

VALUE ENGINEERING REPORT

**US 19/41/SR 3 / Tara Boulevard
Widening and Reconstruction
NH000-0001-04(060); PI No. 722030
Clayton County**

May 14, 2012

PROJECT OWNER:



Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308

VALUE ENGINEERING CONSULTANT:



AMEC Environment & Infrastructure, Inc.
3200 Town Point Drive NW, Suite 100
Kennesaw, GA 30144

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Disclaimer

This Value Engineering (VE) report presents recommendations for consideration by the design team for alternate methods of completing the current design that may be acceptable to both the design team and the owner. In most cases, each recommendation contains a cost estimate to help evaluate each recommendation on a cost effective basis including both capital and life cycle costs. These estimates are generated whenever possible using the design team's best estimate of cost and mark-ups for quantities and/or unit costs for items proposed to be changed. Using this method, a comparison can be made of the cost estimates for each item by evaluating the original design concept against the proposed change in the VE recommendation. The VE recommendation cost estimates are developed based on the information provided by the design team during the study. At this stage of design, and considering the limited time available for a VE study, the costs should be considered as order of magnitude costs only and do not reflect the final design estimated costs or actual construction costs. The difference in the original design concept and proposed VE recommendation reflects the potential cost change that may be considered by decision makers.

Finally, the VE recommendations and associated cost estimates are for consideration by only the design team and owner. The VE team does not make decisions as to which, if any, of the recommendations are incorporated into the project design. A decision to incorporate a VE recommendation is the responsibility of the design team. Also, the VE recommendations do not have to be accepted as presented in the VE study report. The recommendations should be considered a concept that can be improved and/or modified by the design team to result in a design modification that is mutually acceptable to the design team, project sponsor and owner and includes GDOT.

EXECUTIVE SUMMARY

Executive Summary

VALUE ENGINEERING STUDY

**US 19/41/SR 3 Widening and Reconstruction
NH000-0001-04(060); PI No. 722030
Clayton County
April 30 – May 3, 2012**

Introduction

This report presents the results of a value engineering (VE) study conducted on the proposed design for the US 19/41/SR 3/Tara Boulevard, Widening and Reconstruction project in Clayton County. This project is required to reduce the frequency and severity of crashes and to improve capacity and/or operations throughout this corridor.

The project begins just south of CR 54/Tara Road and ends at the CR 1337/Flint River Road intersection, a distance of about 3.5 miles and is entirely in Clayton County. The project extends the northern abutting, existing 6-lane section from just south of Flint River Road southward to the Tara Road intersection where the projected traffic volumes decrease by 20%.

The preferred alternate widens the corridor from 4 to 6 lanes with an 18 foot wide, raised median. It includes 11 ft left and center lanes and a 12 ft right lane, on-street bike lanes and a 12 ft urban shoulder with a sidewalk on the west side and a rural, ditch section with no sidewalk on the east side. The design speed is 55 mph.

Major contract work items include asphalt paving earthwork drainage sidewalks curb and gutter traffic signals and erosion control measures. The total estimated project cost is \$31,082,556 and includes \$9,484,000 for right of way. The project is following the GDOT Plan Development Process (PDP). The current overall schedule is for R/W authorization in June 2014 and project letting in February 2017. The design is currently in the concept stage, preparing for final concept plans. The environmental document is not yet approved. The VE study was conducted April 30 – May 3, 2012, at the Georgia DOT Headquarters in Atlanta using a three 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 contains information about the project and the team. The Recommendations presents a detailed description and support information about each recommendation. 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.

Results Obtained

The VE team focused their efforts on the high cost items of the project. Using function analysis and brain storming techniques, the team generated 26 ideas with 18 identified for additional evaluation as possible recommendations or design considerations. The VE team developed 6 independent recommendations. Implementing all the recommendations is not feasible however implementation of the independent, exclusive recommendations has the potential to reduce the project cost approximately \$16,750,000. A detailed write-up of each recommendation is contained in the respective portion of this report. The following is a summary of the recommendations.

Recommendation Summary

Idea A-2: Develop a multi-use trail along the western side of the road.

This will eliminate the on-road bike trail and associated buffer as well as the sidewalk and combine into a 10 foot wide multi-use trail along the western side.

The total potential savings is \$2,037,000.

Idea A-3: Retain and re-use the existing pavement.

Rather than call for the complete removal and reconstruction of the existing pavement, retain and re-use the existing pavement structure.

The total potential savings is \$4,834,000.

Idea A-5: Use a 45 mph design speed.

This recommendation incorporates a lower design speed for the corridor, which is more suitable as a continuation and extension of the northern section and based on the projected traffic volumes and land use development.

The total potential savings is \$1,390,000

Idea A-10: Retain and re-use the existing 32 foot median.

This recommendation will maintain the existing 32 foot depressed median and construct all widening and improvements to the outside. The existing right of way width of 200 feet is wide enough for the proposed typical section.

The total potential savings is \$1,340,000

Idea B-1: Reduce the right of way width.

The existing R/W width of 200 feet is sufficient to accommodate the proposed typical section. No additional right of way acquisition is required, except for outfall areas, erosion protection and other miscellaneous areas to be designated as part of the plan development.

The total potential savings is \$8,535,000

Idea D-2: Use a flush grassed median with cable rail.

This recommendation will use a flush median with cable rail to contain errant, cross-over incidents.

The total potential savings is \$383,000

US 19/41/SR 3 Widening and Reconstruction
SUMMARY OF POTENTIAL COST SAVINGS

IDEA No.	RECOMMENDATION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS
A-2	Develop a multi-use path along the western side; incorporate a rural, ditch section	\$3,784,000	\$1,747,000	\$2,037,000	N/A	\$2,037,000
A-3	Retain existing pavement	\$5,130,000	\$296,000	\$4,834,000	N/A	\$4,834,000
A-5	Use 45 mph design speed	\$5,100,000	\$3,710,000	\$1,390,000	N/A	\$1,390,000
A-10	Retain and re-use the existing 32 foot median; widen to the outside	\$1,340,000	\$0	\$1,340,000	N/A	\$1,340,000
B-1	Reduce the right of way width; do not acquire additional 20 feet on each side	\$9,484,000	\$949,000	\$8,535,000	N/A	\$8,535,000
D-2	Use a flush, grassed median with cable rail	\$772,000	\$389,000	\$383,000	N/A	\$383,000

STUDY IDENTIFICATION

Study Identification

Project: US 19/41/SR 3 Widening and Reconstruction	Date: April 30 – May 3, 2012
Study Location: GDOT General Offices, Atlanta, GA	

VE Team Members

Name:	Title:	Organization:	Telephone:
Jeff VanDyke, PE	Highway Design	RS & H	678-528-7234
Steve Bitney, PE	Highway Design / Constructability	Stantec	770-813-0882
George Obaranec, PE, CVS	VE Team Facilitator	AMEC	770-421-3346

Project Description

This project is the widening and reconstruction of US 19/41/SR 3/Tara Boulevard in Clayton County. This project is required to reduce the frequency and severity of crashes and to improve capacity and/or operations throughout this corridor. The project begins just south of CR 54/Tara Road and ends at the CR 1337/Flint River Road intersection, a distance of about 3.5 miles and is entirely in Clayton County. The project extends the northern abutting, existing 6-lane section from just south of Flint River Road southward to the Tara Road intersection where the projected traffic volumes decrease by 20%.

