

VALUE ENGINEERING MOD 1 TRAINING REPORT

SR 20 / Loganville Highway
Ozara Road to Brand Road

Project No. MSL00-0004-00(644)
Gwinnett County
PI No. 0004644
February 18, 2009

OWNER:



Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308
(404.631.1770)

VALUE ENGINEERING
MOD 1 INSTRUCTOR:



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EXECUTIVE SUMMARY

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Project No. MSL00-0004-00(644)
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Introduction

This report summarizes the results of a value engineering (VE) study for roadway improvements along SR 20 / Loganville Highway from Ozara Road to Brand Road in Gwinnett County. The study was conducted as part of the Mod 1 training session held for select GDOT staff on January 26 to 30, 2009.

This project is the widening and reconstruction of SR 20 / Loganville Highway from SR 81 to Ozora Road in Gwinnett County for a total of 3.4 miles. SR 20 consists of 2- 12 foot lanes with rural shoulders on 100 foot of Right of Way. The purpose of this project is to improve east/ west mobility along SR 20 which serves as a primary arterial between Gwinnett and Walton Counties in the area southeast of Lawrenceville.

The proposed construction will provide 2- 12 foot travel lanes in each direction with a 24 foot raised median, 16 foot shoulders, curb and gutter and 5 foot sidewalks on both sides. Where appropriate, side road alignments will be improved. The total estimated construction cost of the project is \$13,270,000. On Monday, January 26, 2009, the design team gave an overview of the project to the VE team and on Friday, January 30, 2009, the VE Team presented their recommendations.

This report presents the VE 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 **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.

DEVELOPMENT PHASE - EXECUTIVE SUMMARY	
Project: SR 20 / Loganville Highway	Team: 3
Location: Gwinnett County	Date: 1/30/09

Introduction

This report summarizes the results of a value engineering (VE) study conducted on the SR 20 / Loganville Highway roadway from Ozora Road to Brand Road in Gwinnett County. The project consists of widening the existing 2-lane roadway to a four-lane divided section, with medians ranging from 20' to 24'. The estimated construction cost not including Right of Way is \$13.3M. The design is currently at the Final Design Stage. Right of Way acquisition is roughly 80% complete. This project is scheduled to be let for construction in June, 2009. It is being designed by GDOT's Office of Road Design. The study occurred January 26-30, 2009 at the GDOT office in Atlanta using a 5-person VE team.

Considerations

The only constraint to the VE study that was identified was that the Right of Way acquisition was nearly completed. The team conducted the study under this guideline.

Results Obtained

The VE team developed 5 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**A-2 Reduce Pavement Width of Lanes to 11'**

The VE team believes that this concept would provide an acceptable functionality for a roadway of this traffic volume. A one-foot reduction in the width of all the lanes would likely be imperceptible to the motorist.

The total potential savings if accepted is \$476,250.00, plus a nominal reduction in O&M over time.

A-6 Reduce Length of Turn Lanes

In an effort to reduce the cost of pavement we recommend reducing the length of the turn lanes. Left turn lanes will have 100' tapers and 235' of storage, while right turn lanes will have 100' feet of taper and 250' of storage.

The total potential savings if accepted is \$272,000.00.

C-1 Reduce Width of Median to 16'

Replacing the median with a doveled-in median and reducing the median width from 24' to 16' would still provide a safe and enhanced facility.

The total potential savings if accepted is \$399,343.00.

E-1 Eliminate Sidewalk on North side of Project

By eliminating the concrete pavement on one side of the project, significant savings can be achieved in the cost of concrete.

The total potential savings if accepted is \$142,050.00 .

F-2 Change Type of Retaining Wall

The cost to purchase material for an MSE Wall versus the Type 2C, Concrete Side Barrier as proposed is less. Also, construction of an MSE Wall is quicker and easier.

The total potential savings if accepted is \$132,000.00.

Design Suggestions

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

B-3 Redesign Drainage System

The VE team recommends that the designer review the plans for redundancy and look at reducing the amount of cross drain situations. Eliminating cross drains would reduce potential cuts in the pavement for repairs to the drainage pipes, which avoiding impacts to traffic. For example, eliminate pipe between F2 and F4, (keep the cross drain from F2 to F1 and add connection from F1 to F7); re-route pipe D16 to pipe D21 and D21 to D27, and F1 to F7.

D-1 Steepen tie-slopes

By changing tie-slopes from 4:1 to 2:1, this would reduce the amount of embankment needed and decrease the clearing and grubbing required for this project.

