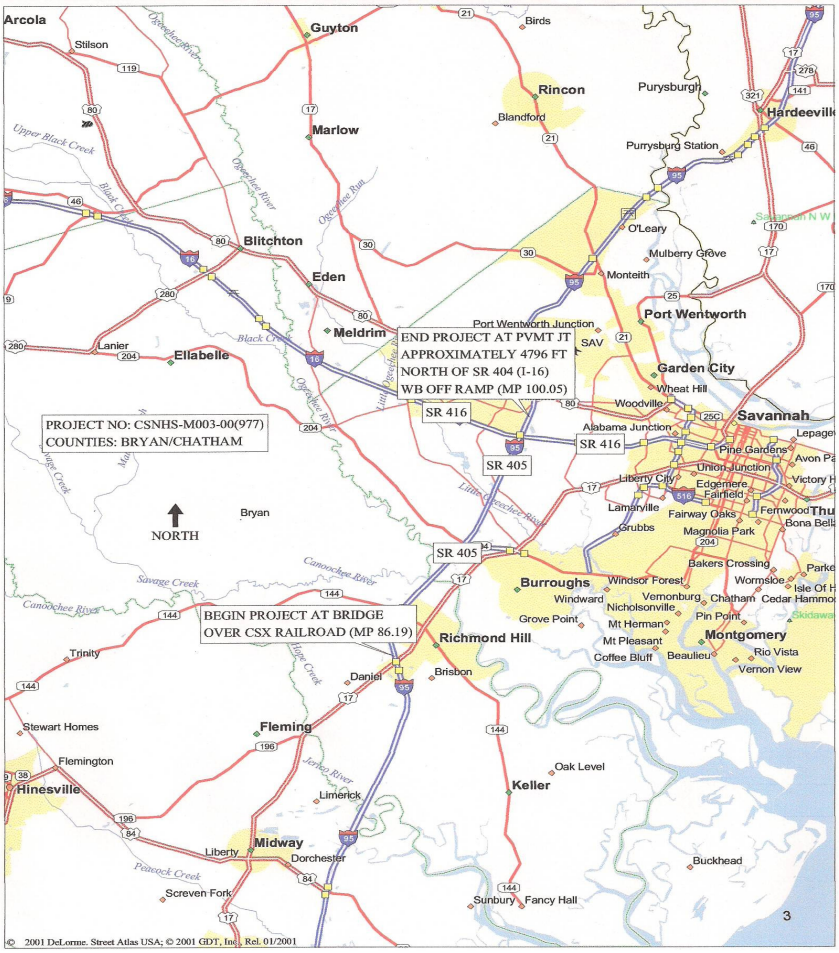
Value Engineering Study Report

Georgia Department of Transportation
CSNHSM003-00(977)) – P.I. No. M003977
I-95 Rehabilitation
Bryan and Chatham Counties



Value Engineering Team **Design Team**

May 1, 2009

May 1, 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-16 Rehabilitation
Project Nos.: CSNHS-M003-00(977) – P.I. No. M003977
Bryan and Chatham Counties

This Value Engineering Study, which was performed on April 29, 2009, identified **10 *alternatives*** of which **3 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

