

# VALUE ENGINEERING TRAINING STUDY REPORT

SR 9/ North Main Street  
Widening and Improvements

Project No. STP00-0114-01(084)  
Fulton County  
PI No. 721780  
October 22, 2009

---

---

OWNER:



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

VALUE ENGINEERING  
INSTRUCTOR:



MACTEC Engineering and Consulting, Inc.  
3200 Town Point Drive NW, Suite 100  
Kennesaw, GA 30144  
(770.421.3400)

# TABLE OF CONTENTS

## VALUE ENGINEERING TRAINING STUDY REPORT

SR 9 / North Main Street  
Widening and Improvements

Project No. STP00-0114-01(084)  
PI No. 721780

**October 22, 2009**

---

Executive Summary .....	1
Study Background.....	2
Study Identification.....	6
VE Team Members .....	7
Project Description.....	7
Value Engineering Recommendations.....	8
Appendix	
Information Phase - Sources.....	25
Information Phase - Cost Model.....	26
Information Phase – Function Analysis.....	27
Information Phase – Fast Diagram.....	29
Creative Phase/Idea Evaluation.....	30

## **EXECUTIVE SUMMARY**

## EXECUTIVE SUMMARY

# VALUE ENGINEERING TRAINING STUDY REPORT

### SR 9 / North Main Street Widening and Improvements

Project No. STP00-0114-01(084)  
PI No. 721780

**October 22, 2009**

### **Study Background**

This report presents the results of a value engineering (VE) study for the widening and improvements to SR 9 / North Main Street from Academy Street to Winward Parkway. The study was conducted as part of a VE training session held for GDOT staff on October 5 to 9, 2009.

SR 9 serves as a major north-south facility between the cities of Roswell and Alpharetta. SR 9 is west of and roughly parallel to SR 400. SR 9 is a non-uniform arterial having several different sections along the corridor including a 3, 4 and 5 lane section with a flush median and a lane undivided section. The overall project corridor consists of improvements to a 3.64 mile section of SR 9 within the City of Alpharetta, Fulton County. The proposed improvements are divided into two projects; PI No. 721790 beginning at Upper Hembree Road and continuing to Academy Street and 721780 from Academy Street to Winward Parkway. The proposed project improvements include widening, reconfiguration of side roads, pedestrian improvements and signal upgrades.

The primary purpose of this project is to relieve traffic congestion while providing safety and operational improvements along the corridor. As a result of recent growth and combined with the proximity to GA 400, the roadway network has struggled to handle the travel demands. Without any operational improvements, many of the signalized intersections will be deficient by the design year. The proposed project improvements would improve the overall corridor safety and operations by relieving congestion and eliminating and/or restricting turning movements by constructing a raised median.

The estimated construction cost of the project is \$6,270,000, the R/W estimate is \$24,700,000 yielding a total project cost of \$30,970,000. On Monday, October 5, 2009, the design team gave an overview of the project to the VE team and on Friday, October 9, 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 worksheets developed during the information, creative and evaluation phases of the study. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

## VE-11

### DEVELOPMENT PHASE - EXECUTIVE SUMMARY

**Project:** SR 9 Widening, PI No. 721780  
**Location:**

**Team:** 2  
**Date:** 10/9/09

This report summarizes the results of a value engineering (VE) study conducted for project STP00-0114-01(084); the widening of SR 9 from Academy Street to Windward Parkway in north Fulton County. The proposed project will reconfigure of side roads, add pedestrian and bicycle facilities, includes traffic and operational improvements, signal upgrades and raised median.

The proposed typical includes 4 – 11 foot travel lanes, a 17 foot median and 12 foot shoulders. The total cost of the project will be \$33,870,000 with \$24,700,000 in R/W and \$9,170,000 in Construction. The design is currently in the Concept Stage. The value Engineering Study was conducted October 5-9, 2009 at the Georgia DOT General Office in Atlanta.

This report includes recommendations formulated by the VE Team and includes all supporting documentation. Recommendations in this report represent an estimated 7% reduction in the over project costs.

