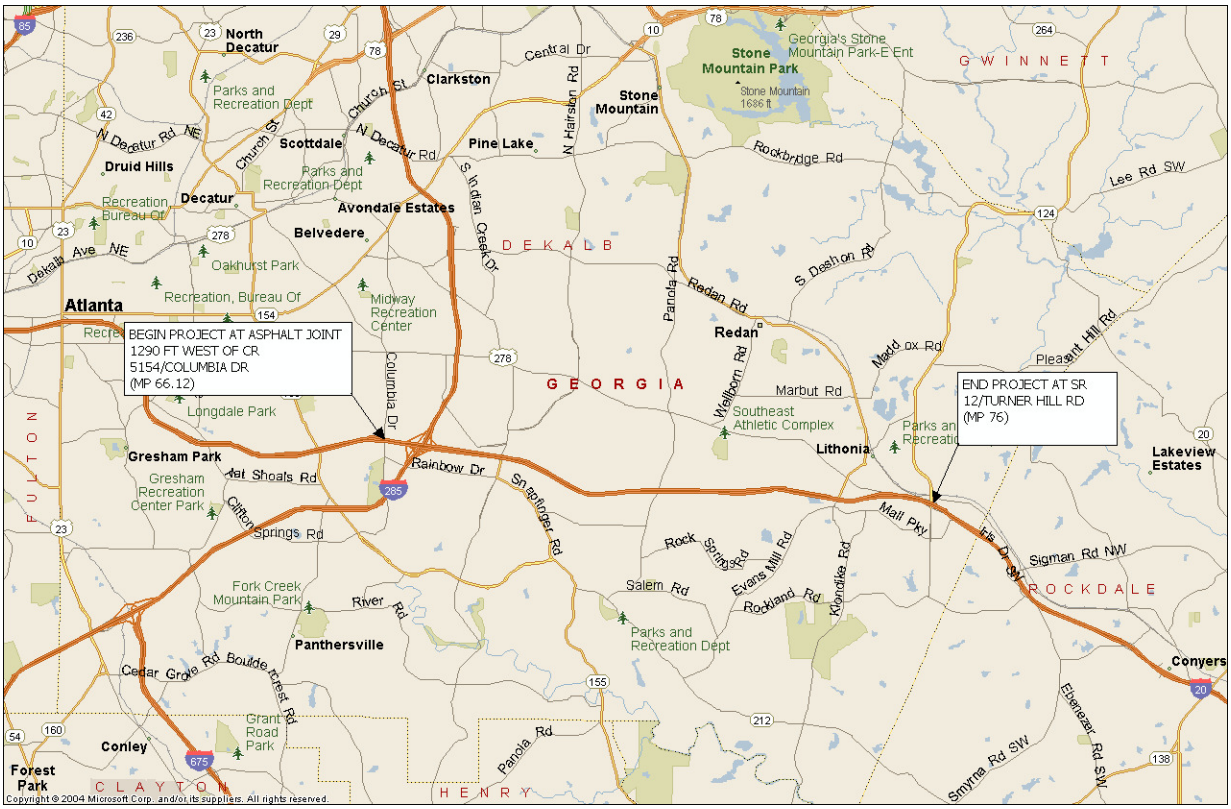
Value Engineering Study Report

Georgia Department of Transportation
CSNHS-M003-00(234) – P.I. No. M003234
I-20 Resurfacing
DeKalb County



Value Engineering Team

Design Team

May 6, 2009

May 5, 2009

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 I-20 Resurfacing
Project Nos.: CSNHS-M003-00(234) – P.I. No. M003234
DeKalb County

This Value Engineering Study, which was performed on May 4, 2009, identified **8** ***alternatives*** of which **7 are recommended for implementation**. We believe that these ***Ideas*** may have a significant positive affect on the project.