STUDY IDENTIFICATION

STUDY IDENTIFICATION

Project: SR 20 / Loganville Highway Ozara Road to Brand Road	Dates: January 26 - 30, 2009
Location: GDOT HQ – Atlanta, 4th Floor; Conducted as part of Module 1 Training	

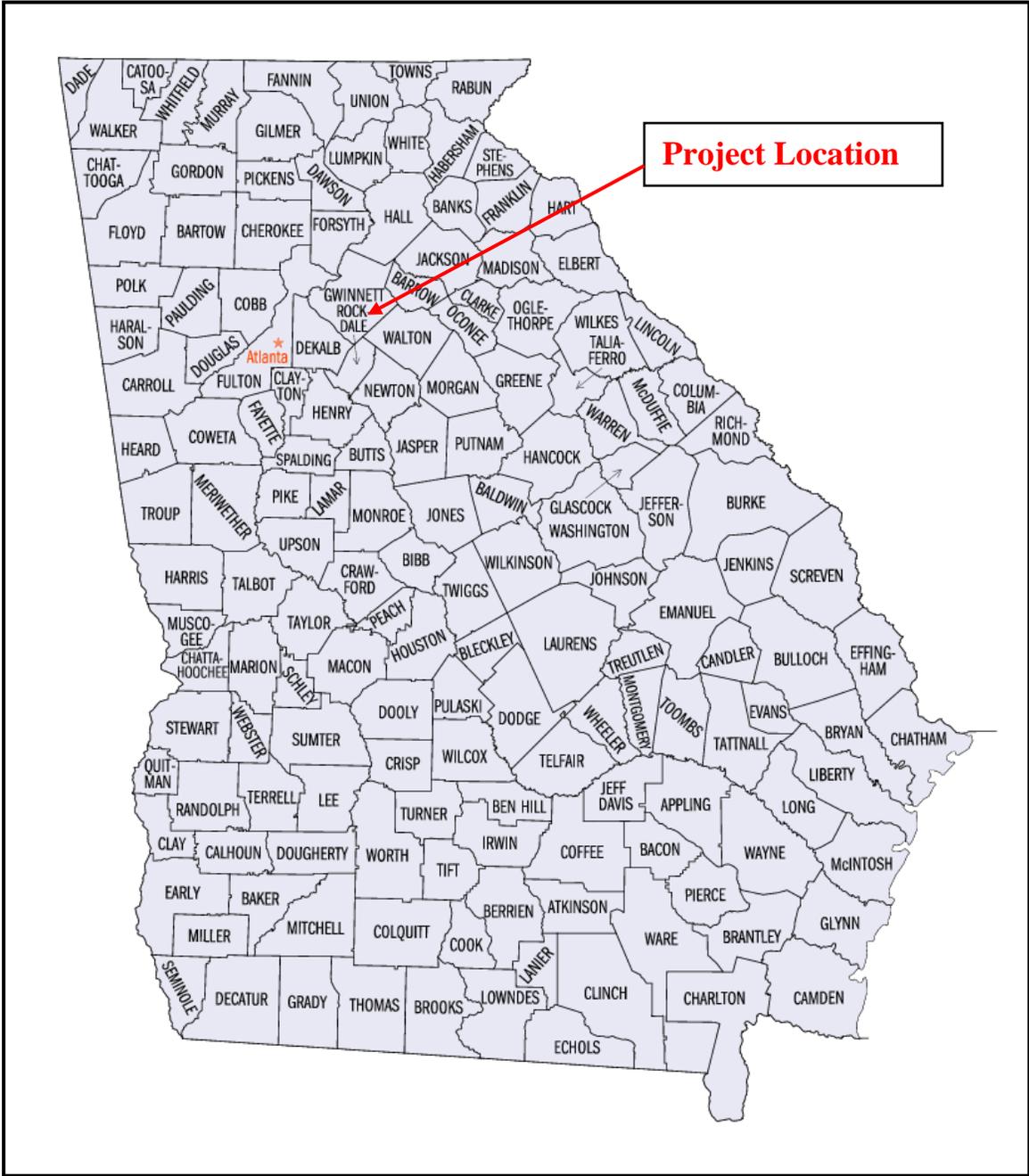
VE Team Members

Name:	Position:	Organization:	Telephone:
Francis Alomia	Assistant Group Leader	GDOT-Urban	404-631-1681
Anthony Eadie	Assistant Group Leader	GDOT-Road	404-631-1544
Patrick Allen	Traffic Design Supervisor	GDOT-Traffic Ops	404-635-8138
Nicole Law	Design Engineer III	GDOT-Urban	404-631-1723
*Darrell Richardson	Assistant Office Head	GDOT-Urban	404-631-1705
*Team Leader			

Project Description The proposed project will widen 2.5 miles of SR 20 from two lanes to four lanes with a 24-foot raised median, 16-foot shoulder on each side with curb and gutter, and a 5-foot sidewalk. The estimated cost for the project is \$13.7 million.

Project Constraints: This project is in the final design phase, an FFPR was held on January 10, 2009, and they have purchased most of the ROW.