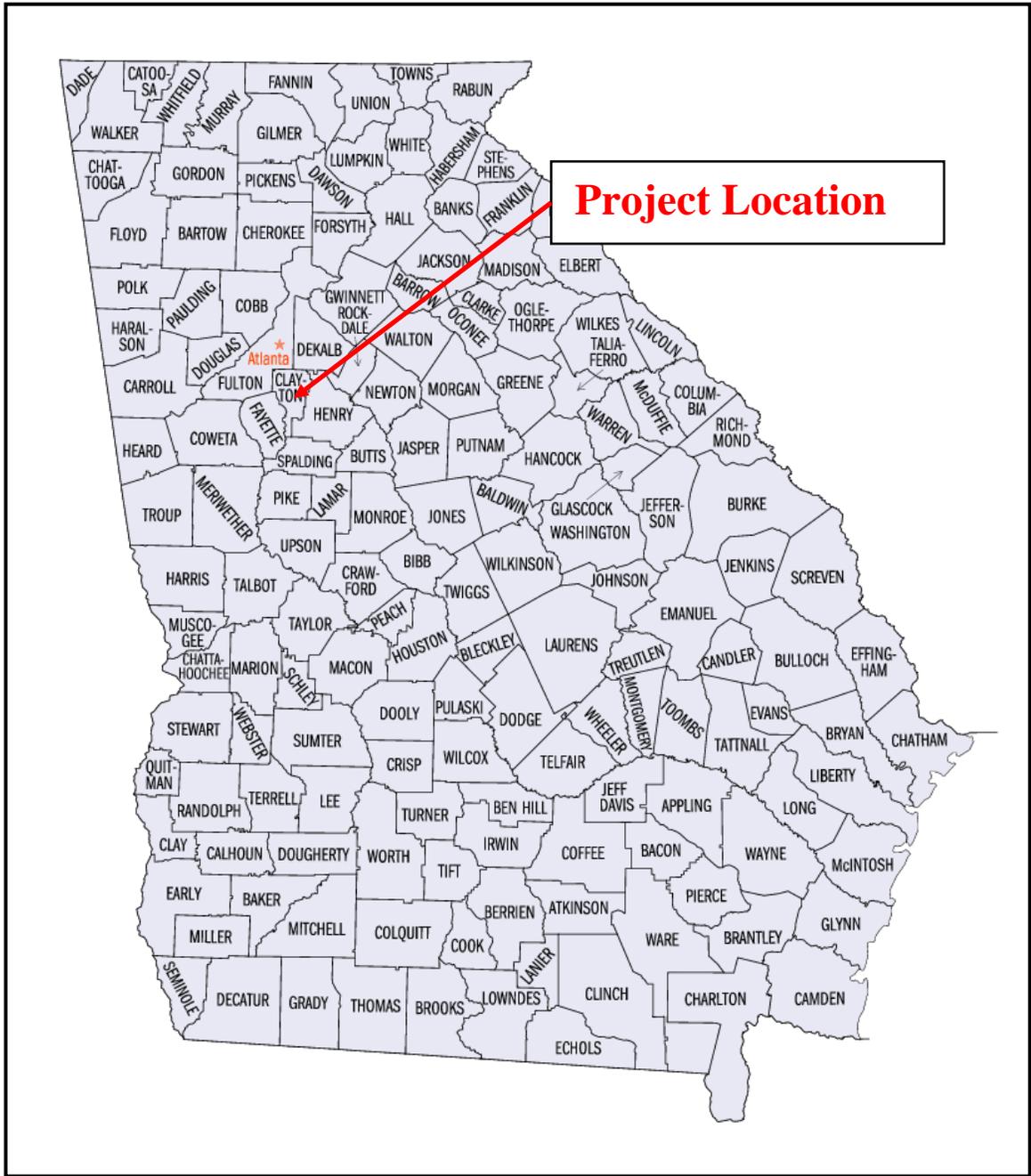
The preferred alternate widens the corridor from 4 to 6 lanes with an 18 foot wide, raised median. It includes 11 ft left and center lanes and a 12 ft right lane, on-street bike lanes and a 12 ft urban shoulder with a sidewalk on the west side and a rural, ditch section with no sidewalk on the east side. The design speed is 55 mph.

Major contract work items include asphalt paving earthwork drainage sidewalks curb and gutter traffic signals and erosion control measures. The total estimated project cost is \$31,082,556 and includes \$9,484,000 for right of way. The project is following the GDOT Plan Development Process (PDP). The current overall schedule is for R/W authorization in June 2014 and project letting in February 2017. The design is currently in the concept stage, preparing for final concept plans. The environmental document is not yet approved. The VE study was conducted April 30 – May 3, 2012, at the Georgia DOT Headquarters in Atlanta using a three person VE team.

Project Design Briefing

The VE team received a project briefing by the GDOT project design team represented by Joshua Taylor and Fletcher Miller. The following information and comments were presented:

- This project will widen and reconstruct US 19/41/SR 3 from Tara Road to SR 54, a distance of about 3.5 miles.
- The concept plans presented are on aerial mapping. Survey data and basemapping is due within a few weeks.
- The existing 4-lane road will be widened to a 6-lane roadway. The preferred typical section includes 11 ft left and center lanes and a 12 ft right lane; a raised, 18 ft median and a 12 ft urban shoulder on the west side and a rural, ditch section on the east side.
- An alternate, 45 mph design speed typical section includes all 12 foot lanes, a 24 ft. raised median and 12 ft urban shoulders on both sides.
- Both typical sections are laid out symmetrically around the existing centerline.
- This is a designated bike route and includes bicycle lanes in each direction. The current layout is for on-road bicycle lanes.
- There are 7 existing signalized intersections that will remain signalized. The current option is for video detection at the signals.
- There is one at-grade RR crossing at Freeman Road that is very close to the mainline. There is currently a right turn lane that the RR has said cannot be further widened or improved. They cannot allow any encroachment beyond the existing right turn lane.
- The construction cost estimate and preferred alternative provide for a worst-case scenario including full pavement removal and reconstruction and additional right of way acquisition.
- The northern section of US 19/41/SR 3 to I-75 is posted at 45 mph.
- The project includes a surfacing of Open Graded Friction Course (OGFC) to reduce spray.
- There are several historic resources along the project that currently show additional right of way to be acquired.
- The environmental document is being developed.
- There are no programmed projects for further extending the 6-laning south. This corridor is however part of a Super Arterial Concept Roadway and part of a TIA project.
- The project schedule is for R/W authorization in June 2014 and project letting in February 2017.



Project Location Map

VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

Project: US 19/41/SR 3 Widening and Reconstruction

IDEA No.: A-2	Sheet No.: 1 of 4	CREATIVE IDEA: Construct a multi-use trail on the west side and eliminate the on-road bike lanes.
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Comp By: SSB Date: 5/2/12 Checked By: GAO Date: 5/8/12

Original Concept: Provide curb and gutter with a 5' concrete sidewalk on west side. Also provide on-road bike lanes with buffer offsets in each direction.

Proposed Change: On the west side, develop a 10 foot wide multi-use path and eliminate the curb and gutter; provide a rural ditch section. Remove the on-road bike lanes and buffer offsets in each direction.