**VE-10**

<b>DEVELOPMENT PHASE - SUMMARY OF COST SAVINGS</b>						
<b>Project:</b> SR 9 Widening, PI No. 721780					<b>Team No.:</b> 2	
<b>Location:</b>					<b>Date:</b> 10/9/09	
<b>Idea No.</b>	<b>Creative Idea Description</b>	<b>Original Initial Cost</b>	<b>Proposed Initial Cost</b>	<b>Initial Cost Savings</b>	<b>Future Savings</b>	<b>Total Life Cycle Savings</b>
A-1	Change Bike Lanes to Shared Use	\$26,403,000	\$25,953,000	\$450,000		
A-2	Change Perm. Esmt. to Temp. Esmt.	\$1,775,000	\$1,287,000	\$488,000		
A-3	Shift Road to Avoid Total Takes	\$780,000	\$0	\$780,000		
F-1	Use 24" C&G vs. 30" C&G	\$679,000	\$605,000	\$74,000		
G-1	Reduce Median to 8 Feet.	\$614,000	\$300,000	\$314,000		
	<b>Totals</b>			<b>\$2,106,000</b>		

## STUDY IDENTIFICATION

**VE-1**

## **STUDY IDENTIFICATION**

<b>Project:</b> 721780 – Fulton	<b>Date:</b> 10/5/09 – 10/9/09
<b>Location:</b> SR 9 / N. Main Street from Academy St to Windward Pkwy	

### **VE Team Members**

<b>Name:</b>	<b>Position:</b>	<b>Organization:</b>	<b>Telephone:</b>
Eugene Hopkins	Road Design	GDOT	
Ted Crabtree	Engineering Services	GDOT	
Aghdas Ghazi	Project Manager	GDOT	
Robert Murphy	Project Manager	GDOT	
Sonya Sykes	Design Engineer	GDOT	

**Project Description:** Fulton County, PI No. 721780, begins at Academy Street and extends north to Windward Parkway on SR 9 within the City of Alpharetta. The proposed improvements along SR 9 include widening, reconfiguration of side roads, pedestrian improvements and signal upgrades.

**Project Commitments:** Historical Properties and LCI Study

## **VE RECOMMENDATIONS**

VE-9

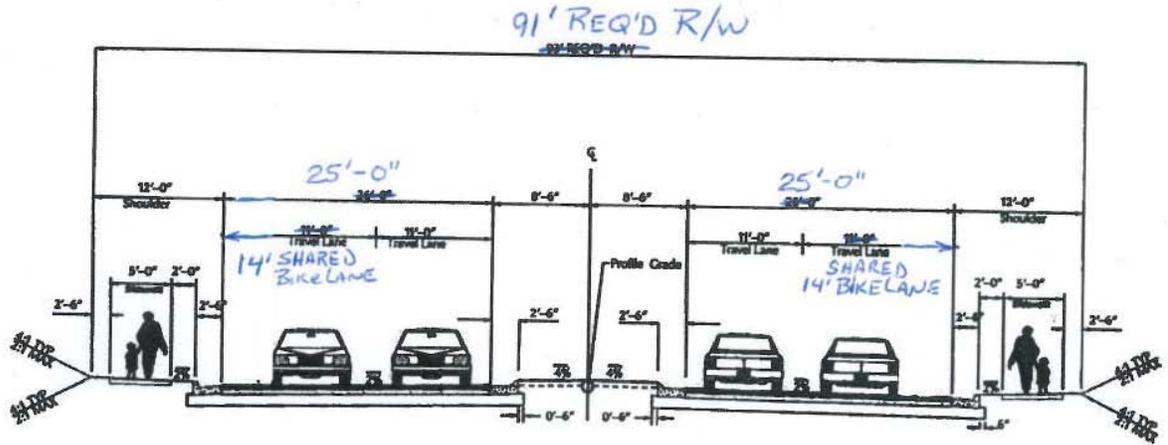
<b>DEVELOPMENT AND RECOMMENDATION PHASE</b>			
<b>Project: SR 9 Widening, PI No. 721780</b>			
<b>Idea No.:</b> A-1 C-1	<b>Sheet No.:</b> 1 of 1	<b>CREATIVE IDEA:</b> Use 14' shared lane instead of separate 4' bike lane.	
Comp By:	Date:	Checked By:	Date:
<p><b>Original Concept:</b> Use 4' bike lanes and reduced width travel lanes.</p> <p><b>Proposed Change:</b> We recommend using a 14' shared bike lane for the outside travel lanes instead of the 11' travel lane and 4' bike lane configuration.</p> <p><b>Justification:</b> Using the 14' shared lane will reduce the width of the required full depth paving and allow for subsequent reduction in R/W and Esmt.</p> <p>Using 14' shared lanes will reduce the width of the roadway and pavement 2' over the entire length of the project saving \$155,000 in pavement and base cost.</p> <p>Considering the same reduction in Permanent Easement, right of way costs could be reduced by an additional \$288,000</p>			
<b>LIFE CYCLE COST SUMMARY</b>	<b>INITIAL Project Cost</b>	<b>FUTURE Project Cost</b>	<b>TOTAL Present Worth Cost</b>
<b>INITIAL COST: Original</b>	\$26,403,000		
<b>Proposed</b>	\$25,953,000		
<b>Savings</b>	\$450,000		
<b>FUTURE COST: Savings</b>		N/A	\$450,000
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$450,000</b>

