59	-

#### Pavement width reduction:

$$3,100 \text{ ft} \times 10 \text{ ft lane} = 31,000 \text{ SF} / 9 = 3,444 \text{ SY}$$

$$3,100 \text{ ft} \times 3 \text{ ft lane} \times 2 = 18,600 \text{ SF} / 9 = 2,067 \text{ SY}$$

$$\text{Total: } 3,444 + 2,067 = 5,511 \text{ SF}$$

$$12.5 \text{ mm Superpave} = 5,511 \text{ SY} \times 0.0825 = 454.7 \text{ Tons}$$

$$19 \text{ mm Superpave} = 5,511 \text{ SY} \times 0.11 = 606.2 \text{ Tons}$$

$$25 \text{ mm Superpave} = 5,511 \text{ SY} \times 0.275 = 1,515.5 \text{ Tons}$$

$$10'' \text{ Graded Aggregate Base} = 5,511 \text{ SY} \times 0.59 = 3,251.1 \text{ Tons}$$

#### Outside Shoulder:

$$3,100 \text{ ft} \times 6.5 \text{ ft} = 20,150 \text{ SF} \times 2 = 40,300 \text{ SF} / 9 = 4,478 \text{ SY}$$

$$12.5 \text{ mm Superpave} = 4,478 \text{ SY} \times 0.0825 = 369.4 \text{ Tons}$$

$$19 \text{ mm Superpave} = 4,478 \text{ SY} \times 0.11 = 492.6 \text{ Tons}$$

$$10'' \text{ Graded Aggregate Base} = 4,478 \text{ SY} \times 0.472 = 2,113.6 \text{ Tons}$$

#### R/W Needs:

$$\text{Current design: } 12 \text{ ft} \times 4 + 14 \text{ ft} + 3 \text{ ft} \times 2 + 12 \text{ ft} \times 2 = 92 \text{ ft}$$

$$\text{VE design: } 12 \text{ ft} \times 4 + 4 \text{ ft} \times 1 + 10 \text{ ft} \times 2 + 10 \text{ ft} \times 2 = 92 \text{ ft}$$

#### Borrow:

$$\text{Roadway Volume} = 3,100 \text{ ft} \times 10 \text{ ft} \times 2 \text{ ft} = 62,000 / 27 = 2,296.3 \text{ CY}$$

$$\text{Shoulder Volume (from A-19.1)} = \text{Vol (1)} + \text{Vol (2)} = 1,505 \text{ CY} + 1,479 \text{ CY} = 2,984 \text{ CY}$$

$$\text{Total volume} = 2,296.3 + 2,984 = 5,280.3 \text{ CY} \quad \text{Say } 5,280 \text{ CY}$$

## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-19  
Client: GDOT  
Sheet 5 of 5

### **Drainage Items for 5-lane section:**

Removing C & Gutter will remove the drainage system.

All 22 catch basins, group 1 are removed

All 6,200 feet of 24-inch storm drain would be removed

4 safety ends for the 24-inch pipe would be removed

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> A-19.1	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA: <u>Option 2</u></b> Construct four 12-foot travel-lanes with urban shoulders in-lieu-of the 5-lane urban roadway section between Station 690 and Station 721.
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Comp By: G.O. Date: 04/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The original roadway design includes a 5-lane urban section between Station 690 and Station 721. This 5-lane urban section includes four 12-foot travel lanes, a 14-foot center turn lane, two 3-foot bike lanes, and 12-foot urban shoulders on both sides. The 12-foot urban shoulder includes a concrete curb and gutter, a 5-foot concrete sidewalk, and grass offsets on both sides of the sidewalk.

**Proposed Change:**

It is recommended that a modified 4-lane urban roadway be constructed in-lieu-of the 5-lane urban roadway. This modified 4-lane urban roadway section would provide four 12-foot travel lanes, a 4-foot striped median, and 12-foot urban shoulders.

**Justification:**

The proposed 5-lane urban roadway design results in a total typical section width of 92 feet. The reported reason for using a 5-lane urban section in this area is to reduce the width of the roadway to lessen the project’s impact on the area. The VE concept would reduce the total section width to 76 feet further lessening the project’s impact on the area.

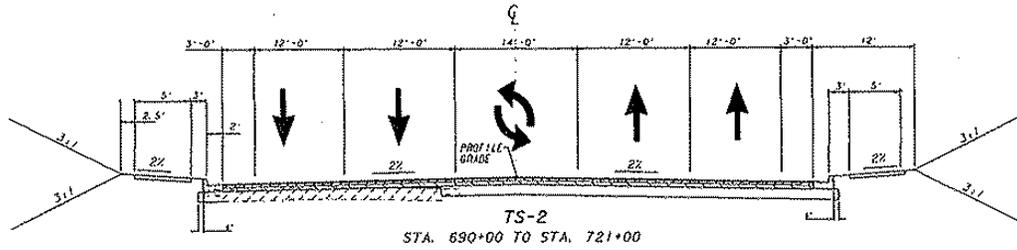
Eliminating the 14-foot center turning lane and dual 3-foot bike lanes from this section should not impact safety. State Route 40 has very low traffic volumes and is only being widened to comply with the State’s GRIP program. The 4-lane modified urban roadway provides the same function as the original design. This concept provides adequate safety for a roadway section with low traffic volumes and a posted speed of 45 MPH. It also results in significant cost savings and would simplify / accelerate construction.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b><u>INITIAL COST:</u> - Original</b>	\$321,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$321,000		\$321,000
<b><u>FUTURE COST:</u> – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$321,000</b>