Justification: Constructing a dedicated, off-road multi-use trail will provide a more user-friendly path. Removing the on-road bike lanes will reduce the pavement width and eliminate the required buffer offset for a 55 mph design speed. There is ample room within the existing right-of-way for the multi-use trail. Additionally, this appears to be a low use corridor for both pedestrian and bicyclists and combining the usage provides efficiencies. If, in the future, this corridor is further developed and pedestrian and bicyclist usage picks up, there is still ample room to widen on both sides.

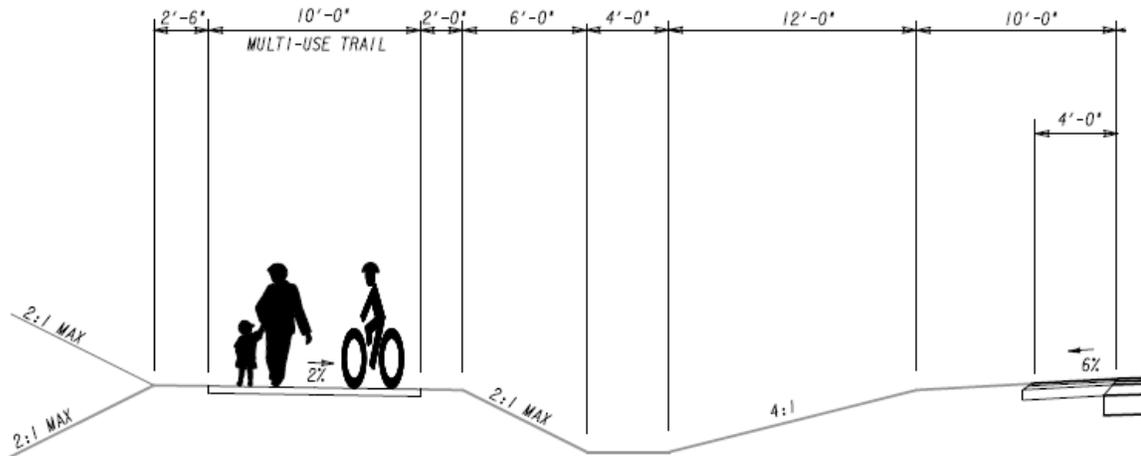
This recommendation reflects a rural ditch section on the west side however the multi-use trail concept would also work with an urban section, on either side of the road.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$3,784,000		
Proposed	\$1,747,000		
Savings	\$2,037,000		\$2,037,000
FUTURE COST: – Savings		\$0	\$0
TOTAL PRESENT WORTH SAVINGS			\$2,037,000

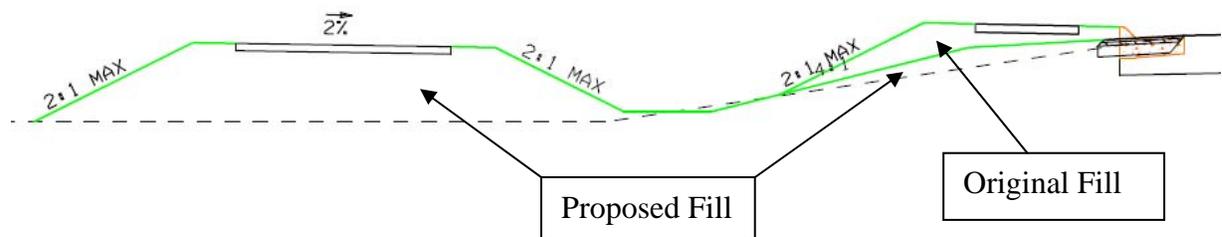
SKETCH

Project: US 19/41/SR 3 Widening and Reconstruction

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



PROPOSED SHOULDER TYPICAL SECTION



CALCULATIONS

Project: US 19/41/SR 3 Widening and Reconstruction

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

Original Design

Project length; 3.5 miles x 5,280 ft/mile = 18,480 feet

Eliminate Curb and Gutter – 18,480 LF

Eliminate Conc Sidewalk – 10,297 SY; from construction cost estimate

8' wide; full depth pavement $8 \times 18,480/9 = 16,427 \text{ SY}$

OGFC – $16,427 \times 90\#/2,000 = 739.2 \text{ TN}$

SMA – $16,427 \times 165\#/2,000 = 1355.2 \text{ TN}$

19 mm – $16,427 \times 220\#/2,000 = 1,807.0 \text{ TN}$

25 mm – $16,427 \times 853\#/2,000 = 7006.1 \text{ TN}$

GAB – $16,427 \times 1,400\#/2,000 = 11,499.0 \text{ TN}$

Tack Coat $16,427 \times 0.05 \times 4 = 3,285 \text{ GA}$

Shoulder $2.5 \times 18,480/9 = 5,133 \text{ SY}$

SMA - $5,133 \times 165\#/2,000 = 423.5 \text{ TN}$

25 mm – $5,133 \times 440\#/2,000 = 1,129.3 \text{ TN}$

GAB – $5,133 \times 700\#/2,000 = 1,796.6 \text{ TN}$

Tack Coat – $5,133 \times 0.05 \times 2 = 513 \text{ GA}$

Earthwork

Fill - $32 \text{ SF} \times 18,480/27 = 21,902 \text{ CY}$

Perm. Grassing

$18,480 \times 20/43,560 = 8.5 \text{ AC}$

Drainage reduction; piping and structures; assume 75% reduction

$\$1,855,927 \times 0.80 = \$1,484,742$

Proposed Design

Earthwork

Fill – $(15 \times 0.9) + (20.5 \times 3.5) = 85.3 \text{ SF}$

$85.3 \times 18,480/27 = 58,383 \text{ CY}$

Perm. Grassing

$19.0 \times 18,480/43,560 = 8 \text{ AC}$

Trail (4" Concrete)

$10 \times 18,480/9 = 20,533 \text{ SY}$

4' Shldr. Pavt. $4 \times 18,480/9 = 8,213 \text{ SY}$

SMA – $8,213 \times 165\#/2,000 = 678 \text{ TN}$

25 mm – $8,213 \times 440\#/2000 = 1,807 \text{ TN}$

GAB – $8,213 \times 700\#/2000 = 2,875 \text{ TN}$

Tack Coat – $8,213 \times 0.05 \times 2 = 821 \text{ GA}$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: US 19/41/SR 3 Widening and Reconstruction

IDEA No.: A-3	Sheet No.: 1 of 3	CREATIVE IDEA: Retain and re-use the existing pavement
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Comp By: SSB Date: 5/1/12 Checked By: GAO Date: 5/8/12

Original Concept: Based on a worst-case approach, the original concept is to completely remove the existing pavement and construct new, full-depth pavement for the entire roadway width.

Proposed Change: The proposed recommendation is to retain and re-use the existing pavement. This approach is consistent with similar widening and improvement projects of this nature.

Justification: There was no indication at the presentation meeting that there is a pavement issue that would require complete reconstruction. Additionally, during the field visit it appeared in decent condition, suitable for re-use and resurfacing, rather than complete reconstruction. The final pavement analysis and recommendation will dictate the final pavement disposition however on other similar projects, it has always been beneficial to investigate and re-use the existing pavement if feasible.