VE-9A

# SKETCH

Project: SR 9 Widening, PI No. 721780

Idea No. : A-1,C-1  
Client::  
Sheet of





**VE-9C****CALCULATIONS****Project:** SR 9 Widening, PI No. 721780

Idea No. : A-1, C-1

Client::

Sheet of

1-1/2" 9.5mm SP @ \$67.52/tn 165 lb/sy  $67.52 \times 0.009166 = \$0.62$  sf2" 19mm SP @ \$81.04/tn 220 lb/sy  $\$81.04/tn \times 0.0122tn/sf = \$0.99$  sf6" 25mm SP @ \$74.66/tn 660 lb/sy  $74.66 \times 0.0366tn/sf = \$2.74$  sfGR AGG Base Crs, 10",  $\$15.07sy / 9 = \$1.67$  sf

Total Cost Per SF for full depth pavement: \$6.02 sf

Used 12000 feet as length of roadway suitable for pavement width adjustment in computation. Width adjustment eliminates the need for 1 foot of pavement width on each side of the road.  $12000 \text{ lf} \times 2 = 24,000$  sf of pavement that will not be needed.

Cost of pavement that can be eliminated:  $24000 \text{ sf} \times \$6.02 \text{ sf} = \$145,000$ 

Delete 24000 lf of 5" white stripe = \$16,320

Permanent easement can be by 24000 sf. At \$12 sf this would save \$288,000

VE-9

<b>DEVELOPMENT AND RECOMMENDATION PHASE</b>			
<b>Project: SR 9 Widening, PI No. 721780</b>			
<b>Idea No.:</b> A-2	<b>Sheet No.:</b> of	<b>CREATIVE IDEA:</b> Convert Permanente Easement to Temporary Easement.	
Comp By:            Date:		Checked By:        Date:	
<b>Original Concept:</b> Use permanent easement thought project limits.			
<b>Proposed Change:</b> Convert permanent easements to temporary easements			
<b>Justification:</b> Reduce R/W cost, Allow property owners to regain control of their property.			
<b>LIFE CYCLE COST SUMMARY</b>	<b>INITIAL Project Cost</b>	<b>FUTURE Project Cost</b>	<b>TOTAL Present Worth Cost</b>
<b>INITIAL COST: Original</b>	\$1,775,000.00		
<b>Proposed</b>	\$1,287,000.00		
<b>Savings</b>	\$488,000.00		
<b>FUTURE COST: Savings</b>			
<b>TOTAL PRESENT WORTH SAVINGS</b>			



**VE-9C**

**CALCULATIONS**

**Project: SR 9 Widening, PI No. 721780**

Idea No. : A-2  
Client:  
Sheet of

Residential Easement: \$350,000.00/0.25acres

0.25=10,890 sf. @ 32.13 per sf x 50% x 25% = 12.00 per sf. = 130,680-350,000.00=

Savings of \$219,320.00

Commercial Easement \$1,425,000.00/3.817acres

3.817=166,268sf @8.57 per sf x 50% x 25% = 6.42sf = 1,067,440-1,425,000.00=

Savings of \$357,559

Total Savings of (\$576,879.00)