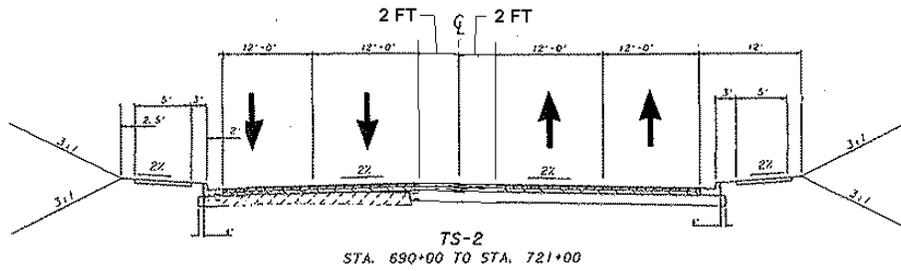
# SKETCH

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-19.1  
Client: GDOT  
Sheet 2 of 4



ORIGINAL CONCEPT



PROPOSED CONCEPT



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: A-19.1  
Client: GDOT  
Sheet 4 of 4

Length of 5-Lane Roadway Section 3,100 feet

### SR 40 Pavement Calculations

Pavement Layer	Tons/SY	Overlay	Mainline &		Outside Shld
			Inside Shld		
165# 12.5mm	0.0825	0.0825	0.0825	0.0825	0.0825
220# 19mm	0.11	0.11	0.11	0.11	0.11
550# 25mm	0.275	-	0.275	-	-
8" GAB	0.472	-	-	-	0.472
10" GAB	0.59	-	0.59	-	-

Pavement width reduction:

$3,100 \text{ ft} \times 14 \text{ ft lane} = 43,400 \text{ SF}$   
 $+ 3,100 \text{ ft} \times 2 \text{ ft lane} = 6,200 \text{ SF}$   
 $= 49,600 \text{ SF} / 9 = 5,511 \text{ SY}$   
 12.5 mm Superpave =  $5,511 \text{ SY} \times 0.0825 = 454.7 \text{ Tons}$   
 19 mm Superpave =  $5,511 \text{ SY} \times 0.11 = 606.2 \text{ Tons}$   
 25 mm Superpave =  $5,511 \text{ SY} \times 0.275 = 1,515.5 \text{ Tons}$   
 10" Graded Aggregate Base =  $5,511 \text{ SY} \times 0.59 = 3,251.1 \text{ Tons}$

R/W Needs:

	lanes	median	lane/shld	shld	
Current design:	12 ft x 4	+ 14 ft x 1	+ 3 ft x 2	+ 12 ft x 2	= 92 ft
VE design:	12 ft x 4	+ 4 ft x 1	+ 12 ft x 2		= 76 ft
Difference = 92 ft – 76 ft = 16 ft					
$3,100 \text{ ft} \times 16 \text{ ft} = 49,600 \text{ SF}$					

Borrow:

Volume =  $3,100 \text{ ft} \times 16 \text{ ft} \times 2 \text{ ft} = 99,200 / 27 = 3,674.1 \text{ CY}$  Say 3,675 CY

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> B-1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Buy R/W only out to the shoulder break and obtain any additional outside R/W through a permanent easement.
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Comp By: S.W.G. Date: 04/16/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The original concept proposes to acquire R/W and no easements.

**Proposed Change:**

It is recommended that R/W be acquired out to the shoulder breakpoint and that permanent easements be acquired beyond the shoulder breakpoint as necessary.

**Justification:**

Permanent easements would allow for construction / maintenance of slopes and for drainage along the project corridor. The conversion of R/W acquisition to permanent easement will result in significant savings in R/W Cost.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$890,000		
<b>- Proposed</b>	\$535,000		
<b>- Savings</b>	\$355,000		\$355,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$355,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: B-1  
Client: GDOT  
Sheet 3 of 3

### Original Concept

Assume an average of 50 lf of R/W can be converted to Permanent Easement along the entire corridor.

