

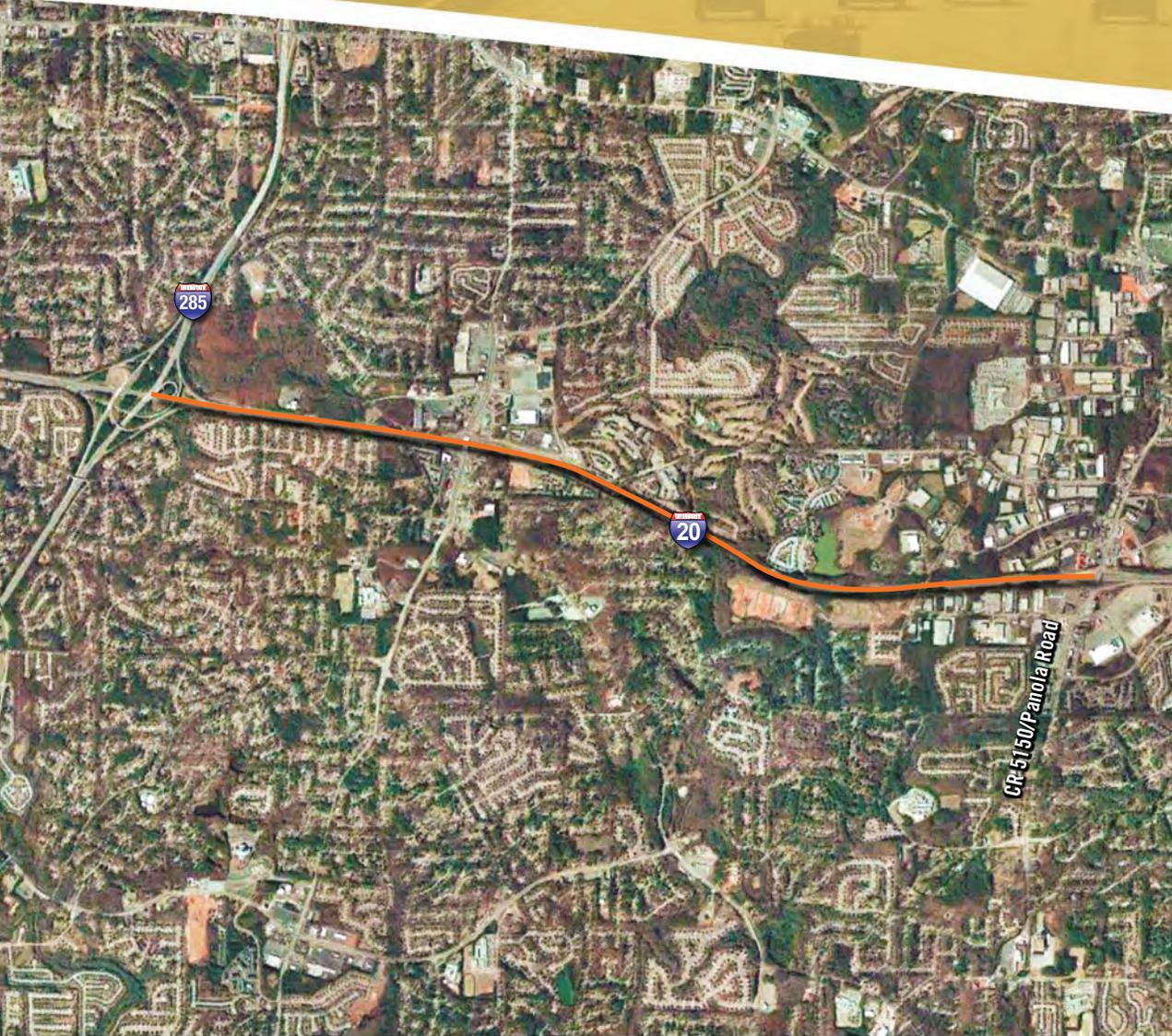
# Value Engineering Study Report

## Georgia Department of Transportation

I-20 Eastbound from I-285 to CR 5150/Panola Road

Collector Distributor System • P.I. No. 0009542

DeKalb County



02217 | dv | 10



Value Engineering Team



Design Team





February 2010

Ms. Lisa Myers  
Design Review Engineer Manager/VE Coordinator  
Georgia Department of Transportation-Engineering Services  
One Georgia Center  
600 W. Peachtree Street NW  
Atlanta, GA 30308

RE: Submittal of the final Value Engineering Report  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road  
Collector Distributor System  
DeKalb County

Dear Ms. Myers:

Please find enclosed two (2) hard copies and one (1) CD of our final Value Engineering Report for I-20 Eastbound from I-285 to CR 5150/Panola Road.

Using the Value Engineering "Job Plan" – Investigation, Analysis (*Function*), Speculation, Evaluation & Development, the VE Team identified:

- Nine (9) Alternatives recommended to improve the project value.

We trust that you will find this report to be in proper order. It should be noted that the results of this workshop are volatile in that they can be overcome by the events that accompany the expeditious continuance of the design process. Accordingly, we encourage an equally expeditious implementation meeting to design the disposition of the contents of this report.

On behalf of our VE Team, we thank you very much for this opportunity to work with you and the hard working staff of the Georgia Department of Transportation.

Yours truly,

**PBS&J**

A handwritten signature in black ink that reads "Les M. Thomas".

**Les M. Thomas PE, CVS-Life  
Project Manager**

# Value Engineering Study Report

P.I. No. 0009542

I-20 Eastbound from I-285 to CR 5150/Panola Road  
Collector Distributor System

DeKalb County

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# **EXECUTIVE SUMMARY**

## **INTRODUCTION**

This report summarizes the analysis and conclusions by the PBS&J Value Engineering workshop team as they performed a Value Engineering study during the period of February 9 – February 12, 2010 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study is identified in the Project Concept Report as P.I. Number 0009542, ***I-20 Eastbound From I-285 to CR 5150/ Panola Road – CD System, in DeKalb County, Georgia.*** The design for the project has been prepared by Arcadis. At the time of the workshop the plans had advanced to the preliminary design level.

## **PROJECT DESCRIPTION**

The purpose of the proposed project is to provide operational and safety improvements along I-20 eastbound in the vicinity of I-285 interchange (from approximately Columbia Drive to the I-20/Panola Road interchange) in DeKalb County. A primary goal of the project is to renew and extend the operational life of a critical segment of Georgia's interstate system. This project is needed to address operational issues resulting from significant weaving on I-20 eastbound between I-285 and Wesley Chapel Road. The weaving in this section results from the conflict between entering traffic from I-285 and exiting traffic to Wesley Chapel Road. This situation is made worse by a two-lane reduction in mainline capacity at the Wesley Chapel Road exit. The resulting congestion in this segment spills back on I-20 west of I-285 and up both ramps of entering I-285 traffic, thereby creating congestion on I-285 as well.

This construction work is proposed as an interim operational improvement along I-20 eastbound in the area noted above. These improvements include adding collector-distributor (CD) lanes, modifying general purpose lanes, and making ramp improvements from just west of the I-20/I-285 interchange, to the I-20/Panola Road interchange, for a total distance of approximately 4.5 miles. Designed to address traffic capacity/movement issues in the project area, the CD system would free up freeway capacity that is currently not being fully utilized due to weaving, significantly increase vehicle throughput, and would address conflicting vehicle movements and stop-and-go traffic conditions to create safer travel conditions.

The proposed project that is the subject of this VE Study, is meant as a short-term solution for the segment of I-20 between I-285 and Panola Road. This temporary solution was identified by GDOT as a way to provide operational improvements until the larger programmed project on I-20 East (Project NHIM0-0020-02(166), P.I. No. 713610, I-20 East Collector/Distributor Lanes Project from Columbia Drive to Evans Mill Road) can be implemented. This project is designed as an interim improvement project only, with a design life of approximately 10 years. The larger project is planned for long-range, but a funding source has not yet been secured for its implementation.

The traffic problems noted above, result in capacity shortcomings in the project area. In order to address this problem, a collector distributor system is being proposed in this

segment which would revise the interstate access points at the existing I-20/I-285 and I-20/Wesley Chapel Road interchanges. The proposed operational improvements would need to include auxiliary lanes from the CD lane merge with mainline I-20 to Panola Road in order to sufficiently address lane balance and operational efficiency of the Wesley Chapel Road and Panola Road interchanges. The addition of two mainline lanes at the merge of the proposed CD system with the I-20 mainline allows for proper lane balancing between Wesley Chapel Road and Panola Road with the subsequent lane drops. Because of the proximity of the CD lane merge with I-20 to the Wesley Chapel Road on-ramp merge, the fifth lane is continued 4,700 feet through the merge of the Wesley Chapel Road on-ramp and is dropped approximately 2,600 feet east of that point, which meets both the AASHTO and GDOT lane drop recommendations. This length also gives sufficient length for CD traffic to merge with mainline I-20. Because traffic forecasts show the exiting traffic from I-20 to Panola Road being so high, the extension of the fourth lane to Panola Road allows the lane to be used as an auxiliary lane for this exit and to provide for the required weaving length.

This project is more fully described in the documentation that is located in Tabbed section of this report, entitled ***Project Description***.

## **VALUE ENGINEERING PROCESS**

The Value Engineering team followed the seven step Value Engineering job plan as promulgated by the Georgia Department of Transportation. This seven step job plan includes the following:

- Investigative
- Analysis
- Speculation
- Evaluation
- Development
- Recommendation
- Presentation

This report is a component of the Presentation Phase. As part of the VE workshop in Atlanta, the team made an informal presentation of their results on the last morning of the workshop. This report is intended to formalize the workshop results and set the stage for a formal implementation meeting in which alternatives and design suggestions will typically be accepted, accepted with modifications, or rejected for cause. The worksheet that follows, along with the formally developed alternatives and design suggestions can be used as a “score sheet” for the implementation meeting. It is also included in this report to identify, on a summary basis, the results of the workshop. The reader is encouraged to visit the third tabbed section of this report entitled ***Study Results*** for a review of the details of the developed alternatives. The tabbed section ***Project Description*** includes information about the project itself and the tabbed section ***Value Engineering Process*** presents the detail process of the Value Engineering Study.

## PROJECT CONCERNS AND OBJECTIVES

This project is being developed under the terms of a categorical exclusion. This requires that the design and construction will not call for additional right-of-way, will not add to the roadway encroachments on either streams or wetlands, and will not result in any relocations to permit construction. There are also certain agreements that have been put in place as a result of periodic public meetings with local stakeholders. Among these agreements is the inclusion of fairly extensive runs of sound barriers to reduce the sound and visual impact on local homes and businesses.

The work of this project is being done in order to facilitate a prompt fix to weaving difficulties on this part of the I-20 eastbound corridor. It was determined that one way in which the VE team could add value to the project was to identify ways in which to expedite the project. Getting the weaving fix in place as soon as possible would be a prized benefit to the traveling public. Accordingly, most of the ideas developed by the VE Team had this goal in mind, along with potential cost savings.

## CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified **40 *Alternative Ideas*** that appeared to hold potential for reducing the construction cost, improving the end product, and/or reducing the difficulty and time of project construction.

After the evaluation phase was completed, **9 *Alternative Ideas*** remained for further consideration. These Alternative Ideas may be found, in their documented form, in the section of this report entitled ***Study Results***.

The following ***Summary of Alternatives*** coupled with the documentation of the developed alternatives should provide the reader with the information required to fully evaluate the merits of each of the alternatives.

# Summary of Alternatives & Design Suggestions



PROJECT: <b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/Panola Road –</b> <b>Collector Distributor System</b> <b>DeKalb County</b>			SHEET NO.: 1 of 1
ALTERNATIVE NUMBER	DESCRIPTION OF ALTERNATIVE	INITIAL COST SAVINGS	
	<b>ASPHALTIC CONCRETE (AC)</b>		
AC-1	Utilize a 10' in-lieu of a 12' outside shoulder on collector distributor (CD) lanes	\$150,938	
AC-2	Coordinate with planned maintenance resurfacing project (P.I. No. M003234)	\$1,219,988	
AC-3	Utilize 4% cross-slope on outside shoulders in tangent sections	\$144,973	
	<b>MISCELLANEOUS (MS)</b>		
MS-3	Use double-sided guardrail in-lieu of barrier rail to separate CD and general purpose lanes	\$1,093,397	
MS-4	Use corrugated metal pipe for CD drainage	\$74,360	
	<b>RETAINING WALLS (RW)</b>		
RW-1	Use MSE walls in-lieu of cast-in-place concrete retaining walls	\$1,931,439	
RW-9	Affix sound walls to retaining walls where appropriate	\$505,230	
RW-10	Use sheet piles in-lieu of concrete retaining walls	\$1,161,210	
	<b>SOUND BARRIERS (SB)</b>		
SB-3	Defer sound barrier walls on westbound roadway	\$1,511,840	

# **STUDY RESULTS**

## **INTRODUCTION**

This section includes the study results presented in the form of fully developed value engineering alternatives that include descriptions of the original design, description of the alternative design configurations, comments on the technical justifications, opportunities and risks associated with the alternatives, sketches, calculations and technical justification for these alternatives. For the most part, these fully developed alternatives represent an array of choices that clearly could have an impact on the eventual cost and performance of the finished project.

This introductory sheet is followed by a **Summary of Alternatives**. It should be noted that the alternatives that are included, which have cost estimates attached are not necessarily representative of the final cost outcome for each alternative. Some of these alternatives have components that are mutually exclusive so they may not be added together.

The users of this report are asked to consider these alternatives and design suggestions as a smorgasbord of choices for selection and use as the project moves forward. The enclosed **Summary of Alternatives** may also be used as a “score sheet” within the bounds of an implementation meeting.

## **COST CALCULATIONS**

The cost calculations are intended only as a guide to the approximate results that might be expected from implementation of the alternatives. They should be helpful in making clear choices as to the pursuit of individual alternatives.

The composite mark-up of 10% for the construction cost comparisons was derived from the cost estimate for the project. This estimate can be found in the section of this report entitled **Project Description**.

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.: **AC-1**

DESCRIPTION: **Utilize a 10' in-lieu of a 12' outside shoulder on CD lanes** SHEET NO.: **1 of 4**

### Original Design:

The original design proposes constructing 12' outside shoulders for the length of the CD lanes.

### Alternative:

The alternative proposes using 10' paved outside shoulders for the length of the CD lanes.

### Opportunities:

- Reduction in full depth pavement quantities
- Reduction in construction costs
- Reduction in construction time

### Risks:

- None apparent

### Technical Discussion:

Since the outside shoulder is not on the I-20 mainline alignment, and the design speed of the CD lanes is 55 mph, the alternative suggests using a 10' outside paved shoulder width. The alternative would reduce paving costs incurred by 2' of full depth pavement in the outside shoulder section for the length of the CD lanes.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 15,135,170	\$ 0	\$ 15,135,170
ALTERNATIVE	\$ 14,984,232	\$ 0	\$ 14,984,232
SAVINGS	\$ 150,938	\$ 0	\$ 150,938

# Illustrations

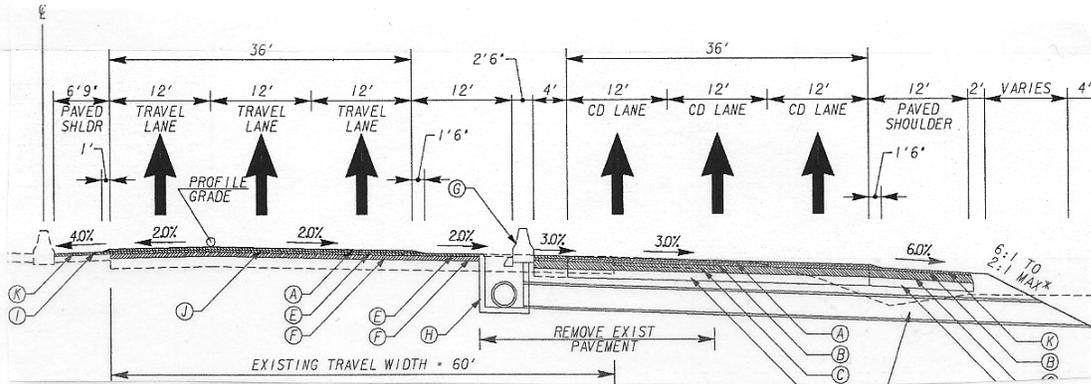


PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

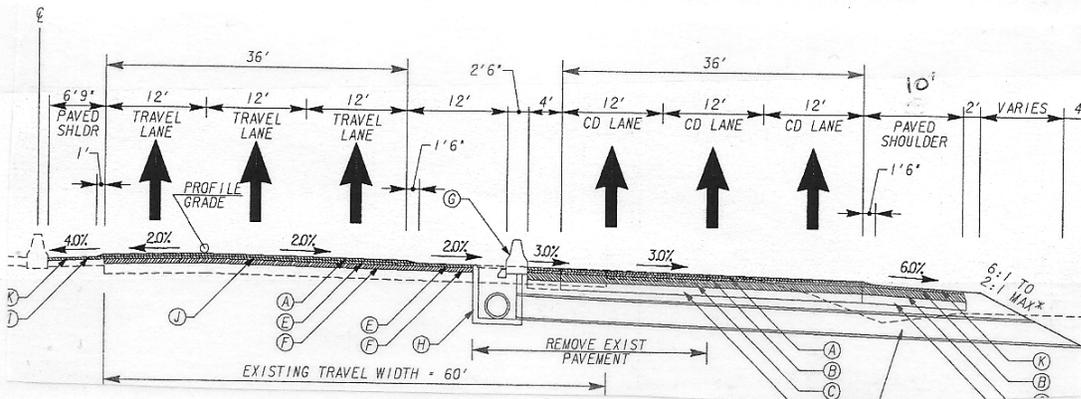
ALTERNATIVE NO.:  
**AC-1**

DESCRIPTION: **Utilize a 10' in-lieu of a 12' outside shoulder on CD lanes**

SHEET NO.: **2** of **4**



ORIGINAL DESIGN - 12' OUTSIDE SHOULDERS



ALTERNATIVE DESIGN - 10' OUTSIDE SHOULDERS

# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County  
Utilize a 10' in-lieu of a 12' outside shoulder on CD lanes**

DESCRIPTION:

ALTERNATIVE NO.:  
**AC-1**

SHEET NO.: **3** of **4**

## Assumptions:

Reduce outside shoulder width on CD lanes by 2' of full depth pavement.  
Reduce shoulder width from STA +/-65+00 to STA +/-135+00= 7000 LF.  
 $7000\text{LF} \times 2' = 14,000\text{SF}/9 = 1556\text{ SY}$  full depth pavement reduction.