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

Alan K. Adelgren, P.E., CVS-Life
VE Team Leader

Value Engineering Study Report

Project No. CSNHS-M003-00(234) – P.I. No. M003234

Resurfacing of I-20

DeKalb County

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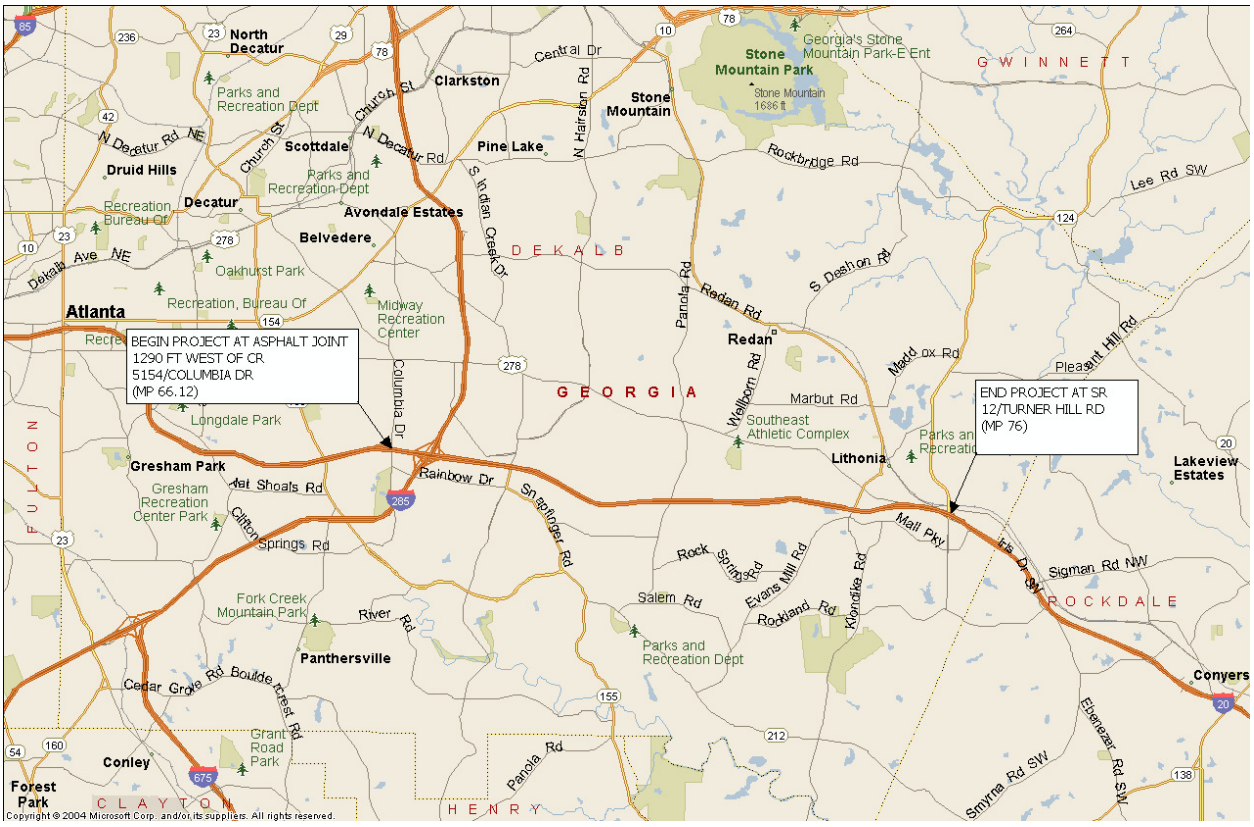
EXECUTIVE SUMMARY

PROJECT OVERVIEW

This report summarizes the analysis, conclusions, and recommendations by the PBS&J Value Engineering workshop team as they performed a Value Engineering Study on May 4, 2009, in Atlanta, at the office of the Georgia Department of Transportation. The subject of the study was Project CSNHS-M003-00(234) - P.I. No. M003234. The project involves the resurfacing of a portion of I-20, from east of the CR 5154 / Columbia Drive interchange to the west of the SR 12/124/Turner Hill Road interchange.

