

VALUE ENGINEERING REPORT

SR 27.US 280 Widening and Reconstruction
SR 45 in Plains to SR 49 South of Americus
STP-030-1(18)
Sumter County

March 19, 2008

OWNER AND DESIGN TEAM:



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

VALUE ENGINEERING CONSULTANT:



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Kennesaw, GA 30144

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SR 45 in Plains to SR 49 South of Americus
Sumter County
PI Nos.: 322780

March 19, 2008

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EXECUTIVE SUMMARY

Executive Summary

VALUE ENGINEERING STUDY

SR 27/US 280 Widening and Reconstruction

March 19, 2008

Introduction

This report summarizes the results of a value engineering (VE) study conducted on the SR 27/US 280 roadway between SR 45 in Plains and SR 49 in Americus. The project consists of widening the existing 2-lane roadway to a four-lane divided section, with medians ranging from 14' to 44'. The estimated construction cost including Right of Way is \$46.9M. The design is currently at the Final Concept stage. This project is not scheduled for construction. It is being designed through GDOT Office of Consultant Design (OCD) by their consultant Jordan, Jones, and Golding. The study occurred February 18-21 at the GDOT offices in Atlanta using a 3- 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. Lastly, the **Appendix** includes a complete record of the Team's activities and findings as well as the meeting attendees sign in sheet. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

Considerations

Two alternatives have been identified for this project. Alternative 2, which would make better use of the existing right of way and pavement, has been chosen by the Design Team and was the baseline for this VE study. Preliminary profile and cost estimate existed only for Alternative 1, however, and the VE Team used these as general information.

The only constraint to the VE study that was identified was that a four-lane concept is a given for this project. The Team conducted the study under this guideline.

Results Obtained

The VE Team developed 6 recommendations and 2 design suggestions for consideration by the decision-makers. The recommendations have the potential to reduce the construction and O&M costs of the project while continuing to provide the required functionality. A brief summary of each recommendation follows.

Recommendation Highlights

P-3 Reduce Pavement Width of Inside Lanes to 11'

The VE Team believes that this concept would provide an acceptable functionality for a roadway of this low traffic volume. Most trucks would be expected to use the outside lanes which would remain at 12'. A one-foot reduction in the width of the inside lanes would likely be imperceptible to the motorist.

The total potential savings if accepted is \$770,000 plus a nominal reduction in O&M over time.

R-6 Reduce Design Speed from 65 MPH to 55 MPH.

A 55 mph design and posted speed would be appropriate for a low-volume roadway such as this one. This change would reduce R/W impacts, especially in the area of Sta. 305+00 to Sta. 315+00 where the horizontal curve flattening would be minimized.

The total potential savings if accepted was not estimated, but would be significant.

P-6 Build One Direction, New Roadway and Overlay Existing Roadway

For the most part, the existing roadway meets a 55 mph design speed. Under this concept; the existing roadway, in the depressed median section, would be upgraded only where needed to attain a 55 mph design speed and elsewhere would only have standard shoulders constructed and an overlay. The relatively flat terrain in this area would facilitate this concept. The VE Team did not have access to a formal appraisal of the existing pavement condition but we were under the impression that it was in at least fair condition.

The total potential savings if accepted is \$4,640,000.

R-2 Reduce Median Width from 44' to 32'

This section of SR 27 has low existing and projected volumes of traffic. A 32' median would provide a safe and enhanced facility to meet GRIP goals while reducing right of way costs and impacts significantly.

The total potential savings if accepted is \$820,000.

R-8 Revise SR 49 Realignment

The baseline realignment achieves a desirable 90 degree intersection but requires the acquisition of a significant amount of R/W and the realignment of a portion of Jenkins Road. A 70 degree intersection would meet the minimum standard and reduce project costs.

The total potential savings if accepted is \$210,000.

S-1 Two Bridges in lieu of Box Culvert Extension

The baseline profile indicates an embankment of approximately 8' to be placed over the existing box culvert. It is not known at this point whether the existing box would provide the required future hydraulic capacity or support the additional load. Based on the VE Team's estimate of proposed culvert extension length and a conservative bridge size, the construction costs for bridge and culvert would be approximately the same but the bridge would avoid these potential problems.

The additional construction cost was estimated at \$50,000.

Design Suggestions

The following concepts were not advanced as Recommendations but the VE Team believed they may have merit. We suggest that the Design Team consider them as project development continues.

1. Eliminate Landscaping Budget

The preliminary estimate includes \$784,000 for landscaping. The Design Team has indicated that landscaping will not be a part of this project and the VE Team wanted to convey this decision and express its agreement with that approach.

2. Short Retaining Walls

The use of these easily constructable walls might avoid or mitigate impact on some properties at a modest cost. They can also be aesthetic additions to the project which tend to be graffiti resistant. We suggest that the Design Team review the project for any such opportunities.

**SR 27/US 280 Widening and Reconstruction
SR 45 to SR 49
SUMMARY OF RECOMMENDATIONS**

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	COMMENTS
	RECOMMENDATIONS					
P-3	11' inside and 12' outside lanes	\$18.8M	\$18.0M	\$0.8M	Nominal	- Acceptable concept for low volume
						- Trucks mostly in outside – 12' – lanes
R-6	Design Speed = 55 MPH in lieu of 65			Not Est.	N/A	- Vertical curves at 55 anyway
						- Acceptable for traffic volume
						- Minimizes relocations
P-6	Build new bound and overlay existing	\$4.6M	\$0	\$4.6M	N/A	- Facilitated by 32'/44' median and flat terrain; facilitated by 55 mph DSpeed
R-2	32' median in lieu of 44'	\$6.1M	\$5.3M	\$0.8M	Signif.	- Reduced environ. and R/W impact

**SR 27/US 280 Widening and Reconstruction
SR 45 to SR 49
SUMMARY OF RECOMMENDATIONS**

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	COMMENTS
R-8	Revise SR 49 Realignment	\$210,000	\$0	\$210,000	Nominal	- Reduced R/W; May avoid Jenkins work
						- 70 degrees meets standard
						- Minimize R/R impact
S-1	Bridges in lieu of Box Culvert Extension	\$350,000	\$400,000	(\$50,000)	Nominal	- Box may not be large or strong enough
						- Bridges would be more constructable
						- Reduces impact on waterway

STUDY IDENTIFICATION

Georgia DOT
6115070004.19

SR 27/US 280 Widening and Reconstruction
March 19, 2008

7



Study Identification

Project: SR 27/US 280	Dates: March 19, 2008
Location: Atlanta	

VE Team Members

Name:	Discipline:	Organization:	Telephone:
Alan Hunley, PE	Constructability	Parsons	678-969-2304
Aykut Urgan, PE	Design	Parsons	678-969-2327
Rodney Curtis, PE CVS	VE Team Facilitator	MACTEC	602-770-1062

Project Description

From the Project Concept Report:

“This project is located in the west side of Sumter County, beginning within the City of Plains at the intersection of SR 27 and SR 45/Bond Street (MP 2.86) and ending within the City of Americus at the intersection of SR 27 and SR 49 South (MP 10.77). The project will consist of widening the existing two/three-lane roadway to a four-lane divided roadway with a 44-foot depressed grass median, a 20-foot raised median and a 14-foot flush median; and 10-foot shoulders (outside) and 6-foot shoulders (inside for depressed grass median) on both sides of the road. The existing intersection of SR 27 and SR 49 will be realigned to create a 90 degree intersection with SR 27 and line up with Jenkins Road. The total project length is approximately 7.85 miles between the termini of the project.”