Les M. Thomas, P.E., CVS-Life
VE Team Leader

Randy S. Thomas, CVS
Assistant Team Leader

Value Engineering Study Report

Project No. CSNHS-M003-00(977) – P.I. No. M003977

Rehabilitation of I-95

Bryan and Chatham Counties

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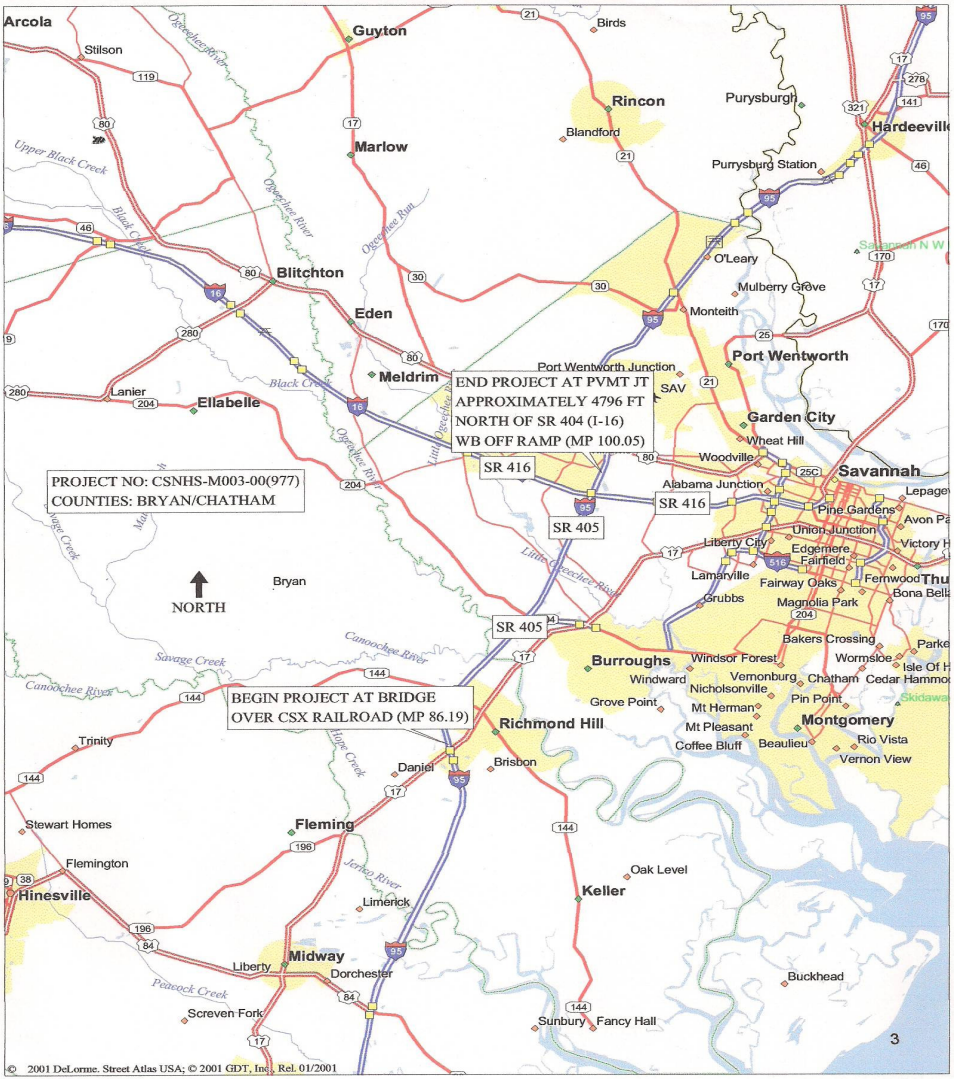
EXECUTIVE SUMMARY

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 April 29, 2009 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the rehabilitation project is CSNHS-M003-00(977) – P.I. No. M003977. The project is the rehabilitation of I-95 in Bryan and Chatham Counties.

PROJECT DESCRIPTION & LOCATION

CSNHS-M003-00(977) is located 64% within Chatham County and 36% within Bryan County. The length of the project is 14.095 miles and present traffic is 71,970 vehicles per day.



The estimated construction cost for the project is $13,517,755.14.

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

PROJECT OBSERVATIONS

Due to its cost and potential impacts to both project execution and traffic operations, the VE Team looked at the traffic control plan and construction sequencing in greater detail.

The milling and overlay operation on the main lanes is simple and straight forward. The Designer is proposing to construct the main lane overlay and restriping with standard GDOT details and provisions from the MUTCD. Due to traffic volumes two lane closures for the construction of the center lane were restricted to nighttime hours. The VE team could not identify any potential modifications to this approach that would either save time, money or enhance project safety.