**Figure 1
Project Vicinity Map**



County Map of Georgia

VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 20/LOGANVILLE HWY FM OZORA ROAD TO BRAND ROAD-GRTA

Idea No.: A-2	Sheet No.: 1 of 4	CREATIVE IDEA: REDUCE THE PROPOSED LANE WIDTHS FROM 12 FEET TO 11 FEET.
-------------------------	-----------------------------	---

Comp By: NSL Date: 1/29/09 Checked By: Date:

Original Concept: The original proposed concept includes 4-12 foot travel lanes for the typical section

Proposed Change: The proposed VE changes use 11-foot lanes for the typical section.

Justification: This is an urban section that has a design speed of 45mph. Using an urban section with that speed, the 11 foot lanes should function similar to the 12 foot lanes without any significant issues.

Decreasing the pavement width will result in grading, cross drain pipe lengths and earthwork.

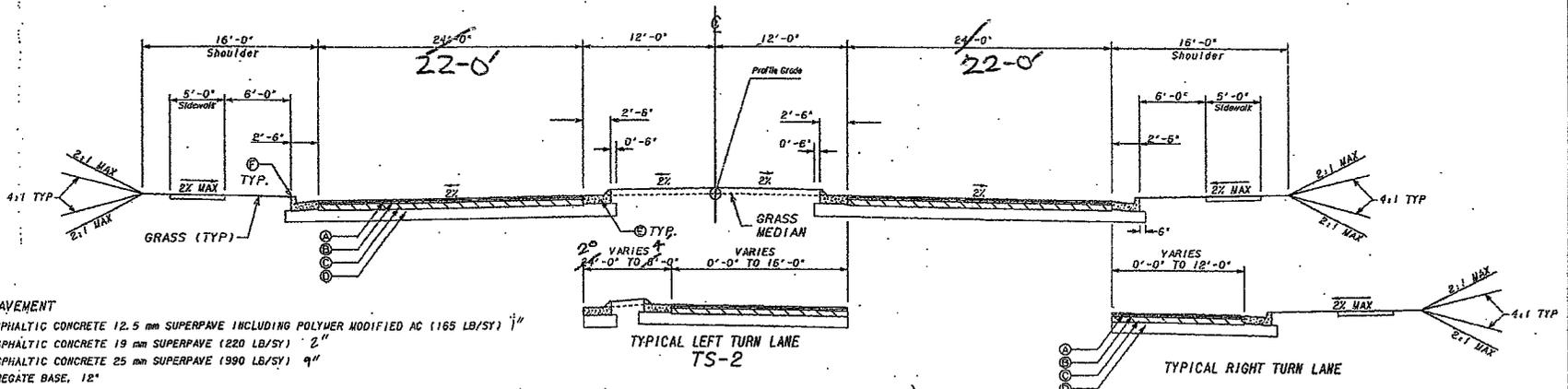
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
INITIAL COST: Original			
Proposed			
Savings	\$476,250.00		
FUTURE COST: Savings			
TOTAL PRESENT WORTH SAVINGS			\$476,250.00