Unadjusted R/W Cost (Composite) = \$0.10/SF

Adjusted R/W Cost (Composite) =  $(\$0.10)(1.55)(1.60) = \$0.248/\text{SF}$

Total Project Length =  $(154+53-53+68) + (890+00-273+00) = 71,785 \text{ LF}$

Total Area R/W =  $50(71,785) = 3,589,250 \text{ SF}$

### Proposed Change

Total Area Permanent Easement = 3,589,250 SF

## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

**IDEA No.:**  
G-1

**Sheet No.:**  
1 of 3

**CREATIVE IDEA:** Maintain the standard roadway crown on the existing roadway in-lieu-of building up the pavement to add reverse crown.

Comp By: S.W.G. Date: 04/16/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The cross slopes on the existing road are adjusted from standard normal crown to reverse crown to accommodate reconstruction to a 4-lane section. Asphalt leveling is applied to make the cross slope adjustment.

**Proposed Change:**

The revised concept proposes to maintain the standard normal crown section with no adjustment of cross slopes.

**Justification:**

The standard normal crown section will function adequately after traffic patterns are shifted from two-way to one-way after the new two lane section is completed. Although the presence of a 4% breakover between the adjacent travel lanes is not desirable, it is acceptable per AASHTO guidelines.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$1,002,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$1,002,000		\$1,002,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$1,002,000</b>



## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

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

### Original Concept

Normal Crown Station Ranges

273+00 to 440+00, 455+00 to 605+00, 640+00 to 680+00, 755+00 to 765+00,  
790+00 to 850+00, 875+00 to 890+00, 70+00 to 140+00

Total Length = 51,200 LF

Required Leveling = 2.88 SF / cross section

Total Wt Leveling = (2.88 SF)(51,200 LF) X (.075 tons/CF) = 11,059 tons

### Proposed Change

Leveling Cost = \$0

**DEVELOPMENT AND RECOMMENDATION PHASE**

**SR 40 – Okefenokee Parkway**

<b>IDEA No.:</b> J-1	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Eliminate the 2 foot inside widening by shifting all widening to the outside.
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Comp By: G.C.G. Date: 4/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The Original Concept, Typical Sections TS-1 & TS-3, call for constructing a narrow inside shoulder, as well as construction of the new outside shoulder.

**Proposed Change:**

It is recommended that the profile grade line be shifted so that no new subgrade and pavement (other than milling and overlaying existing pavement) is required to be placed on the inside (median side) of the existing section.

**Justification:**

Eliminating the narrow inside subgrade / pavement work will simplify construction and improve the quality of the work due to the wider single widening being more proportioned to standard compaction and paving equipment. This concept would likely accelerate construction and also eliminate the inside line of pavement reinforcing fabric strips.

<b>LIFE CYCLE COST SUMMARY</b>	<b>CAPITAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL COST</b>
<b>INITIAL COST: - Original</b>	\$965,000		
<b>- Proposed</b>	\$665,000		
<b>- Savings</b>	\$300,000		(\$300,000)
<b>FUTURE COST: – Savings</b>		\$0	\$0
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$300,000</b>



## COST WORKSHEET

<b>Project:</b> SR 40 – Okefenokee Parkway					Idea No.: J-1		
					Client: GDOT		
					Sheet 3 of 4		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
<b>Current Design:</b>							
Project No.: STP-0000-00(820)							
PVMT Reinforcement Fabric Strips, TP 2, 18 inch width	LF	123,870	\$5.72	\$708,536			
Project No.: STP-0000-00(821)							
PVMT Reinforcement Fabric Strips, TP 2, 18 inch width	LF	20,790	\$2.71	\$56,340			
<b>VE Design:</b>							
Project No.: STP-0000-00(820)							
PVMT Reinforcement Fabric Strips, TP 2, 18 inch width	LF				86,709	\$5.72	\$495,975
Project No.: STP-0000-00(821)							
PVMT Reinforcement Fabric Strips, TP 2, 18 inch width	LF				11,435	\$2.71	\$30,989
<b>SUBTOTAL</b>							
				\$764,876			
<b>MARK-UP (26.2 %)</b>				\$200,398			
<b>TOTAL</b>				\$965,274			
<b>TOTAL ROUNDED</b>				<b>\$965,000</b>	<b>\$665,000</b>		

## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: J-1  
Client: GDOT  
Sheet 4 of 4

It is understood that the template for the combined outside paving of the 2-foot additional full depth pavement and partial depth shoulder in the proposed condition are equal in quantity to the original concept.

There will be certain savings for the contractor ease of constructing the combined section verses the two separate sections. The VE team did not attempt to quantify these savings.

Portions of the length of pavement reinforcing strips will no longer be required as a result of shifting the profile grade 2 feet away from the centerline of the proposed roadway.

The cost estimate includes the following quantities:

Project No.: STP-0000-00(820) 123,870 LF = 23.46 miles (Length of Project = 11.47 miles)

Project No.: STP-0000-00(821) 20,790 LF = 3.93 miles (Length of Project = 1.91 miles)

These distances represent a continuous strip along the inside and outside of the edge of the existing section.