Two alternates- 1 and 2 – are identified in the Concept Report. Alternative 1 would avoid environmental resources as much as possible but would incur a larger R/W cost. Alternative 2 would use the existing R/W and pavement as much as feasible but would have more impact on environmental resources. A design speed of 65 MPH is proposed for the depressed median portion of the project under both alternatives. Year 2012 ADT is forecast to range from 2300 to 4300. In 2032, ADT is forecast to range from 3750 to 7050. Traffic volumes are highest in the Americus portion of the project. The only significant structure in the project is a twin 10’ X 9’ box culvert which is proposed to be extended.

Numerous cultural resources, some of which may be historic, would be affected by this project, including churches, cemeteries, and a historic district in Plains. The inventory of these resources was at a preliminary stage at the time of the VE study.

This is a G.R.I.P. project. Key items of the proposed work include:

- A/C Pavement - \$18.9M
- Right of Way - \$ 12.4M (for Alternative 1 – Alternative 2 will be less)
- Earthwork - \$2.3M
- Box Culvert - \$1.9 M (budgeted amount - probably not accurate – too high)

The current estimate for Alternative 1 is \$46.9M

A **Kick-off meeting** was held on 2/18/2008 at the outset of the VE study. GDOT PM Tim Matthews presented a brief overview of the project and answered questions. In addition to the VE Team, the following were in attendance:

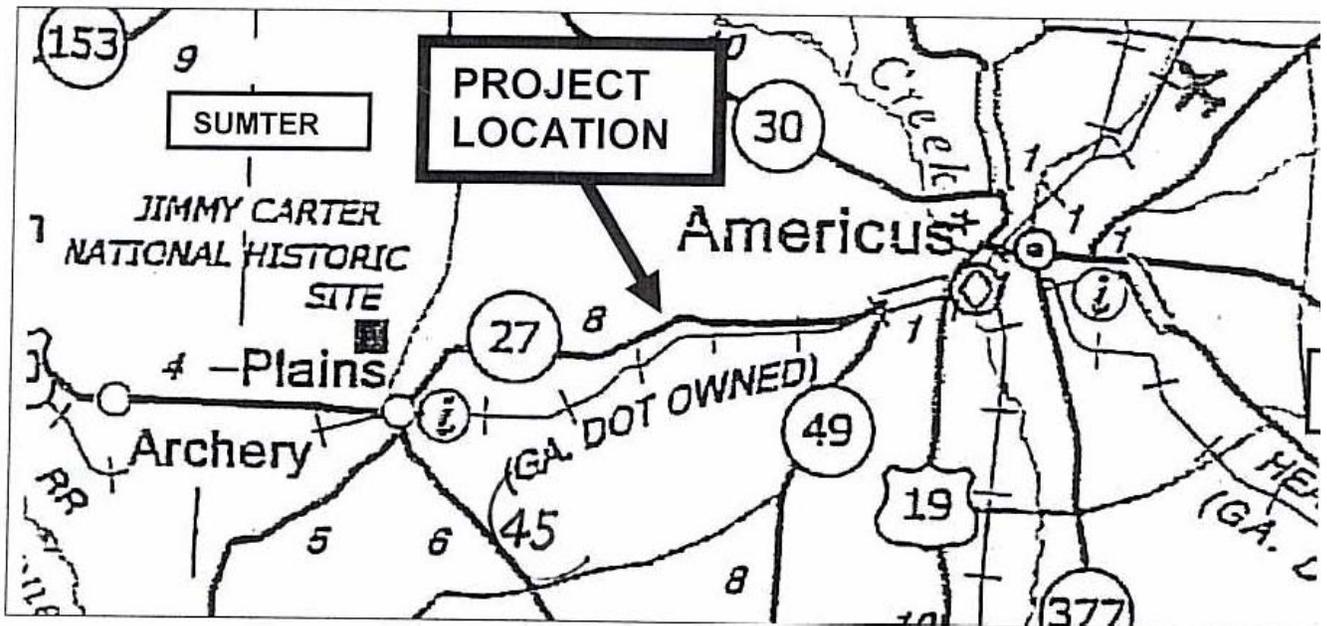
Lisa Myers	GDOT	Engineering Services
Andy Lindsey	GDOT	District 3
Jerry Milligan	GDOT	Right of Way
Bruce Hart	GDOT	Engineering Services
Joshua Taylor	GDOT	Road Design
Ron Wishon	GDOT	Engineering Services
Tim Matthews	GDOT	Road Design
Andy Casey	GDOT	Road Design
Richard Marshall	GDOT	Construction

The following items were noted during the meeting:

- A Final Concept Meeting for this project was held in January, 2008.
- Alternative 2 is the selected concept – which uses the existing R/W and pavement as much as possible.
- There may be one alignment shift to avoid a historic property but Alternative 2 has been selected. The Design Team may vary from Alt 2 but will not go back to Alt 1.
- The cost estimate in the Project Concept Report is for Alternative 1. There is no itemized estimate for Alternative 1. Alternative 2 cost will be similar except for R/W cost which will be significantly lower.
- The Design Consultant provided a rough profile for Alt 1. No profile for Alt 2 exists.
- Cross hatching on the wall mount plans indicates areas where the existing alignment does not meet current standards, based on 65 mph design speed.
- A historic district in Plains will be impacted.
- Potential environmental justice issues exist, largely related to several mobile home parks.
- 13 median openings are planned along the roadway.
- The bio-diesel plant under construction is expected to add between 30 and 100 trucks per day to this roadway. Also 4 trains per week.
- The railroad adjacent to the roadway in some locations is state owned.
- Any 2’ “trench widening” will need to be removed. I.e. the widening cannot extend from the edge of trench widening. This has caused problems in the past.

- The 44' median will have 6:1 slopes.
- The Design Team provided a list of potentially historic properties.
- This project is currently not funded for construction and may be dropped from the Priority List.
- Four lanes is a given for this project (**constraint to the VE study**).

Project Location Map



V.E. RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

SR 27/US 280 Widening and Reconstruction

IDEA No.: P3	Sheet No.: 1 of 3	CREATIVE IDEA: Reduce Pavement Width of Inside Lanes to 11'
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Prepared By: AEH Date: 02/19/08 Checked By: RHC Date: 2/26/08

Original Concept:

The baseline concept proposes 12' wide lanes throughout the length of the project.

Proposed Change:

The VE Team recommends the use of 11' lanes for the inside lanes throughout the length of the project. The outside lanes and all auxiliary lanes would remain 12' wide.

Justification:

A four-lane cross section is a requirement of the GRIP corridor, but forecast traffic is very light, even in the design year. Reducing the travel lane width for the inside lane to 11' would not provide a noticeable variance for most motorists. Even considering additional truck traffic projected to result from the construction of the bio-diesel facility, the overall truck traffic, as with the general traffic, should remain relatively light. In addition, trucks will usually be in the right lane, which would remain 12' as in the original concept.