The VE team evaluated alternatives to the interchange closure details and the proposed Special Provision Section 150 / 150.11 – Special Conditions. While other alternatives could be utilized it was felt the basic approach selected by the Designer was inherently the best. The proposed alternative closes the ramps on weekends for slab replacement and provides detours using major arterials and that are as simple as possible. The ramp closures were also limited to one interchange at a time. By limiting work to one interchange at a time it will not only provide better access, it will allow better communication with the travelling public both through the project signing and the media. The only potential modification the VE Team felt had any utility would be to limit ramp closures to one direction (i.e. northbound entrance/exit or southbound entrance/exit). This would provide the opportunity for vehicles that miss the "detour exits" that occur before the closed interchange to u-turn at the next exit and still access the subject crossroad. The disadvantage to this approach is that it would limit the work area for the contractor and increase the number of weekend closures required to execute the project.

CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified **10** ***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 ***3*** *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(977) – P.I. No. M003977
Bryan/Chatham
I-95 Rehabilitation

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

IDEA NUMBER	DESCRIPTION OF RECOMMENDATION	
2	Construct traversable shoulders to avoid ramp shutdown.	
4	Investigate in-situ repair of ramps in-lieu of replacement.	
9	Provide a contract item for base/subgrade reconstruction for ramps	

Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(977) – P.I. No. M003977** **Bryan/Chatham** **I-95 Rehabilitation**	ALTERNATIVE NO.: **2**
DESCRIPTION:	**Construct traversable shoulders to avoid ramp shutdown**	SHEET NO.: **1** of **1**

Original Design:

To perform full depth concrete slab replacement on interchange ramps, the design calls for these ramps to be closed. Typically, detours are being installed at adjacent interchanges to accommodate traffic.

Alternative:

The alternative would be to construct a shoulder with enough structural capacity and width to accommodate traffic and perform full depth concrete slab replacement under traffic in stages.

Opportunities:

- Allow slab replacement to occur during weekdays
- Eliminate ramp closures and reduce detours
- Create a facility which can accommodate future traffic shifts resulting from accidents and maintenance work

Risks:

- Additional costs associated with shoulder reconstruction
- Additional details required for staging slab replacement
- Reduced safety with staged construction on ramps

Technical Discussion:

Currently, there are 20 ramps on the project all requiring full depth replacement of some concrete slabs. Slabs are to be replaced at the direction of the engineer. In general, the asphalt shoulders on these ramps are to be milled (1.5") and resurfaced. Special Provision 108 assigns Liquidated Damages at the rate of $5,000 per day for ramps not returned to service at the times specified. Special Provision 150.11 C allows ramp closure and detour of traffic between the hours of 7:00 pm Friday to 7:00 am Monday and from 7:00 pm Monday through Thursday. Basically, ramp reconstruction is confined to nights and weekends. In Stage 1 of this alternative, one of the ramp shoulders could be reconstructed with enough structurally capacity and width to accommodate traffic. In Stage 2, traffic could be shifted on this reconstructed shoulder and full depth slab replacement performed on a portion of the ramp. Finally, traffic would be shifted onto the Stage 2 section and the remaining full depth slab sections be replaced. Additional coring would be required in the ramp shoulders to determine to what extent reconstruction is required. Since milling and resurfacing of the shoulders is already required for the ramps, the additional cost for reconstruction may be just the material costs. It is important to note that there is additional benefit to having the relief of structurally adequate shoulders which can be used to provide relief on the interstate during accidents or future maintenance work. Reconstruction of the shoulders and replacement of the concrete slabs can be performed during weekdays without a detour which should reduce traffic control cost and any premiums associated with night and weekend work. Because the plans for this project are schematic in nature, additional cost associated with shoulder reconstructed, such as resetting guardrail and grading, could not be evaluated.

Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(977) – P.I. No. M003977** **Bryan/Chatham** **I-95 Rehabilitation**	ALTERNATIVE NO.: **4**
DESCRIPTION:	**Investigate in-situ repair of ramps in lieu of replacement**	SHEET NO.: **1** of **1**

Original Design:

The original design calls for slab replacement on ramps throughout the project in locations to be determined by the engineer.

Alternative:

The alternative would propose investigating whether an in-situ repair for the concrete ramps may be appropriate in part or whole.