Pavement reduction using preliminary pavement design. (Prepared by Ty Denning and submitted to VE team, currently unapproved and dated 2/3/2010)

$12.5\text{mm PEM} = 135\text{LB/SY} \times 1556\text{SY}/2000 = 105\text{ ton reduction}$   
 $12.5\text{mm SMA} = 220\text{LB/SY} \times 1556\text{SY}/2000 = 171\text{ ton reduction}$   
 $19\text{mm Superpave} = 440\text{LB/SY} \times 1556\text{SY}/2000 = 342\text{ ton reduction}$   
 $25\text{mm Superpave} = 1210\text{LB/SY} \times 1556\text{SY}/2000 = 941\text{ ton reduction}$   
GAB=1556 SY reduction



# Cost Worksheet

PROJECT:	<b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/Panola</b> <b>Road – Collector Distributor System</b> <b>DeKalb County</b>	ALTERNATIVE NO.:	<b>AC-1</b>
DESCRIPTION:	<b>Utilize a 10' in-lieu of a 12' outside shoulder on</b> <b>CD lanes</b>	SHEET NO.:	<b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
12.5 mm PEM	TN	24,000	\$ 80.00	\$ 1,920,000	23,895	\$ 80.00	\$ 1,911,600
12.5 mm SMA	TN	22,000	\$ 101.00	\$ 2,222,000	21,829	\$ 101.00	\$ 2,204,729
19.0 mm Superpave	TN	24,000	\$ 60.00	\$ 1,440,000	23658	\$ 60.00	\$ 1,419,480
25.0 mm Superpave	TN	95,000	\$ 63.00	\$ 5,985,000	94059	\$ 63.00	\$ 5,925,717
GAB	SY	107,463	\$ 20.40	\$ 2,192,245	105907	\$ 20.40	\$ 2,160,503
<b>Sub-total</b>				<b>\$ 13,759,245</b>			<b>\$ 13,622,029</b>
<b>Cons't Mark-up 10.00%</b>				<b>\$ 1,375,925</b>			<b>\$ 1,362,203</b>
<b>TOTAL</b>				<b>\$ 15,135,170</b>			<b>\$ 14,984,232</b>
Estimated Savings:							<b>\$150,938</b>

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**AC-2**

DESCRIPTION: **Coordinate with the planned maintenance resurfacing  
project P.I. No.: M003234**

SHEET NO.: **1** of **3**

**Original Design:**

The original design proposes milling all of the asphaltic concrete on the inside two lanes down to the underlying concrete layer.

**Alternative:**

The alternative design proposes coordinating the required paving with the maintenance project (P.I. No.: M003234) in order to eliminate one layer of PEM and one layer of milling.

**Opportunities:**

- Reduction in paving cost
- Reduction in construction time

**Risks:**

- None Apparent

**Technical Discussion:**

If the PEM is placed in the maintenance project (P.I. No.: M003234) it will have to be milled and replaced in order to place the final striping on this job. If it is left out of the maintenance project, it will eliminate the milling and one layer of PEM.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	1,219,988	\$ 0	\$ 1,219,988
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 1,219,988	\$ 0	\$ 1,219,988

# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

DESCRIPTION: **Coordinate with the planned maintenance resurfacing  
project P.I. No.: M003234**

ALTERNATIVE NO.:  
**AC-2**

SHEET NO.: **2** of **3**

## Paving & Milling:

Station 1147+18 to Station 1380+49 =>23,330 LF  
Assume milling and placement of one layer of PEM can be saved.

$23,300 \text{ LF} \times 36 \text{ FT} = 838,800 \text{ SF} / (9 \text{ SF/SY}) \Rightarrow 93,200 \text{ SY}$

Milling => 93,200 SY

$\text{PEM } 12.5\text{mm} = [(93,200 \text{ SY} \times 135\#/\text{SY-IN}) / (2000\#/\text{Ton})] \Rightarrow 6,291 \text{ TN}$

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/Panola Road – Collector Distributor System, DeKalb County</b>	ALTERNATIVE NO.:
		<b>AC-2</b>
DESCRIPTION:	<b>Coordinate with the planned maintenance resurfacing project P.I. No.: M003234</b>	SHEET NO.: <b>3 of 3</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
PEM 12.5 mm	TN	6,291	\$ 80.00	\$ 503,280	0		\$ -
Milling Asphalt Pavement	SY	93,200	\$ 6.50	\$ 605,800	0		\$ -
<b>Sub-total</b>				\$ 1,109,080			\$ -
<b>Mark-up at 10.00%</b>				\$ 110,908			\$ -
<b>TOTAL</b>				<b>\$ 1,219,988</b>			<b>\$ -</b>

Estimated Savings: \$1,219,988

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**AC-3**

DESCRIPTION: **Utilize 4% cross-slope on outside shoulders in tangent sections**

SHEET NO.: **1** of **4**

## Original Design:

The original design calls for construction of the outside shoulders with full depth pavement at a cross-slope of 6% in tangent sections.

## Alternative:

The alternative proposes to construct the outside shoulders with full depth pavement with a cross-slope of 4% in tangent sections.

## Opportunities:

- Reduction in future milling costs
- Reduction in future leveling costs

## Risks:

- May impact sheet flow drainage

\*It is noted that this alternative provides an opportunity for future savings at no cost to the current project, thus adding value and utility to the current project

## Technical Discussion:

The alternative proposes using 4% cross slopes on the outside shoulder in tangent sections instead of the originally designed cross-slope of 6%. The intent is to reduce future work required for widening the shoulders for travel lane usage. By constructing the outside shoulders at 4%, future milling and leveling is reduced by minimizing the “wedge” area to mill and level prior to seal overlay to correct cross-slope for travel lanes at 2% in tangent sections (see Illustration). An identified risk is that the reduction in cross slope of the outside shoulder from 6% to 4% may have an adverse effect to sheet flow drainage across the existing travel lanes.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 144,973	\$ 0	\$ 144,973
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 144,973	\$ 0	\$ 144,973

# Illustrations

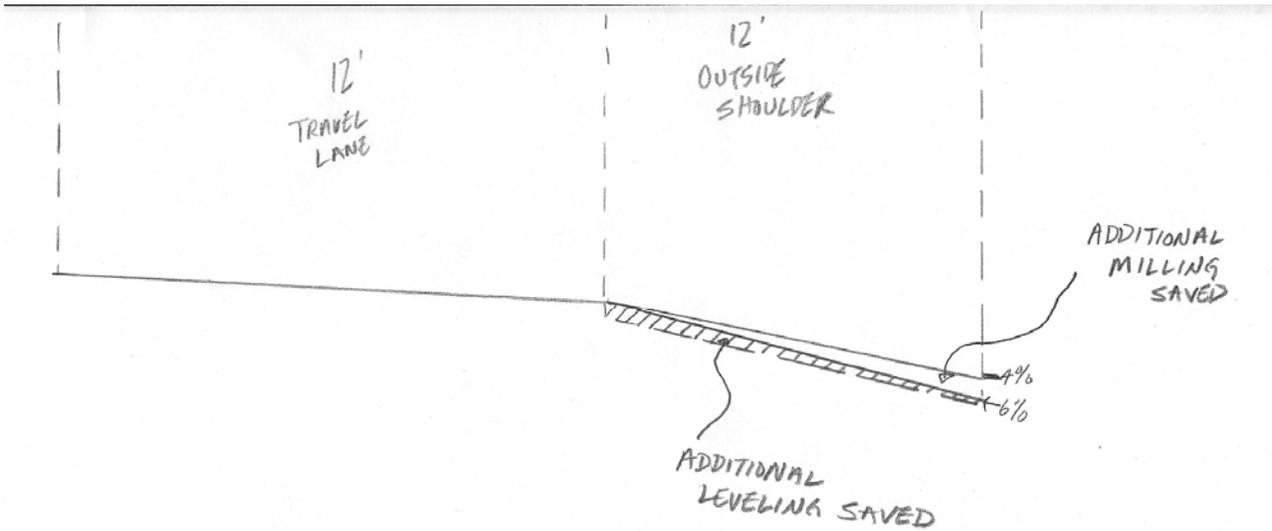


PROJECT: Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County

DESCRIPTION: Utilize 4% cross-slope on outside shoulders in tangent sections

ALTERNATIVE NO.:  
**AC-3**

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

DESCRIPTION: **Utilize 4% cross-slope on outside shoulders in tangent sections**

ALTERNATIVE NO.:  
**AC-3**

SHEET NO.: **3** of **4**

## Assumptions:

Project Length- 4.5 miles

Approximately 50% of project length is in tangent section-3.67 miles x 5280=19,378LF Eastbound outside shoulder. 19,378LF x 12' w/9=25,837 SY shoulder area impacted.

Cross slope is set from grading operation on roadbed processing and transferred through base, binder, and seal. (i.e. no additional paving quantities required to construct 4% cross slope vs. 6%).

At 6%, cross slope from edge of travel lane to edge of paved 12' shoulder is 7.2".  
7.2" max. to 0" min.= 3.6" avg.

At 4%, cross slope from edge of travel lane to edge of paved shoulder is 4.8".  
4.8" max. to 0" min.=2.4" avg.

3.6"-2.4"=1.2" average thickness saved across shoulder width.

1.2"=+/- 135LB/SY

135LB/SY x 25,837 SY/2000=1,744 tons leveling saved.



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation P.I. No. 0009542 I-20 Eastbound from I-285 to CR 5150/Panola Road – Collector Distributor System DeKalb County</b>	ALTERNATIVE NO.:	<b>MS-3</b>
DESCRIPTION:	<b>Use double-sided guardrail in-lieu of concrete barrier rail to separate CD-GP lanes</b>	SHEET NO.:	<b>1 of 5</b>

### Original Design:

The original design proposes constructing a Type 26 Concrete Median Barrier for positive separation between the general purpose and CD lanes from approximate STA 65+00 to approximate STA 135+00.

### Alternative:

The alternative proposes using double-faced guardrail, Type W in-lieu of concrete barrier rail.

### Opportunities:

- First cost savings on materials used
- Less obtrusive for removal for future widening
- Reduction in time of installation

### Risks:

- Requires drainage revisions
- Increases maintenance costs

### Technical Discussion:

The alternative proposes using double-faced guardrail to separate the CD lanes from the GP lanes. The cost savings derived represent a reduction in cost per unit for the guardrail compared to the concrete median barrier. The original design contemplates drop inlets adjacent to the barrier rail to a closed drainage system. The alternative, if implemented, provides the opportunity for exploring other methods for conveying the drainage which may reduce costs further. For future widening on I-20, removal of the guardrail would be less expensive and easier to utilize than removing the concrete median. First cost savings by using the guardrail instead of the concrete median may be diminished by an increase in maintenance costs by repairing/replacing damaged sections of guardrail.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,223,860	\$ 0	\$ 1,223,860
ALTERNATIVE	\$ 130,463	\$ 0	\$ 130,463
SAVINGS	\$ 1,093,397	\$ 0	\$ 1,093,397

# Illustrations

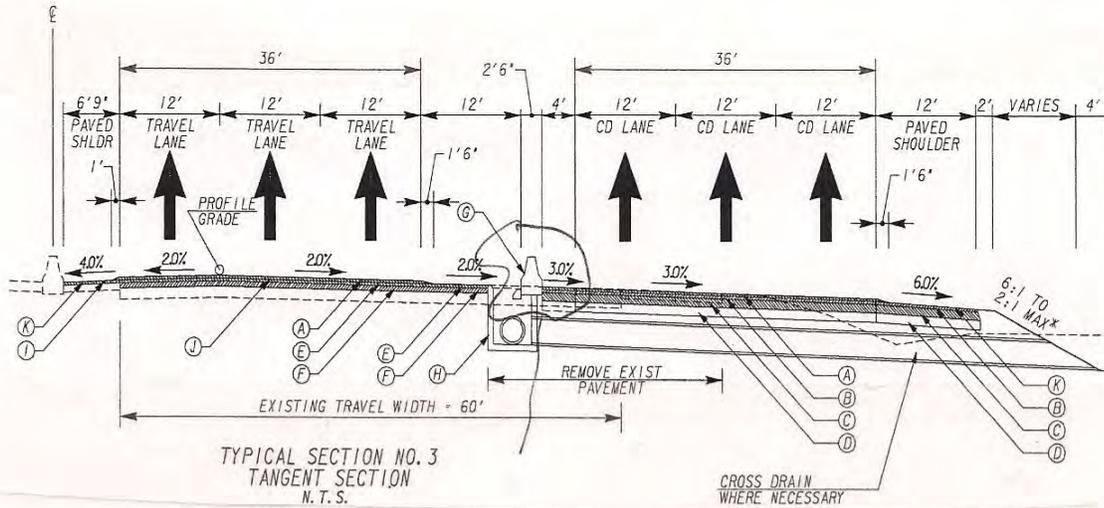


PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
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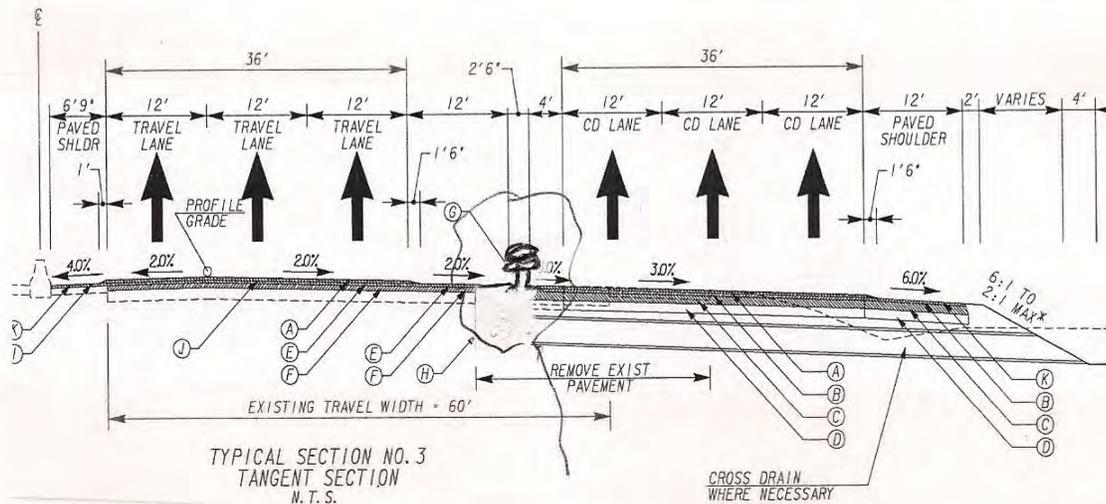
ALTERNATIVE NO.:  
**MS-3**

DESCRIPTION: **Use double-sided guardrail in-lieu of concrete barrier rail  
to separate CD-GP lanes**

SHEET NO.: **2 of 5**



*ORIGINAL DESIGN W/ CONCRETE MEDIAN BARRIER*



*ALTERNATIVE DESIGN W/ DOUBLE SIDED GUARDRAIL - TYPE W*

# Calculations



PROJECT:	<b>Georgia Department of Transportation P.I. No. 0009542 I-20 Eastbound from I-285 to CR 5150/Panola Road – Collector Distributor System DeKalb County</b>	ALTERNATIVE NO.:	<b>MS-3</b>
DESCRIPTION:	<b>Use double-sided guardrail in lieu of concrete barrier rail to separate CD-GP lanes</b>	SHEET NO.:	<b>3 of 5</b>

Use double sided guardrail at \$21.32/LF (1/11/2010 Item Mean Summary) instead of Concrete Median Barrier, Type 6 at \$200/LF.