A savings of 2 feet of pavement and 2 feet of right of way would be realized for the entire project length. Earthwork savings were considered negligible and not calculated. Additional O&M savings would result from maintaining less roadway, but were not estimated.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<i>INITIAL COST - Original</i>	\$18,780,000		
- Proposed	\$18,010,000		
- Savings	\$770,000		\$770,000
FUTURE COST – Savings			Nominal
TOTAL PRESENT WORTH SAVINGS			\$770,000 +

CALCULATIONS

Project Name: SR 27/US 280 Reconstruction and Widening

ITEM No:
P3

Sheet 3 of 3

Pavement items affected are:

- 310-1101 Gr Aggr Base Course
- 400-3605 Asph Conc. 19 MM Superpave
- 402-3130 Recycled Asph Conc. 12.5 MM Superpave
- 402-3143 Asph Conc 25 MM Superpave

Total Project Length = Sta. 476+14 – Sta. 56+53 = 41,961 LF

Pavement savings = 2' x 41,961' = 83,922 SF x 1 SY/9SF = 9325 SY

Base, assume 12", volume = 83,922 SF x 1 ft = 83,922 cf. x 140 lbs/cf = 11,749,080 lbs
11,749,080 lbs / 2000 lbs per ton = 5875 tons @ \$19.72 per ton = \$115,900

19 MM Superpave: 220 lbs/SY x 9325 SY x 1 Ton/ 2000 lbs = 1026 tn x \$94.45/Ton = \$96,900

12.5 MM Superpave: 165 lbs/SY x 9325 SY x 1 Ton/2000 lbs = 769 x \$77.80/Ton = \$59,900

25 MM Superpave: 550 lbs/SY x 9325 SY x 1 Ton/2000 lbs = 2564 x \$105.13/Ton = \$269,600

Right of Way Savings:

83,922 SF x 1 Acre/43,560 SF x \$80,000 per acre = \$154,000 SAY 2 ac = \$160,000

DEVELOPMENT AND RECOMMENDATION PHASE

SR 27/US 280 Widening and Reconstruction

IDEA No.: R6	Sheet No.: 1 of 3	CREATIVE IDEA: Reduce Design Speed from 65 mph to 55 mph
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Prepared By: aeh Date: 02/20/08 Checked By: RHC Date: 2/26/08

Original Concept:

The baseline concept is a 65 mph design speed for the majority of the project with a grass median. The project connects at each end with sections approximately 1 mile in length that each has a design speed of 45 mph.

Proposed Change:

The VE Recommendation is a design speed of 55 mph for the portion of the project with a grass median, retaining a 45 mph design speed for the sections at each end as shown in the original concept.

Justification:

Providing a 10 mph differential in design speeds for adjacent roadway sections is appropriate. The project is not controlled access, and should not be signed for greater than 55 mph.

The existing roadway horizontal alignment currently meets the criteria for 55 mph. Providing a 65 mph design speed would require reconstruction of the curve at approximate station 310+00 to provide for the larger radius required by the faster design speed. Reconstruction of the curve to meet 65 mph standards results in two displacements, one of which is shown as a potential historic structure. Reducing the design speed to 55 mph in this area, along with a minor alignment shift to the north, would allow utilization of the existing pavement as well as avoiding or minimizing impacts to the potential historic resource.

The existing roadway profile appears to meet criteria for 55 mph design speed in most, if not all, areas. Original Concept profile (provided for Alternate 1) includes many instances where the proposed profile does not meet criteria for 65 mph, but does meet 55 mph. Designing for 55 mph should result in retention of more existing pavement, resulting in lower pavement costs. This would also facilitate implementing recommendation P6 – below.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<i>INITIAL COST - Original</i>			
- Proposed			
- Savings			
FUTURE COST – Savings			N/A
TOTAL PRESENT WORTH SAVINGS			Not Estimated

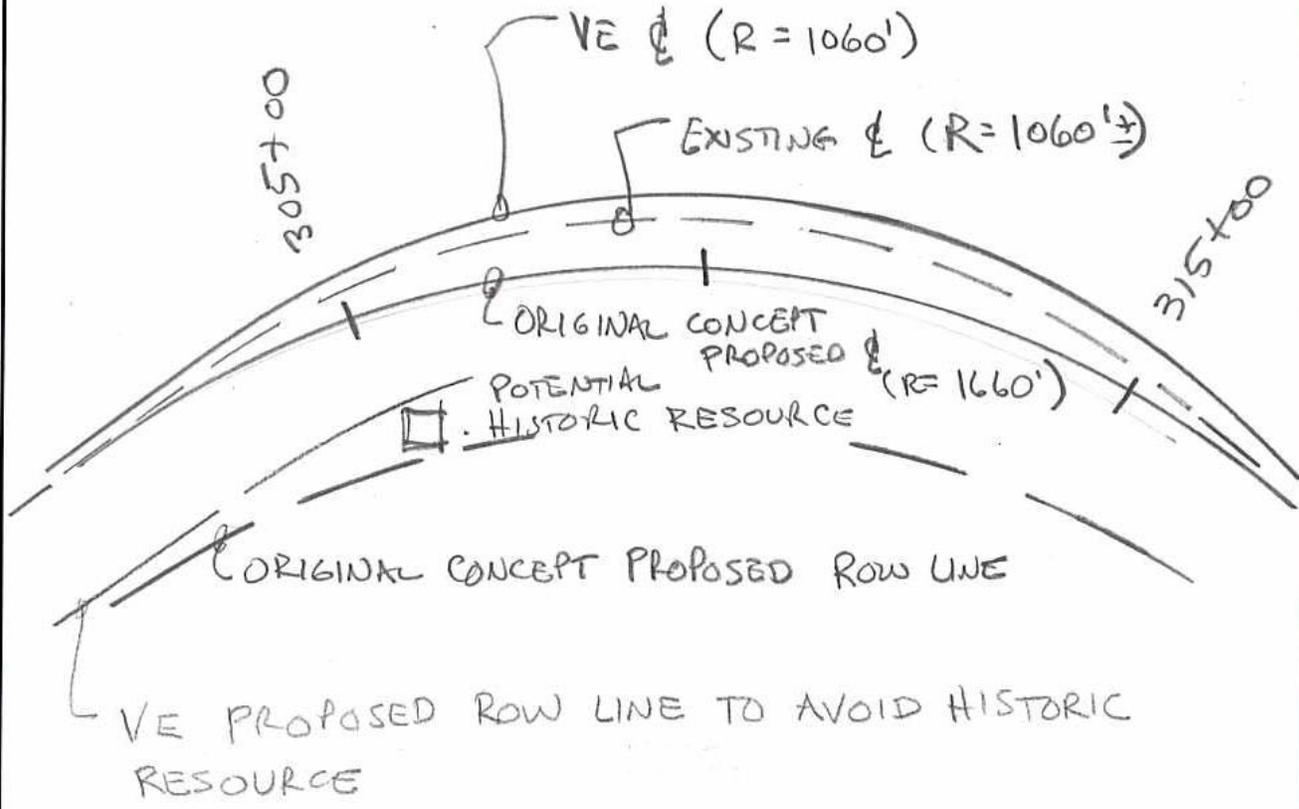
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Project Name: SR27/US280

IDEA No: R6
~~PS~~

SR 27/US 280 Widening and Reconstruction

Sheet 2 of 3



ALIGNMENT SHIFT NEAR STA 310+00

N.T.S

CALCULATIONS

Project Name: : SR 27/US 280 Widening and Reconstruction

ITEM No: R6

Sheet 3 of 3

Cost reductions consist of elimination of alignment shift in vicinity of the Nathan Revell property at Sta 310+00, and retention of existing profile in most areas. This would also result in reduction of required right of way in the vicinity of Station 310+00, and reduction in earthwork at various places throughout the project. In addition, this change should also result in avoiding two displacements on the Nathan Revell property. Without detailed profile for Alternate 2 cost savings cannot be quantified.