SKETCH

**Project: SR 20/Loganville Hwy fm Ozora to Brand Rd -
GRTA**

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

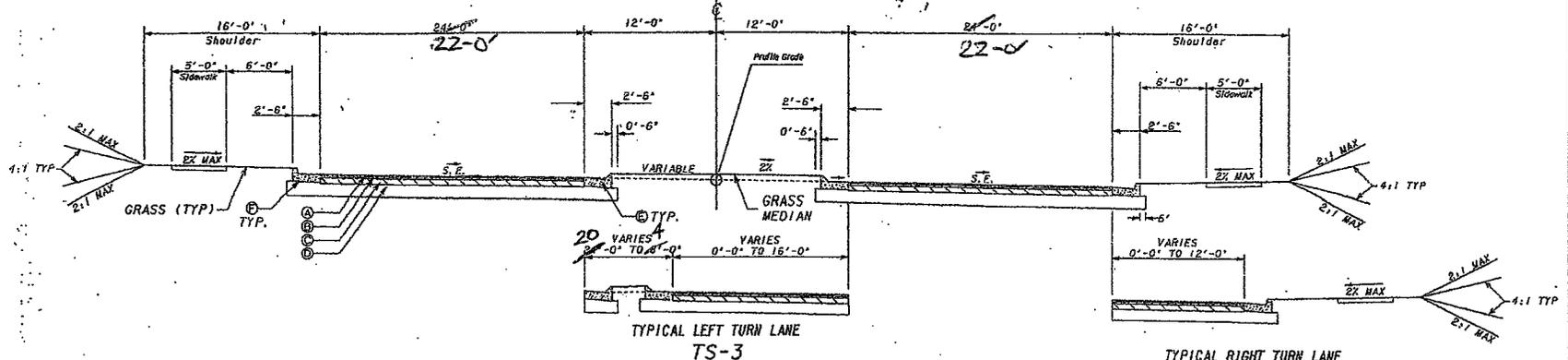
Please see attached pdf plan sheet



S. R. 20
 TANGENT SECTION
 STA. 103+92.11 - 174+56.71
 STA. 198+10.73 - 232+00.00

REQUIRED PAVEMENT

- A RECYCLED ASPHALTIC CONCRETE 12.5 mm SUPERPAVE INCLUDING POLYMER MODIFIED AC (165 LB/SY) 1"
- B RECYCLED ASPHALTIC CONCRETE 19 mm SUPERPAVE (220 LB/SY) 2"
- C RECYCLED ASPHALTIC CONCRETE 25 mm SUPERPAVE (190 LB/SY) 4"
- D GRADED AGGREGATE BASE, 12"
- E CONC CURB & GUTTER, 8 IN x 30 IN, TYPE 1
- F CONC CURB & GUTTER, 8 IN x 30 IN, TYPE 2
- G ASPHALTIC CONC. LEVELING
- H EXISTING PAVEMENT (TO BE RETAINED)
- I 7/4" MONOLITHIC CONCRETE MEDIAN 18 AREAS OVER EXISTING ASPHALT
- J MILLING (2" DEPTH)



S. R. 20
 SUPERELEVATION SECTION
 STA. 174+56.71 - 198+10.73

SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	0'-6"	0'-10"
3:1	6'-10"	---
2:1*	OVER 10'	OVER 10'

*GUARDRAIL IS REQUIRED ON ALL 2:1 SLOPES OVER 6' IN HEIGHT

CALCULATIONS

Project: SR 20/LOGANVILLE HWY FM OZORA RD TO BRAND RD-GRTA

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

STA: 240+00 – STA: 100+00 = 14000LF

→(14000LF*2lanes*1LF)/9SF/SY = 6222SY

Asphalt Course & Cost: 1.5in of 12.5mm @ \$66.09/TN
2.0in of 19.0mm @ \$65.79/TN
9.0in of 25.0mm @ \$61.76/TN

→12.5≈165LB/SY (6222*165)/2000 = 513TN + 219TN for the turn lanes gives a value of 513 + 219 = 479TN * \$66.09 = **\$48,380TN**

→19.0≈220LB/SY (6222*220)/2000 = 684TN + 293TN for the turn lanes gives a value of 684 + 293 = 635TN * \$65.79 = **\$64,280TN**

→25.0≈990LB/SY (6222*990)/2000 = 2800TN + 1319TN for the turn lanes gives a value of 2800 + 1319 = 2859TN * \$61.76 = **\$254,389TN**

GAB

→(14000LF*2lanes*1LF*1LF)/27 = 2074CY

→2074*1.971 = 4090TN + 1759TN for the turn lanes gives a value of 4090 + 1759 = 5849 5849TN*\$18.67 = **\$109,201TN**

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: SR 20/LOGANVILLE HWY FM OZORA RD TO BRAND RD-GRTA			
Idea No.: A-6	Sheet No.: 1 of 3	CREATIVE IDEA: Reduce the length of the turning lane	
Comp By: PA	Date: 1/29/09	Checked By:	Date:
<p><u>Original Concept:</u> The current project proposes to construct 600' turn lanes (400' storage with 200' taper)</p> <p><u>Proposed Change:</u> Reduce turn lanes to minimums as required in GDOT Driveway & Encroachment Control Manual.</p> <p><u>Justification:</u> The minimum required lengths based on 45mph are 235' storage with 100' taper for left turn lanes and 250' storage with 100' taper for right turn lanes. Based on a review of the design hour volumes the proposed turn lane lengths can be reduced. This modification will reduce overall asphalt costs.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
<u>INITIAL COST:</u> Original			
Proposed			
Savings	\$272,000.00		
<u>FUTURE COST:</u> Savings			
TOTAL PRESENT WORTH SAVINGS			\$272,000.00

SKETCH

Project:

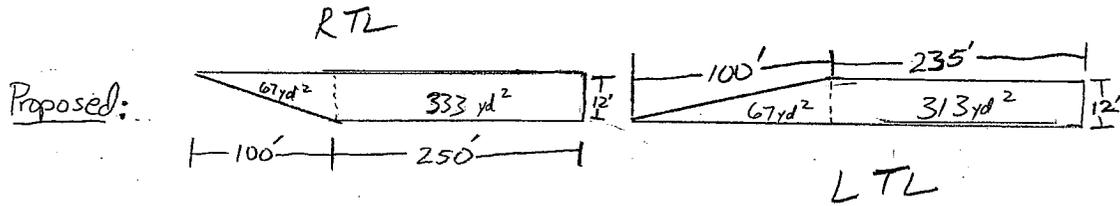
Idea No.:
Client::
Sheet of

PLEASE SEE CLACULATIONS SHEET 9C FOR SKETCHES

CALCULATIONS

Project: SR 20/LOGANVILLE HWY FM OZORA ROAD
TO BRAND RD GRTA

Idea No.: A-6
Client:
Sheet of



12.5 mm $400 \text{ yd}^2 (165/2000) = 33 \text{ TN}$

19 mm $400 (220/2000) = 44 \text{ TN}$

25 mm $400 (990/2000) = 198 \text{ TN}$

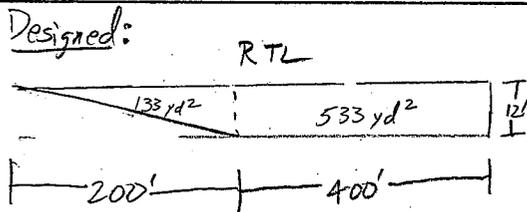
GAB $\frac{400 (0.333)(146)(27)}{2000} = 263 \text{ TN}$
Total 538 Tons

$380 \text{ yd}^2 (165/2000) = 31.35 \text{ TN}$

$380 (220/2000) = 41.8 \text{ TN}$

$380 (990/2000) = 188.1 \text{ TN}$

$\frac{380 (0.333)(146)(27)}{2000} = 249 \text{ TN}$
Total 510.25 tons



12.5 mm $666 \text{ yd}^2 (165/2000) = 55 \text{ TN}$

19 mm $666 \text{ yd}^2 (220/2000) = 73 \text{ TN}$

25 mm $666 \text{ yd}^2 (990/2000) = 330 \text{ TN}$

GAB $\frac{666 \text{ yd}^2 (0.333)(146)(27)}{2000} = 437 \text{ TN}$
Total 895 tons

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: SR 20 /Loganville Hwy fm Ozora to Brand Road - GRTA			
Idea No.: B-3	Sheet No.: of	CREATIVE IDEA: Change type of retaining wall	
Comp By: TE	Date: 1/29/09	Checked By:	Date:
<u>Original Concept:</u>			
The original plans called for numerous cross drains throughout the project			
<u>Proposed Change:</u>			
The VE team recommends that the designer review the plans for redundancy and look at reducing the amount of cross drain situations. For example, eliminate pipe between F2 and F4, (keep the cross drain from F2 to F1 and add connection from F1 to F7); re-route pipe D16 to pipe D21 and D21 to D27, and F1 to F7.			
<u>Justification:</u>			
(Pros): Eliminate cost to repair the road if pipe repairs are needed and impacts to traffic if such repairs are needed.			
(Cons): Total lineal footage of pipe would increase.			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
<u>INITIAL COST:</u> Original			
Proposed			
Savings			
<u>FUTURE COST:</u> Savings			
TOTAL PRESENT WORTH SAVINGS			

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: SR 20/Loganville Hwy fm Ozora to Brand Road			
Idea No.: C-1	Sheet No.: 1 of 4	CREATIVE IDEA: Reduce Median width	
Comp By: DMR		Date: 1/29/2009	Checked By: Date:
<u>Original Concept:</u>			
A median width of 24 feet; 20 feet raised with C & G and grass. At median openings the proposed section is 16 feet paved with C & G and 4 feet paved concrete median. 4 feet of the 16 feet is hatched (striped) between travel way and turn lane.			
<u>Proposed Change:</u>			
Reduce the median to 16 feet wide with C & G; 12 feet raised. At median openings the proposed section is 11 turn lane (paved completely) with a dowelled 7 1/2 “ median 1 wide; 2 ft offsets from travel lane to raised median.			
<u>Justification:</u>			
Reduce footprint by 8 feet, reduction in median paving and curb and gutter costs, reduction in cross drain costs. Due to the dowelled median there is an increase in pavement costs. Except for the reduced footprint, there was no cost calculated for the full width median. At median openings a cost for a 660 foot section (X2) was calculated for each opening(each left turn lane area). In addition, there are 36 cross drains. Assuming 8 feet of length savings for each of those equals +\$10,000 savings if all cross drains were 18” diameter.			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
<u>INITIAL COST:</u> Original	1277374		
Proposed	878,031		
Savings	399,343		
<u>FUTURE COST:</u> Savings			
TOTAL PRESENT WORTH SAVINGS			399343

CALCULATIONS

Project: SR 20/Loganville Hwy fm Ozora to Brand Road

Idea No.: C-1A

Client::

Sheet: 3 of 4

Calculations based on a 1420 feet median opening consisting of 260 feet of transition from 24 feet to 8 feet, 400 feet of left turn lane and 100 feet of intersection.