Additional savings may be realized by configuring roadway drainage with guardrail (surface drainage, slotted drain) as opposed to drop inlets presumed to be used for concrete median rail.

For future consideration, the guardrail would be much easier to remove and patch/overlay when future widening of I-20 takes place.

It is likely that the first cost savings by using guardrail will be diminished somewhat by future maintenance costs in repairing/replacing damaged sections.



## Cost Worksheet

PROJECT:	<b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/Panola</b> <b>Road – Collector Distributor System</b> <b>DeKalb County</b>	ALTERNATIVE NO.:	<b>MS-3</b>
DESCRIPTION:	<b>Use double-sided guardrail in-lieu of concrete barrier rail to separate CD-GP lanes</b>	SHEET NO.:	<b>4 of 5</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE				
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL		
Concrete Median Barrier, Type 6	LF	5,563	\$ 200.00	\$ 1,112,600	0	\$ 200.00	\$ -		
641-2200- Double Faced Guardrail	LF	0	\$ 21.32	\$ -	5,563	\$ 21.32	\$ 118,603		
<b>Sub-total</b>				<b>\$ 1,112,600</b>				<b>\$ 118,603</b>	
<b>Cons't Mark-up</b>	<b>10.00%</b>				<b>\$ 111,260</b>				<b>\$ 11,860</b>
<b>TOTAL</b>				<b>\$ 1,223,860</b>				<b>\$ 130,463</b>	

Estimated Savings: \$1,093,397

# Life Cycle Cost Worksheet



PROJECT: <b>Georgia Department of Transportation</b>				ALTERNATIVE NO.			
<b>P.I. No. 0009542</b>							
<b>I-20 Eastbound from I-285 to CR</b>							
<b>5150/Panola Road – Collector Distributor</b>				<b>MS-3</b>			
<b>DeKalb County</b>							
<b>Use double-sided guardrail in-lieu of concrete barrier rail to separate CD-GP lanes</b>				SHEET NO. <b>5 of 5</b>			
Life Cycle Period	10 years			Original	Proposed		
Interest Rate	3.00%	Escalation Rate	0.00%	Concrete	Metal		
A. Initial Cost				\$ 1,222,860	\$ 130,463		
Useful Life (Years)				30	10		
Initial Cost Savings:					\$ 1,092,397		
B. Recurrent Cost (Annual Expenditures)				Original	Proposed		
1.	Maintenance	% of First Cost during ea. Yr	Concrete @ 0.50%	\$ 6,114			
2.	Maintenance	% of First Cost during ea. Yr	Metal @ 10.00%		\$ 13,046		
Total Annual Costs				\$ 6,114	\$ 13,046		
Present Worth Factor				8.53	8.53		
Present Worth of Recurrent Costs				\$ 52,156	\$ 111,288		
C. Single Expenditure			Year	Amount	PW factor	Present Worth	Present Worth
Orig	Prop	< Put "x" in appropriate box (original design or proposed design)					
		1.				\$ -	\$ -
		2.				\$ -	\$ -
		3.				\$ -	\$ -
D. Salvage Value			Year	Amount	PW Factor	Present Worth	Present Worth
	x	1.			1.000	\$ -	\$ -
		2.			1.000	\$ -	\$ -
Present Worth of Single Expenditures:						\$ -	\$ -
E. Total Recurrent Costs & Single Expenditures (B + C - D)				\$ 52,156	\$ 111,288		
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS					\$ (59,132)		
TOTAL PRESENT WORTH COST (A + E)				\$ 1,275,016	\$ 241,751		
TOTAL LIFE CYCLE SAVINGS					\$ 1,033,265		
<b>Note - escalation shown as 0.0% since using constant dollar LCC analysis</b>							

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**MS-4**

DESCRIPTION: **Use corrugated metal pipe for CD road drainage.**

SHEET NO.: **1 of 4**

## Original Design:

The original design proposes using reinforced concrete pipe for the drainage along the barrier line separating the general purpose lanes and the collector distributor road.

## Alternative:

The alternative design proposes using corrugated metal pipe for the drainage along the barrier line separating the general purpose lanes and the collector distributor road.

## Opportunities:

- Reduction in drainage cost
- Reduction in construction

## Risks:

- None Apparent

## Technical Discussion:

Normally, CMP would not be proposed for a closed drainage system along an interstate roadway. However, this system is installed with the intent of abandoning and filling it in the foreseeable future. It should also be noted that this drainage will be located under the shoulders separating the general purpose lanes and the collector distributor road and will not be subject to direct traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 186,780	\$ 0	\$ 186,780
ALTERNATIVE	\$ 112,420	\$ 0	\$ 112,420
SAVINGS	\$ 74,360	\$ 0	\$ 74,360

# Illustrations

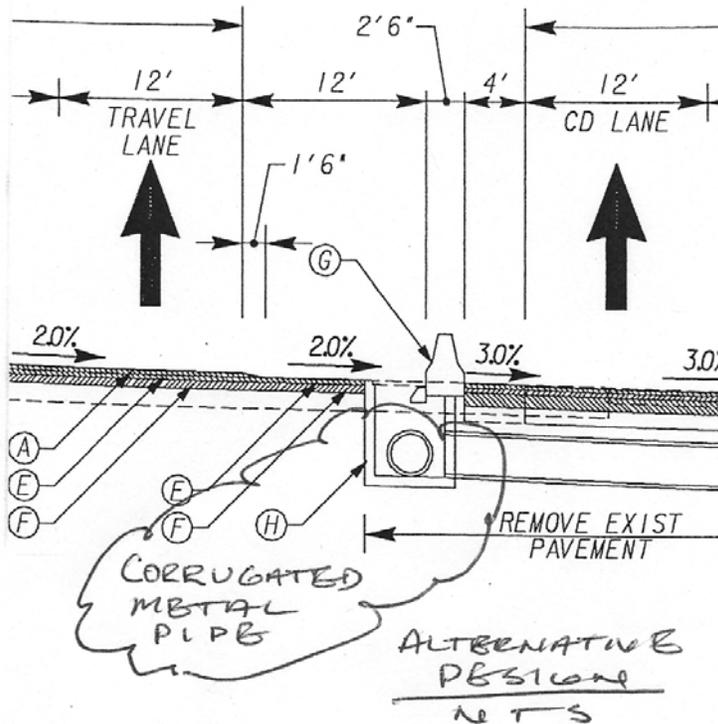
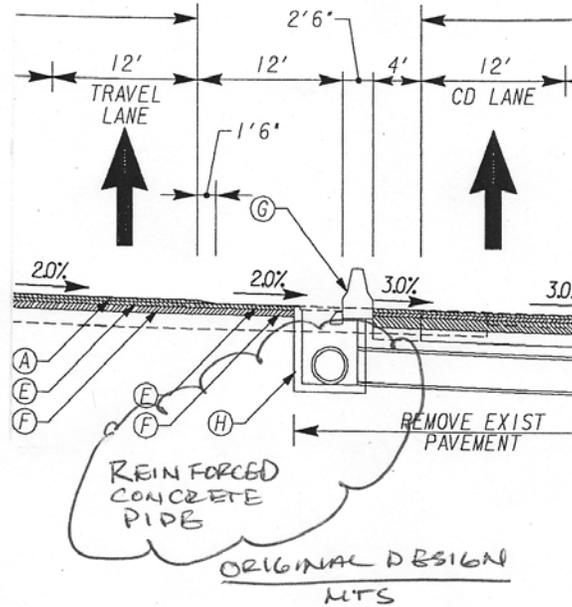


PROJECT: Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County

ALTERNATIVE NO.:  
**MS-4**

DESCRIPTION: Use corrugated metal pipe for CD road drainage.

SHEET NO.: 2 of 4



# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**MS-4**

DESCRIPTION: **Use corrugated metal pipe for CD road drainage.**

SHEET NO.: **3** of **4**

## C/D Road Barrier Length:

Station 1179+72 to Station 1230+25 =>5,100 LF

Assume 80% trunk line => 4,200 LF => 500 LF 30" / 1,200 LF 24" / 2,500 LF 18"

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/Panola Road – Collector Distributor System, DeKalb County</b>	ALTERNATIVE NO.:	<b>MS-4</b>
DESCRIPTION:	<b>Use Corrugated Metal Pipe for CD Road drainage.</b>	SHEET NO.:	<b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
18" RCP	LF	2,500	\$ 36.00	\$ 90,000	0	\$ 36.00	\$ -
24" RCP	LF	1,200	\$ 44.00	\$ 52,800	0	\$ 44.00	\$ -
30" RCP	LF	500	\$ 54.00	\$ 27,000	0	\$ 54.00	\$ -
18" CMP	LF	0	\$ 22.00	\$ -	2,500	\$ 22.00	\$ 55,000
24" CMP	LF	0	\$ 26.00	\$ -	1,200	\$ 26.00	\$ 31,200
30" CMP	LF	0	\$ 32.00	\$ -	500	\$ 32.00	\$ 16,000
<b>Sub-total</b>				<b>\$ 169,800</b>			<b>\$ 102,200</b>
<b>Mark-up at 10.00%</b>				<b>\$ 16,980</b>			<b>\$ 10,220</b>
<b>TOTAL</b>				<b>\$ 186,780</b>			<b>\$ 112,420</b>
Estimated Savings:							<b>\$74,360</b>

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**RW-1**

DESCRIPTION: **Use MSE walls in-lieu of cast-in-place concrete retaining walls** SHEET NO.: **1 of 4**

## Original Design:

The original design calls for the use of GDOT Standard CIP retaining walls. The walls, ranging in height from 2.5 feet to 7.0 feet run along the south side of project for almost the entire length of the segment between I-285 and Wesley Chapel Road and in partial sections between Wesley Chapel Road and Panola Road.

## Alternative:

The alternative proposes the use of MSE walls in lieu of the cast-in-place retaining walls. The alternative maintains the original design wall envelope and geometry.

## Opportunities:

- Cost savings
- Reduces construction time
- GDOT Standard designs readily available
- Improves aesthetics
- MSE Walls have been utilized on this corridor

## Risks:

- None apparent

## Technical Discussion:

MSE walls are an acceptable standard GDOT wall type and have demonstrated satisfactory performance. This is a common wall type used in the Metro Atlanta area, similar to where the current project is located.

See the next sheet for the calculation of the savings noted below.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,556,937	\$ 0	\$ 4,556,937
ALTERNATIVE	\$ 2,625,498	\$ 0	\$ 2,625,498
SAVINGS	\$ 1,931,439	\$ 0	\$ 1,931,439

# Illustrations

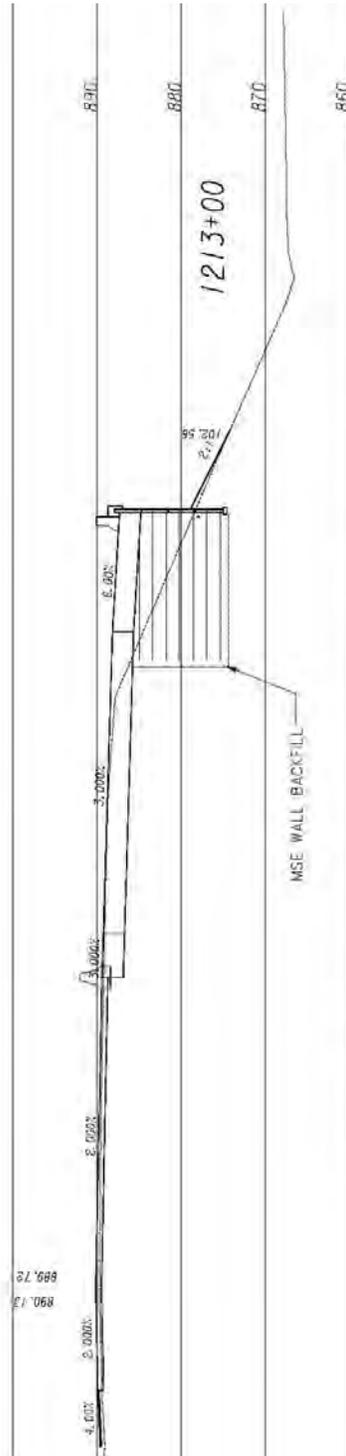
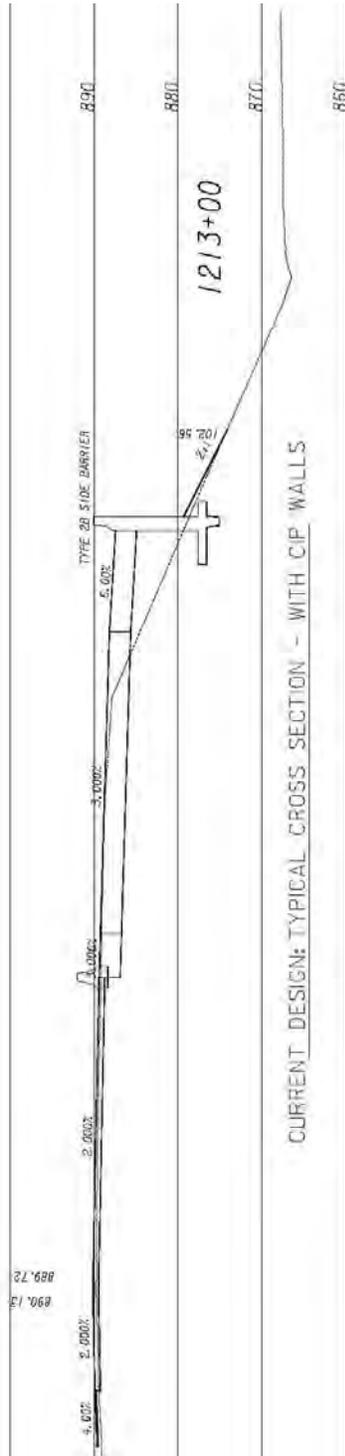


PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

DESCRIPTION: **Use MSE walls in-lieu of cast-in-place concrete retaining walls**

ALTERNATIVE NO.:  
**RW-1**

SHEET NO.: **2** of **4**



# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

DESCRIPTION: **Use MSE walls in-lieu of cast-in-place concrete retaining  
walls**

ALTERNATIVE NO.:  
**RW-1**

SHEET NO.: **3** of **4**

## **Current Design – GDOT STD Cast-in-Place Concrete Retaining Walls**

Wall Height = Varies (0 ft – 20 ft)  
Total Wall Area = 59,181 SF

## **Alternate – MSE WALLS WITH COPING**

Total Area of MSE Walls = Total Area of Concrete Walls (conservative)

Assume average height of wall to be 12 ft

Approximate length of walls =  $59.181 \text{ SF} / 12 \text{ ft} = 5000 \text{ ft}$  (say)

Length of Coping = Length of walls = 5000 ft (say)

## **Note:**

Savings from Alternative = Cost for current design



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**RW-9**

DESCRIPTION: **Affix sound walls to concrete retaining walls where appropriate**

SHEET NO.: **1** of **4**

## Original Design:

The original design calls for the provision of sound walls along the both sides of the corridor. Currently, CIP retaining walls are used adjacent to the roadway.

## Alternative:

The alternative proposes implementing soil stabilization techniques to facilitate steeper slopes in lieu of the cast-in-place retaining walls. The alternative maintains the original roadway geometry.

## Opportunities:

- Cost savings
- Reduction in construction time
- Less intrusive construction
- Saves trees

## Risks:

- None apparent

## Technical Discussion:

Keeping in perspective the long range plan for improvements to this corridor, utilization of soil stabilization techniques to facilitate steeper slopes to accommodate the additional lanes would obviate the need for cast-in-place retaining walls.

Guard rails could be used in-lieu of concrete barriers.

See the next sheet for the calculation of the savings noted below.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 505,230	\$ 0	\$ 505,230
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 505,230	\$ 0	\$ 505,230

# Illustrations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

DESCRIPTION: **Affix sound walls to concrete retaining walls where  
appropriate**

ALTERNATIVE NO.:  
**RW-9**

SHEET NO.: **2** of **4**

## EXAMPLE OF CONCRETE WALL MOUNTED SOUND BARRIER



# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

DESCRIPTION: **Affix sound walls to concrete retaining walls where  
appropriate**

ALTERNATIVE NO.:  
**RW-9**

SHEET NO.: **3** of **4**

## **Current Design – Stand Alone Sound Barrier**

- 1) Assume panel widths are 16'
- 2) Assume HP 10X42 Piles are used every 16'
- 3) Assume Piles are embedded 10' below ground surface
- 4) Assumed cost for tree removal as lump sum amount (\$50,000 – conservative)

## **Alternate – Concrete Wall Mounted Sound Barrier**

For approximately 16,000 LF of Sound Barriers, number of piles =  $16000 \text{ ft} / 16 \text{ ft} = 1000$  (approx.)