For this project, this would have a significant cost savings, would ease the construction staging and maintenance of traffic and would reduce extensive hauling and disposal costs of the exiting pavement.

The cost developed for comparison do not include any provisions for reconstruction or rehabbing the existing pavement however, even is some nominal amount is considered, the cost savings, constructability and removal costs are significantly improved by this recommendation.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$5,130,000		
Proposed	\$296,000		
Savings	\$4,834,000		\$4,834,000
FUTURE COST: – Savings		\$0	\$0
TOTAL PRESENT WORTH SAVINGS			\$4,834,000

COST WORKSHEET							
US 19/41/SR 3 Widening and Reconstruction					Idea No.: A-3		
Comp By: JJV Date: 5/2/12 Checked By: GAO Date: 5/8/12					Client: GDOT		
					Sheet 2 of 3		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
				0			0
Original Design:				0			0
				0			0
asphalt pavement	sy	98,560	52.00	5,125,120			0
				0			0
				0			0
				0			0
				0			0
VE Design:				0			0
				0			0
				0			0
pavement interface strip	lf			0	73,920	2.00	147,840
sawcut	lf			0	73,920	2.00	147,840
				0	0	0.00	0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
SUBTOTAL				5,125,120			295,680
TOTAL ROUNDED				5,130,000			296,000

CALCULATIONS

Project: US 19/41/SR 3 Widening and Reconstruction

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

Existing Pavement area to be retained; length of project, 3.5 miles = 18,480 ln ft
 $18,480 \text{ ft} \times (4 \times 12) = 887,040 \text{ sq ft} = 98,560 \text{ sq yds}$

Difference in pavement between full depth and resurfacing is everything but OGFC and 12.5 mm SMA.

19 mm	$220\text{lbs/sy} \times 1\text{sy} \times 1\text{ton}/2000\text{lb} \times \$69.12/\text{ton} =$	\$ 7.60
25 mm	$853\text{lbs/sy} \times 1\text{sy} \times 1\text{ton}/2000\text{lb} \times \$68.42/\text{ton} =$	\$29.18
12" GAB	$1,400\text{lbs/sy} \times 1\text{sy} \times 1\text{ton}/2000\text{lb} \times \$21.08/\text{ton} =$	<u>\$14.76</u>

Total SY Cost	\$51.54 /sy
USE	\$52.00 per SY

Additional sawcut and pavement interface strip required:
 $18,480 \times 4 = 73,920 \text{ ln ft}$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: US 19/41/SR 3 Widening and Reconstruction

IDEA No.: A-5	Sheet No.: 1 of 5	CREATIVE IDEA: Reduce Design Speed to 45 mph to allow for more flexibility in design elements.
Comp By: JJV Date: 05/02/2012		Checked By: GAO Date: 5/8/12

Original Concept: Use 55 mph design speed

- Widen 4 Lanes to 6 Lanes. 1-12' outside lane and 2-11' lanes.
- OGFC and SMA used for surface layers.
- 18' Raised median including 2 foot paved shoulder each side of median
- Urban southbound shoulder with 8' paved shoulder containing a 4' buffer and a 4' bike lane
- Rural northbound shoulder 6.5' wide with 4' bike lane
- 5' wide sidewalk on southbound side only

Proposed Change: Use 45 mph design speed

- Replace OGFC and SMA used for surface layer with 12.5 mm superpave
- Use standard 20' raised median.
- Provide urban northbound and southbound shoulders with no buffers or bike lanes.
- Construct a 10' wide, multi-use trail on southbound shoulder.

Justification: Using a 45 mph design speed allows additional flexibility in the design guidelines and offers the design team additional options for more appropriate and project specific typical section elements. This recommendation incorporates the desirable options however they can also each be analyzed and reviewed on an individual basis.

- 20' raised median allows for more opposing lane separation at turn bays than 18' median. In addition, 4' feet of additional full depth paving adjacent to the median could be eliminated.
- Urban northbound and southbound shoulders
 - Reduces roadway footprint. This template will fit within the existing 200 ft right-of-way
 - Offset buffer is not required for urban shoulders at 45mph.
 - Moving the bike lanes to a multi-use trail on the shoulder eliminates additional bike lane pavement and provides separation for pedestrians and bikers from the projected 88,000 vehicles.

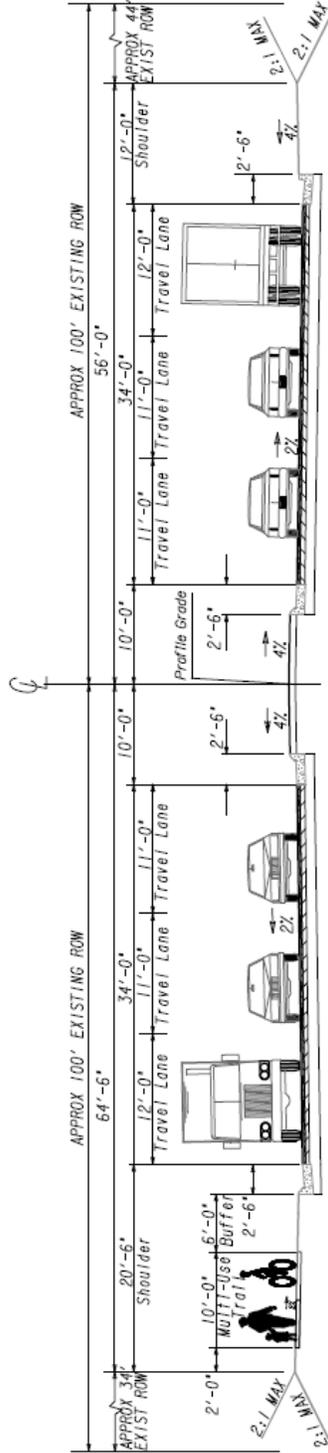
In addition to the cost savings and the added design flexibility, it is beneficial to lower the operating speeds based on the number of lanes and projected traffic volumes. A speed study for this project would be advantageous to properly ascertain the design elements. The northern abutting corridor of US 19/41/SR 3 is currently posted at 45 mph and is a more appropriate design element for this project based on projected traffic volumes and anticipated land use and development patterns.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$5,100,000		
Proposed	\$3,710,000		
Savings	\$1,390,000		\$1,390,000
FUTURE COST: – Savings		\$0	\$0
TOTAL PRESENT WORTH SAVINGS			\$1,390,000