Opportunities:

- May reduce ramp detours.
- Reduction in traffic control items.
- Reduction in concrete slab removal and replacement quantities.

Risks:

- May not be feasible due to slab degradation.

Technical Discussion:

The alternative proposes investigating whether the slab rehabilitation proposed in the original plans may be reduced by correcting deficiencies in-situ by pressure grouting or application of cementitious slurry under the existing concrete slabs. This measure would allow deficiencies in subgrade or base to be corrected without removal of the existing slab. It is noted that this suggestion applies only to the concrete slab sections where underlying base failures are responsible for the need for slab repair, and assumes that the existing concrete slabs are in serviceable condition. It is also noted that several of the ramp areas on the project have an asphalt overlay to be removed, indicating surface irregularities that have been corrected.

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Value Analysis Project Recommendation

PROJECT:	**Georgia Department of Transportation** **CSNHS-M003-00(977) – P.I. No. M003977** **Bryan/Chatham** **I-95 Rehabilitation**	ALTERNATIVE NO.: **9**
DESCRIPTION:	**Provide a contract item for base/subgrade reconstruction for ramps.**	SHEET NO.: **1** of **1**

Original Design:

The original design does not incorporate unit items for base/subgrade rehabilitation should those items become necessary during the slab repair on ramps throughout the project.

Alternative:

The alternative would suggest including contract items for base and subgrade repair/rehabilitation in the as-let plans.

Opportunities:

- Eliminate potential change order

Risks:

- None identified

Technical Discussion:

The cost estimate included with the package provided did not include contingency items for subgrade or base corrections should they be encountered during the proposed ramp slab replacement on multiple locations throughout the project. The alternative proposes including, at a minimum or equivalent:

Item 301-6000- Cement Stabilized Reclaimed Base Construction

It can be reasonably expected that during the slab removal on the ramps that areas of base/subgrade failure may be encountered. The intent is to provide a contract mechanism to complete those items of work if encountered without having to resort to a change order or force account. The item suggested in the alternative may need to be substituted with an aggregate base as well if poor base conditions are confined to a limited area, making soil cement stabilization impractical.

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(977) – P.I. No. M003977
Bryan and Chatham Counties
I-95 Rehabilitation

April 29, 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

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
    - Illustrations
    - Calculations
    - Cost worksheets

Post-Workshop Activities

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

(FAST DIAGRAM)

Georgia Department of Transportation

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I-95 Rehabilitation

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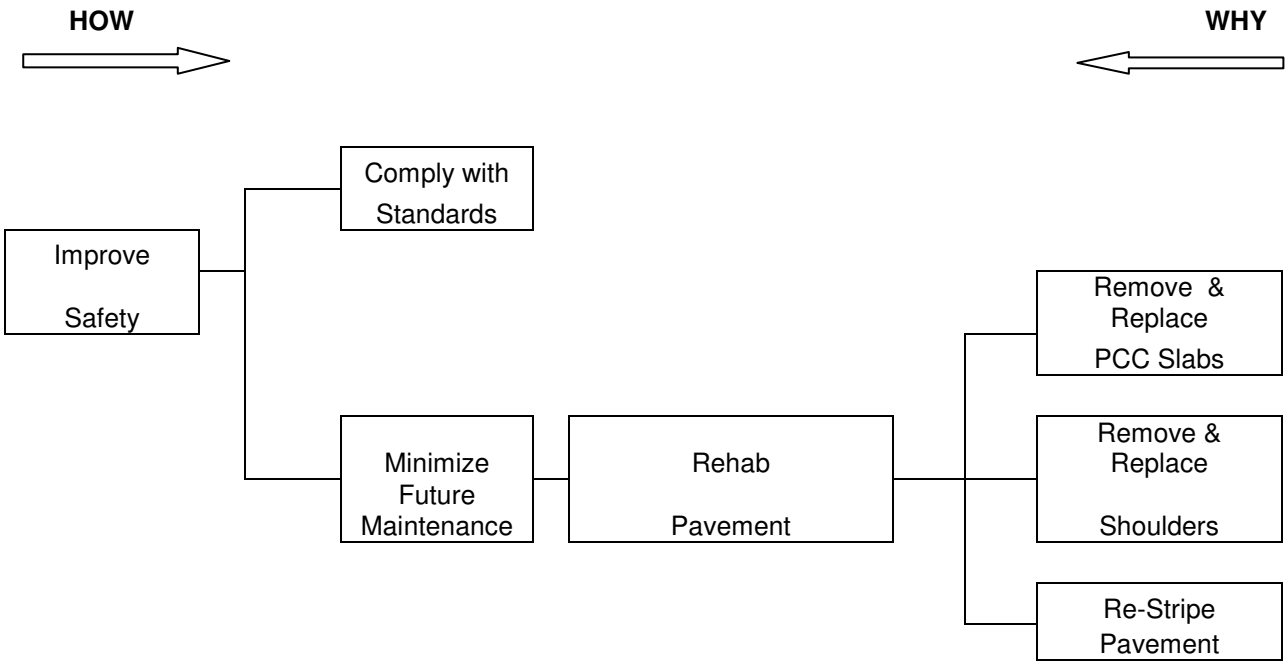