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name: SR 27/US 280 Widening and Reconstruction

IDEA No.: P6	Sheet No.: 1 of 4	CREATIVE IDEA: Build New Bound and Overlay Existing Roadway
------------------------	-----------------------------	--

Prepared By: AU **Date:** 02/20/2008 **Checked By:** RHC **Date:** 2/26/08

Original Concept: Alternative #2 proposes construction of 2 x 12' lanes on each direction with three different types of median widths along the project.

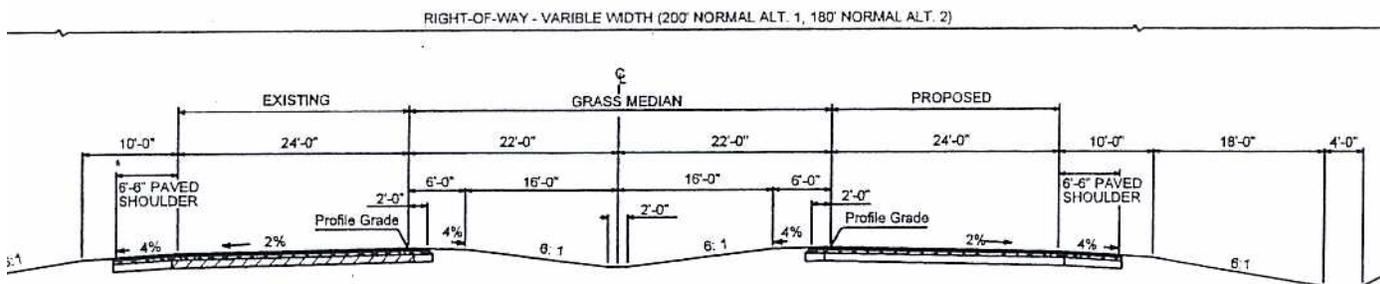
Proposed Change: The VE team proposes construction of only one bound between Sta. 91+75 – Sta. 197+000 and Sta. 266+00 – Sta. 418+00 and leveling & overlaying the existing road as necessary in those locations. The VE team also recommends using 32' depressed median instead of 44' depressed median in creative idea R2. The savings for the reduction in the median width have not been included on the below calculations. Savings from creative idea R2 should be added to the below savings to calculate the potential final savings amount.

Justification: The existing pavement on SR27/US280 is assumed to be in fairly good shape since the Need and Purpose of the concept report doesn't state any need to rehabilitate the existing asphalt and there are no known issues at this point. Leaving the existing pavement in place in the portions of the depressed median area noted above, and adding appropriate shoulders and overlaying the roadway results in significant cost savings for the project. The PGL on each bound would be designed separately by using a bifurcated PGL concept.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	\$4,640,000		
- Proposed	\$0		
- Savings	\$4,640,000		
FUTURE COST – Savings			
TOTAL PRESENT WORTH SAVINGS			\$4,640,000

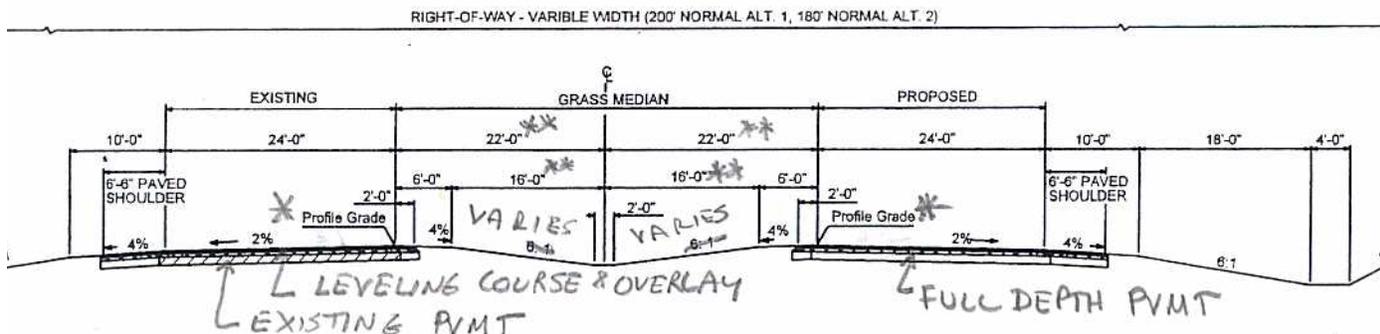
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Project Name: SR 27/US 280 Widening and Reconstruction	IDEA No: P6
	Sheet 2 of 4

MAINLINE - STA. 91+75 +/- TO STA. 418+00 +/- ALTERNATE 2



ORIGINAL CONCEPT

MAINLINE - STA. 91+75 +/- TO STA. 197+00 AND
STA. 266+00 TO STA. 418+00 +/- ALTERNATE 2



* USE BIFURCATED PGL.
** REDUCE PER IDEA # R2
VE PROPOSAL

CALCULATIONS

Project Name: : SR 27/US 280 Widening and Reconstruction

ITEM No: P6

Sheet 3 of 4

Sections not suitable for single bound construction;

Sta. 57+00 – Sta. 91+75 => 14' flush median section (3475')

Sta. 197+00 – Sta. 266+00 => 44' median section not suitable for single bound construction due to horizontal and/or vertical alignment constraints (6900')

Sta. 418+00 – Sta. 475+00 => 20' raised median (5700')

Total length = 3475' + 6900' + 5700' = 16,075' (not suitable for single bound construction)

Total project length = 41,800' – 16,075' = 25,725' single bound construction (62% of the project) Assume 40% reduction in pavement width for one bound concept – with new shoulders

PAVEMENT

Total Pavement Cost for the project = \$16,500,000+/-

Savings on Pavement Cost for the Single bound section = \$16,500,000 x 0.62 x 0.40 = \$4,092,000

Total Overlay Cost for the project = \$2,400,000

Overlay Cost for the single bound section = \$2,400,000 x 0.62 x 0.40 = \$595,200

Total Pavement Savings = \$4,092,000 - \$595,200 = **\$3,496,800**

EARTHWORK

Total Earthwork Cost for the project = \$2,300,000

Savings on Earthwork for the single bound section = \$2,300,000 x 0.62 x 0.40 = **\$570,400**

EROSION CONTROL

Total Erosion Control Cost for the project = \$2,300,000

Savings on erosion control for the single bound section = \$2,300,000 x 0.62 x 0.40 = **\$570,400**

TOTAL SAVINGS: \$3,496,800 + \$570,400 + \$570,400 = \$4,637,600 say \$4,640,000

CALCULATIONS

Project Name: : SR 27/US 280 Widening and Reconstruction

ITEM No: P6

Sheet 4 of 4

For purposes of estimating the cost savings, it was assumed that the construction cost will be half (50%) of the cost of the original concept for the portion of the project applicable to this design idea, with the following modifications:

- Additional cost will be added back in (5%) to account for median crossovers.
- Additional cost will be added back in (5%) to account for adding new shoulders on the existing lanes.