PROJECT DESCRIPTION & LOCATION

CSNHS-M003-00(234) is located within DeKalb County. The length of the project is 9.87 miles and present traffic count is 188,090 vehicles per day.



The estimated construction cost for the project is $44,337,453.22.

PROJECT CONCERNS AND OBJECTIVES

Some of the information from the concept report and the designer's presentation indicated the following important points about the project:

- Comply with Standards
- Need to improve safety
- Re-establish rideablility

CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified **8** ***alternatives*** 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, the team had selected ***7*** *of the* ***alternatives for final development.*** These recommendations are presented in the ***Study Results***.

Summary of Project Recommendations

PROJECT: **Georgia Department of Transportation**
CSNHS-M003-00(234) – P.I. No. M003234
DeKalb County
I-20 Resurfacing

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

IDEA NUMBER	DESCRIPTION OF RECOMMENDATION	
1	Divide project at I-285 due to differing traffic control requirements	3
2	Allow longer segments for weekend closures	4
3	Use Option 2 mix only	5
4	Mill and inlay shoulder first to remove rumble strips	5
5	Open graded friction course (OGFC) instead of PEM	5
6	Build from outside to inside, construct outside shoulder improvements first	4
7	Evaluate shoulder for sufficiency	4
8	Limit or restrict truck traffic to traffic lanes, not on shoulder	Combined w/ #7

Rating: 1→2 = Not to be Developed; 3 = Varying Degrees of Development Potential; 4→5 = Most likely to be Developed
C = Combined With (Idea Number); DS = Design Suggestion; ABD = Already Being Done; OB= Observation

Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(234) – P.I. No. M003234** **DeKalb County** **I-20 Resurfacing**	ALTERNATIVE NO.: 1
DESCRIPTION:	**Divide project at I-285 due to differing traffic control requirements**	SHEET NO.: **1** of **1**

Original Design:

The original design intent has the resurfacing project commence approximately 0.6 miles west of the I-285 perimeter ring, from CR 5154 / Columbia Drive interchange, then continue eastward to the SR 12/124/Turner Hill Road interchange. This may result with the project having two separate traffic control requirements

Alternative:

The alternative would divide the project into two separate phases:

(1) I-20 at I-285, commencing 1290 feet west of the CR 5154 / Columbia Drive interchange (MP 66.12) continuing eastward past the I-285 interchange.

(2) I-20 east of I-285, commencing from the I-20 / I-285 interchange eastward to the SR 12/124/Turner Hill Road interchange (MP 76).

Opportunities:

- Avoids having differing Section 150 - Traffic Control – Special Provisions for the work areas.

Risks:

- Additional costs incurred for contract and construction management

Technical Discussion:

The project may encounter separate traffic control requirements and restrictions for work performed inside the I-285 perimeter road, versus work performed beyond the perimeter road. The ADT differentials between the inside and outside of the I-285 perimeter will dictate these conditions. These differing requirements may require separate Section 150 - Traffic Control – Special Provisions for the work areas which would have construction cost implications, and have the potential to create confusion within construction contractor.

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Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(234) – P.I. No. M003234** **DeKalb County** **I-20 Resurfacing**	ALTERNATIVE NO.: **2**
DESCRIPTION:	**Allow longer segments for weekend closures**	SHEET NO.: **1** of **1**

Original Design:

The original design calls for the length of any lane closure to be limited to 2 miles in length as outlined in paragraph 150.02-C-1a (page 20) of Special Provision 150 – Traffic Control.

Alternative:

The alternative would specifically allow for a longer length of lane closure during the periods of weekend work.

Opportunities:

- Allow a single contiguous work zone as opposed to multiple work areas
- Reduce the number of transverse joints
- Eliminate the movement of men and equipment from one work zone to another

Risks:

- Increased traffic delay

Technical Discussion:

By increasing the work zone length it will allow the contractor to construct the maximum length of paving without having to reset his work zone or to use multiple work zones.

Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(234) – P.I. No. M003234** **DeKalb County** **I-20 Resurfacing**	ALTERNATIVE NO. **3**
DESCRIPTION:	**Use option 2 pavement design**	SHEET NO.: **1** of **1**

Original Design:

The original design calls for two options for the pavement inlay, Option 1 requires four pavement design mixes in varying thicknesses. Option 2 requires three pavement design mixes.

Alternative:

The alternative would choose to implement the pavement build-up as described in Option 2.

Opportunities:

- Reduces construction time
- Reduction in number of pavement design mixes

Risks:

- None identified

Technical Discussion:

The pavement evaluation summary provided to the team by OMR includes two options regarding proposed pavement mixes and thicknesses. Option one includes four pavement design mixes, including 19mm Superpave. Option two includes three design mixes and omits the 19mm Superpave, opting to use 25mm Superpave in thicker lifts to account for the vertical differential. The recommendation is to use Option two as found in the OMR Pavement Evaluation Review, which would reduce the pavement design mixes from four to three.

Greater benefits may accrue from using the proposed pavement build-up in Option two by being able to place the 25mm Superpave in thicker lifts, possibly reducing the number of paving pulls from five to four throughout the project. The reduction of one pull of base throughout the project would be greatly beneficial in the time required to construct the project, and would reduce the number and time durations of lane closures.
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Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(234) – P.I. No. M003234** **DeKalb County** **I-20 Resurfacing**	ALTERNATIVE NO.: **4**
DESCRIPTION:	**Mill/Inlay shoulder first to remove rumble strips**	SHEET NO.: **1** of **1**

Original Design:

The original design calls for leveling course for shoulders to remove rumble strips and decrease the shoulder grade; milling/inlay and patch the shoulders after the travel lanes are open.

Alternative:

The alternative would mill/inlay and patch shoulders per project specifications at the beginning of the project.

Opportunities:

- Reduce the project cost
- Decrease project time

Risks:

- Reduced speed limits during on shoulder during lane closings

Technical Discussion:
The alternative would mill/inlay the shoulder to project specifications at the beginning of the project prior to diverting traffic onto the shoulder, thereby eliminate the need/cost for the leveling and patching cost. Traffic diverted onto the shoulder should be restricted to passenger vehicle at a lower speed limit. This will decrease construction cost by approximately $250,000.00, by reducing or eliminating the estimated quantities for:

402-1802-Recycled Asphaltic Concrete, Patching (approximately $83,000)
402-1812- Recycled Asphaltic Concrete, Leveling (approximately $174,000)

Overlaying the outside shoulder with 12.5mm Superpave at the beginning of the project, rather than the end, could well minimize the necessity of the patching and leveling items.

Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation CSNHS-M003-00(234) – P.I. No. M003234 DeKalb County I-20 Resurfacing**	ALTERNATIVE NO.: **5**
DESCRIPTION:	**Use open graded friction course (OGFC) instead of PEM**	SHEET NO.: **1** of **1**

Original Design:

The original design calls for the use of a 12.5mm PEM drainage surface.

Alternative:

The alternative proposal suggests considering the use of 12.5mm OGFC as the drainage surface.

Opportunities:

- Reduces paving cost
- Would not alter existing profile grade

Risks:

- None identified

Technical Discussion:

The alternative proposes the consideration of OGFC as a drainage course in lieu of the PEM that is currently designed. The OGFC could be placed in thinner lifts (90LB/SY for OGFC, 135LB/SY for PEM) resulting in a reduction of approximately 30% of the estimated quantities of PEM.

Using OGFC would allow tie-in to existing bridge approach slabs and other associated fixtures without adjustments to the existing profile grade line.

According to the GDOT Mean Item Summary, the average let cost per ton for the PEM item is 400-3624, which is $80.94/ton. The estimated cost for OGFC is 400-3206 is $72.96/ton, resulting in comparable cost savings even before cost saving realized by utilizing the thinner application.

Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(234) – P.I. No. M003234** **DeKalb County** **I-20 Resurfacing**	ALTERNATIVE NO.: **6**
DESCRIPTION:	**Build from the outside to inside**	SHEET NO.: **1** of **1**

Original Design:

The original design does not address specific lane construction sequencing.

Alternative:

The alternative would direct construction from the outside lane to the inside lane.

Opportunities:

- Better construction sequencing
- Reduced construction times

Risks:

- None identified

Technical Discussion:

Construct the project from the outside lane to the inside lane which would permit multiple lane closures during weekend and evening hours as the project progresses. This alternative presumes that outside shoulders will be improved before traffic is temporarily diverted onto them as opposed to improving the shoulders after the planned temporary traffic diversion. This would allow lane closures to move in a continuous fashion from outside shoulder moving to the inside shoulder.

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Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(234) – P.I. No. M003234** **DeKalb County** **I-20 Resurfacing**	ALTERNATIVE NO.: **8**
DESCRIPTION:	**Restrict truck traffic on shoulder**	SHEET NO.: **1** of **1**

Original Design:

The original design does not restrict truck traffic's use of shoulders.

Alternative:

The alternative would restrict "thru truck traffic" to the existing travel lanes during lane closures where a shoulder is open to traffic.

Opportunities:

- Reduce damage to the shoulders

Risks:

- Reduce operational efficiency
- Place truck traffic adjacent to the work zone

Technical Discussion:

Placing truck traffic on shoulder pavement always risks a potential failure of the pavement. By limiting the use of the shoulder area to only those trucks exiting the freeway the potential of a significant pavement failure during construction will be greatly reduced.

VALUE ENGINEERING PROCESS

The Value Engineering team followed the seven step Value Engineering job plan as promulgated by SAVE International. This seven step job plan includes the following:

- Investigative
- Analysis
- Speculation
- Evaluation
- Development
- Recommendation
- VE Report

VALUE ENGINEERING STUDY AGENDA

For

Georgia Department of Transportation

CSNHS-M003-00(234) – P.I. No. M003234

DeKalb County
I-20 Resurfacing

May 4, 2009

Pre-Workshop Activities

VE Team Leader organizes study, coordinates with the Owner and Designer about the project objectives and materials. The VE Team receives and reviews all project documents.

8:30-9:00 Project Overview (Information Phase)

- Introduction of participants
- Presentation of the project by GDOT
  - Current Construction Completion Schedule
  - Project Cost Estimate and Budget Constraints
- Discussion, questions and answers
- Overview of the VE Process and Agenda – Workshop goals & project goals

Value Engineering Study Agenda (continued)

9:00-10:00 VE Team reviews project (Information Phase)

- Review GDOT's presentation
- Review Cost Estimate
- Review plans

10:00-10:30 Function Analysis Phase

- Identify basic and secondary functions
- Complete Function Matrix/FAST Diagram

10:30-11:30 Creative Phase

- Brainstorming of alternative ideas

11:30-12:30 Evaluation Phase

- Establish criteria for evaluation
- Rank ideas
- Identify "best" ideas for development
- Identify a "champion" for each idea to be developed

1:30-5:00 Development Phase

- Develop alternative ideas with assessment of original design and write up new alternatives including:
    - Opportunities & risks
    - Technical Discussion

Post-Workshop Activities

Team Leader prepares and writes report. The team members review report. Then the report is published and delivered to the client.

Function Analysis System Technique
(FAST DIAGRAM)