VE-9

<b>DEVELOPMENT AND RECOMMENDATION PHASE</b>			
<b>Project: SR 9 Widening, PI No. 721780</b>			
<b>Idea No.:</b> A-3	<b>Sheet No.:</b> of	<b>CREATIVE IDEA:</b> Shift alignment slightly to the west around Station 269+00.	
Comp By: TC	Date: 10/08/09	Checked By:	Date:
<p><b>Original Concept:</b> Stay on original alignment.</p> <p><b>Proposed Change:</b> We recommend shifting the alignment slightly to the west around station 269+00.</p> <p><b>Justification:</b> There are two properties around Station 269+00 – RT that will be total takes based on the current construction limits. Impacts to these properties would be reduced enough to eliminate the total take. On the other side of the SR 9 the current construction limits fall within the existing R/W the 6 foot widening can be contain within the grass island / shoulder in front of Lowes. This could be accomplished by tweaking the radius of the curve around Station 269+00.</p>			
LIFE CYCLE COST SUMMARY	INITIAL Project Cost	FUTURE Project Cost	TOTAL Present Worth Cost
<b>INITIAL COST:</b> Original	\$780,000		
Proposed	\$0		
Savings	\$780,000		
<b>FUTURE COST:</b> Savings			
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$780,000</b>



## CALCULATIONS

**Project: SR 9 Widening, PI No. 721780**

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

Existing Cost

Total R/W Take:

1 House      \$350,000 X 2 = \$700,000  
Relocation    \$ 40,000 X 2 = \$ 80,000

Proposed Cost

Change in Alignment:

No Total R/W Takes required.

**VE-9A**

<b>DEVELOPMENT AND RECOMMENDATION PHASE</b>			
<b>Project: SR 9 Widening, PI No. 721780</b>			
<b>Idea No.:</b> F-1	<b>Sheet No.:</b> of	<b>CREATIVE IDEA:</b> Use 8”X24”, TP2 concrete curb and gutter instead of 8”X30”, TP2 concrete curb and gutter throughout the project	
Comp By: SS & AG		Date: 10/08/09	Checked By:      Date:
<p><b>Original Concept:</b> The project proposes 8”X30”, TP2 concrete curb and gutter throughout the project.</p> <p><b>Proposed Change:</b> Recommend using 8”X24”, TP2 concrete curb and gutter since this project proposes 4’ bicycle lanes which provides more distance between the curb or drainage structure to the travel lane.</p> <p><b>Justification:</b> A decrease in the size of the curb and gutter will result in a decrease in the overall cost</p>			
<b>LIFE CYCLE COST SUMMARY</b>	<b>INITIAL Project Cost</b>	<b>FUTURE Project Cost</b>	<b>TOTAL Present Worth Cost</b>
<b>INITIAL COST:</b> Original	\$679,000		
Proposed	\$606,000		
Savings	\$74,000		
<b>FUTURE COST:</b> Savings			
<b>TOTAL PRESENT WORTH SAVINGS</b>			



**VE-9C**

<b>CALCULATIONS</b>	
<b>Project:</b> 721780	Idea No. : F-1 Client:: Sheet of
<u>Proposed Cost</u> 8"X24" Curb and Gutter  41,750 LF * \$14.51 = \$605,793  <u>Existing Cost</u> 8"X30" Curb and Gutter  41,750 LF * \$16.27 = \$679,273  <u>Savings</u> \$679,273 - \$605,793 = \$73,480	