Pavement reinforcing strips will still be required at all left turn lanes off the existing section and continuous along the outside of the existing section

On project STP-0000-00(821) there is a large proportion of left turn lanes. Actually just the 3,100 feet in the 5 lane section.

$$11.47 \text{ miles} - 3100 \text{ ft}/5280 \text{ ft} = 11.47 \text{ miles} - 0.587 \text{ miles} = 10.88 \text{ miles}$$

$$10.88 \text{ miles}/11.47 \text{ miles} = 95\%$$

Use 5% reduction for the inside.

On project STP-0000-00(820) there is a much smaller proportion of left turn lanes. Approximately 20% (conservative) of the inside.

$$\text{Project No.: STP-0000-00(820): } 123,870 \text{ LF} \times [0.5 + 0.2] = 123,870 \times 70\% = 86,709 \text{ LF}$$

$$\text{Project No.: STP-0000-00(821): } 20,790 \text{ LF} \times [0.5 + 0.05] = 20,790 \times 55\% = 11,435 \text{ LF}$$

**DEVELOPMENT AND RECOMMENDATION PHASE**

**SR 40 – Okefenokee Parkway**

<b>IDEA No.:</b> R-1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Eliminate asphalt curb from under the guardrail.
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Comp By: G.C.G. Date: 4/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:** The current design includes the construction of a 5-inch asphalt curb along all guardrail installations on the project.

**Proposed Change:**

It is recommended that the 5-inch asphalt curb that is to be constructed along all guardrail installations be eliminated.

**Justification:**

This project is located in an extremely flat area. The installation of asphalt curbs are designed to comply with the GDOT Design Policy Manual Section 6.5.2, which states “Asphaltic curbs are used to control runoff and erosion on high fills (>20-ft) with 2:1 side slopes or in guardrail sections along rural roadways.” Based on reviewing the photo log of the project the following observations were made:

- The height of the fill slopes with existing guardrail appear to be less than 5 feet.
- The existing guardrail installations do not have asphaltic curb behind them.
- No erosion or shoulder / slope instability was noticeable in the video logs.

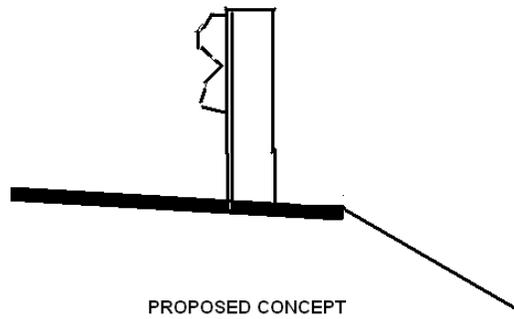
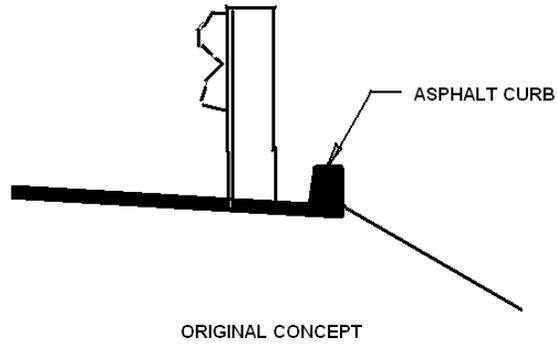
Since the proposed divided four-lane roadway will incorporate the existing (resurfaced) two-lane roadway into its typical section, its grade will remain essentially the same as the existing road. Keeping the existing roadway grade will result in the new road having the same extremely flat side slopes as the existing road. This will reduce the probability of erosion problems on the shoulders / side slopes.

<b>LIFE CYCLE COST SUMMARY</b>	<b>CAPITAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL COST</b>
<b>INITIAL COST: - Original</b>	\$369,000		
<b>- Proposed</b>	\$0.0		
<b>- Savings</b>	\$369,000		\$369,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$369,000</b>

# SKETCH

**Project:** SR 40 – Okefenokee Parkway

Idea No.: R-1  
Client: GDOT  
Sheet 2 of x3





## DEVELOPMENT AND RECOMMENDATION PHASE

### SR 40 – Okefenokee Parkway

<b>IDEA No.:</b> U-1	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Eliminate both sidewalks along the 5-lane urban roadway section.
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Comp By: G.C.G. Date: 4/15/09 Checked By: K.B. Date: 04/27/09

**Original Concept:**

The current design for the 5-lane urban roadway section between Station 690 and Station 731 includes 5-foot concrete sidewalks on both sides of the roadway.

**Proposed Change:**

It is recommended that both 5-foot concrete sidewalks be eliminated in the proposed 5-lane urban roadway section between Station 690 and Station 721.