Savings in embedded portion of pile =  $10 \text{ ft} \times 1000 = 10,000 \text{ LF}$

Savings in tree removal = \$50,000

## **Note:**

Savings from Alternative = Cost for current design



# Cost Worksheet

PROJECT:	<b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/Panola Road – Collector Distributor System</b> <b>DeKalb County</b>	ALTERNATIVE NO.:	<b>RW-9</b>
DESCRIPTION:	<b>Affix sound walls to concrete retaining walls where appropriate</b>	SHEET NO.:	<b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Fdn. Standalone Sound Barrier	LF	10,000	\$ 40.93	\$ 409,300.00	0	\$ 40.93	\$ -
Tree Removal (Assumed)	LS	1	\$ 50,000.00	\$ 50,000.00	0	\$50,000.00	\$ -
Note:							

- 1) Assumed that stand alone Sound Barriers would require at least **10' embedment of 1000 HP 10X42 Piles**
- 2) Assumed cost for tree removal as lump sum amount
- 3) Savings from Alternative = Cost for current design

<b>Sub-total</b>				\$ 459,300			\$ -
<b>Cons't Mark-up 10.00%</b>				\$ 45,930			\$ -
<b>TOTAL</b>				\$ 505,230			\$ -

Estimated Savings: \$505,230

# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation** ALTERNATIVE NO.:  
**P.I. No. 0009542**  
**I-20 Eastbound from I-285 to CR 5150/Panola Road –** **RW-10**  
**Collector Distributor System**  
**DeKalb County**

DESCRIPTION: **Use sheet piles in-lieu of cast-in-place concrete retaining walls** SHEET NO.: **1 of 4**

**Original Design:**

The original design calls for the use of GDOT standard CIP retaining walls. The walls, ranging in height from 2.5 feet to 7.0 feet run along the south side of project for almost the entire length of the segment between I-285 and Wesley Chapel Road and in partial sections between Wesley Chapel Road and Panola Road.

**Alternative:**

The alternative proposes the use of sheet piles in-lieu of the cast-in-place retaining walls. The alternative maintains the original design wall envelope and geometry.

**Opportunities:**

- Cost savings
- Reduction in construction time
- Sheet piles can be salvaged for later use resulting in additional savings in future

**Risks:**

- None apparent

**Technical Discussion:**

Keeping in perspective the long range plan for improvements to this corridor which would result in the demolition of the cast-in-place retaining walls, the reusability of sheet piles is an added advantage that could result in future cost savings.

Coping could be provided on the sheet piles for improved aesthetics.

See the next sheet for the calculation of the savings noted below.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,556,937	\$ 0	\$ 4,556,937
ALTERNATIVE	\$ 3,395,728	\$ 0	\$ 3,395,728
SAVINGS	\$ 1,161,210	\$ 0	\$ 1,161,210

# Illustrations

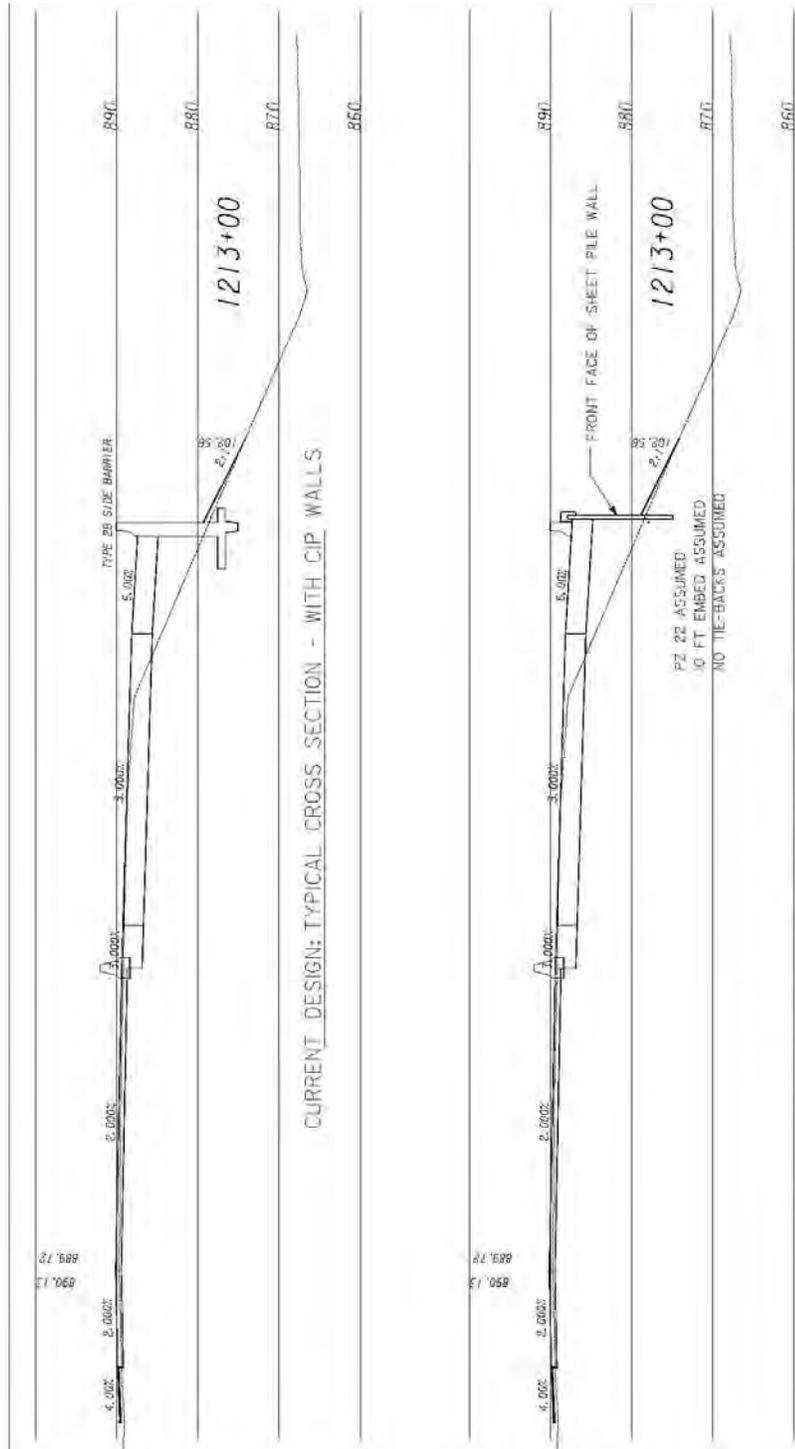


PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

DESCRIPTION: **Use sheet piles in-lieu of cast-in-place concrete retaining walls**

ALTERNATIVE NO.:  
**RW-10**

SHEET NO.: **2** of **4**



# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**RW-10**

DESCRIPTION: **Use sheet piles in-lieu of cast-in-place concrete retaining walls** SHEET NO.: **3** of **4**

## **Current Design – GDOT STD Cast-in-Place Concrete Retaining Walls**

Wall Height = Varies (0 ft – 20 ft)  
Total Wall Area = 59,181 SF

## **Alternate Design – Sheet Piles with Coping**

Assume average height of concrete wall to be 12 ft

Approximate length of concrete walls = 59,181 SF / 12 ft = 5,000 ft (say)

Length of Coping = Length of walls = 5,000 ft (say)

Assume 10 ft embedment of sheet piles into natural ground (below estimated concrete wall base).

Total Area of Sheet Piles = Total Area of Concrete Walls + 10 ft X 5,000 ft  
= 59,181 SF + 50,000 SF = 109181 SF

## **Note:**

Savings from Alternative = Cost for current design



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**SB-3**

DESCRIPTION: **Defer installation of sound barrier walls along the  
westbound roadway**

SHEET NO.: **1** of **3**

**Original Design:**

The original design proposes installing sound barriers along the westbound (offside) roadway.

**Alternative:**

The alternative design proposes deferring the installation of sound barrier walls along the westbound roadway until such time that the westbound section of roadway is reconstructed.

**Opportunities:**

- Reduction in overall cost

**Risks:**

- None apparent

**Technical Discussion:**

Since no modification is being made to the westbound roadway it may be possible to delay installation of sound barriers until such time that it is reconstructed or widened. Further, it could be argued that placing sound barriers on the westbound side slopes might result in having to relocate the barriers when the future alignment needs are better understood.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,511,840	\$ 0	\$ 1,511,840
ALTERNATIVE	\$ 0	\$ 0	\$ 0
SAVINGS	\$ 1,511,840	\$ 0	\$ 1,511,840

# Calculations



PROJECT: **Georgia Department of Transportation  
P.I. No. 0009542  
I-20 Eastbound from I-285 to CR 5150/Panola Road –  
Collector Distributor System  
DeKalb County**

ALTERNATIVE NO.:  
**SB-3**

DESCRIPTION: **Delay installation of sound barrier walls along the  
westbound roadway**

SHEET NO.: **2** of **3**

Sound walls:

Sound Wall #5-Station 1263+23 left to Station 1285+16 left =>2,193 LF  
Sound Wall #7-Station 1308+57 left to Station 1321+00 left =>1,243 LF  
Total- =>3,436 LF

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/ Panola Road – Collector Distributor System, DeKalb County</b>	ALTERNATIVE NO.:	<b>SB-3</b>
DESCRIPTION:	<b>Delay Installation of sound barrier walls along the westbound roadway</b>	SHEET NO.:	<b>3 of 3</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Sound Barrier Wall	LF	3,436	\$ 400.00	\$ 1,374,400	0	\$ 400.00	\$ -
<b>Sub-total</b>				\$ 1,374,400			\$ -
<b>Mark-up at 10.00%</b>				\$ 137,440			\$ -
<b>TOTAL</b>				<b>\$ 1,511,840</b>			<b>\$ -</b>

Estimated Savings:	\$1,511,840
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# PROJECT DESCRIPTION

## INTRODUCTION

The subject of the Value Engineering study is identified in the Project Concept Report as P.I. Number 0009542, ***I-20 Eastbound From I-285 to CR 5150/ Panola Road – CD System, in DeKalb County, Georgia.*** The design for the project has been prepared by Arcadis. At the time of the workshop the plans had advanced to the preliminary design level.

## PROJECT DESCRIPTION

The purpose of the proposed project is to provide operational improvements along I-20 eastbound in the vicinity of I-285 interchange (from approximately Columbia Drive to the I-20/Panola Road interchange) in DeKalb County. A primary goal of the project is to renew and extend the operational life of a critical segment of Georgia's interstate system. This project is needed to address operational issues resulting from weaving on I-20 eastbound between I-285 and Wesley Chapel Road. The weaving in this section results from the conflict between entering traffic from I-285 and exiting traffic to Wesley Chapel Road. This situation is made worse by a two-lane reduction in mainline capacity at the Wesley Chapel Road exit. The resulting congestion in this segment spills back on I-20 west of I-285 and up both ramps of entering I-285 traffic, thereby creating congestion on I-285 as well.

This construction work is proposed as an interim operational improvement along I-20 eastbound in the area noted above. These improvements include adding collector distributor (CD) lanes, modifying general purpose (GP) lanes, and making ramp improvements from the I-20/I-285 interchange, to the I-20/Panola Road interchange, for a total distance of approximately 4.5 miles. Designed to address system deficiencies in the project area, the CD system would free up freeway capacity that is currently not being fully utilized due to weaving, increase vehicle throughput, and would address conflicting vehicle movements and stop-and-go traffic conditions to create safer travel conditions.

The proposed project that is the subject of this VE Study is meant as a short-term solution for the segment of I-20 between I-285 and Panola Road. This temporary solution was identified by GDOT as a way to provide operational improvements until the larger programmed project on I-20 East (Project NHIM0-0020-02(166), P.I. No. 713610, I-20 East Collector Distributor Lanes Project from Columbia Drive to Evans Mill Road) can be implemented. This project is designed as an interim improvement project only, with a design life of approximately 10 years. The larger project is planned for a long-range, but a funding source has not yet been secured for its implementation.

Traffic count (AADT) eastbound only:

Current Year: (2009)	I-285 to Wesley Chapel	96,000
	Wesley Chapel to Panola	83,460
Open Year: (2012)	I-285 to Wesley Chapel	96,875
	Wesley Chapel to Panola	87,030

Design Year: (2032)	I-285 to Wesley Chapel	148,420
	Wesley Chapel to Panola	132,095

No right-of-way will be required. Existing right-of-way varies from 300-400 feet. Consequently, there will be no displacements.

There are no existing bridge decks the will need to be modified or widened in the proposed project. There are several types of retaining walls, L-walls, soil nail, tie-back, and MSE. Wall types are to be analyzed on a case by case basis taking into account right-of-way cost, utility impacts, and wall-type usage.

There are four major interchanges on the project:

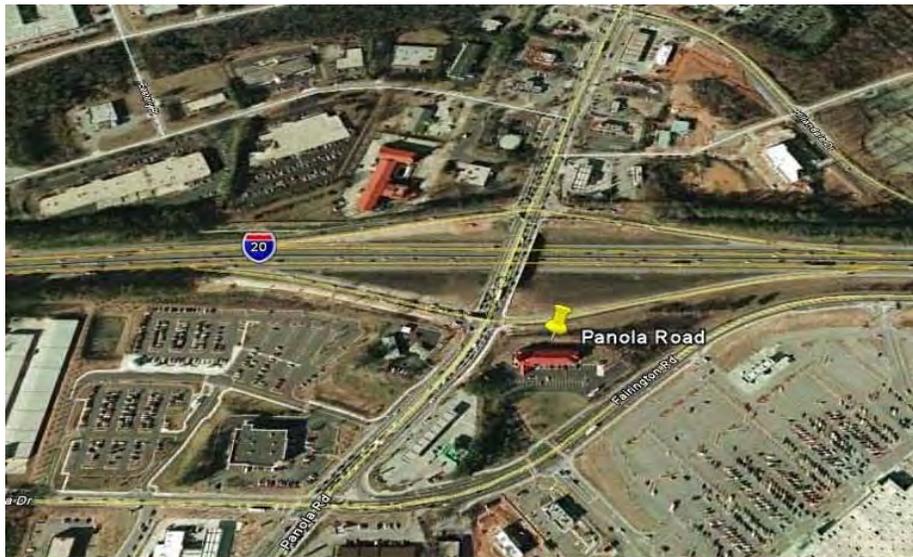
- I-20 at Columbia Drive – no changes are planned.
- I-20 and I-285 – the ramp from I-285 eastbound to I-285 will be realigned
- I-20 at Wesley Chapel Road – eastbound on and off ramps will be realigned
- I-20 at Panola road – eastbound off ramp will be realigned

There are two major intersections on the project:

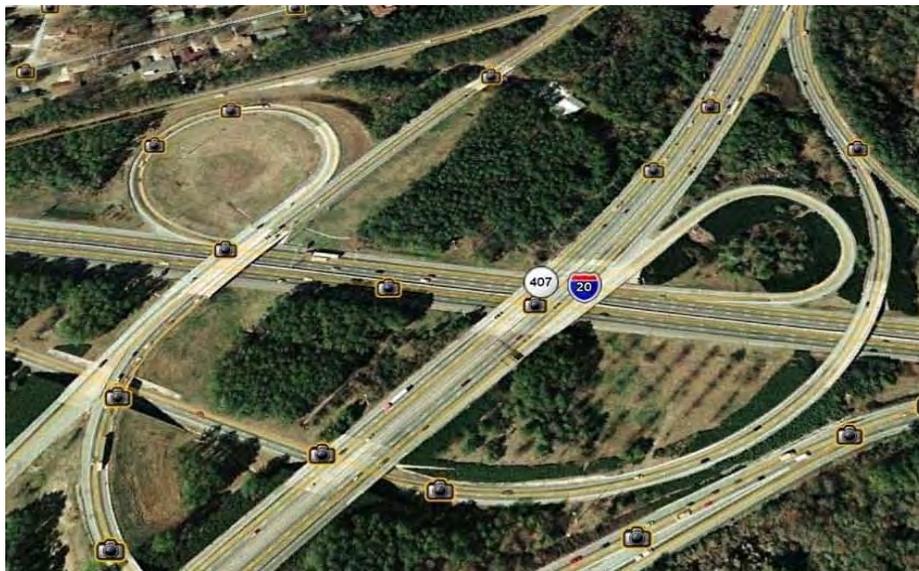
- I-20 eastbound ramps at Wesley Chapel Road – proposed ramp construction will tie to the existing intersection
- I-20 eastbound ramps at Panola Road – proposed ramp construction will tie to the existing intersection



**I-20 and Wesley Chapel Road Interchange**



**I-20 and Panola Road Interchange**



**I-285 and I-20 Interchange**

### **CONSTRUCTION COSTS**

The estimated construction cost for the project is projected at \$61,654,000. There are no Right-of-Way costs. Reimbursable utilities are estimated at \$3,222,852. The projected total cost for the project is \$64,876,940.

The design for the project has been prepared by **Arcadis**.

## REPRESENTATIVE DOCUMENTS

- Georgia Department of Transportation
  - Concept Report
  - Project Location Map
  - Construction Cost Estimate
  - Photos of the Project
  - Anticipated Environmental Concerns
  - Traffic Analysis & Accident Data
  - Pavement Analysis

The VE Team utilized the GDOT supplied project materials noted above plus the preliminary plans and drawings provided by Arcadis.

**DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA**

*Office of Innovative Program Delivery*

**PROJECT CONCEPT REPORT**

**I-20 Eastbound From I-285 to CR 5150/Panola Road – CD System**

Project Number: --

County: DeKalb

P. I. Number: 0009542

Federal Route Number: I-20

State Route Number: 402

Recommendation for approval:

DATE \_\_\_\_\_

\_\_\_\_\_  
Project Manager

DATE \_\_\_\_\_

\_\_\_\_\_  
Office Head/District Engineer

The concept as presented herein and submitted for approval is consistent with that which is included in the Regional Transportation Program (RTP) and the State Transportation Improvement Program (STIP).

DATE \_\_\_\_\_

\_\_\_\_\_  
State Transportation Planning Administrator

DATE \_\_\_\_\_

\_\_\_\_\_  
State Transportation Programming Engineer

DATE \_\_\_\_\_

\_\_\_\_\_  
State Environmental/Location Engineer

DATE \_\_\_\_\_

\_\_\_\_\_  
State Traffic Safety & Design Engineer

DATE \_\_\_\_\_

\_\_\_\_\_  
District Engineer

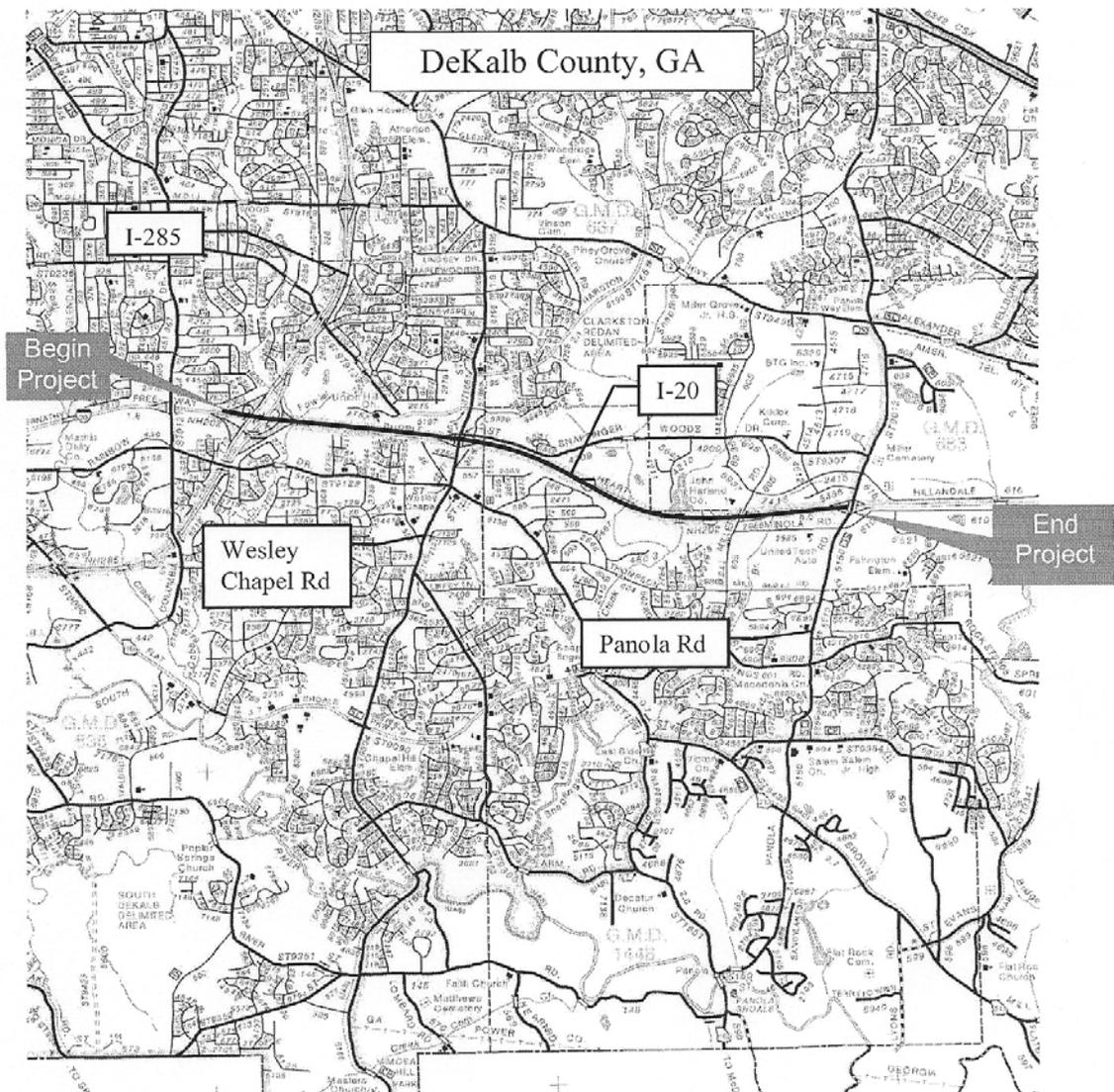
DATE \_\_\_\_\_

\_\_\_\_\_  
Project Review Engineer

DATE \_\_\_\_\_

\_\_\_\_\_  
Other Offices as required such as Bridge Design, etc.

## Project Location Map



### **Need and Purpose:**

The purpose of the proposed project is to provide operational and safety improvements along I-20 eastbound in the vicinity of the I-285 interchange (from approximately Columbia Drive to the I-20/Panola Road interchange) in DeKalb County, Georgia. A primary goal of the proposed project is to renew and extend the operational life of a critical segment of Georgia's interstate system. This project is needed to address operational and safety issues resulting from significant weaving on I-20 eastbound between I-285 and Wesley Chapel Road. The weaving in this section results from the conflict between entering traffic from I-285 and exiting traffic to Wesley Chapel Road. This deficiency is made worse by a two-lane reduction in mainline capacity at the Wesley Chapel Road exit. The resulting congestion in this segment spills back on I-20 west of I-285 and up both ramps of entering I-285 traffic, thereby creating congestion on I-285 as well. Poor traffic operations in this section raise major operational and safety concerns, which are described in Attachments 4 and 5.

The Georgia Department of Transportation (DOT) proposes to provide an interim operational improvement along I-20 eastbound in the vicinity of the I-20/I-285 interchange by adding collector-distributor (CD) lanes, modifying general purpose lanes, and making ramp improvements from just west of the I-20/I-285 interchange (approximately Columbia Drive) to the I-20/Panola Road interchange, for a total distance of approximately 4.5 miles. Designed to address system deficiencies in the project area, the CD system would free up the freeway capacity that is currently not being fully utilized due to excessive weaving, significantly increase vehicle throughput, and would address conflicting vehicle movements and stop-and-go traffic conditions to create safer travel conditions.

The proposed project is meant as a short-term solution for the segment of I-20 between I-285 and Panola Road. This temporary solution was identified by GDOT as a way to provide safety and operational improvements until the larger programmed project on I-20 East (Project NHIM0-0020-02(166), P.I. No. 713610, I-20 East Collector/Distributor Lanes Project from Columbia Drive to Evans Mill Road) can be implemented. This project is designed as an interim improvement project only, with a design life of approximately 10 years. The larger project is planned for long-range, but a funding source has not yet been secured for its implementation.

The breakdown year is defined as the year in which the roadway segment would fail (or, operate at a level of service of LOS F). For the proposed improvements within the project area, one section (between Wesley Chapel Road and Panola Road) would fail in 2019; the other section (between I-285 and Wesley Chapel Road) would fail in 2025. Therefore, an overall breakdown year of 2023 was selected for the project area to represent a 10-year design period.

### *Logical Termini*

Significant weaving currently occurs on I-20 between the traffic exiting from I-20 eastbound onto Wesley Chapel Road and entering I-285 traffic that has destinations on I-20 east of Wesley Chapel Road. This weaving along with a two-lane reduction in capacity at the Wesley Chapel exit creates congestion and reduces capacity in this area. This reduction in capacity prevents vehicles from I-285 and I-20 west of the I-285 interchange from entering this segment and causes this freeway section to fail. In order to address this problem, a collector distributor system is being proposed in this segment which would revise the interstate

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access points at the existing I-20/I-285 and I-20/Wesley Chapel Road interchanges, thus causing an Interchange Modification Report (IMR) to be required. According to the Federal Highway Administration (FHWA), Georgia Division's Guidance on Interstate Access Requests (August 5, 2003), an IMR requires that the operational impact on the mainline interstate between the proposed revised access and the adjacent existing interchanges on either side be analyzed. Therefore, the proposed project extends from Columbia Drive on the western end, which is the first interchange to the west of the I-20/I-285 interchange, and Panola Road on the eastern end, which is the first interchange to the east of the I-20/Wesley Chapel Road interchange, thereby encompassing the two adjacent interchanges and providing logical termini for this operational improvement project.

The proposed operational improvements would need to include auxiliary lanes from the CD lane merge with mainline I-20 to Panola Road in order to sufficiently address lane balance and operational efficiency of the Wesley Chapel Road and Panola Road interchanges. The addition of two mainline lanes at the merge of the proposed CD system with the I-20 mainline allows for proper lane balancing between Wesley Chapel Road and Panola Road with the subsequent lane drops. Because of the proximity of the CD lane merge with I-20 to the Wesley Chapel Road on ramp merge, the fifth lane is continued 4700 feet through the merge of the Wesley Chapel Road on ramp and is dropped approximately 2600 feet east of that point, which meets both AASHTO and GDOT lane drop recommendations. This length also gives sufficient length for CD traffic and Wesley Chapel Road traffic to merge with mainline I-20. Because traffic forecasts show the exiting traffic from I-20 to Panola Road being so high, the extension of the fourth lane to Panola Road allows the lane to be utilized as an auxiliary lane for the Panola Road exit, and to allow for sufficient weaving length. Termination of this lane at the Panola Road exit maintains the existing two-lane (one exit-only lane, one shared lane) configuration of this exit ramp, would provide lane balance, and would additionally allow for a lane reduction back to the existing three mainline lanes. Therefore, the proposed eastern project terminus at Panola Road is logical.

#### **Description of the proposed project:**

This project is located in DeKalb County, Georgia on I-20 in the vicinity of the eastern I-20/I-285 interchange, near the towns of Lithonia and Decatur, Georgia. The project is 4.54 miles long and begins at approximate I-20 mile log 66.62 (DeKalb mile log 7.15), just east of the eastbound I-20 off ramp to I-285, and ends at I-20 mile log 71.16 (DeKalb mile log 11.68) at the Panola Road interchange. The proposed construction affects only the eastbound lanes of I-20.

This project consists of constructing approximately 1.2 miles of collector-distributor (CD) lanes from the I-285 / I-20 interchange to Wesley Chapel Road. Three CD lanes will be constructed within existing roadway right of way on the south side of I-20 and will be separated from the I-20 through lanes by a continuous barrier. To mitigate the need to acquire right of way and to reduce environmental impacts, various types of retaining walls will be constructed along the length of the project.

To serve the I-20 traffic entering the CD, an auxiliary lane will be constructed which will widen I-20 from 3 to 4 lanes from just east of the gore area of eastbound I-20 off ramps to I-285 continuing approximately 2700 feet eastward to the proposed slip ramp to the CD lanes.

Additionally, I-20 will be widened from 3 to 5 lanes from just east of Wesley Chapel Road, where the 2-lane CD will merge with I-20, for approximately 4700 feet. From there to Panola Road (approximately 1.7

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miles), one lane will be dropped and I-20 will be widened from 3 to 4 lanes.

To provide more adequate ramp storage capacity and to accommodate the proposed widening, the eastbound on and off ramps for Wesley Chapel Road and the eastbound off ramp for Panola will be partially realigned. The I-285 NB and SB ramp to I-20 EB will also be realigned to form the beginning of the proposed CD lanes.

**Is the project located in a Non-attainment area?**  Yes  No.

Based on conversations with GDOT Planning, this project is being considered to be included in the TIP and ENVISION 6 model. The project concept is being provided to ARC so there should be no difference between the proposed project concept and the conforming plans.

**PDP Classification:** Major  Minor

**Federal Oversight:** Full Oversight (X), Exempt ( ), State Funded ( ), or Other ( )

**Functional Classification:** Freeway

**U. S. Route Number(s):** I-20 **State Route Number(s):** 402

**Traffic (AADT):** \*Eastbound only\*  
Current Year: (2009) I-285 to Wesley Chapel: 96000  
Wesley Chapel to Panola: 83460

Open Year: (2012) I-285 to Wesley Chapel: 99875  
Wesley Chapel to Panola: 87030

Design Year: (2032) I-285 to Wesley Chapel: 148420  
Wesley Chapel to Panola: 132095

**Existing design features:**

- Typical Section:
  - Existing eastbound I-20 through the area of the project consists of five 12 foot lanes from the I-20/I-285 merge to Wesley Chapel Road and has three 12 foot lanes from Wesley Chapel Road to Panola Road. I-20 has a 12 foot paved, rural outside shoulder and 6'-9" paved inside shoulder with median barrier running the entire length of the project.
  - The on-ramp from I-285 to I-20 eastbound consists of three 12 foot lanes, one of which drops after the merge with I-20. Both the inside and outside shoulders are paved 10 foot rural shoulders.
  - The eastbound off ramps for Wesley Chapel and Panola Road vary from two to four 12 foot lanes with a 4 foot inside and 6 foot outside paved shoulder.
  - The eastbound on ramp for Wesley Chapel is a single 16 foot lane with 4 foot inside and 6 foot outside paved shoulders.
- Posted speed:
  - I-20: 55 mph
  - Ramps: variable 35-55 mph

- Maximum degree of curvature:
  - I-20: 1deg. 30' (3819' R)
  - I-285 system ramp to I-20 EB: 5deg. 12' 31" (1100' R)
  - Wesley Chapel and Panola Road ramps: 5deg. 43' 47" (1000' R)
- Maximum grade:
  - I-20: 3.55%
  - I-285: 6.00%
  - Wesley Chapel Road ramps: 5.60%
  - Panola Road ramp: 5.50%
- Width of right of way: varies 300-400 ft
- Major structures:
  - I-285 southbound ramps bridge over I-20: 82' x 236'
    - Sufficiency Rating: unknown
  - I-285 NB and SB bridge over I-20: 164' to 190' wide x 264' long
    - Sufficiency Rating: unknown
  - I-20 EB ramp to I-285 NB bridge over I-20: 42' x 295'
    - Sufficiency Rating: 93.7 (06/20/2000 INSPECTION)
  - Quadruple box culvert at Fowler Creek approximately 44' wide x 12' high located on I-20 approximately at the eastern gores of the I-20/I-285 interchange.
    - Sufficiency Rating: 70.00
  - Wesley Chapel Bridge over I-20: 120' x 297'
    - Sufficiency Rating: 53.22 (the rating for the new bridge was not found)
  - I-20 Bridge over the Snapfinger Creek: 116' x 190'
    - Sufficiency Rating: 83.00
  - Miller Road bridge over I-20: 43' x 250'
    - Sufficiency Rating: 86.16
  - Panola Road bridge over I-20: 90' x 228'
    - Sufficiency Rating: 92.5
- Major interchanges or intersections along the project:
  - **Interchanges**
    - I-20 at Columbia Drive interchange
    - I-20 and I-285 interchange
    - I-20 at Wesley Chapel Road interchange
    - I-20 at Panola Road interchange
  - **Intersections**
    - I-20 eastbound on and off ramps at Wesley Chapel Road
    - I-20 eastbound off ramp at Panola Road
- The existing length of roadway for this project is 4.54 miles. The beginning mile log for DeKalb County is mile 7.15.

**Proposed Design Features:**

- Proposed typical section(s):
  - I-20 and CD from east of I-285 to Wesley Chapel Road: I-20 will have a 6'-9" paved inside shoulder with median barrier, three 12' travel lanes, and a 12' paved outside shoulder including a continuous barrier to separate I-20 travel lanes from the CD lanes. The CD will have a 4' paved inside shoulder, three 12' travel lanes, 12' paved outside shoulder with

- retaining wall and a continuous concrete barrier.
- I-20 from just west of the I-285/I-20 interchange to the just east of the I-285/I-20 interchange: 6'-9" paved inside shoulder with median barrier, four 12' travel lanes, and a 12' paved outside shoulder. Retaining walls and concrete barriers will be constructed as needed.
- Wesley Chapel Road to 4700' east of Wesley Chapel Road: 6'-9" paved inside shoulder with median barrier, five 12' travel lanes, and a 12' paved outside shoulder. Retaining walls and concrete barriers will be constructed as needed.
- 4700' east of Wesley Chapel Road to Panola Road: 6'-9" paved inside shoulder with median barrier, four 12' travel lanes, and a 12' paved outside shoulder. Retaining walls and concrete barriers will be constructed as needed.
- I-285 CD ramp: 10' paved inside shoulder, three 12' travel lanes, and a 12' paved outside shoulder. Retaining walls and concrete barriers will be constructed as needed.
- Wesley Chapel Road EB off ramp: 6' paved inside shoulder with median barrier, three to four 12' travel lanes, and a 6' to 10' paved outside shoulder. Retaining walls and concrete barriers will be constructed as needed.
- Wesley Chapel Road EB on ramp: 4' paved inside shoulder with median barrier, two 12' travel lanes, and a 10' to 12' paved outside shoulder. Retaining walls and concrete barriers will be constructed as needed.
- Panola Road EB off ramp: 4' paved inside shoulder with median barrier, two to three 12' travel lanes, and a 10' paved outside shoulder.