24 feet median

Pavement:

$$2(260 \times 8 + 400 \times 16) + 100(24) = 19360 \text{ SF}$$

This is the SF area of three asphalt courses

$$12.5 \text{ MM } 19360/9 \times 165/2000 = 177.5 @ 66.09 = \$11,731$$

$$19\text{MM } 19360/9 \times 220/2000 = 237 @ 65.79 = \$15,560$$

$$25\text{MM } 19360/9 \times 990/2000 = 1065 @ 61.76 = \$65,744$$

Add to the above SF # additional GAB under C & G

1320 LF of C & G x 3 feet of GAB x 2 sides to opening

$$= 7920 \text{ SF} + 19360 \text{ SF} = 27280 \text{ SF}$$

GAB 1" thick = 27280 CF

$$27280 \text{ CF} \times 146 \text{ \#/CF} \times 1 \text{ TN}/2000 \text{ \#} = 1991 @ 18.67 = \$37,172$$

Curb and Gutter

$$1320 \times 2 = 1640 @ 13.39 = \$35,350$$

4 " concrete median

$$2250 \text{ SF} \times 2 = 4500/9 = 500 @ 33.79 = \$16,895$$

$$24 \text{ feet median opening cost total} = \$182,482$$

Calculations based on a 1420 feet median opening consisting of 80 feet to length to equate to 24 feet width transition, 180 feet of transition from 16 feet to 5 feet, 400 feet of left turn lane and 100 feet of intersection.

16 feet median

Pavement:

$$2(114 \times 5 + 400 \times 16) + 100(16) = 18048 \text{ SF}$$

This is the SF area of three asphalt courses

$$12.5 \text{ MM } 18048/9 \times 165/2000 = 165.4 @ 66.09 = \$10,934$$

$$19\text{MM } 18048/9 \times 220/2000 = 220.5 @ 65.79 = \$14,510$$

$$25\text{MM } 18048/9 \times 990/2000 = 993 @ 61.76 = \$61,328$$

Add to the above SF # additional GAB under C & G

584 LF of C & G x 3 feet of GAB x 2 sides to opening

$$= 1752 \text{ SF} + 18048 \text{ SF} = 19800 \text{ SF}$$

GAB 1" thick = 19800 CF

$$19800 \text{ CF} \times 146 \text{ \#/CF} \times 1 \text{ TN}/2000 \text{ \#} = 1445 @ 18.67 = \$26,986$$

Curb and Gutter

$$1320 \times 2 = 584 @ 13.39 = \$7,820$$

7 1/2 " concrete median

$$410 \text{ SF} \times 2 = 820/9 = 92 @ 42.11 = \$3,875$$

$$16 \text{ feet median opening cost total} = \$125,433$$

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: SR 20 /Loganville Hwy fm Ozora to Brand Road - GRTA			
Idea No.: D-1	Sheet No.: 1 of 1	CREATIVE IDEA: Provide steeper tie slopes	
Comp By: TE		Date: 1/29/09	Checked By: Date:
<u>Original Concept:</u>			
The typical sections require a minimum of a 4:1 slope and a maximum of 2:1 slopes			
<u>Proposed Change:</u>			
The VE team recommends that the designer consider utilizing 2:1 slopes where clear zone can be maintained			
<u>Justification:</u>			
By increasing tie slopes to 2:1, this would reduce the amount of embankment required on this project.			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
<u>INITIAL COST:</u> Original	662,480.00		
Proposed	462,480.00		
Savings	200,000.00		
<u>FUTURE COST:</u> Savings		Nominal	
TOTAL PRESENT WORTH SAVINGS			200,000.00

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: SR/Loganville Hwy fm Ozora to Brand Road - GRTA			
Idea No.: E1	Sheet No.: 1 of 2	CREATIVE IDEA: One side sidewalk proposal	
Comp By: FA		Date: 1/29/09	Checked By: Date:
<u>Original Concept:</u> The proposed concept features the use of a 5-foot wide concrete sidewalk on both sides of S.R.20/Loganville Highway			
<u>Proposed Change:</u> The VE Team recommends considering utilizing an 8-foot wide concrete sidewalk on the north west side of the project.			
<u>Justification:</u> A cost reduction in the concrete quantity can occur by eliminating the 5-foot sidewalk from the northeast side of SR 20. Although there are two high schools along the project, there is no history of pedestrian activity. By placing the 8-foot wide sidewalk on the northwest side of the project, pedestrians will have access to both the Christian Covenant Academy and Grayson High Schools. Pedestrians on the northeast side of SR20 can access the 8-foot sidewalk at the intersection of SR20 with Oak Road Relocated and at the intersection of SR20 with Brand Road.			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
<u>INITIAL COST:</u> Original	\$ 508,050.00		
Proposed	\$ 366,000.00		
Savings	\$142,050.00		
<u>FUTURE COST:</u> Savings			
TOTAL PRESENT WORTH SAVINGS			\$142,050.00

CALCULATIONS

Project: SR 20/Loganville Hwy fm Ozora to Brand Road -
GRTA

Idea No.: E1

Client::