Therefore, the assumption is that the savings will be reduced to 40% of the original cost proposed in these areas.

DEVELOPMENT AND RECOMMENDATION PHASE

SR 27/US 280 Widening and Reconstruction

IDEA No.: R2	Sheet No.: 1 of 5	CREATIVE IDEA: Reduce Median Width from 44' to 32'
------------------------	-----------------------------	--

Prepared By: aeh Date: 02/19/08 Checked By: RHC Date: 2/26/08

Original Concept:

The baseline concept proposes a grass median 44' wide from Sta. 91+75 to Sta. 418+00.

Proposed Change:

The VE Team recommends a median width of 32' from Sta. 91+75 to Sta. 418+00.

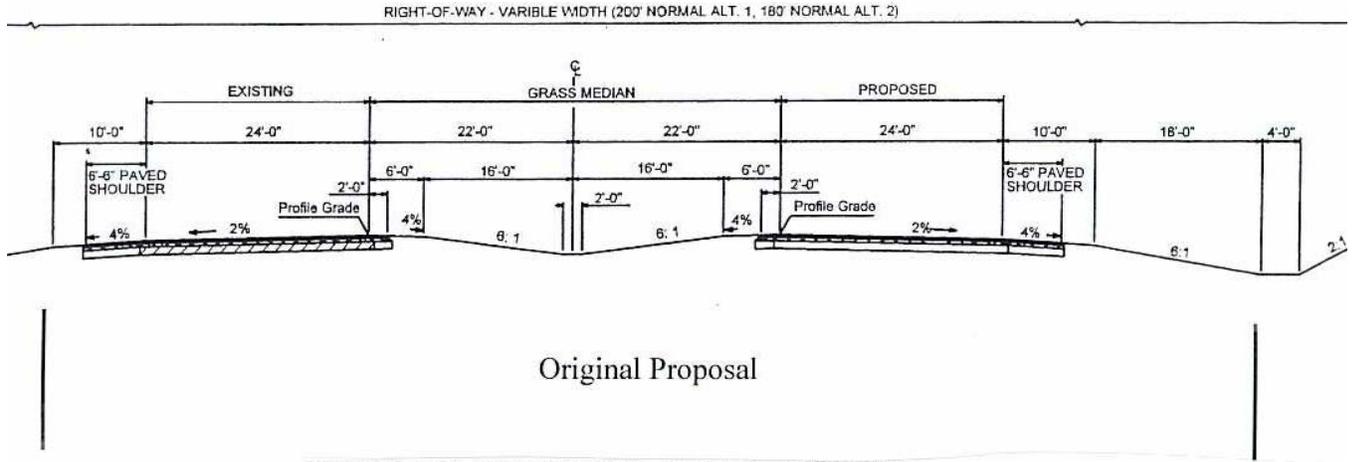
Justification:

The proposed project is a 4 lane GRIP project with low forecast volumes. Based on anticipated low traffic volumes, reducing the median width would not compromise safety requirements, and could result in significant savings in right of way costs.

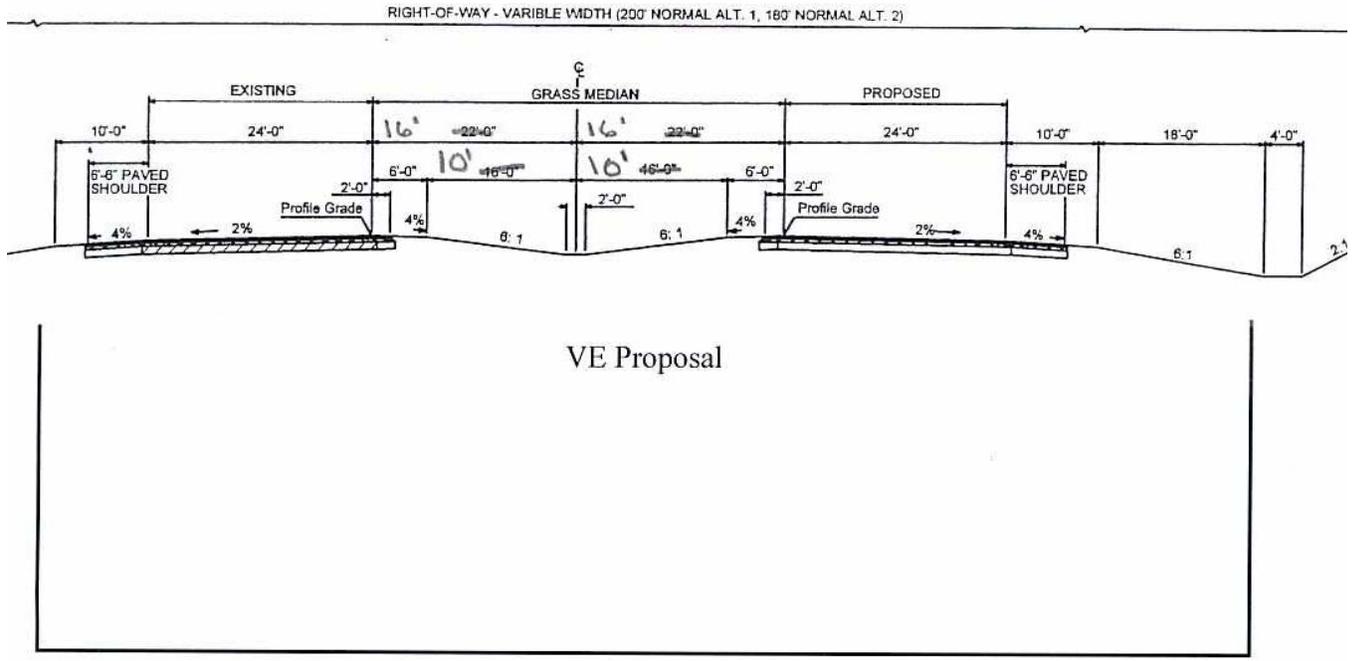
LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<i>INITIAL COST - Original</i>	\$6,085,000		
- Proposed	\$5,265,000		
- Savings	\$820,000		
FUTURE COST – Savings		Nominal	
TOTAL PRESENT WORTH SAVINGS			\$820,000

SKETCH	
Project Name: <i>SR27/US280</i>	IDEA No: R2
SR 27/US 280 Widening and Reconstruction	Sheet 2 of <i>5</i>

MAINLINE - STA. 91+75 +/- TO STA. 418+00 +/- ALTERNATE 2



MAINLINE - STA. 91+75 +/- TO STA. 418+00 +/- ALTERNATE 2



Project Name: SR 27/US 280 Widening and Reconstruction	IDEA No: R2
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CALCULATIONS

Project Name: **SR 27/US 280 Widening and Reconstruction**

ITEM No: R2

Sheet 5 of 5

Preliminary Right of Way Costs Estimate

Date: February 18, 2008

PI Number: 322780

No.