**NOTE: Although not shown in the Typical Sections (Attachment 3), the existing eastbound lanes of I-20 will be milled to a depth specified by the Pavement Evaluation Report and inlaid with new material. The amount of surfacing and the type of treatment is determined by the pavement evaluation report (Attachment 11b).**

- This project is being constructed as an interim project to a larger programmed CD lane project and managed lane construction project. The current proposed project is meant as a short-term solution until the larger project can be realized and funding can be secured. Because acquisition of right of way was prohibited for this project, all proposed construction will be contained within the existing roadway's clear zone / right of way. Future widening / capacity projects will require additional right of way and will therefore cause the need to remove most, if not all, of the drainage, retaining walls, and sound barriers proposed for this project. However, it is anticipated that much of the proposed paving for this project will be retained for use in the future. See **Attachment 11c** for an itemized cost of items to be removed under future contracts.
- Proposed Design Speed Mainline 70 mph
- Proposed Design Speed CD Lanes 55 mph
- Proposed Maximum grade Mainline 4 %                      Maximum grade allowable 4 %
- Proposed Maximum grade Ramps 6 %                      Maximum grade allowable 6 %
- Proposed Maximum grade Side Street n/a %              Maximum grade allowable n/a %.
- Proposed Maximum grade driveway n/a %
- Proposed Maximum degree of curve:
  - I-20: 1deg. 30' (3819' R)

- I-285 ramps: 5deg. 24' 19" (1060' R)
- Maximum degree allowable:
- I-20: 2deg. 48' 31" (2040'R @ 6%, 70 mph)
  - I-285 ramps: 5deg. 24' 19" (1060' R @ 6%, 55 mph)
- Right of way
    - Width: No right of way will be acquired. Existing right of way varies 300-400 ft.
    - Easements: Temporary ( ), Permanent ( ), Utility ( ), Other ( ).
    - Type of access control: Full (x), Partial ( ), By Permit ( ), Other ( ).
    - Number of parcels:   0   Number of displacements:
      - Business:   0
      - Residences:   0
      - Mobile homes:   0
      - Other:   0
  - Structures:
    - Bridges: No existing bridge decks will be modified or widened. Impacts to bridges will be isolated to reconstructing/reconfiguring bridge column protection and the restriping of travel lanes and shoulders.
    - Retaining walls: Several types of retaining walls will be constructed that may include cantilever walls, gravity walls, L-walls, soil nail, tie-back, and MSE. Depending on right of way restrictions, pier walls and other types of small-footprint type walls may be constructed. Wall types will be analyzed on a case-by-case basis taking into account right of way, cost, utility impacts, and wall-type usage.
  - Major intersections and interchanges:
    - **Interchanges:**
      - I-20 at Columbia Drive: this interchange was included in the study area but no changes are planned.
      - I-20 and I-285: the on ramp from I-285 to eastbound I-20 will be realigned at existing grade.
      - I-20 at Wesley Chapel Road: the eastbound on and off ramps will be realigned at existing grade.
      - I-20 at Panola Road: the eastbound off ramp will be realigned at existing grade.
    - **Intersections:**
      - I-20 eastbound ramps at Wesley Chapel Road: proposed ramp construction will tie to the existing intersection.
      - I-20 eastbound ramps at Panola Road: proposed ramp construction will tie to the existing intersection.
  - Traffic control during construction: Widening and construction will tie to the existing grade of I-20 and all interchange ramps. Minimal temporary lane closures will be needed to overlay existing I-20 and to pave where the proposed construction crosses existing travel lanes and ramps. A long term shoulder closure will be required for the construction of widening and the CD lanes. The closure type and schedule will be established by special provision 150.11 and should be limited to nights and weekends.

- Design Exceptions to controlling criteria anticipated:

	<u>UNDETERMINED</u>	<u>YES</u>	<u>NO</u>
HORIZONTAL ALIGNMENT:	( )	( )	(x)
ROADWAY WIDTH:	( )	(x)	( )
SHOULDER WIDTH:	( )	(x)	( )
VERTICAL GRADES:	( )	( )	(x)
CROSS SLOPES:	( )	( )	(x)
STOPPING SIGHT DISTANCE:	( )	( )	(x)
SUPERELEVATION RATES:	( )	( )	(x)
HORIZONTAL CLEARANCE:	( )	(x)	( )
SPEED DESIGN:	( )	( )	(x)
VERTICAL CLEARANCE:	(x)	( )	( )
BRIDGE WIDTH:	( )	(x)	( )
BRIDGE STRUCTURAL CAPACITY:	(x)	( )	( )

**Roadway Width Exception:** To retain the existing Snapfinger Creek bridge on I-20 and the Miller Road Bridge over I-20, the eastbound lane width is proposed to be reduced to 11' starting at the Snapfinger Creek bridge and ending just past the Miller Road bridge (approximately 5500').

**Shoulder Width Exception #1:** To minimize the amount of construction needed and to reduce the need for right of way, the existing 6'-9" inside shoulders (8' on center) will be retained throughout the project on I-20.

**Shoulder Width Exception #2:** To retain the existing bridge, the outside paved shoulder is proposed to be reduced to 2'-10" on I-20 in area of the bridge over Snapfinger Creek.

**Shoulder Width Exception #3:** To retain the existing bridge, the outside paved shoulder is proposed to be reduced to 2' on I-20 in area of the Miller Road bridge over I-20.

**Shoulder Width Exception #4:** To eliminate the need to acquire right of way, a 6' outside shoulder is proposed on a portion of the I-20 EB off ramp to Wesley Chapel Road.

**Horizontal Clearance Exception #1:** To minimize the amount of construction needed and to reduce the need for right of way, the existing 6'-9" inside shoulders will be retained throughout the project on I-20. The horizontal clearance to concrete side barriers will require a design exception.

**Horizontal Clearance Exception #2:** To retain the existing bridge, the outside paved shoulder is proposed to be reduced to 2'-10" on I-20 in area of the bridge over Snapfinger Creek. The horizontal clearance to concrete side barriers will require a design exception.

**Horizontal Clearance Exception #3:** To retain the existing bridge, the outside paved shoulder is proposed to be reduced to 2' on I-20 in area of the Miller Road bridge over I-20. Because of this, the horizontal clearance to concrete side barriers will require a design exception.

**Horizontal Clearance Exception #4:** To eliminate the need to acquire right of way, a 6' outside shoulder and retaining wall is proposed on a portion of the I-20 EB off ramp to Wesley Chapel Road. The horizontal clearance to the retaining wall will require a design exception.

**Bridge Width Exception:** To retain the existing Snapfinger Creek Bridge, the outside paved shoulder is proposed to be reduced to 2'-10" on I-20.

**Vertical Clearance Exception:** There is a possibility that Miller Road bridge over I-20 does not provide adequate clearance. This will be investigated and an exception will be submitted if conditions merit one.

- Design Variances: None expected.

- Environmental concerns: Impacts to waters of the U.S., Section 404 Permit, floodplains, noise impacts, environmental justice communities.
- Level of environmental analysis anticipated:
  - Are Time Savings Procedures appropriate? Yes (x), No ( ),
  - Categorical exclusion (x),
  - Environmental Assessment/Finding of No Significant Impact (FONSI) ( ), or
  - Environmental Impact Statement (EIS) ( ).
- Utility involvements: Expected involvements will be determined pending a SUE Level B survey of the corridor.
  - Communications
  - Power
  - Gas
  - ITS
  - Telephone

**Project responsibilities:**

- Design: GA DOT Office of Innovative Delivery; Consultant: ARCADIS
- Right of Way Acquisition: N/A
- Relocation of Utilities: Utility Owner
- Letting to contract (**design build**): GA DOT
- Supervision of construction: GA DOT
- Providing material pits: Construction Contractor
- Providing detours: Construction Contractor

**Coordination**

- Initial Concept Meeting date and brief summary: N/A, Due to fast-track schedule, only the concept meeting will be held.
- Concept meeting date and brief summary: Meeting held September 29, 2009. See meeting minutes for summary (Attachment 8).
- P. A. R. meetings, dates and results: None expected.
- FEMA, USCG, and/or TVA: None expected
- Public involvement: A Public Information Open House is anticipated to be held November 17, 2009. Public input will be evaluated and incorporated into the project as appropriate.
- Local government comments: No comments have been received at this time.
- Other projects in the area.
  - 721820-DeKalb (STP00-0165-01(060)): Snapfinger Rd from Wesley Chapel to Flat Shoals Pkwy
  - 712510-DeKalb (NHIM0-0285-01(296)): I-285 from I-20 N to Stone Mountain Fwy
  - 713610-DeKalb (NHIM0-0020-02(166)): I-20 from Columbia Dr east to Evans Mill Rd
  - 742750-DeKalb (STP00-9121-00(005)): Columbia Drive at Columbia Woods Drive / Rainbow Drive
  - 714085-Rockdale (NH000-0020-02(179)): I-20 ATMS Comm/Surveillance fm I-285/Dek to SR 138/SR20 Rock

- M003234-DeKalb (CSNHS-M003-00(234)): I-20 from CR 5154 / Columbia Dr to SR 12/Turner Hill Rd
- M003309-DeKalb (CSNHS-M003-00(309)): I-20 @ CR 5150 / Panola Road – Interchange Improvement
- 0000715 (NHS00-0000-00(715)): I-20 from East Managed Lanes
- 0006898 (CSSTP-0006-00(898)): CR 5195 / Rainbow Drive from Candler Rd to Wesley Chapel Rd
- 0006459 (CSMSL-0006-00(459)): I-285 Noise Walls from I-20 to Bouldercrest Rd
- 0006402 (CSNHS-0006-00(402)): I-20 from I-285/Fulton to I-285/DeKalb – ATMS Ramp Meters
- 0006395 (CSNHS-0006-00(395)): I-285 NE ATMS Ramp Meters from I-85 to I-20
- 0005905 (CSSTP-0005-00(905)): CR 5150/Panola Rd from Thompson Mill Rd to Fairington Rd
- 0002868 (NHS00-0002-00(868)): Panola Rd @ I-20 from Fairington Rd to Snapfinger Woods Dr
- 0000378 (IM000-0000-00(378)): I-285 / I-20 East: Reconstruct Interchange
- Other coordination to date:
  - Section 106 Early Notification Letter sent Sept 04, 2009
  - Georgia DNR Early Coordination letter for T&E Species sent Sept 04, 2009
  - FEMA Early Coordination letter sent Oct 02,2009
- Railroads – N/A

**Scheduling – Responsible Parties’ Estimate (For Detailed Schedule, See Attachment 11d)**

- Time to complete the environmental process:   6   Months.
- Time to complete ~~preliminary construction plans~~ 30% costing plans for the design build project:   8   Months.
- Time to complete right of way plans:   N/A   Months.
- Time to complete the Section 404 Permit:   2.5   Months.
- Time to complete final construction plans:   N/A   Months.
- Time to complete to purchase right of way:   N/A   Months.
- List other major items that will affect the project schedule:            Months.

**Other alternates considered:** Alternatives that were not used are as follows:

**2023 No-Build Scenario**

- Existing Roadway network
- Tie back to the existing three lane section along I-20 eastbound, past Panola Road off ramp

**Alternative 2: 3-Lane Barrier CD with 1-Lane Merge with Mainline east of Wesley Chapel Road On-Ramp**

- Develop a 1-lane eastbound deceleration lane for the CD immediately after the I-20 Eastbound exit ramp to I-285 South.
- Sign the beginning of the CD ‘to Wesley Chapel Road’.
- Start the barrier in the gore where the CD starts.

- Continue the 1-lane CD to the entrance ramp from I-285.
- Merge the I-285 northbound entrance ramp with 2-lane entrance ramp from I-285 southbound to form a 2-lane entrance ramp from I-285.
- Merge the 1-CD lane with the 2-lane entrance ramp from I-285 to form a 3-lane CD.
- Sign the outside CD lane to be exit only to Wesley Chapel and keep the center CD lane to be a decision lane to exit at Wesley Chapel or continue through. (this configuration would provide approximately 4500 feet of weaving segment length along I-20 eastbound CD, between I-285 merge and Wesley Chapel Road exit)
- Merge the acceleration lane from 1-lane Wesley Chapel on-ramp with the 2-lane CD to form a 2-lane CD.
- Continue 2-lane CD for an approximate distance of 2950 feet from the Wesley Chapel Road merge and drop the rightmost lane to form 1-lane CD.
- Continue 1-lane CD for an approximate distance of 2000 feet and merge with 3-lane I-20 eastbound mainline to form 4-lane section on I-20.
- Maintain 4th lane as an auxiliary lane up to Panola Road exit.
- Tie back to the existing three lane section along I-20 eastbound, past Panola Road off ramp

**Alternative 3: 3-Lane Barrier CD with Braided Option and 2-Lane Merge with Mainline**

- Develop a 1-lane eastbound deceleration lane for the CD immediately after the I-20 Eastbound exit ramp to I-285 South.
- Sign the beginning of the CD 'to Wesley Chapel Road'.
- Braid the 1-lane CD from I-20 with the entrance ramp from I-285
- Continue the 1-lane CD to the entrance ramp from I-285.
- Merge the I-285 northbound entrance ramp with 2-lane entrance ramp from I-285 southbound to form a 2-lane entrance ramp from I-285.
- Merge the 1-CD lane with the 2-lane entrance ramp from I-285 to form a 3-lane CD.
- Sign the outside CD lane to be exit only to Wesley Chapel and keep the center CD lane to be a decision lane to exit at Wesley Chapel or continue through. (this configuration would provide approximately 4500 feet of weaving segment length along I-20 eastbound CD, between I-285 merge and Wesley Chapel Road exit)
- Merge the two CD lanes (past 2-lane off-ramp to Wesley Chapel) with 3-lane I-20 eastbound mainline to form a 5-lane section on I-20.
- Keep five lanes along I-20 eastbound segment east of Wesley Chapel Road, with fifth lane dropped off at approximately 4700 feet east of Wesley Chapel Road
- Maintain 4th lane as an auxiliary lane up to Panola Road exit.
- Tie back to the existing three lane section along I-20 eastbound, past Panola Road off ramp

**Alternative 4: 3-Lane Barrier CD with Braided Option and 1-Lane Merge with Mainline**

- Develop a 1-lane eastbound deceleration lane for the CD immediately after the I-20 Eastbound exit ramp to I-285 South.
- Sign the beginning of the CD 'to Wesley Chapel Road'.
- Braid the 1-lane CD from I-20 with the entrance ramp from I-285
- Continue the 1-lane CD to the entrance ramp from I-285.
- Start the barrier where the 3-lane CD starts.

- Merge the I-285 northbound entrance ramp with 2-lane entrance ramp from I-285 southbound to form a 2-lane entrance ramp from I-285.
- Merge the 1-lane CD as a buffer separated lane with the 2-lane entrance ramp from I-285 to form a 3-lane CD.
- Sign the outside CD lane to be exit only to Wesley Chapel and keep the center CD lane to be a decision lane to exit at Wesley Chapel or continue through. (this configuration would provide approximately 4500 feet of weaving segment length along I-20 eastbound CD, between I-285 merge and Wesley Chapel Road exit)
- Merge the acceleration lane from 1-lane Wesley Chapel on-ramp with the 2-lane CD to form a 2-lane CD.
- Continue 2-lane CD for an approximate distance of 2950 feet from the Wesley Chapel Road merge and drop the rightmost lane to form 1-lane CD.
- Continue 1-lane CD for an approximate distance of 2000 feet and merge with 3-lane I-20 eastbound mainline to form 4-lane section on I-20.
- Maintain 4th lane as an auxiliary lane up to Panola Road exit.
- Tie back to the existing three lane section along I-20 eastbound, past Panola Road off ramp

**Alternative 5: Two lane barrier separated CD**

- Develop a 1-lane eastbound deceleration lane for the CD immediately after the I-20 Eastbound exit ramp to I-285 South.
- Sign the beginning of the CD 'to Wesley Chapel Road'.
- Start the barrier in the gore where the CD starts.
- Continue the 1-lane CD to the entrance ramp from I-285.
- Transition I-285 southbound ramp from two lane to one lane ramp, upstream of I-285 northbound ramp merge
- Merge the I-285 northbound entrance ramp with 1-lane entrance ramp from I-285 southbound to form a 1-lane entrance ramp from I-285.
- Merge the 1-CD lane with the 1-lane entrance ramp from I-285 to form a 2-lane CD.
- Sign the outside CD lane to be exit only to Wesley Chapel and keep the inner CD lane to be a decision lane to exit at Wesley Chapel or continue through. Merge the one CD lane (past 2-lane off-ramp to Wesley Chapel) with 3-lane I-20 eastbound mainline to form a 4-lane section on I-20.
- Maintain 4<sup>th</sup> lane as an auxiliary lane up to Panola Road exit.
- Tie back to the existing three lane section along I-20 eastbound, past Panola Road off ramp

**Alternative 6: 3-Lane Barrier CD with 2-Lane Merge with Mainline and Additional Mainline Capacity Improvements**

- Develop a 1-lane eastbound deceleration lane for the CD immediately after the I-20 Eastbound exit ramp to I-285 South.
- Sign the beginning of the CD 'to Wesley Chapel Road'.
- Start the barrier in the gore where the CD starts.
- Continue the 1-lane CD to the entrance ramp from I-285.
- Merge the I-285 northbound entrance ramp with 2-lane entrance ramp from I-285 southbound to form a 2-lane entrance ramp from I-285.
- Merge the 1-CD lane with the 2-lane entrance ramp from I-285 to form a 3-lane CD.