SKETCH

Project: US 19/41/SR 3 Widening and Reconstruction

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



COST WORKSHEET

US 19/41/SR 3 Widening and Reconstruction					Idea No.: A-5 Client: GDOT		
Comp BY: JJV Date: 05/02/2012 Checked By: GAO Date: 5/9/12					Sheet 3 of 5		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Original Design:							
<i>Replace OGFC/SMA w 12.5 SP</i>							
Asph Conc 12.5 mm OGFC	TN	9,105	81.67	743,605			
Asph Conc 12.5 mm SMA	TN	16,691	102.27	1,706,989			
<i>Use 20' Raised Median</i>							
Recyl Asph Conc 19 mm	TN	903	69.12	62,415			
Recyl Asph Conc 25 mm	TN	3,503	68.42	239,675			
GAB 12"	TN	5,749	21.08	121,189			
<i>Eliminate BL/Buffers</i>							
Sidewalk	SY	10,297	50.31	518,042			
<i>SB BL / Buffer</i>							
Recyl Asph Conc 19 mm	TN	1,807	69.12	124,900			
Recyl Asph Conc 25 mm	TN	7,006	68.42	479,351			
GAB 12"	TN	11,499	21.08	242,399			
<i>NB BL / Buffer</i>							
Shoulder Paving Unit Cost	SY	13,347	35.00	467,145			
<i>Urban NB Shoulder</i>							
Type 2 C&G SB Side (SB)	LF	18,480	21.26	392,885			
Drainage N/A							
VE Design:							
<i>Replace OGFC/SMA w 12.5 SP</i>							
Asph Conc 12.5 mm SMA	TN				16,691	78.00	1,301,898
Multi-Use Trail							
10' Wide Sidewalk	SY				20,594	50.51	1,040,203
<i>Urban NB Shoulder</i>							
Type 2 C&G SB Side	LF				36,960	21.26	785,770
18" Storm Drain H 1-10	LF				12,557	36.18	454,312
Catch Basin, GP 1	EA				60	2,188.48	131,309
SUBTOTAL							
				5,098,595			3,713,492
TOTAL ROUNDED							
				5,100,000			3,710,000

CALCULATIONS

Project: US 19/41/SR 3 Widening and Reconstruction

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

Original Preferred Design

Replace OGFC and SMA with 12.5mm Superpave

Existing OGFC and SMA area = 202,314 SY from designer furnished asphalt calculations spreadsheet.

Asph Conc OGFC 90#/SY $90 \times 202,314 / 2,000 = 9105$ TN

Asph Conc 12.5 mm SMA 165#/SY $165 \times 202,314 / 2,000 = 16,691$ TN

Use 20' Raised Median

18' Median has 2' full depth pavement each side of median.

2 wide' x 2 sides x 3.5 miles x 5,280ft/mile x SY/9 SF = 8,213 SY

Recyl Asph Conc 19 mm 220#/SY $220 \times 8,213 / 2000 = 903$ TN

Recyl Asph Conc 25 mm 853#/SY $853 \times 8,213 / 2000 = 3,503$ TN

GAB 12" 1,400#/SY $1,400 \times 8,213 / 2000 = 5,749$ TN

Eliminate Bike Lanes / Buffer and Replace with Multi-Use Trail on SB Shoulder

Sidewalk = 10,297 SY

Multi-Use Trail

N/A

SB Bike Lane and Buffer

8' Wide x 3.5miles x 5,280 ft/mile x SY/9SF = 16,427 SY

Recyl Asph Conc 19 mm 220#/SY $220 \times 16,427 / 2000 = 1,807$ TN

Recyl Asph Conc 25 mm 853#/SY $853 \times 16,427 / 2000 = 7,006$ TN

GAB 12" 1,400#/SY $1,400 \times 16,427 / 2000 = 11,499$ TN

NB Bike Lane and Buffer

6.5' Wide x 3.5 miles x 5280 ft/mile x SY/9SF = 13,347 SY Shoulder Paving Unit Cost

Urban NB Shoulder

Note: 18,480 LF of Type 2 curb and gutter used for original design as a more realistic estimate.

Drainage

N/A

CALCULATIONS

Project: US 19/41/SR 3 Widening and Reconstruction

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

Proposed

Replace OGFC and SMA with 12.5mm Superpave

Existing OGFC and SMA area = 202,314 SY from designer furnished asphalt calculations spreadsheet.
Unit Cost for 12.5mm w/polymer modified AC Approx \$78/ton

Asph Conc 12.5 mm Superpave 165#/SY $165 \times 202,314 / 2,000 = 16,691$ TN

Use 20' Raised Median

N/A

Eliminate Bike Lanes / Buffer and Replace with Multi-Use Trail on SB Shoulder

Sidewalk

N/A

Multi-Use Trail

Use 2 x Sidewalk Area

$2 \times 10,297 \text{ SY} = 20,594$

SB Bike Lane and Buffer

N/A

NB Bike Lane and Buffer

N/A

Urban NB Shoulder

$18,480 \text{ LF SB} + 18,480 \text{ LF NB} = 36,960 \text{ LF Type 2 C\&G}$

Drainage

Pipe - Assume same amount of 18" Pipe as preferred design = 12,557 LF

Catch Basins – Assume 1 CB every 300'

$3.5 \text{ miles} \times 5,280 \text{ ft/mile} / 300 = 61.6$ Use 60 Catch Basins

DEVELOPMENT AND RECOMMENDATION PHASE

Project: US 19/41/SR 3 Widening and Reconstruction

IDEA No.: A-10	Sheet No.: 1 of 4	CREATIVE IDEA: Use the existing 32 ft median; widen to the outside
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Comp By: JJV Date: 5/2/12 Checked By: GAO Date: 5/7/12

Original Concept: Use an 18 ft raised median with concrete surfacing and Type 7 concrete curb and gutter. Widen symmetrically about the centerline which requires roadway widening and full-depth pavement construction to both the inside and outside of the existing roadway template.

Proposed Change: Retain and re-use the existing 32 ft wide depressed, grassed median and construct all new widening to the outside.

Justification: Since the existing right of way width is 190/200 feet, utilizing the existing 32 ft median and constructing all widening to the outside will allow a wider median and eliminate most interior work. There is ample room within the existing R/W to accommodate the required template even with other considerations such as a combined multi-use trail and rural ditch sections. As compared to the 18 foot proposed median width, a shift of only 7 feet would be required (half-section);