Project: STP-030-1(18) SUMTER CO,
Existing/Required R//W: 100'/160'-180'

Parcels: 136

Land:	Acre	Cost/Ac re	Cost	
Commercial	<u>1.9</u>	\$10,000	\$19,000	
Sm. Residential	7.3	\$15,000	\$109,500	
Lg. Residential	9.9	\$4,000	\$39,600	
Agricultural	54.9	\$3,000	\$164,700	
TOTAL	74			\$332,800
Improvements	14/40 x			
	\$1,750,000=			\$612,500
Relocation:				
2 Commercial @ \$25,000/parcel =			\$50,000	
12 Residential @ \$40,000/parcel=			\$480,000	
TOTAL				\$530,000
Damages				
Proximity-			\$465,000	
Consequential-			\$150,000	
Cost to Cure-			\$250,000	
TOTAL				\$865,000
Net Cost				\$2,340,300
Scheduling Contingency		55%		\$1,287,165
ADM/Court Cost		60%		\$1,404,180
Market				
Appreciation		40%		\$936,120
TOTAL				\$5,967,765
TOTAL COST			Say	\$6,000,000
TOTAL ACRES				74
COST/ACRE				\$81,081.08
			Say	\$81,000

DEVELOPMENT AND RECOMMENDATION PHASE

SR 27/US 280 Widening and Reconstruction

IDEA No.: R8	Sheet No.: 1 of 3	CREATIVE IDEA: Revise SR 49 Realignment
------------------------	-----------------------------	--

Prepared By: AU **Date:** 02/20/2008 **Checked By:** RHC **Date:** 2/26/08

Original Concept: Alternative #2 proposes to realign the SR49 South and Jenkins Road in order to create a 90 degree intersection with SR27/US280. As a result of this realignment approximately 1000' of reconstruction will need to be done on SR49 South and 450' of reconstruction on Jenkins Road.

Proposed Change: The VE team proposes to use a 70 degree angle between SR49 South and SR27/US280 so that the proposed alignment of SR49 will be in close proximity of the existing alignment. This would eliminate the proposed improvements outside the proposed right-of-way on Jenkins Road since a 70 degree connection on SR49 South would align properly with the existing Jenkins Road alignment.

Justification: The VE team acknowledges that a perpendicular intersection angle is desirable in a signalized intersection; however, AASHTO allows intersection angles up to 70 degrees. Considering that the majority of the traffic turns right onto SR27/US280 from SR49South northbound, a 70 degree connection would not reduce the safety of this intersection. Also, this would allow reducing the right-of-way impacts and construction cost since the proposed alignment of SR49South would be very close to the existing alignment. This should minimize impacts at the existing grade crossing and also would utilize the maximum amount of existing roadway embankment and right-of-way.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	\$210,000		
- Proposed	0		
- Savings	\$210,000		
FUTURE COST – Savings		Nominal	
TOTAL PRESENT WORTH SAVINGS			\$210,000

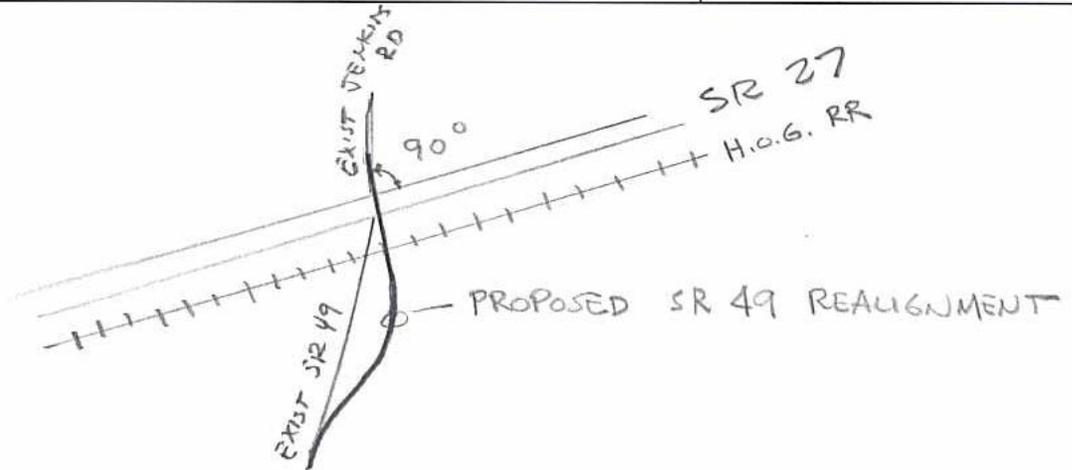
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Project Name: SR 27/US 280

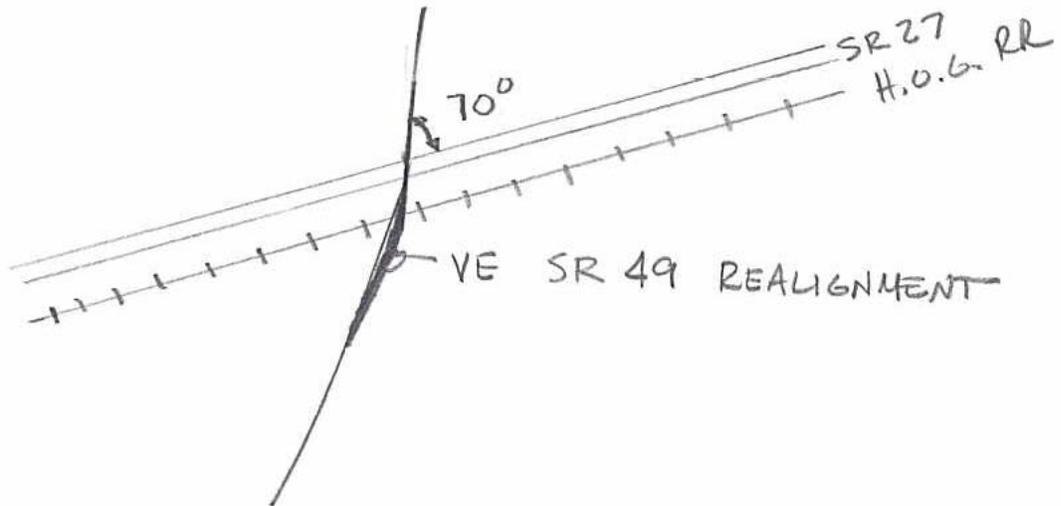
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SR 27/US 280 Widening and Reconstruction

Sheet 2 of 3



ORIGINAL CONCEPT



VE PROPOSAL

CALCULATIONS

SR 27/US 280 Widening and Reconstruction

ITEM No: R8

Sheet 3 of 3

Proposed Improvement length (existing design) on SR49 South = 1000'