- Sign the outside CD lane to be exit only to Wesley Chapel and keep the center CD lane to be a decision lane to exit at Wesley Chapel or continue through. (this configuration would provide approximately 4500 feet of weaving segment length along I-20 eastbound CD, between I-285 merge and Wesley Chapel Road exit)
- Merge the two CD lanes (past 2-lane off-ramp to Wesley Chapel) with 3-lane I-20 eastbound mainline to form a 5-lane section on I-20.
- Sign the 5<sup>th</sup> lane (outside lane) as an exit only lane to Panola Road and maintain the 4<sup>th</sup> lane as a decision lane to exit to Panola Road or continue on I-20, at approximately 8400 feet from the 2-lane CD merge on to I-20 mainline
- Keep the 4 lane section along I-20 past Panola Road and merge the 1- lane on ramp from Panola Road on to I-20 to form a 4 lane section along I-20
- Maintain the 4<sup>th</sup> lane (outside lane) as an auxiliary lane up to Lithonia Industrial Boulevard / Evans Mill Road exit
- Tie back to the existing three lane section along I-20 eastbound, past Lithonia Industrial Boulevard / Evans Mill Road off ramp

**ANTICIPATED ENVIRONMENTAL COMMITMENTS**  
**P.I. No. 0009542/DeKalb County**  
**I-20 Eastbound from I-285 to CR 5150/Panola Road – Collector Distributor System**

Pre-Construction Commitments

- The presence of migratory birds requires that Special Provisions 107.23G will be followed. These provisions prohibit the demolition or reconstruction of existing bridges or culverts during the nesting season of these species from 01 April to 31 August unless exclusionary barriers are installed prior to 01 March but after 31 August, as described in Special Provision 107.23G, and successfully prevent the nesting of migratory birds on the bridge or in the culvert.
- A National Pollutant Discharge Elimination System (NPDES) permit shall be required for this project. The permit shall be acquired by the construction contractor following the award of the contract but prior to the start of construction.
- A Nationwide Permit (NWP) 23 with a preconstruction notice (PCN) is anticipated under Section 404 of the Clean Water Act and would need to be obtained from the U.S. Army Corps of Engineers (USACE) prior to construction.
- Mitigation may be required for stream impacts from culvert replacement and is at the discretion of the USACE Project Manager due to the permit type. Mitigation will be done in accordance with the USACE, Savannah District's March 2004 SOP for compensatory mitigation through the purchase of mitigation credits from an agency approved commercial mitigation bank that services HUC 03070103 or by a contribution to the In-Lieu Fee Program with the Georgia Land Trust Service Center.

During Construction Commitments

- In the event that any incident occurs that causes harm to, or could be detrimental to the continued existence of, migratory birds along the project corridor, the Contractor shall report the incident immediately to the Project Engineer. The Project Engineer will follow the notification requirements set forth in Special Provision 107.23G.
- Noise walls will be constructed along impacted receivers on both sides of I-20. [Note: Locations in the vicinity of the I-20/I-285 interchange have not yet been fully determined and are pending FHWA guidance.]

Post Construction Commitments

- Post-construction measures outlined in Special Provisions 107.23G for the protection of migratory birds will be followed.



Construction Cost Estimate  
 I-20 East Project  
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LATEST CE  
 5/9/2010

Temporary Items

Item	Quantity	Unit	Unit Cost	Total Cost
Traffic Control	1	LS	\$ 7,492,000.00	\$ 7,492,000.00
Field Engineer's Office TP3	1	EA	\$ 76,758.00	\$ 76,758.00
Traffic Control, Portable Impact Attenuator	10	EA	\$ 13,200.00	\$ 132,000.00
Temporary Barrier Method 1	10560	LF	\$ 31.00	\$ 327,360.00
<b>Sub Total Temporary Items</b>				<b>\$ 8,028,118.00</b>

Earthwork

Item	Quantity	Unit	Unit Cost	Total Cost
Grading Complete	1	LS	\$ 5,038,000.00	\$ 5,038,000.00
<b>Sub Total Earthwork</b>				<b>\$ 5,038,000.00</b>

Roadway Construction

Item	Quantity	Unit	Unit Cost	Total Cost
12.5 mm SMA - 400-3604	22,000	TN	\$ 101.00	\$ 2,222,000.00
12.5 mm PEM - 400-3624	24,000	TN	\$ 80.00	\$ 1,920,000.00
12.5 MM Superpave - 400-3101	4,000	TN	\$ 105.00	\$ 420,000.00
Recycled 25 mm Superpave - 402-3121	95,000	TN	\$ 63.00	\$ 5,985,000.00
Recycled 19 mm Superpave - 402-3190	24,000	TN	\$ 60.00	\$ 1,440,000.00
BITUM Tack Coat - 413-1000	69,000	GL	\$ 2.00	\$ 138,000.00
GR AGGR BASE CRS, 12 INCH, INCL MATL - 310-5120	107,463	SY	\$ 20.40	\$ 2,192,245.20
Concrete Median Barrier, Type 26	5563	LF	\$ 200.00	\$ 1,112,600.00
Concrete Side Barrier	1585	LF	\$ 39.00	\$ 61,815.00
Mill, 8 1/4" depth	135,000	SY	\$ 8.70	\$ 1,174,500.00
Mill, 2" depth	30,600	SY	\$ 6.50	\$ 198,900.00
Impact Attenuator Unit Type P-3-U-30	2	EA	\$ 17,113.00	\$ 34,226.00
Chain Link Fence	9114	LF	\$ 40.00	\$ 364,550.00
Indentation Rumble Strips Ground In-place	7	GLM	\$ 947.00	\$ 6,629.00
Changeable Message Sign, Portable, Type 3	6	EA	\$ 12,875.00	\$ 77,250.00
Guardrail Type T	350	LF	\$ 52.00	\$ 18,200.00
Guardrail Type W	10670	LF	\$ 17.00	\$ 181,390.00
Guardrail Anchor TP1	9	EA	\$ 673.00	\$ 6,057.00
Guardrail Anchor TP 5	17	EA	\$ 1,008.00	\$ 17,136.00
Guardrail Anchor TP12	16	EA	\$ 1,762.00	\$ 28,192.00
<b>Sub Total Roadway Construction</b>				<b>\$ 17,598,690.20</b>

Bridge

Item	Quantity	Unit	Unit Cost	Total Cost
Bridge Jacking Inclusive, Miller Rd	0	LUMP	\$ 300,000.00	\$ -
<b>Sub Total Bridge</b>				<b>\$ -</b>

Walls

Item	Quantity	Unit	Unit Cost	Total Cost
Retaining Wall (0 ft - 20ft) All types	59,181	SF	\$ 70.00	\$ 4,142,687.50
Sound Walls	16,290	LF	\$ 400.00	\$ 6,516,000.00
<b>Sub Total Walls</b>				<b>\$ 10,658,687.50</b>

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**Drainage Items**

Item	Quantity	Unit	Unit Cost	Total Cost
Class A Conc	4480	CY	\$ 526.00	\$ 2,356,480.00
Class A Conc Including Reinf Steel	10	CY	\$ 740.00	\$ 7,400.00
Bar Reinf Steel	487000	LB	\$ 1.00	\$ 487,000.00
Storm Drain Pipe 18 in 1-10 ft	18230	LF	\$ 36.00	\$ 656,280.00
Storm Drain Pipe 24 in 1-10 ft	9120	LF	\$ 44.00	\$ 401,280.00
Storm Drain Pipe 30 in 1-10 ft	5470	LF	\$ 54.00	\$ 295,380.00
Storm Drain Pipe 36 in 1-10 ft	3650	LF	\$ 66.00	\$ 240,900.00
Storm Drain Pipe 48 in 10-15 ft	1830	LF	\$ 116.00	\$ 212,280.00
Flared End Section 18 in	10	EA	\$ 551.00	\$ 5,510.00
Flared End Section 24 in	5	EA	\$ 643.00	\$ 3,215.00
Flared End Section 30 in	3	EA	\$ 761.00	\$ 2,283.00
Flared End Section 36 in	2	EA	\$ 1,055.00	\$ 2,110.00
Stone Dumped Rip-Rap TP 3, 24"	450	SY	\$ 47.00	\$ 21,150.00
Plastic Filter Fabric	450	SY	\$ 4.00	\$ 1,800.00
Drop Inlet Group 1	130	EA	\$ 3,588.00	\$ 466,440.00
Drop Inlet Add'l Depth GP 1	260	LF	\$ 255.00	\$ 66,300.00
Drop Inlet Group 2	10	EA	\$ 3,111.00	\$ 31,110.00
Drop Inlet Add'l Depth GP 2	20	LF	\$ 273.00	\$ 5,460.00
<b>Sub Total Drainage Items</b>				<b>\$ 5,262,378.00</b>

**Signing, Marking, ITS Items**

Item	Quantity	Unit	Unit Cost	Total Cost
Highway signs, tp 1 matl, refl sheeting, tp 3	900	SF	\$ 16.00	\$ 14,400.00
Highway signs, tp 2 matl, refl sheeting, tp 3	9000	SF	\$ 17.00	\$ 153,000.00
Highway signs, tp1, matl, refl sheeting tp 9	600	SF	\$ 20.00	\$ 12,000.00
Highway signs, tp2, matl, refl sheeting tp 9	900	SF	\$ 37.00	\$ 33,300.00
Highway signs, alum extruded panels, refl sheeting, tp 3	9000	SF	\$ 30.00	\$ 270,000.00
Galv steel posts, tp 7	800	LF	\$ 8.00	\$ 6,400.00
Galv steel posts, tp 8	800	LF	\$ 11.00	\$ 8,800.00
Galv steel posts, tp 9	1500	LF	\$ 9.00	\$ 13,500.00
Galv steel str shape post	12000	LB	\$ 3.00	\$ 36,000.00
Delineator, tp 1	300	EA	\$ 46.00	\$ 13,800.00
Piling in place, signs, steel h, hp 12 x 53	600	LF	\$ 82.00	\$ 49,200.00
Str support for overhead sign, tp i, sta -	8	EA	\$ 100,000.00	\$ 800,000.00
Thermoplastic pvmt marking, arrow, tp 2	140	EA	\$ 88.00	\$ 12,320.00
Thermoplastic pvmt marking, word, tp 13	40	EA	\$ 1,560.00	\$ 62,400.00
Thermoplastic pvmt marking, symbol, tp 1	140	EA	\$ 234.00	\$ 32,760.00
Thermoplastic solid traf stripe, 5 in, white	77000	LF	\$ 0.50	\$ 38,500.00
Thermoplastic solid traf stripe, 5 in, yellow	77000	LF	\$ 0.50	\$ 38,500.00
Thermoplastic solid traf stripe, 10 in, white	36000	LF	\$ 1.50	\$ 54,000.00
Thermoplastic skip traf stripe, 5 in, white	167000	GLF	\$ 0.50	\$ 83,500.00
Thermoplastic traf striping, white	10000	SY	\$ 2.00	\$ 20,000.00
Raised pvmt markers tp 3	1600	EA	\$ 4.00	\$ 6,400.00
ITS	1	LUMP	\$ 600,000.00	\$ 600,000.00
Traffic Signal				
<b>Sub Total Signing, Marking, ITS Items</b>				<b>\$ 2,358,780.00</b>

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Erosion Control Items

Item	Quantity	Unit	Unit Cost	Total Cost
Temporary Grassing	21	AC	\$ 529.00	\$ 11,109.00
Mulch	609	TN	\$ 204.00	\$ 124,236.00
Construction Exit	13	EA	\$ 1,822.00	\$ 23,686.00
Construct And Remove Silt Control Gate, Tp3	31	EA	\$ 903.00	\$ 27,993.00
Construct And Remove Temp Ditch Checks	303	EA	\$ 165.00	\$ 49,995.00
Construct And Remove Inlet Sediment Trap	21	EA	\$ 266.00	\$ 5,586.00
Maintenance Of Temporary Silt Fence - Type C	15101	LF	\$ 1.00	\$ 15,101.00
Maint Of Erosion Control Checkdams / Ditch Checks	303	EA	\$ 71.00	\$ 21,513.00
Maintenance Of Silt Control Gate, Tp 3	31	EA	\$ 172.00	\$ 5,332.00
Maintenance Of Construction Exit	13	EA	\$ 488.00	\$ 6,344.00
Maintenance Of Inlet Sediment Trap	21	EA	\$ 95.00	\$ 1,995.00
Water Quality Monitoring And Sampling	30	EA	\$ 1,485.00	\$ 44,550.00
Water Quality Inspections	12	MOS	\$ 917.00	\$ 11,004.00
Temporary Silt Fence, Type A	7551	LF	\$ 2.00	\$ 15,102.00
Temporary Silt Fence, Type C	30202	LF	\$ 3.00	\$ 90,606.00
Permanent Grassing	42	AC	\$ 839.00	\$ 35,238.00
Agricultural Lime	84	TN	\$ 60.00	\$ 5,040.00
Liquid Lime	105	GAL	\$ 20.00	\$ 2,100.00
Fertilizer Mixed Grade	42	TN	\$ 409.00	\$ 17,178.00
Fertilizer Nitrogen Content	2100	LB	\$ 2.00	\$ 4,200.00
Bituminous Treated Roving, Waterways	2014	SY	\$ 2.00	\$ 4,028.00
Erosion Control Mats, Slopes	5034	SY	\$ 1.00	\$ 5,034.00
<b>Sub Total Erosion Control Items</b>				<b>\$ 526,970.00</b>

Construction Cost Estimate  
 I-20 East Project  
 Project: NHM0-0020-02(166)  
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**Summary**

Sub Total Temporary Items				\$ 8,028,118.00
Sub Total Earthwork				\$ 5,038,000.00
Sub Total Roadway Construction				\$ 17,598,690.20
Sub Total Bridge				\$ -
Sub Total Walls				\$ 10,658,687.50
Sub Total Drainage Items				\$ 5,262,378.00
Sub Total Signing, Marking, ITS Items				\$ 2,358,780.00
Sub Total Erosion Control Items				\$ 526,970.00

Section 109 - Unleaded Fuel	\$ 402,760.00
Section 109 - Diesel Fuel	\$ 1,601,291.00
Section 109 - Asphalt Cement Price Adjustment	\$ 141,187.00
Section 109 - 400/402 Asphalt Cement Price Adjustment	\$ 4,025,580.00
<b>Total</b>	<b>\$ 55,642,441.70</b>

Contingency (@10% of Subtotal and Section 109)				\$ 5,564,244.17
Design Complete				\$ 2,200,000.00
Estimated Construction Cost				\$ 63,410,000.00

## VALUE ENGINEERING PROCESS

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE study during the period 9 – 12 February 2010 in Atlanta, Georgia for the Georgia Department of Transportation. The study was conducted at the offices of the Georgia DOT.

### INTRODUCTION

The Value Engineering Study team and leadership were provided by PBS&J supplemented by a bridge design engineer from Civil Services, Inc. (CSI). This team consisted of the following:

Charles R. McDuff, PE, CVS-Life	PBS&J	Team Leader
Luke Clarke, PE, AVS	PBS&J	Senior Highway Design Engineer
Kevin Martin, Esq., AVS	PBS&J	Highway Construction Specialist
Ramesh Kalvakalvaa, PE, AVS	CSI	Senior Bridge Design Engineer

The Value Engineering Team followed the Seven Step Value Engineering Job Plan as promulgated by SAVE International. The Seven Step Job Plan includes the following:

- **Investigation/Information Phase** – during this phase of the VE Team’s work, the team received a briefing from the Georgia Department of Transportation (GDOT) staff and their design consultants from Arcadis. This briefing included discussions of the design intent behind the project, the cost concerns, and the physical project limitations. In the working session that followed, the VE team developed cost models from the cost data provided by the designers and familiarized themselves with the construction drawings and other data that was made available to the team. Some of the representative project information (concept report, cost estimate, and special provisions) may be found in the tabbed section of this report entitled **Project Description**. Following this current narrative the reader will also find a cost model done in the Pareto fashion, i.e., identifying the high cost items down to the lowest costs, for the larger construction cost elements. This cost model, developed by the VE Team was used by the team to help focus their week of work. The headings on the Pareto Chart also were used as headings for the creative phase activities.
- **Analysis Phase** – during this phase the VE Team determined the “**Functions**” of the project. This was accompanied by reviewing the project from the simplest format in asking the questions of “What is the project supposed to do?”, and “How is it supposed to accomplish this purpose?”. In the Value Engineering vernacular, the answers to these questions are cast in the form of active verbs and measurable nouns. These verb/noun pairs form the basis of the function analysis which distinguishes a Value Engineering effort from a potentially damaging cost cutting exercise. A FAST diagram was prepared highlighting the project’s required functions.