$$32 - 18 = 14 \text{ ft} / 2 = 7 \text{ ft}$$

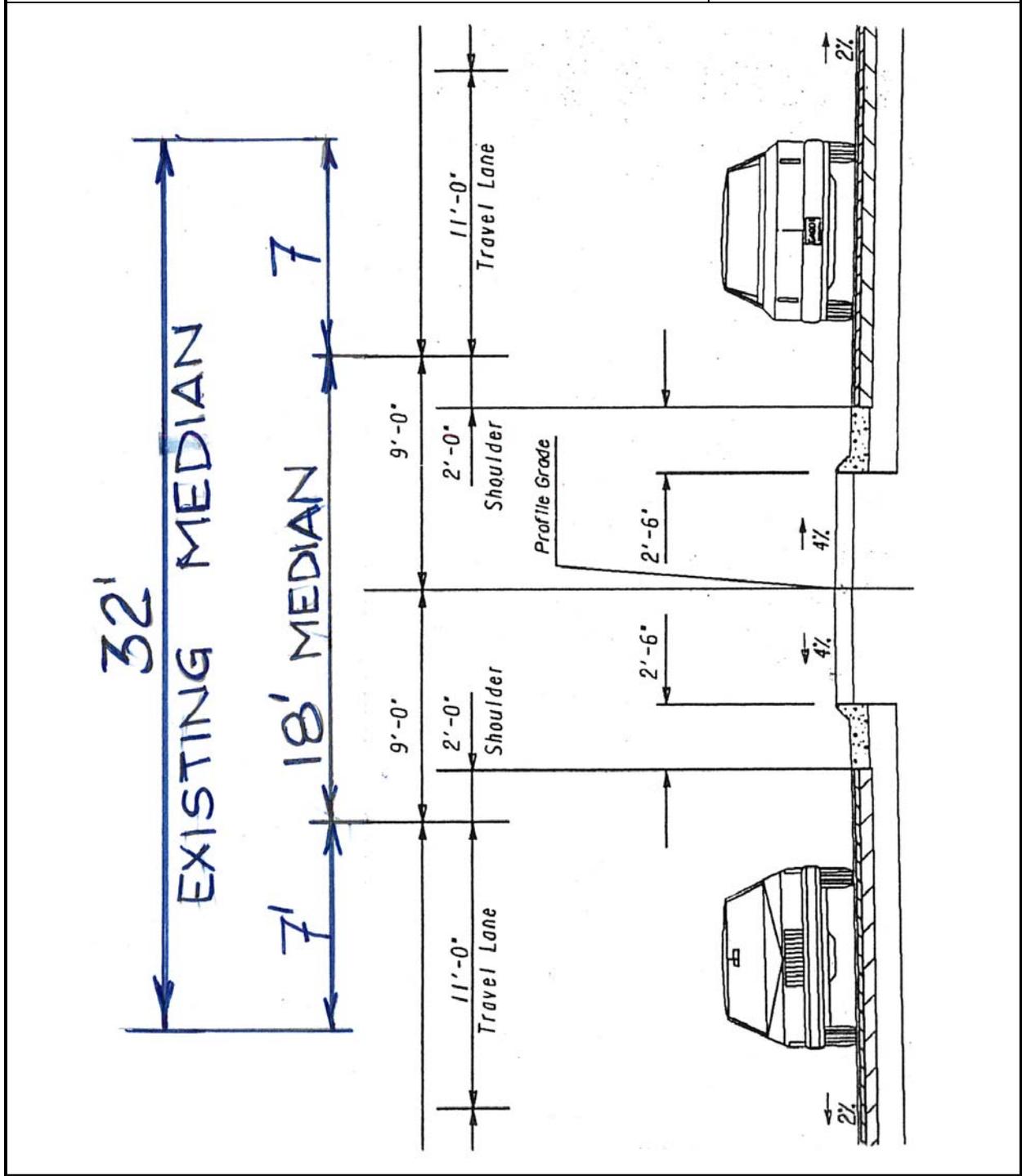
Additionally, the wider median will allow a larger recovery area and is in conformance to GDOT guidelines for a 55 mph roadway. If all full-depth pavement construction is limited to the outside, the construction staging and maintenance of traffic should be more easily accommodated.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$1,340,000		
Proposed	\$0		
Savings	\$1,340,000		\$1,340,000
FUTURE COST: – Savings		\$0	\$0
TOTAL PRESENT WORTH SAVINGS			\$1,340,000

SKETCH

Project: US 19/41/SR 3 Widening and Reconstruction

Idea No.: A-10
Client: GDOT
Sheet 2 of 4



COST WORKSHEET							
US 19/41/SR 3 Widening and Reconstruction					Idea No.: A-10		
Comp BY: JJV Date: 5/2/12 Checked By: GAO Date: 5/8/12					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
				0			0
Original Design:				0			0
				0			0
concrete curb and gutter, type 7	lf	39,066	9.75	380,894			0
concrete median	sy	15,626	25.00	390,650			0
asphalt pavement	sy	8,681	65.00	564,265			0
				0			0
				0			0
				0			0
VE Design:				0			0
				0			0
				0			0
				0	0	0.00	0
				0	0	0.00	0
				0	0	0.00	0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
SUBTOTAL				1,335,809			0
TOTAL ROUNDED				1,340,000			0

CALCULATIONS / ASSUMPTIONS

Project: US 19/41/SR 3 Widening and Reconstruction

Idea No.: A-10
Client: GDOT
 Sheet 4 of 4

Project length 39,066 ft / 2 = 19,533 ft

Concrete curb and gutter; eliminate all median curbing; 39,066 ft

Concrete median; 9 feet wide; assume 80 % is raised median.

19,533 ft (0.80%) x 9 ft = 140,638 sq ft = 15,626 sq yds

Proposed 2 ft inside paved shoulders are not required

19,533 x (2 + 2) = 78,132 sq ft = 8,681 sq yds

Cost of Square Yard - Full Depth Paving

Asphalt

12.5 mm(OGFC)90lbs/sy X 1sy X 1ton/2000lb X \$81.67/ton = \$ 3.68

12.5 mm 165lbs/sy X 1sy X 1ton/2000lb X \$102.27/ton = \$ 8.44

19 mm 220lbs/sy X 1sy X 1ton/2000lb X \$69.12/ton = \$ 7.60

25 mm 853lbs/sy X 1sy X 1ton/2000lb X \$68.42/ton = \$29.18

12" GAB 1,400lbs/sy X 1sy X 1ton/2000lb X \$21.08/ton = \$14.76

Total SY Cost \$63.66 /sy

USE \$65.00 per SY

DEVELOPMENT AND RECOMMENDATION PHASE

Project: US 19/41/SR 3 Widening and Reconstruction

IDEA No.: B-1	Sheet No.: 1 of 4	CREATIVE IDEA: Narrow the required R/W template
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Comp By: SSB Date: 5/1/12 Checked By: GAO Date: 5/8/12

Original Concept: Acquire 20 feet of Right of Way on both sides of the existing R/W width of 200 feet for a total R/W width of 240 feet.

Proposed Change: Eliminate the additional 20 feet of proposed right for the project length. The proposed roadway template is about 134 feet from break point to break point, which allows for about 30 – 35 feet on each side to the existing right of way. The additional 20 feet on each side is excessive and not required based on the current roadway template. Assume about 10% will be required for outfalls, erosion protection and other maintenance related conditions.

Justification: The existing right of way is shown to be approximately 200'. The proposed is shown to be approximately 240'. 200' is adequate to fit the proposed typical section with about 25 - 30 feet to spare on each side.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	9,484,000		
Proposed	949,000		
Savings	8,535,000		8,535,000
FUTURE COST: – Savings		0	0
TOTAL PRESENT WORTH SAVINGS			8,535,000

CALCULATIONS

Project: US 19/41/SR 3 Widening and Reconstruction

Idea No.: B-1

Client: GDOT

Sheet 4 of 4

Assume that 90% of proposed R/W will be eliminated and 10% will be retained for drainage structure extension etc.

Proposed R/W cost = \$9,484,000

$9,484,000 \times 0.90 = \$8,535,600$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: US 19/41/SR 3 Widening and Reconstruction

IDEA No.: D-2	Sheet No.: 1 of 4	CREATIVE IDEA: Use flush, grassed median with cable rail
-------------------------	-----------------------------	---

Comp By: JJV Date: 5/2/12 Checked By: GAO Date: 5/8/12

Original Concept: Use a raised median with concrete surfacing and Type 7 concrete curb and gutter.

Proposed Change: Use a grassed median with cable rail and eliminate the mountable curb and gutter and concrete surfacing.