**Justification:**

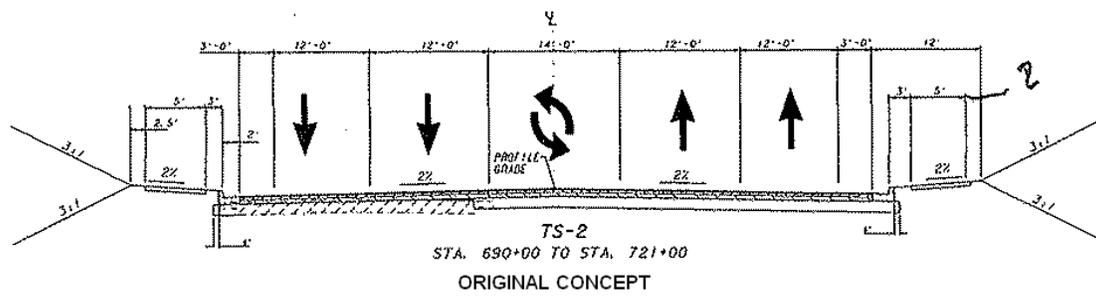
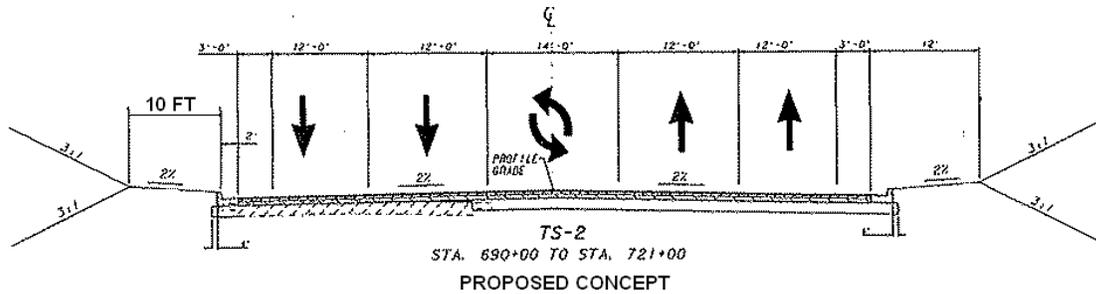
This entire project is in a very rural area where pedestrian traffic is extremely low, so the need for sidewalks is unwarranted.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<b>INITIAL COST: - Original</b>	\$136,000		
<b>- Proposed</b>	\$0		
<b>- Savings</b>	\$136,000		\$136,000
<b>FUTURE COST: – Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$136,000</b>

# SKETCH

**Project:** SR 40 – Okefenokee Parkway

Idea No.: U-1  
Client: GDOT  
Sheet 2 of 4





## CALCULATIONS

**Project:** SR 40 – Okefenokee Parkway

Idea No.: U-1  
Client: GDOT  
Sheet 4 of 4

AREA OF SIDEWALK = 3,100 ft x 2 sides x 5 ft wide  
= 31,000 FT<sup>2</sup>  
= 3,444 YD<sup>2</sup>

# APPENDIX

## Sources

### Approving/Authorizing Persons

Name:	Position:	Telephone:
Ron Wishon	GDOT – Engineering Services, Project Review Engineer	404-631-1753
Rebecca Thigpen	Project Design Engineer	912-427-5794

### Personal Contacts

Name:	Telephone:	Notes:
Geoffrey Donald	404-364-2656	Project design briefing
Geoffrey Donald	404-364-2656	Obtain pavement design information and discuss guardrail locations
Geoffrey Donald	404-364-2656	Additional clarification on pavement design

### Documents/Abstracts

Reference:	Reference:
Project Cost Estimate	100 Scale Layout for (821)
Project Concept Report	200 Scale Layout for (820)
R/W Cost Estimate	Roadway Typical Sections
Utility Cost Estimate	
Traffic Diagrams for Various Intersections	