VE-9A

<b>DEVELOPMENT AND RECOMMENDATION PHASE</b>			
<b>Project: SR 9 Widening, PI No. 721780</b>			
<b>Idea No.:</b> G-1	<b>Sheet No.:</b> of	<b>CREATIVE IDEA:</b> Reduce median width from Sta. 219+00 to 240+00, Sta. 257+00 to 273+00 and Sta. 279+50 to 288+90	
Comp By: SS & AG		Date: 10/08/09	Checked By:      Date:
<p><b>Original Concept:</b> The median width from approximate Sta. 219+00 to 240+00, Sta. 257+00 to 273+00 and Sta. 279+50 288+90 is proposed to be 17' wide.</p> <p><b>Proposed Change:</b> Recommend decreasing the median width within the above mentioned areas to a maximum proposed width of 8'.</p> <p><b>Justification:</b> A decrease in the median width at these locations will reduce the cost of purchasing property for Right of Way and Permanent Easement. Reduces materials cost and reduces the roadway footprint.</p>			
<b>LIFE CYCLE COST SUMMARY</b>	<b>INITIAL Project Cost</b>	<b>FUTURE Project Cost</b>	<b>TOTAL Present Worth Cost</b>
<b>INITIAL COST:</b> Original	\$614,000		
Proposed	\$300,000		
Savings	\$314,000		
<b>FUTURE COST:</b> Savings			
<b>TOTAL PRESENT WORTH SAVINGS</b>			



**VE-9C**

Idea No.: G-1

**Project:** 721780

Savings

Median:

Straight Section:  $1300' + 780' + 140' = 2220' \times 9' = 19980 \text{ ft}^2 / 9 \text{ yd}^2 = 2220 \text{ yd}^2$

Taper Section:  $405' \times 9' \times 3 \text{ each} = 10,935 \text{ ft}^2 / 9 \text{ yd}^2 = 1,215 \text{ yd}^2$

Total =  $3,435 \text{ yd}^2 \times \$55.62 = \$191,055$

Right of Way:

Approximately  $570 \text{ ft} \times 9 \text{ ft} = 5130 \text{ ft}^2 / 43,560 \text{ ft}^2 / \text{acre} = .12 \text{ acres} \times \$1,425,000/\text{acre} = \$171,000$

Proposed

Straight Section:  $1300' + 780' + 140' = 2220' \times 8' = 17,760 \text{ ft}^2 / 9 \text{ yd}^2 = 1973 \text{ yd}^2$

Taper Section:  $(8' + 17' / 2) \times 450' \times 6 = 30,375 \text{ ft}^2 / 9 \text{ yd}^2 = 3,375 \text{ yd}^2$

Total =  $5,348 \text{ yd}^2 \times \$55.62 = \$297,456$

**APPENDIX**

VE-2

**INFORMATION PHASE - SOURCES**  
**Approving/Authorizing Persons**

<b>Name:</b>	<b>Position:</b>	<b>Telephone:</b>
Gerald Ross	Chief Engineer	
Ron Wishon	Review Engineer	
Bobby Hilliard	Department Head	

**Personal Contacts**

<b>Name:</b>	<b>Telephone:</b>	<b>Notes:</b>
Kevin Skinner	(678) 336-7740	Designer - Consultant
Susan Thomas	(770) 333-9484	Environmental - Consultant
Ronald Osterloh	(678) 336-7740	Designer - Consultant
Amber Phillips		Environmental - GDOT

**Documents/Abstracts**

<b>Reference:</b>	<b>Notes:</b>
Project Layout	
Project Concept Report	
Profiles	
Cross Sections	
Preconstruction Status Report	
Vertical Curve Data	



**VE-4**

**INFORMATION PHASE – FUNCTION ANALYSIS**

**Project:** SR 9 Widening, PI No. 721780

**Project Function:** Operations / Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	Worth	Comments
	Right of Way	Identify	Property	\$24,700,000	\$18,7000	Reduce roadway width.
		Allows	Construction			
		Contains	Project			
	Grading Complete	Leveling	Soil	\$2,000,000	\$2,000,000	Reduce roadway width.
		Remove	Debris			
		Move	Earth			
	Paving	Support	Load	\$1,360,000	\$1,100,000	Reduce roadway width.
		Smooth	Surface			
		Protect	Base			
	Drainage	Drains	Roadway	\$1,200,000	\$1,100,000	Reduce number of structures.
		Conveys	Water			
		Directs	Water			
	Retaining Wall	Retain	Soil	\$864,000	\$650,000	Remove 1 wall.
		Limits	Footprint			
		Prevents	Erosion			