Proposed Improvement length (existing design) on Jenkins Road = 450'

Proposed Improvement length (proposed changes) on SR49 South = 850'

Proposed Improvement length (proposed changes) on Jenkins Road = 50'

Difference on pavement cost = $(550' \times 24')/9 \times \$58/\text{sy}$ (as per P3) = \$85,067, **Say \$85,000**

Right-of-Way savings = $47,500 \text{ ft}^2 / 43,560 = 1.1 \text{ acre} \times \$81,000 = \$89,100$, **Say \$90,000**

Total Savings for pavement and right-of-way = \$175,000

Miscellaneous savings due to the shortened alignment = \$35,000

Total Savings = \$210,000

DEVELOPMENT AND RECOMMENDATION PHASE			
SR 27/US 280 Widening and Reconstruction			
IDEA No.: S1	Sheet No.: 1 of 2	CREATIVE IDEA: Two Bridges in lieu of Box Culvert Extension	
Prepared By: AU Date: 02/19/2008 Checked By: RHC Date: 2/26/08			
<p>Original Concept: Alternative 2 proposes extending the existing double 10'x9' culvert @ Sta.253+50 to accommodate the roadway widening. The profile at this location shows approximately 8' of proposed fill over the existing culvert.</p> <p>Proposed Change: The VE team recommends considering construction of two bridges in lieu of extending the existing culvert.</p> <p>Justification: Considering the lack of a hydraulic study and possible structural problems for approximately 8' of proposed additional fill over the existing culvert, the VE team believes that consideration of a bridge option could eliminate possible structural problems and facilitate possible hydraulic upgrade. The hydraulic and structural studies may require construction of a new culvert instead of extending the existing one. If this would be the case, a two-bridge option would help the constructability of the project significantly since they could be constructed without interrupting the traffic and cost effectively. This option would also enhance the future O&M in comparison with cleaning the culvert and eliminate the risk of differential settlement of the culvert extension. The VE team acknowledges that a bridge option could complicate the design activities.</p>			
LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	\$350,000		
- Proposed	\$400,000		
- Savings	(\$50,000)		
FUTURE COST – Savings		Nominal	
TOTAL PRESENT WORTH SAVINGS			(\$50,000)

CALCULATIONS

SR27/US280 Widening and Reconstruction

ITEM No: S1

Sheet 2 of 2

The construction cost estimate includes a line item for “Structural” for \$994,000 and also includes two separate items for “Class A Concrete” and “Bar Reinforced Steel” totaling \$914,403.69. Since this is the only structure in the project, the VE team assumes that the total estimate of extending the culvert would be the total of these three items, which would be \$1,908,403.69. This estimate appears to be too high for this task. The VE team’s estimation for this task is below:

Cost of Extending the Existing Double 10’x9’ culvert:

Assumption: The total required length for the culvert extension is estimated to be 100’, the cost per lf of this extension has been calculated as:

- Class A Concrete= 3 cy/lf x \$895/cy = \$2,685/lf
- Rebar = 137 lb/cy x 3 cy/lf x \$2.00/lb = \$822/lf
- Total= 100 ft x (\$2,685 + \$822) = \$350,700, say **\$350,000**

Cost of the Proposed two bridges:

Assumption: use a 50’ span which is conservative and would provide larger hydraulic capacity. Use \$100/sf for bridge cost

- Proposed Length = 50’
- Proposed Bridge Width= 2 x 40’
- Total Cost = 2 x 40 x 50 x \$100/ft2* = **\$400,000**

* \$100/ft2 of bridge cost has been estimated by using the average cost prepared for 20+ similar types of bridge designed by the VE team in Georgia.

APPENDIX

Sources

Approving/Authorizing Persons

Name:	Position:	Telephone:
Brian Summers	Manager, Engineering Services	

Personal Contacts

Name:	Telephone:	Notes:
NONE NOTED		

Documents Used During Study

Document:	Source:
Project Concept Report	GDOT
Wall mount aerial map/plans – Alt 1 and 2	JJG
Preliminary profile for Alt 1	JJG
Cost Estimate – Alt 1 (in Concept Report)	GDOT
Historic Properties Information (prelim)	JJG

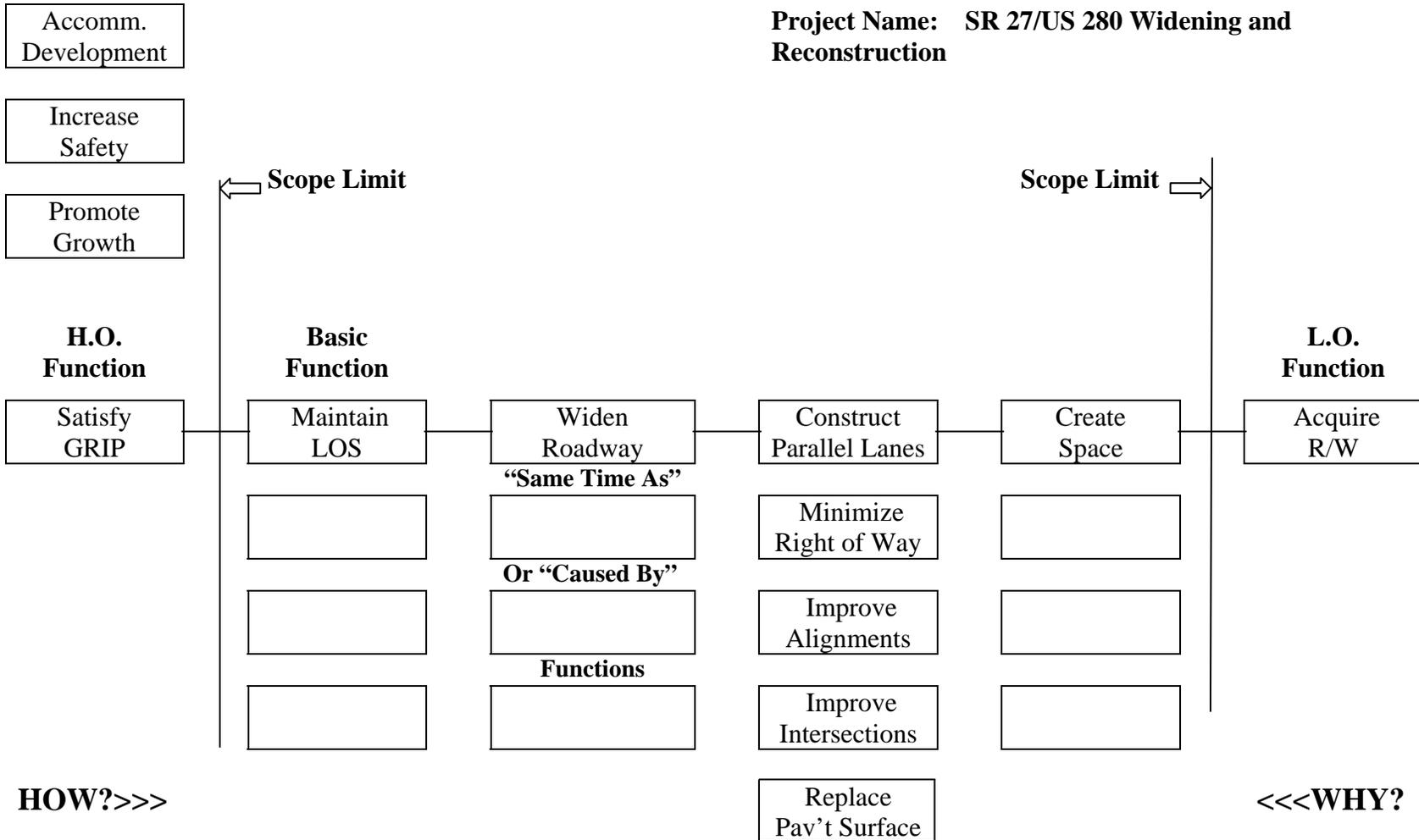
SR 27/US 280 Widening and Reconstruction