Georgia Department of Transportation

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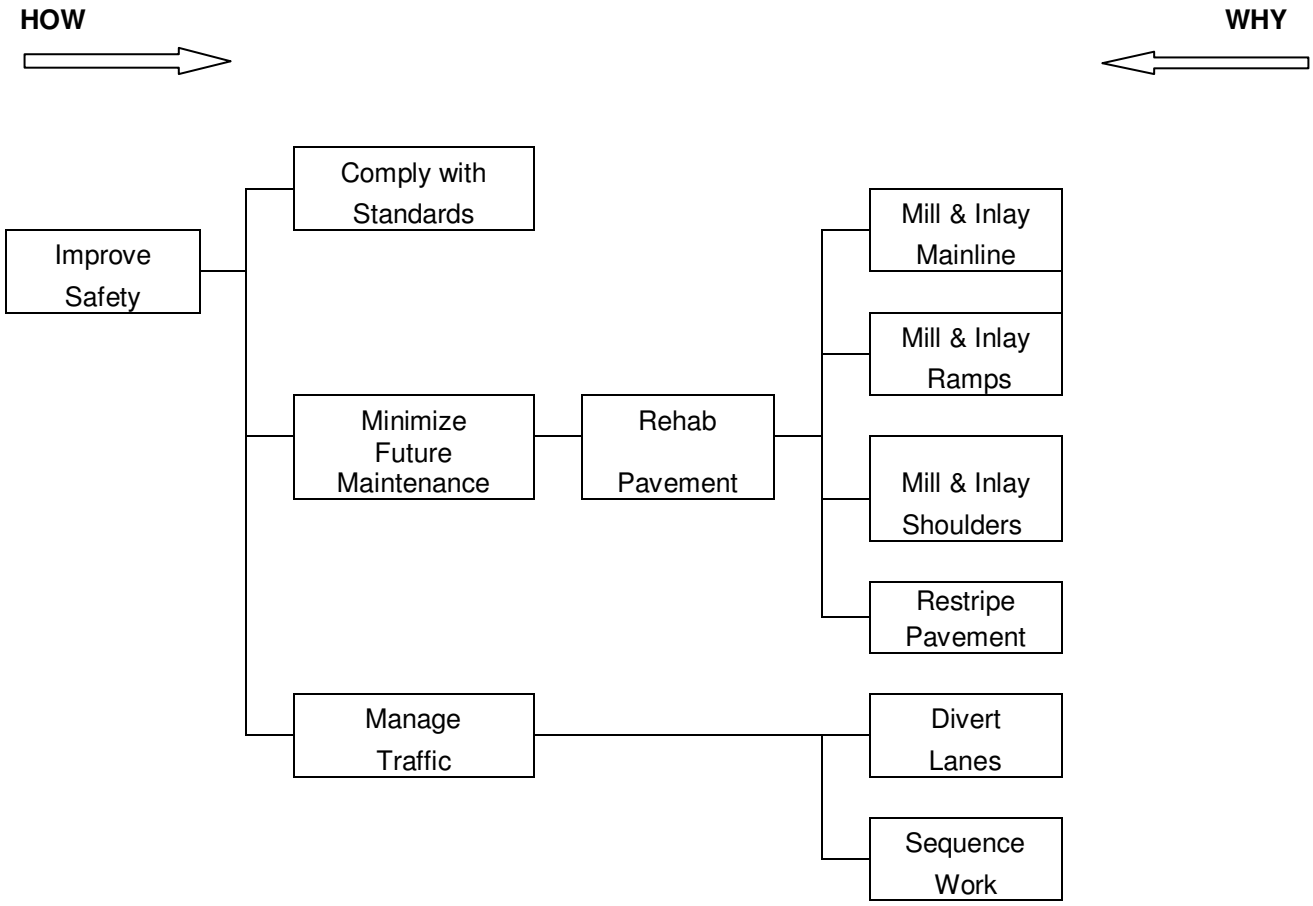

Value Engineering Study

MEETING PARTICIPANTS

Georgia Department of Transportation — **May 4, 2009**

CSNHS-M003-00(234} - P.I. No. M003234

DeKalb County

I-20 Resurfacing

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CREATIVE IDEA LISTING

PROJECT: **Georgia Department of Transportation**
CSNHS-M003-00(234) – P.I. No. M003234
DeKalb County
I-20 Resurfacing

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

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5	OGFC instead of PEM	5
6	Build from outside to inside, construct outside shoulder improvements first	4
7	Evaluate shoulder for sufficiency	ABD
8	Limit or restrict truck traffic to traffic lanes, not on shoulder	4

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