## INFORMATION PHASE – FUNCTION ANALYSIS

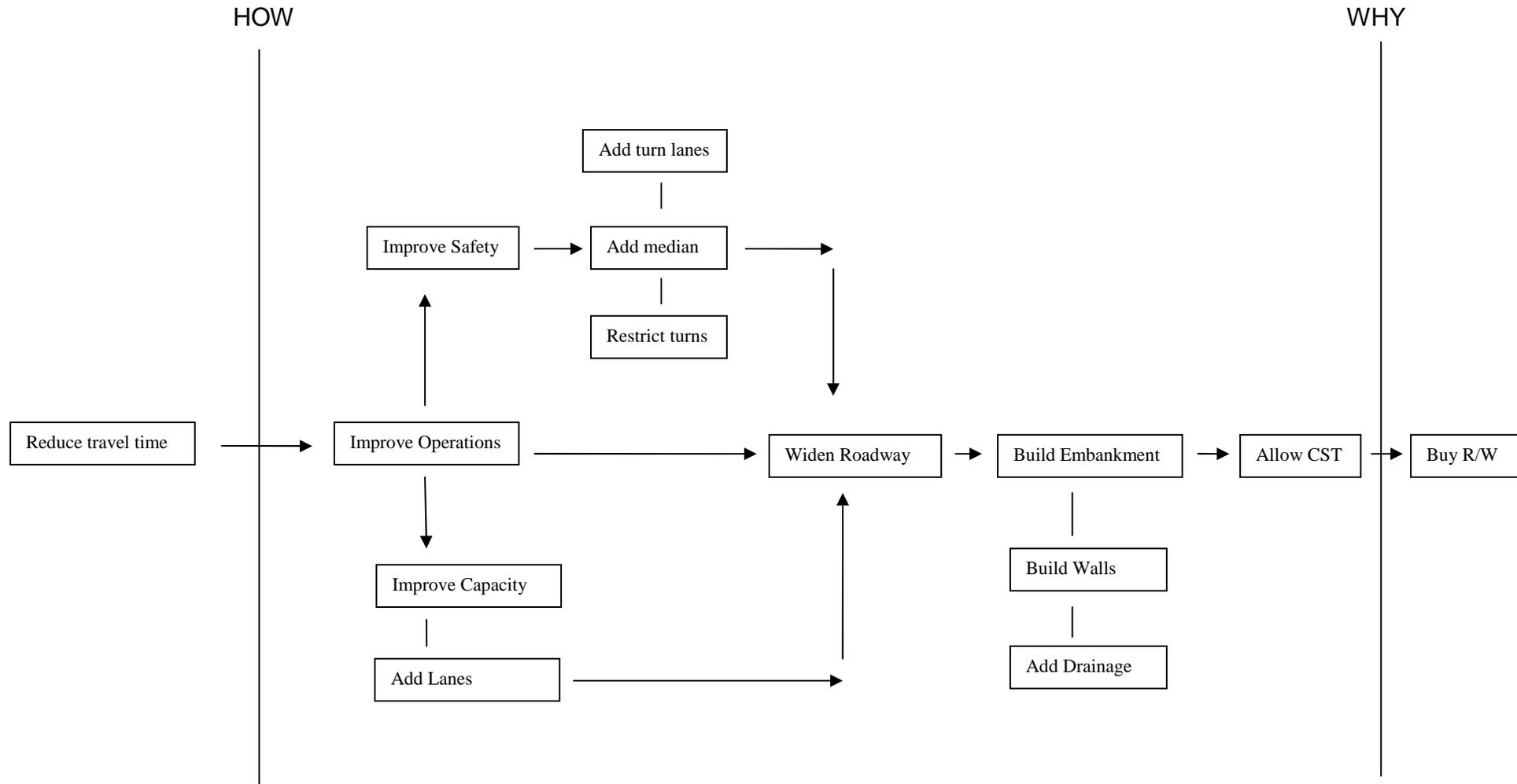
**Project:** SR 9 Widening, PI No. 721780

**Project Function:** Operations / Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	Worth	Comments
	Curb and Gutter	Drains	Roadway	\$679,000	\$400,000	Use header curb.
		Separates	Material			
		Protects	Shoulder			
	Concrete Median	Separate	Traffic	\$167,000	\$80,000	Reduce median width.
		Protect	Traffic			
		Protect	Pedestrian			