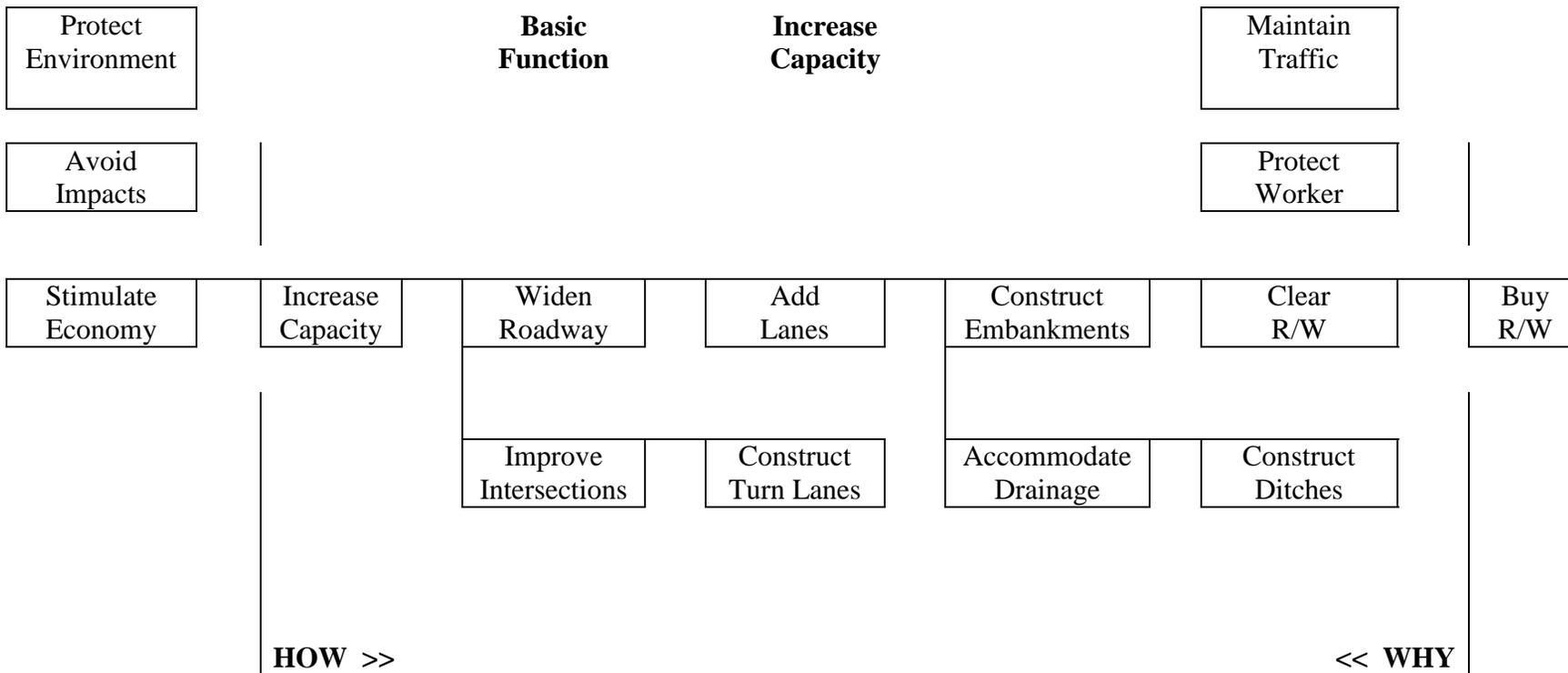
## SR 40 – Okefenokee Parkway

### Cost Model / Distribution

Item	Description	\$ Amount	% of Total Project
<b>A</b>	Bituminous Pavement	\$13,539,000	33.0%
<b>B</b>	Right of Way	\$5,583,000	13.6%
<b>C</b>	Aggregate Base	\$4,723,000	11.5%
<b>D</b>	Temporary / Permanent Erosion Control	\$3,394,000	8.3%
<b>E</b>	Borrow Excavation	\$2,851,000	7.0%
<b>F</b>	Undercut Excavation	\$1,693,000	4.1%
<b>G</b>	Bituminous Leveling Course	\$1,637,000	4.0%
80% Line			
<b>H</b>	Storm Drain Pipe	\$1,454,000	3.5%
<b>I</b>	Box Culverts	\$904,000	2.2%
<b>J</b>	Pavement Reinforcement Strips	\$765,000	1.9%
<b>K</b>	Miscellaneous	\$680,000	1.7%
<b>L</b>	Milled Asphalt Pavement	\$603,000	1.5%
<b>M</b>	Signing & Marking	\$602,000	1.5%
<b>N</b>	Guardrail	\$597,000	1.5%
<b>O</b>	Unclassified Excavation	\$435,000	1.1%
<b>P</b>	Clear & Grub	\$385,000	0.9%
<b>Q</b>	Traffic Control	\$355,000	0.8%
<b>R</b>	Asphalt Concrete Curb	\$292,000	0.7%
<b>S</b>	Temporary Barrier	\$278,000	0.6%
<b>T</b>	Concrete Curb & Gutter	\$109,000	0.3%
<b>U</b>	Concrete Sidewalk	\$108,000	0.3%
	<b>Subtotal</b>	<b>\$40,987,000</b>	<b>100%</b>
*	Engineering & Inspection	\$1,770,000	
*	Construction Contingency	\$1,416,000	
*	Fuel Adjustment	\$3,512,000	
*	Liquid AC Adjustment	\$7,022,000	
*	Utilities	\$827,000	
	<b>Grand Total</b>	<b>\$55,534,000</b>	
	<b>Note:</b> The sum of the five asterisked items above will be used for the Mark-Up percentage in the Recommendation Cost Worksheets.		