Sheet: 2 of 2

Sta:234=39.00 – Sta:112+94.00 = 12,144.14-ft

12,144.14-ft * 8-ft = 97,153.12 ft² / 9ft² = 10,794.79 SY

10,794.79 SY * \$33.87 = \$ 365,619.57 ~ \$ 366,000.00

DEVELOPMENT AND RECOMMENDATION PHASE			
Project: SR 20 /Loganville Hwy fm Ozora to Brand Road – GRTA			
Idea No.: F-2	Sheet No.: 1 of 3	CREATIVE IDEA: Provide alternate layout of longitudinal system	
Comp By: TE		Date: 1/29/09	Checked By: Date:
<u>Original Concept:</u>			
The original plans call for 620 lineal feet of Type 2C Concrete Side Barrier			
<u>Proposed Change:</u>			
Construct the proposed side barrier of MSE wall.			
<u>Justification:</u>			
The cost of constructing an MSE wall is cheaper, easier to install, and is more aesthetically pleasing.			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
<u>INITIAL COST:</u> Original	442,000.00		
Proposed	310,000.00		
Savings	132,000.00		
<u>FUTURE COST:</u> Savings		Nominal	
TOTAL PRESENT WORTH SAVINGS			132,000.00

CALCULATIONS

Project: SR 20/Loganville Hwy fm Ozora to Brand Road - GRTA

Idea No.: F-2
Client:
Sheet: 3 of 3

Type – 2C, Concrete Side Barrier (Original Concept)

$$620\text{-lf @ } \$712.90 = \$442,000.00$$

MSE Wall 0- 10' high (Proposed Change)

$$620' \times 10' \text{ high} \times \$50/\text{sf} = \$310,000.00$$

$$\text{Savings: } \$442,000.00 - \$310,000.00 = \$132,000.00$$

APPENDIX

INFORMATION PHASE - SOURCES

Approving/Authorizing Persons

Name:	Position:	Telephone:
Brad McManus	GDOT- PM	404-631-1630
Bryon Letourneau	PM for Kimley-Horn	678-533-3913

Personal Contacts

Name:	Telephone:	Notes:

Documents/Abstracts

Reference:	Notes:
Concept Layout	
FFPR Plans	
Construction Cost Estimate	
ROW Cost Estimate	80% of the ROW has been purchased
Concept Report	
Item Mean Index Summary	
GDOT Driveway & Encroachment Manual	To get minimum tapers