VE-5

### INVESTIGATION PHASE - FAST DIAGRAM



**VE-6 & 7**

<b>CREATIVE PHASE</b> Creative Idea Listing		<b>JUDGMENT PHASE</b> Idea Evaluation	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>A</b>	<b>R/W</b>		
<b>A-1</b>	Reduce Footprint	Reduce / Eliminate Shoulder, Median and / or Bike Lane(s)	10
<b>A-2</b>	Temp Esmt Only	Lower Cost, Easy Implementation if Viable	7
<b>A-3</b>	Shift Road	Eliminate Total Takes on Water Oak Place	7
<b>A-4</b>	Make Road 1 Way - Eliminate R/W	Political Fallout, Major R/W at Termini, Spillover to Alt's, Reduce R/W	5
<b>A-5</b>	Solicit Donations	Driveway Permits Good, Viable but not Likely	4
<b>B</b>	<b>Grading Complete</b>		
<b>B-1</b>	Steeper Slopes 1:1 - Slope Paving	Not Aesthetic to Prop Owner's, Maintenance & Not Practical for Urban Area	5
<b>B-2</b>	Use Old Pipe for Rip-Rap - Reduce Debris Haul	Cost Crush / Separate Rebar, Quantity Uncertain, Saves Haul Cost	3
<b>B-3</b>	Use Waist for Usable shoulder	Not Viable Option	3
<b>C</b>	<b>Paving</b>		
<b>C-1</b>	Change Typical /Eliminate RT Turn Lane	Save R/W and Materials Cost, Safety Assoc. with Narrowing	10
<b>C-2</b>	Alt Paving for Bike Lanes	Save Material Cost, High Maintenance / Life, Constructability Issues	2
<b>D</b>	<b>Walls</b>		
<b>D-1</b>	Eliminate 1 Wall by Shifting Alignment	Eliminate Cost for Wall, Reduce	8

**VE-6 & 7**

<b>CREATIVE PHASE</b> Creative Idea Listing		<b>JUDGMENT PHASE</b> Idea Evaluation	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<i>E</i>	<i>Drainage</i>		
<i>E-1</i>	Change Curb Types	Reduce Materials Cost, Reduce Road Footprint & R/W	10
<i>E-2</i>	Use Spillways to Eliminate Pipe and Structures	Cheaper than Typical Structure, Viable in Select Locations	5
<i>E-3</i>	Use Alternative Pipe Materials for Side Drain	Already in Specifications	3
<i>E-4</i>	Use Higher Cross Slopes	Reduce Number of Structures, Add Leveling Costs	2
<i>E-5</i>	Use Ditch to Convey Water	High R/W Cost, Not Pedestrian Friendly, Save Material Costs	1
<i>E-6</i>	Landscape Shoulders	High Maintenance, Safety Issue, Limited Savings in Drainage Structures Reductions	1
<i>F</i>	<i>Curb and Gutter</i>		
<i>F-1</i>	Use Smaller Curb and Gutter	Reduce Materials Cost, Reduce Road Footprint & R/W	10
<i>F-2</i>	Use Header Curb	Reduce Materials Cost, Reduce Road Footprint & R/W	7
<i>F-3</i>	Eliminate Curb and Gutter Where Acceptable	Very Limited Use, Minimal Cost, Increase Maintenance, Safety	3
<i>G</i>	<i>Median</i>		
<i>G-1</i>	Use Reduced Width Median	Reduce Materials Cost, Reduce Road Footprint & R/W	10
<i>G-2</i>	Use Guardrail	Aesthetically Bad, Functionality Good, Low Costs, Maintenance Issue, Pedestrian Conflicts	5
<i>G-3</i>	Change Traffic Patterns - 1 Way Pairs	Political Fallout, Major R/W at Termini, Spillover to Alt's, Reduce R/W	5
<i>G-4</i>	Use Corrugated Median	Less Safe Issues, Moderate Cost Savings, Operational Hazards	4
<i>G-5</i>	Use Paint	Cost Savings, Safety Issues, No Pedestrian Refuge, Operational Hazards (Illegal Crossings)	2