- In the specific instance of this project, the important functions of the project were identified as follows:
  - Project Objectives and Goals:
    - Enhance Operational Characteristics
  - Project Basic Functions
    - Reduce weaving conflicts
    - Mitigate Noise
    - Convey Storm Water
- **Speculation Phase** – The VE Team performed a brainstorming session to identify ideas that might help meet the project objectives:
  - Explore ways to widen the proposed 11’ lanes to 12’ lanes
  - Reduce sound wall costs through alternative wall types, alternative materials or by reducing wall heights and lengths of runs
  - Review traffic geometric design in order to add to the already effective design that will greatly reduce the weaving conflicts along this portion of the I-20 corridor

The brainstorming session initially identified numerous ideas that were then evaluated in the Judgment Phase. The reader will find the creative worksheets enclosed. These same work sheets were also used to record the results off the Judgment/Evaluation Phase.

- **Evaluation Phase** – Once the VE Team identified the creative ideas, it was necessary to decide which alternatives should be carried forward. This is the work of the Evaluation or Judgment Phase. The VE Team reflected back on the project constraints and objectives shared with the team by the Owner’s representatives and the design team members. This guidance emerged on the first day of the study at the kick-off meeting. From that guidance, the team selected ideas that they believed would improve the project by a vote process.

Following that selection process, the VE Team used the following values as measures of whether or not an alternative had enough merit to be carried forward in the VE process:

- Expedite project delivery
- Live within critical design constraints (avoid R/W acquisition, stay within the bounds of the existing environmental categorical exclusion, etc.)
- “Implementability” of the alternatives
- Improve Value
- Enhances maintainability
- Construction Cost Savings
- Life Cycle Cost Savings

Based on these criteria, the VE Team evaluated the alternatives and graded them from 5 (Excellent) down to 1 (Poor). Other notes about the alternatives are annotated at the bottom of the enclosed creative and evaluation sheets.

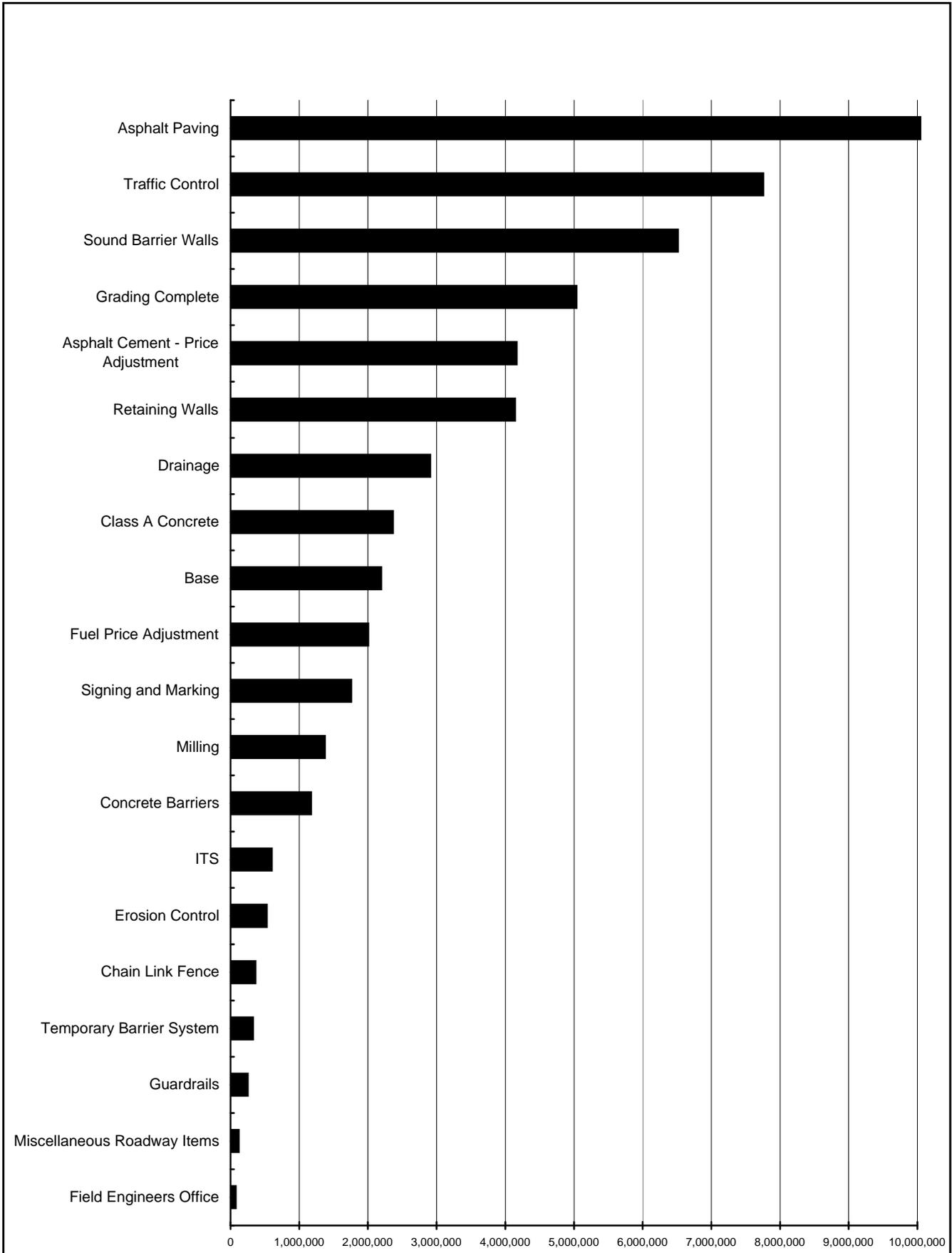
- **Development Phase** – During this phase, the VE Team developed each of the selected alternatives whose rating was “4” or “5” because of time constraints. If time permits, the team will develop additional recommendations. This effort included a detailed

explanation of the idea with sketches as appropriate to clarify the idea from the original concept, advantages and disadvantages, a technical explanation and an estimation of the cost and resultant cost savings if implemented. (See the tabbed section of this report entitled – “**Study Results**”).

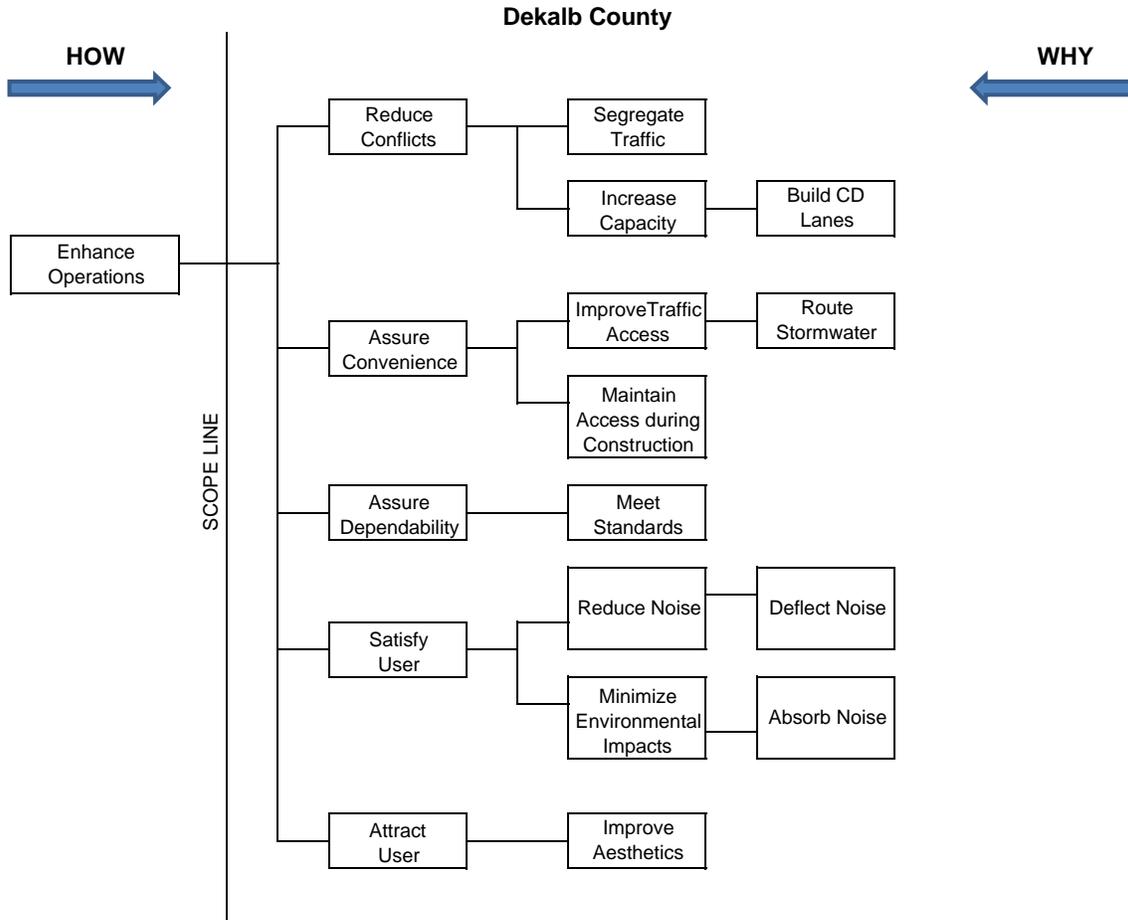
- **Recommendation Phase** – During this phase the VE Team reviews the alternative ideas to confirm which ones are appropriate for the project, provide an opportunity for success and which will improve the value of the project if implemented.
- **Presentation Phase** – As noted earlier, the team made an informal “out-briefing” on the last day of the workshop. This presentation was designed to inform the Owners and the Designers of the initial findings of the VE study. This written report is intended to formalize those findings.

# PARETO CHART - COST HISTOGRAM

<b>PROJECT: Georgia Department of Transportation</b> <b>P.I. No. 0009542</b>  <b>I-20 Eastbound from I-285 to CR 5150/Panola Road - Collector Distributor System</b> <b>DeKalb County</b>			
PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Asphalt Paving	12,125,000	21.74%	21.74%
Traffic Control	7,756,000	13.90%	35.64%
Sound Barrier Walls	6,516,000	11.68%	47.32%
Grading Complete	5,038,000	9.03%	56.35%
Asphalt Cement - Price Adjustment	4,166,767	7.47%	63.82%
Retaining Walls	4,142,688	7.43%	71.25%
Drainage	2,905,898	5.21%	76.46%
Class A Concrete	2,363,880	4.24%	80.70%
Base	2,192,245	3.93%	84.63%
Fuel Price Adjustment	2,004,051	3.59%	88.22%
Signing and Marking	1,758,780	3.15%	91.37%
Milling	1,373,400	2.46%	93.83%
Concrete Barriers	1,174,415	2.11%	95.94%
ITS	600,000	1.08%	97.02%
Erosion Control	526,970	0.94%	97.96%
Chain Link Fence	364,560	0.65%	98.61%
Temporary Barrier System	327,360	0.59%	99.20%
Guardrails	250,975	0.45%	99.65%
Miscellaneous Roadway Items	118,105	0.21%	99.86%
Field Engineers Office	76,758	0.14%	100.00%
<b>Construction Cost</b>	<b>\$ 55,781,852</b>		
<b>E &amp; C Rate @10%</b>	<b>\$ 5,872,236</b>		
<b>Total Construction Costs</b>	<b>\$ 61,654,088</b>		
<b>Right-of-Way</b>	<b>\$ -</b>		
<b>Utilities Reimbursement</b>	<b>\$ 3,222,852</b>		
<b>TOTAL</b>	<b>\$ 64,876,940</b>		



**CUSTOMER FUNCTION/TASK DIAGRAM**  
**P.I. No. P.I. No. P.I. No. 0009542**  
**I-20 Eastbound from I-285 to CR 5150/Panola Road**  
**Collector-Distributor System**



# DESIGNER PRESENTATION



## MEETING PARTICIPANTS

Geogia Department of Transportation		February 9, 2010		
P.I. No. 0009542				
DeKalb County				
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Mike Dover		GDOT-IPD	<a href="mailto:mdover@dot.ga.gov">mdover@dot.ga.gov</a>	404-631-1733

# VE TEAM PRESENTATION



## MEETING PARTICIPANTS

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DeKalb County			
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# CREATIVE IDEA LISTING



PROJECT:	<b>Georgia Department of Transportation</b> <b>P.I. No. 0009542</b> <b>I-20 Eastbound from I-285 to CR 5150/Panola Road –</b> <b>Collector Distributor System</b> <b>DeKalb County</b>	SHEET NO.: 1 of 2
NO.	IDEA DESCRIPTION	RATING
<b>ASPHALTIC CONCRETE (AC)</b>		
AC-1	Utilize a 10' in-lieu of a 12' outside shoulder on collector/distributor (CD) lane	4
AC-2	Coordinate with planned maintenance resurfacing project (P.I. No. M003234)	4
AC-3	Utilize 4% cross-slope on outside shoulders in tangent sections	4
AC-4	Utilize 10' paved shoulders on I-20 mainline	2
AC-5	Utilize 11' travel lanes on CD	2
AC-6	Utilize 11' travel lanes on I-20 widening	1
AC-7	Use full depth pavement on inside shoulders	2
AC-8	Improve inside shoulder for traffic shift between Snapfinger Cr Bridge and Miller Road Bridge	3
AC-9	Replace Miller Road Bridge	3
AC-10	Optimize lane drops	2
AC-11	Reconfigure CD road at Wesley Chapel Road	3
<b>MISCELLANEOUS (MS)</b>		
MS-1	Use precast in lieu of cast-in-place structures	3
MS-2	Use single ConSpan-type structure at Cobb's Creek	3
MS-3	Use double-sided guardrail in-lieu of concrete barrier rail to separate CD-GP lanes	4
MS-4	Use corrugated metal pipe for CD drainage	4
MS-5	Use slab span for 4 – 10' x 12' box extension	2
MS-6	Use "HOV" striping to separate CD from general purpose lanes	2
MS-7	Use open graded friction course (OGFC) in lieu of porous European Mix (PEM)	2
MS-8	Use micromill/inlay on mainline	2
MS-9	Use ramp meters to manage flow	2
MS-10	Use two lane flyover at Miller Road	2
<b>Rating: 1→2 = Not to be Developed; 3 = Varying Degrees of Development Potential;</b> <b>4→5 = Most likely to be Developed; DS = Design Suggestion; ABD = Already Being Done</b>		

# CREATIVE IDEA LISTING



PROJECT: **Georgia Department of Transportation** SHEET NO.: **2 of 2**  
**P.I. No. 0009542**  
**I-20 Eastbound from I-285 to CR 5150/Panola Road –**  
**Collector Distributor System**  
**DeKalb County**

NO.	IDEA DESCRIPTION	RATING
<b>RETAINING WALLS (RW)</b>		
RW-1	Use MSE walls in-lieu of cast-in-place concrete retaining walls	5
RW-2	Use modular block walls in-lieu of cast-in-place walls	1
RW-3	Provide soil stabilization in-lieu of wall construction	4
RW-4	Selectively lower wall height	1
RW-5	Selectively reduce wall length	See RW-3
RW-6	Selectively use Gabion Baskets	1
RW-7	Use gravity walls where appropriate	2
RW-8	Construct earthen shoulders where appropriate	4
RW-9	Affix sound walls to retaining walls where appropriate	5
RW-10	Use sheet piles in lieu of concrete retaining walls	4
<b>SOUND BARRIERS (SB)</b>		
SB-1	Eliminate sound barriers	1
SB-2	Selectively reduce length of sound barriers	1
SB-3	Defer sound barrier walls on westbound roadway	4
SB-4	Defer sound barriers for undeveloped subdivision areas (between Snapfinger Creek and Miller Road Eastbound)	4
SB-5	Selectively reduce height of sound barriers	1
SB-6	Selectively use earth berms in-lieu of sound barriers	2
SB-7	Use HESCO baskets in lieu of sound walls	See RW-3
SB-8	Use European planter baskets in lieu of sound walls	2
SB-9	Relocate sound barriers to be adjacent to shoulder to save trees	5

**Rating: 1→2 = Not to be Developed; 3 = Varying Degrees of Development Potential;**  
**4→5 = Most likely to be Developed; DS = Design Suggestion; ABD = Already Being Done**