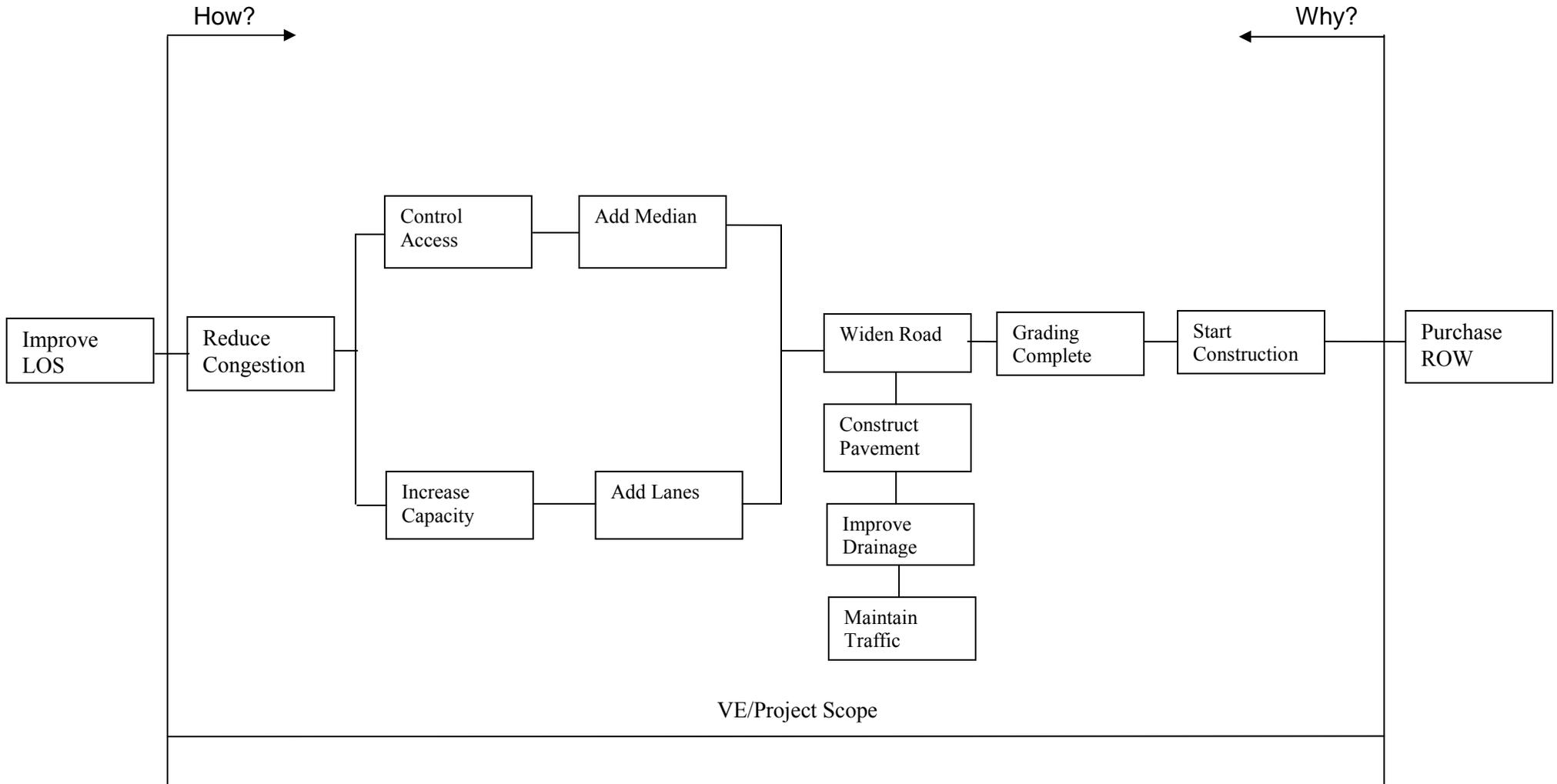
INFORMATION PHASE – FUNCTION ANALYSIS

Project:

Function: Increase Capacity

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	Worth	Comments
A	Pavement	Carry	Traffic	\$6,630,000	\$4,500,000	Lane width/median
B	Drainage	Remove	Water	\$1,540,000	\$1,200,000	Reduction
C	Concrete Medians/Curb & Gutter	Restrict	Movement	\$1,035,000	\$900,000	16' median
		Catch	Water			
D	Embankment	Raise	Grade	\$663,000	\$400,000	Reduce footprint
E	Concrete Sidewalk	Provide/Transport	Safety/People	\$508,000	\$250,000	Sidewalk on one side
F	Clearing & Grubbing	Remove	Items	\$510,000	\$410,000	Reduce
G	Temporary Erosion	Control/Prevent	Erosion/Sedmnt	\$460,000	\$400,000	Reduce
H	Concrete Side barrier	Deflect	Traffic	\$450,000		May remove need
I	Signals	Stop/Control	Cars/Movement	\$407,000	\$300,000	Remove Signal-Brand Rd
J	Misc	Construct	Project	\$350,000	\$300,000	Reduce
K	Concrete Valley Gutter	Move/Drain	Water/Drwys	\$260,000		No Change
L	Traffic Control	Stage	Construction	\$260,000		Increase
M	Pavement Markings	Separate/Provid	Traffic/Info	\$129,000	\$115,000	Reduce amount
N	Permanent Erosion	Prevent	Sediment	\$68,000	\$60,000	Reduce

INVESTIGATION PHASE - FAST DIAGRAM



CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
A	Pavement		
A-1	Reduce Thickness	Cut Cost/Design is based on traffic for first 500'	6
A-2	Reduce Width	Lanes can be reduce to 11'	10
A-3	Rubberize Asphalt	Improve Ride, Reduce Noise	5
A-4	Adjust Side Street Tie-ins	Leave the side streets alone or pave to ROW	6
A-5	Remove Median Openings	Reduce the amount of asphalt	6
A-6	Reduce Length of Turn Lanes	Reduce the amount of asphalt	8
B	Drainage		
B-1	Rural Section/Urban-Mix	Reduce C&G, improve shoulder drainage, reduce need for pipes by using ditches	6
B-2	Reduce Pipe Lengths	By decreasing pvmnt width, will need less pipe	8
B-3	Redesign Drainage System	Decrease the amount of pipes and number of structures	8
C	Concrete Medians/Curb & Gutter		
C-1	Reduce Width	Reduce the concrete section and provide extra width on the shoulders, Reduce to 20' or 16'	10

C-2	Flush Median	Remove concrete and use 14' paved flush median	8

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
D	Embankment		
D-1	Steepen Slope	Change the slopes from 4:1 to 2:1	9
E	Sidewalk-Concrete		5
E-1	Eliminate One Side	Eliminate sidewalk on one side	10
E-2	Alternate Materials	Asphalt sidewalk, rubberized	7
E-3	Multi-Use Path/One side	Eliminates need for sidewalk on one side and allows for a potential bike path	6
F	Other Areas		
F-1	Signals	Remove the signal @ Brand Rd	7
F-2	Walls	Eliminate or shorten wall	7
F-3	Guardrail	Eliminate or reduce the amount used	7

F-4	Pavement Markings	Reduce amount of stripping because of reduction in pavement	7
F-5	Stage Construction	Reduction in footprint changes the staging	7
F-6	Erosion Control	Reduction in footprint reduces the amount of disturbed area	7
F-7	Clearing & Grubbing	Reduction in footprint, reduce amount to be cleared	7