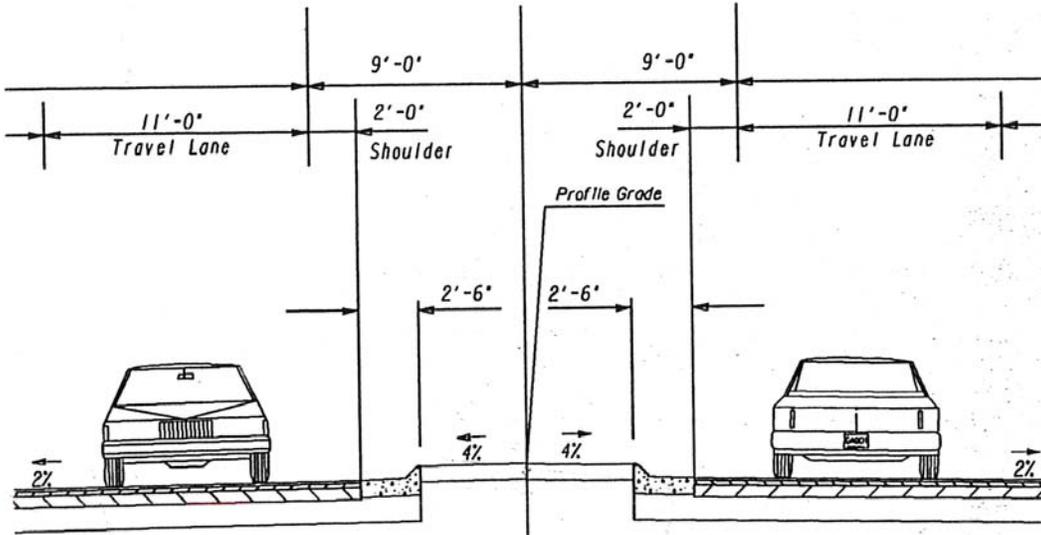
Justification: Using cable railing will provide a positive barrier between opposing directional traffic which will be a concern with a narrower median and mountable curbing. This recommendation is especially more appropriate if a 55 mph design speed is maintained for this project. At higher speeds, a positive barrier is more desirable to minimize crossover incidents.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$772,000		
Proposed	\$389,000		
Savings	\$383,000		\$383,000
FUTURE COST: – Savings		\$0	\$0
TOTAL PRESENT WORTH SAVINGS			\$383,000

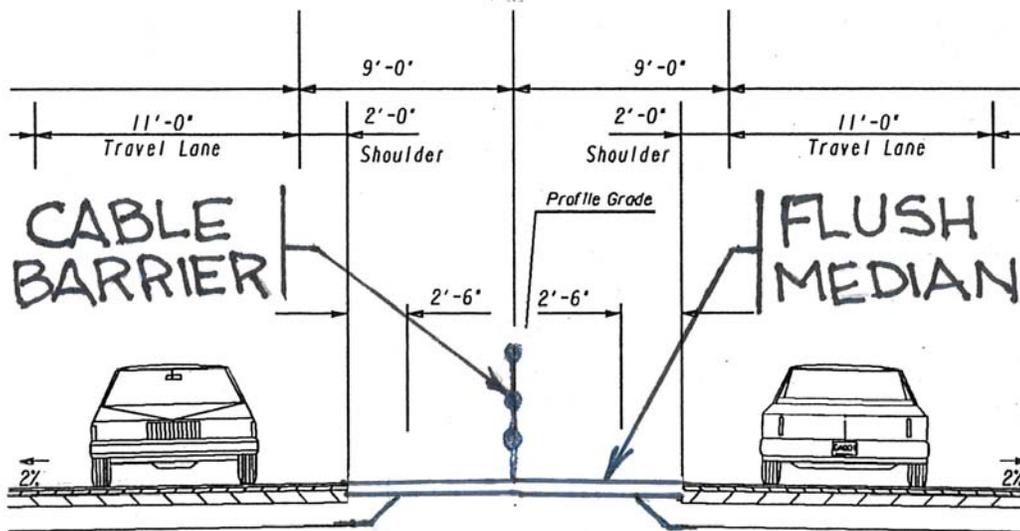
SKETCH

Project: US 19/41/SR 3 Widening and Reconstruction

Idea No.: D-2
Client: GDOT
Sheet 2 of 4



CURRENT DESIGN



RECOMMENDED

COST WORKSHEET							
US 19/41/SR 3 Widening and Reconstruction					Idea No.: D-2		
Comp BY: JJV Date: 5/2/12 Checked By: GAO Date: 5/8/12					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
				0			0
Original Design:				0			0
				0			0
concrete curb and gutter, type 7	lf	39,066	9.75	380,894			0
concrete median	sy	15,626	25.00	390,650			0
				0			0
				0			0
				0			0
				0			0
VE Design:				0			0
				0			0
				0			0
cable rail	lf			0	15,626	18.00	281,268
median grassing	sy			0	24,308	4.00	97,232
asphalt surfacing at intersections	sy			0	1,000	10.00	10,000
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
				0			0
SUBTOTAL				771,544			388,500
TOTAL ROUNDED				772,000			389,000

CALCULATIONS / ASSUMPTIONS

Project: US 19/41/SR 3 Widening and Reconstruction

Idea No.: D-2
Client: GDOT
Sheet 4 of 4

Project length $39,066 \text{ ft} / 2 = 19,533 \text{ ft}$

Concrete curb and gutter; eliminate all median curbing; 39,066 ft

Concrete median; 9 feet wide; assume 80 % is raised median.

$19,533 \text{ ft} (0.80\%) \times 9 \text{ ft} = 140,638 \text{ sq ft} = 15,626 \text{ sq yds}$

Median grassing; assume $18 - (2 + 2) = 14$ feet wide

$19,533 \text{ ft} (0.80\%) \times 14 \text{ ft} = 218,770 \text{ sq ft} = 24,308 \text{ sq yds}$

Cable rail – project length – $19,533 \times 0.80\% = 15,626 \text{ ln ft}$

At intersections; turn lanes, use thinner section of asphalt; assume \$10 per sq yd

APPENDIX

Approving/Authorizing Persons

Name:	Position:	Telephone:
Robert Murphy	Project Manager – Program Delivery	404-631-1586
Lisa Myers	State Project Review Engineer	404-631-1770