# FAST DIAGRAM

Project Name: SR 40 – Okefenokee Parkway



## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 40 – Okefenokee Parkway

**Function:** Increase Capacity

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>A</b>	<b>Bituminous Concrete Pavement</b>	Provide	Surface	\$13,539,000	33.0%	Yes
		Increase	Capacity			
		Improve	Safety			
		Remove	Conflicts			
		Control	Acces			
<b>B</b>	<b>Right of Way</b>	Provide	Clear Zone	\$5,583,000	13.6%	Yes
		Widen	Roadway			
		Shift	Roadway			
		Avoid	Impacts			
<b>C</b>	<b>Aggregate Base Course</b>	Support	Pavement	\$4,723,000	11.5%	Yes
<b>D</b>	<b>Erosion Control Measures</b>	Control	Erosion	\$3,394,000	8.3%	Yes
<b>E</b>	<b>Borrow Excavation</b>	Achieve	Grade	\$2,851,000	7.0%	Yes
		Widen	Roadway			
		Construct	Typical Section			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 40 – Okefenokee Parkway

**Function:** Increase Capacity

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>F</b>	<b>Undercut Excavation</b>	Remove	Waste Mat'l	\$1,693,000	4.1%	Yes
		Remove	Wet Areas			
		Improve	Structure No.			
		Construct	Roadway			
		Widen	Roadway			
<b>G</b>	<b>Bituminous Leveling Course</b>	Achieve	Grade	\$1,637,000	4.0%	Yes
		Build	Superelevation			
		Correct	Profile			
<b>H</b>	<b>Storm Drain Pipes</b>	Equalize	Flow	\$1,454,000	3.5%	Yes
		Store	Water			
		Connect	Ditches			
		Drain	Roadway			
<b>I</b>	<b>Box Culverts</b>	Equalize	Flow	\$904,000	2.2%	Yes
		Convey	Water			
		Carry	Streams			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 40 – Okefenokee Parkway

**Function:** Increase Capacity

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>J</b>	<b>Pavement Reinforcement Strips</b>	Stabilize	Joints	\$765,000	1.9%	Yes
<b>K</b>	<b>Miscellaneous</b>	Construct	Project	\$680,000	1.7%	No
<b>L</b>	<b>Milled Asphalt Pavement</b>	Remove	Deficient Mat'l	\$603,000	1.5%	Yes
		Prepare	Surface			
<b>M</b>	<b>Signing &amp; Marking</b>	Inform	Motorists	\$602,000	1.5%	No
		Delineate	Lanes			
		Separate	Turn Lanes			
		Improve	Safety			
<b>N</b>	<b>Guardrail</b>	Protect	Motorists	\$597,000	1.5%	Yes
		Protect	Wetlands			
		Protect	Stream Buffers			
<b>O</b>	<b>Unclassified Excavation</b>	Construct	Ditches	\$435,000	1.1%	No
		Achieve	Grade			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 40 – Okefenokee Parkway

**Function:** Increase Capacity

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>P</b>	<b>Clearing &amp; Grubbing</b>	Clear	Project	\$385,000	0.9%	No
<b>Q</b>	<b>Traffic Control</b>	Allow	Construction	\$355,000	0.8%	Yes
<b>R</b>	<b>Asphalt Concrete Curb</b>	Prevent	Erosio	\$292,000	0.7%	Yes
		Reduce	Maintenance			
<b>S</b>	<b>Temporary Barrier</b>	Protect	Motorist	\$278,000	0.6%	No
		Protect	Workers			
		Allow	Construction			
		Provide	Safety			
<b>T</b>	<b>Concrete Curb &amp; Gutter</b>	Control	Drainage	\$109,000	0.0%	Yes
		Reduce	R/W			
		Allow	Sidewalks			
<b>U</b>	<b>Concrete Sidewalk</b>	Accommodate	Pedestrians	\$108,000	0.3%	Yes
		Enhance	Access			

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>A</b>	<b>Bituminous Concrete Pavement</b>		
A-1	Reduce the travel lane widths from 12 feet to 11 feet in the 5-lane roadway section	Reduce typical section width, save R/W, save pavement costs	✓
A-2	Reduce the length of the tapers & left right lanes	Reduce cost	✓
A-3	Reduce the length of the tapers & left turn lanes	Reduce cost	✓
A-4	Reduce the full depth asphalt pavement thickness due to the low traffic volumes	Reduce cost	✓
A-5	Reduce the median width to less than 32 feet	Already reduced, needed for divided highway	X
A-6	Eliminate an open median and construct a simple 4-lane roadway	Safety concerns	X
A-7	Construct a new / improved 2-lane roadway	See Idea A-8 and A-9	X
A-8	Construct a new 2-lane roadway with passing lanes	Reduce construction, GRIP implications	X
A-9	Construct a 3-lane section	Accommodate traffic, GRIP implications	X
A-10	Construct a 3-lane roadway on a 4-lane footprint (2 WB lanes and 1 EB lane)	Not practical, Construction Issues @ intersection	X
A-11	Construct a 4-lane roadway with a raised median	Increase cost	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