Value Engineering Study

MEETING PARTICIPANTS

Geogia Department of Transportation **April 29, 2009**

CSNHS-M003-00(977} - P.I. No. M003977

Bryan and Chatham Counties

NAME	ORGANIZATION & TITLE		E-MAIL	PHONE
Lisa Myers	GDOT	GDOT - Engineering Services	lmyers@dot.ga.gov	404-631-1770
Ron Wishon	GDOT	GDOT - Engineering Services	rwishon@dot.ga.gov	404-631-1753
Steve Carter	GDOT	GDOT - Engineering Services	scarter@dot.ga.gov	404-631-1771
Reid Mathews	GDOT	GDOT-Maintenance	rmathews@dot.ga.gov	404-631-1391
Les Thomas, PE, CVS	PBS&J	PBS&J	lmthomas@pbsj.com	678-677-6420
Luke Clarke, PE, AVS	PBS&J	PBS&J	lwclarke@pbsj.com	205-969-3776
Kevin Martin, Esq., AVS	PBS&J	PBS&J	klmartin@pbsj.com	205-969-3776
Randy Thomas, CVS	PBS&J	PBS&J	rsthomas@pbsj.com	770-883-1545
Brian Blair, AVS	PBS&J	PBS&J	bblair@pbsj.com	757-304-1514
Brad Saxon	GDOT	GDOT-D5 Preconstruction	bsaxon@dot.ga.gov	912-427-5791
Hayden Rozier	GDOT	GDOT-D5 State Aid	harozier@dot.ga.gov	912-427-5701
Cary Knox	GDOT	GDOT-D5 Construction	cknox@dot.ga.gov	912-427-5733
Aric Mance		FHWA	aric.mance@fhwa.dov.gov	404-562-3654
Garrick Edwards, PE.AVS	Hatch Mott MacDonald	Hatch Mott Macdonald	garrick.edwards@hatchmott.com	404-925-8385

CREATIVE IDEA LISTING

PBSJ

PROJECT: **Georgia Department of Transportation**
CSNHS-M003-00(977) – P.I. No. M003977
Bryan/Chatham
I-95 Rehabilitation

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

NO.	RECOMMENDATION DESCRIPTION	RATING
1	Consider the use of 12.5mm Superpave instead of 12.5mm OGFC.	1
2	Construct traversable shoulders to avoid ramp shutdown.	4
3	Limit ramp construction to one intersection at any one time.	ABD
4	Investigate in-situ repair of ramps in lieu of replacement.	4
5	Simplify/reduce the detour plan.	3
6	Use HES concrete for ramp slab construction.	ABD
7	Combine detours for Exit 94 and Exit 90.	2
8	Expedite proposed ramp construction.	2
9	Provide a contract item for base/subgrade reconstruction for ramps.	5
10	Phase ramp work to include two interchanges constructed simultaneously in opposite directions.	3

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; OB= Observation