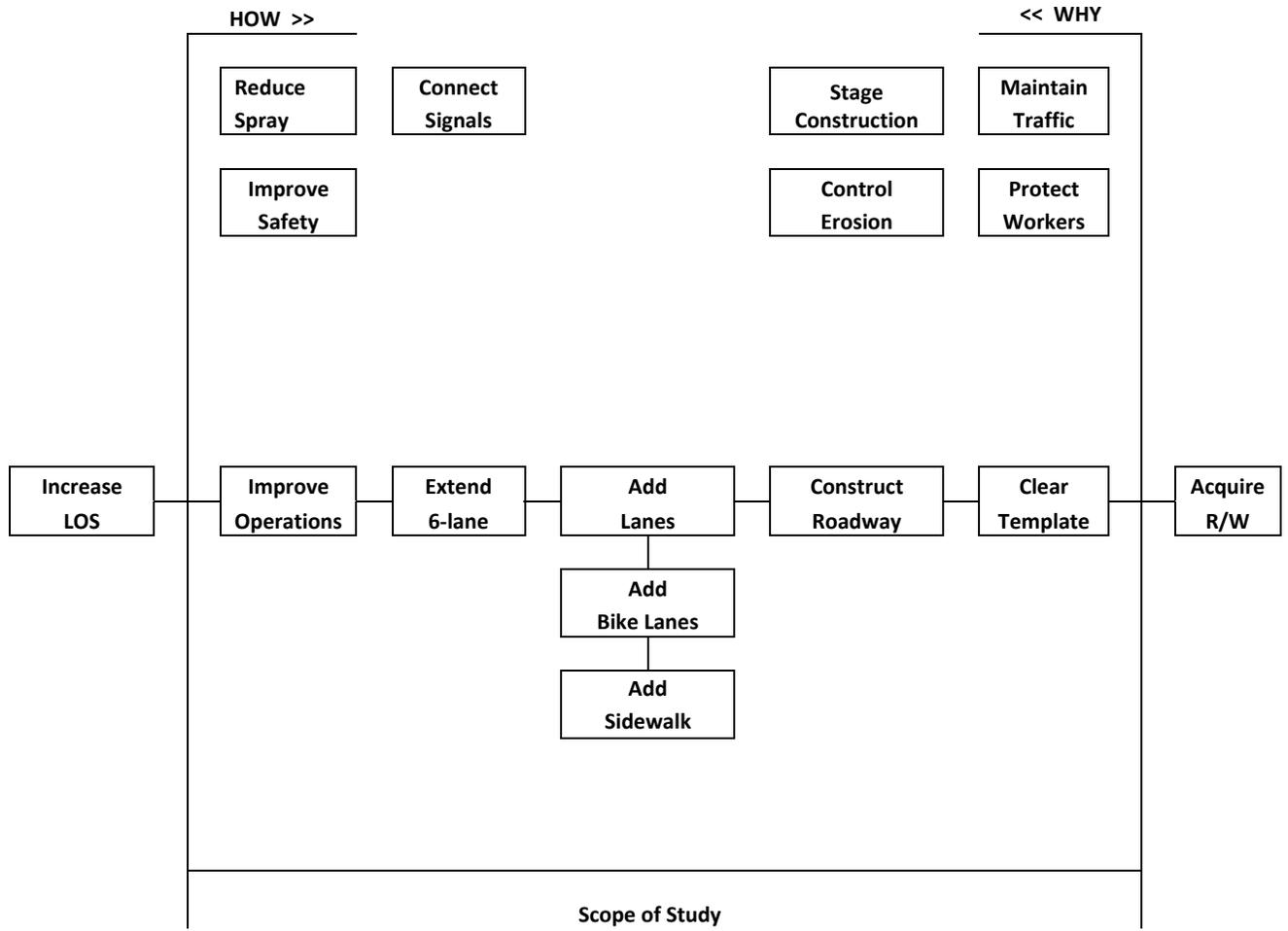
Personal Contacts

Name:	Position:	Notes:
Jim Simpson	GDOT design policy and support	Raised median policy clarification; 2 foot offset
Troy Patterson	GDOT estimator	Cost data

Documents/Abstracts

Reference:	Reference:
Concept aerial plans	Concept R/W Cost Estimate
Concept Cost Estimate	Concept traffic flow diagrams
Draft Concept Report	VE Study constraints worksheet
Pavement Quantity Calculations	

FAST DIAGRAM



INFORMATION PHASE – FUNCTION ANALYSIS

Project: US 19/41/SR 3 Widening and Reconstruction

Basic Function: improve operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
A	Asphalt pavement	add	capacity	\$14,803,455	47.63%	Yes
		support	traffic (volumes)			
		support	traffic (loads)			
		reduce	maintenance			
		support	bike lane			
		reduce	spray			
		convey	drainage			
		improve	traction			
		incorporate	buffer (bike lanes)			
B	Right of Way	store	project	\$9,484,000	30.51%	Yes
		acquire	area (maintenance)			
		allow	construction			
		allow	utilities			
		establish	corridor			
		limit	encroachment			
C	Drainage	convey	run-off	\$1,855,927	5.97%	Yes
		collect	run-off			
		drain	sub-base			
		extend	streams			
		follow	criteria			
D	Concrete curbing	delineate	edge	\$1,211,467	3.90%	Yes
		separate	traffic			
		raise	median			
		convey	run-off			
E	Earthwork	support	pavement	\$1,186,066	3.82%	No
		convey	run-off (ditch)			
		construct	template			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: US 19/41/SR 3 Widening and Reconstruction

Basic Function: improve operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
F	Concrete sidewalk	accommodate	pedestrians	\$698,112	2.25%	Yes
		reduce	maintenance			
G/I	Permanent and (Temporary) erosion control	control	erosion	\$541,706 (\$222,404)	1.74% (0.72%)	No
		stabilize	slopes			
		reduce	maintenance			
		establish	vegetation			
		address	regulations			
H	Traffic signals	control	traffic	\$490,000	1.58%	No
		interconnect	signals			
		detect	traffic			
		control	pedestrians			
J	Traffic control	stage	construction	\$200,000	0.64%	No
		inform	motorists			
		create	work zone			
		maintain	signals			
		control	access			
K	Clearing and grubbing	clear	area	\$150,000	0.48%	No
L	Concrete / re-steel	extend	culverts	\$134,419	0.43%	No
		Construct	walls			
M	Signing and marking	inform	motorist	\$105,000	0.34%	No
		control	traffic			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
A	Asphalt pavement		
A-1	Consolidate bike lanes		✓
A-2	Use multi-use path		✓
A-3	Retain existing pavement		✓
A-4	Eliminate OGFC surfacing	See A-5; not required for DS <55 mph	✓
A-5	Reduce design speed to 45 mph		✓
A-6	Use existing aux pavement between Justice Blvd and SR 54	To be incorporated	X
A-7	Close off Main Street intersection	Displaced traffic volumes too high	X
A-8	Close Freeman Road intersection / RR crossing	Displaced traffic volumes too high	X
A-9	Use urban section on both sides	Available R/W width	X
A-10	Keep existing 32 ft median; widen to the outside		✓
A-11	Reduce R/W – use easements	See B-1	✓
A-12	Shift Justice Blvd signal to southern driveway location	Coordination with interior development circulation	X
A-13	Shift RR tracks to improve crossing at Freeman Road	RR reconstruction is significant scheduling and cost issue	X
A-14	Shift Freeman Road to Tara Road	Not enough room to eliminate at-grade RR crossing	X
A-15	Close median opening at Freeman Road	Displaced traffic volumes too high	X
B	Right of Way		
B-1	Reduce overall R/W width		✓
B-2	Review displacement requirements	See B-1	✓
B-3	Jog R/W line; as required around historic properties	See B-1	✓
B-4	Acquire R/W only for aux. lanes	See B-1	✓

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
C	Drainage		
C-1	Eliminate east ditch; use urban section	See A-9	✓
			✓
D	Concrete curbing		
D-1	Use curbing on east side	See A-9	✓
D-2	Eliminate raised median; use cable rail		✓
E	Earthwork		
F	Concrete sidewalk		
F-1	Use combined multi-use trail	See A-2	✓
G	Permanent erosion control		
H	Traffic signals		
H-1	Eliminate video detection for construction purposes		✓
H-2	Use loops, not video detection		✓
I	Temporary erosion control		
J	Traffic control		
J-1	Retain existing pavement	See A-3	✓
K	Clearing and grubbing		
L	Concrete / re-steel		
M	Signing and marking		