Cost Model / Distribution

Item	Description	\$ Amount	% of Total Project
	Pavement and Base	\$18.9M	40
	Right of Way	12.4M	26
	Maintenance of Traffic	2.8M	6
	Environmental/Landscaping	2.3M	5
	Earthwork	2.3M	5
	Box Culvert Extension	1.9M	4
	Drainage – Pipe and Appurtenances	1.2M	3
	Traffic Engineering –Permanent	1.0M	2
	Miscellaneous	4.1M	9
	Includes 10% E&C		
	No Mobilization cost included		
	TOTAL	\$46.9M	100
	Note: estimate is for Alternate 1		
	Alternate 2 is the baseline but no		
	estimate available at time of study		
	Note: R/W cost for Alt. 2 roughly		
	estimated at half that of Alt. 1		

F.A.S.T. DIAGRAM

Project Name: SR 27/US 280 Widening and Reconstruction



INFORMATION PHASE – FUNCTION ANALYSIS

Project: SR 27/US 280 Widening and Reconstruction

Basic Function: Maintain LOS

ITEM No.	DESCRIPTION	FUNCTION		COST/COMPLEXITY		
		Verb	Noun	Const. Cost	O&M Imp.	Complexity
PN	Pavement – New Lanes	Widen	Roadway	\$16.5M	+	Low
		Add	Lanes			
PO	Pavement - Overlay Existing	Conserve	Exist. Pavement	\$2.4M	-	Medium
R/W	Right of Way	Create	Space	\$12.4M	+	High
MOT	Maintenance of Traffic	Maintain	Traffic			
		Create (safe)	Workzone	\$2.8M	N/A	Medium
E	Erosion Control	Protect	Environment	\$2.3M	+	Low
EK	Earthwork	Improve	Alignment	\$2.3	+	Low
		Support (new)	Pavement			
B	Box Culvert Extension	Accommodate	Widening	\$1.9M	-	Low
D	Drainage	Drain	Median	\$1.2M	+	Medium
		Upgrade	System			
T	Traffic Engineering – Permanent	Communicate	Information	\$1.0	+	Low
		Shield	Obstacle			
		Control	Traffic			
M	Miscellaneous			\$4.1M		
	Bold = Selected For Creativity			\$46.9M		

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
P-1	4-11' lanes for the entire project	Dropped in first cut	X
P-2	4-11' lanes for the raised median and flush median	Dropped in first cut	X
P-3/4	11' inside lanes – 12' outside lanes	A – reduces construction cost	✓
	(entire project or in urban sections)	A – reduce R/W and earthwork	
		D- reduced safety in one lane	
		A – does accommodate trucks in outside lane	
		A – meets AASHTO requirement	
		A – would work better with 55 mph DS	
P-4	11' inside and 12' outside lanes – urban sections	Combine with P-3	X
P-5	Concrete pavement	Dropped in first cut	X
P-6	Build 2 new lanes and overlay existing lanes	A – reduces construction cost	✓
		A – reduce earthwork cost	
		D – would not allow median reduction	
		D – wouldn't work as well with high cuts or fill	
		A – provides significant upgrading of facility	
		A – fewer driveway and access issues	
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
P-6	Continued	D- complicates drainage design	
		A – works with MOT concept	
		A – could do spot vertical alignment upgrades	
		A – facilitates retention of existing pavement	
		A – works with flat/rolling terrain	
		A – less erosion control effort	
		A – less disruption to utilities	
		D – complicates geometric design	
R-1	Flexible R/W width	D – may be standard practice anyway	X
		A – minimize number of parcels/displacements	
		A – maintenance access can be maintained	
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
R-2	32' Median vs 44' Median	A – reduced R/W cost	✓
		A – reduced construction cost – earth and drainage	
		A – meets GDOT standards	
		A – future widening to median not likely	
		D – modifies median opening design	
		A – has been used elsewhere in GA	
R-3	14' flush in lieu of 20' raised median	D – less access control	X
		A – reduced O&M	
		A – simplifies drainage	
		D – limited, if any, construction or O&M savings	
		A – better driver expectation – fewer sections	
		A – more public acceptance	
		D – reduces safety	
		A – meets GDOT policy	
R-4	14' flush median in lieu of 44' median	Dropped in first cut	X
R-5	12' rather than 14' flush median	Dropped in first cut	X
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
R-6	55 mph design speed in lieu of 65 mph	A – reduce construction and R/W cost	✓
		A – facilitates retention of existing alignment	
		A – reduce the Sta 305 to 320 curve realignment	
		D – reduces margin for error as opposed to 65/55 posted	
		A – tentative Alt 1 profile only meets 55 in various vertical curves	
		A – less impact to current design (if increase to 65)	
		A – avoid potential design exceptions/variance	
R-7	Direct access to SR 27 from Biodiesel plant	Dropped in first cut	X
R-8/9	Shorten SR 49 realignment	A – reduce R/W requirement/impact	✓
		A – could improve to 70 degrees with less impact	
		A – may allow elimination of Jenkins work	
		D – does not provide perpendicular intersection	
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
R8/9	continued	D – does not provide perpendicular R/R cross	
		A – Simplifies R/R crossing modification	
R-9	Eliminate Jenkins Road work	Combine with R-8	X
R-10	Move SR 49 intersection to the west	Dropped in first cut	X
R-11	Design speed of 60 rather than 65	Dropped in first cut	X
R-12	Type A vs Type B pavement for median openings	Dropped in first cut	X
R-13	Short decorative walls to avoid property	A – possibly minimize impacts to environmentally sensitive areas	DS
		D – may add some construction cost	
		A – can be assembled easily by labor	
		A – Less R/W needed	
		D – increased O&M	
		D – potential graffiti target	
E-1	Eliminate landscaping work	A – reduces construction cost	DS
		A – reduces O&M cost	
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Idea Listing		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
S-1	Bridges in lieu of box culvert extension	A – may be less construction cost	✓
		A – facilitates possible hydraulic upgrade	
		A – Simplifies the MOT	
		A – enhances O&M	
		D – complicates the design	
		A – eliminates risk of differential settlement	
		A – improves hydraulics	
		D – requires guardrail approaches	
		A – may facilitate utility relocation/reduce impact	
		A – box may not be strong enough for fill	
✓ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			