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<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
A-12	Eliminate the full north shift of the roadway by the cemetery and use more of the existing roadway	Reduce cost of R/W	✓
A-13	Extend the 5-lane roadway section east of the cemetery	Reduce impact on cemetery	✓
A-14	Construct a 5-lane roadway section on the east end of the project (east of Station 845)	Reduce R/W cost, Save R/W relocations	✓
A-15	Shift the start of the 45 MPH zone on the west end of the (821) project from Station 75 to Station 87	Save R/W relocation	✓
A-16	Shift the Willies Road intersection west to avoid taking of a residence	Save R/W relocation	✓
A-17	Shift the alignment to eliminate the need to widen on both sides of the existing roadway	Improve constructability,	✓
A-18	Eliminate the dual 3-foot lanes in the 5-lane section	Reduce cost, un-necessary with very low traffic	✓
A-19	Construct a 4-lane section in-lieu-of a 5-lane section	Reduced cost, Reduce impact	✓
<b>B</b>	<b>Right of Way</b>		
B-1	Buy R/W only out to the shoulder break and obtain the additional needed R/W through a permanent easement	Reduce cost, R/W easements cost around 60% of R/W acquisition	✓
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<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
B-2	Construct 11-foot travel lanes to reduce R/W needs	See Idea A-1	X
B-3	Reduce the width of the median to reduce R/W needs	Already reduced	X
B-4	Construct a simple 4-lane roadway without median	Safety concerns	X
B-5	Use a 55 MPH design speed to reduce width of roadway typical section and reduce R/W needs	Possible reduction in the roadway typical section, GRIP impacts	✓
B-6	Buy the full amount of R/W but only construct 2 or 3-lane roadway	Protect future roadway needs	✓
B-7	Acquire a tract of R/W on east end for future bypass	Protect future connection to future bypass	✓
<b>C</b>	<b>Aggregate Base Course</b>		
C-1	Reference various pavement reducing options in A	Calculated in pavement section change	X
<b>D</b>	<b>Erosion Control Measures</b>		
D-1	Various methods to reduce pavement section width	Calculated in pavement section change	X
D-2	Construct only 2 lanes of the proposed 4-lane section	Calculated in pavement section change	X
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<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>E</b>	<b>Borrow Excavation</b>		
E-1	Construct only a 2 / 3-lane roadway section	Calculated in pavement section change	X
E-2	Construct 2-lane section with passing lanes	Calculated in pavement section change	X
E-3	Construct 4:1 outside side slopes with a 30-foot clear zone	Not practicable for project area.	X
<b>F</b>	<b>Undercut Excavation</b>		
F-1	Relocate roadway to avoid the wet areas	Calculated in pavement section change	X
F-2	All of the roadway typical section reductions in A	Calculated in pavement section change	X
F-3	Stabilize the material in-place	Possible cost reduction, simplify construction	DS
F-4	Use Geo fabric	Possible cost reduction, simplify construction	DS
<b>G</b>	<b>Bituminous Leveling Course</b>		
G-1	Maintain the standard crown on the old roadway (tangent sections)	Cost reduction, Simplify construction	✓
G-2	Provide reverse crown through the milling process	Not practical	X
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<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>H</b>	<b>Storm Drain Pipe</b>		
H-1	Reduce roadway typical section width	Calculated in pavement section change	X
<b>I</b>	<b>Concrete Box Culvert</b>		
I-1	Reduce roadway typical section width	Calculated in pavement section change	X
<b>J</b>	<b>Pavement Reinforcement Strips</b>		
J-1	Eliminate the 2-foot full depth inside widening	Cost saving, Simplify construction, Save time	✓
<b>L</b>	<b>Milled Asphalt Pavement</b>		
L-1	Mill the old pavement to obtain the reverse crown	Not practicable	X
<b>N</b>	<b>Guardrail</b>		
N-1	Obtain locations from consultant	Not available by Station	X
N-2	Use cable barrier in-lieu-of steel guardrail	Cost reduction	✓
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<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>O</b>	<b>Unclassified Excavation</b>		
O-1	Reduce roadway to a 2 / 3-lane section	Calculated in pavement section change	X
<b>Q</b>	<b>Traffic Control</b>		
Q-1	Increase cost of traffic control if 2 / 3-lane section is constructed	Needs to be increased due to traffic conflict during construction	✓
<b>R</b>	<b>Asphalt Concrete Curb</b>		
R-1	Eliminate where possible due to level terrain and 6:1 side slopes	Not needed if flat terrain	✓
<b>T</b>	<b>Concrete Curb and Gutter</b>		
T-1	Increase amount if 5-lane section is lengthened	Higher cost	X
T-2	Construct rural 5-lane section without curb & gutter	No need to construct an urban section	✓
T-3	Check drainage for 5-lane section	Unsure of outlet for enclosed drainage system	X
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<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>U</b>	<b>Concrete Sidewalks</b>		
U-1	Eliminate one or both sidewalks	Reduce cost, Simplify construction	✓
U-2	Construct asphalt concrete sidewalks	See Ides U-1	X
U-3	Place the sidewalks at the back edge of the curb	See Idea U-1	X
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