SR 133 N. JEFFERSON STREET FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA ROAD INTERCHANGE RECONSTRUCTION

NH000-0006-02(055); PI No. 422550

Dougherty County, GA

Value Engineering Study Report

April 2011

Designer

Value Engineering Consultant

Lewis & Zimmerman Associates
9861 Broken Land Parkway
Suite 254
Columbia, Maryland 21046
Tel: 301.984.9590
Fax: 410.381.0109
email: info@lza.com
www.lza.com

Mr. Matthew J. Sanders, AVS
Value Engineering Specialist
Georgia Department of Transportation - Engineering Services
One Georgia Center – 5th Floor
600 West Peachtree Street
Atlanta, Georgia 30308

Re: SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway
To SR 91/Philema Rd. Interchange Reconstruction
NH000-0006-02(055); PI No. 422550, Dougherty County, GA
Value Engineering Study Report

Date:
April 25, 2011

Contact:
Stephen Havens

Phone:
608-438-8227

Email:
shavens@lza.com

Our ref:
LZ083363.0000

Dear Mr. Sanders:

Lewis & Zimmerman Associates is pleased to submit two hard copies and one electronic copy of the referenced value engineering study report documenting the study that took place April 11-14, 2011. The objective of the VE effort was to identify opportunities to resolve issues, improve construction staging, improve functionality, and reduce labor and material requirements.

The VE workshop team developed 12 ideas with identifiable cost avoidance potential and 5 design suggestions with an opportunity to improve construction staging and resolve identified project issues. Of particular interest is an alternative to provide a rural shoulder in lieu of an urban shoulder on the left side of N. Jefferson St.; several alternatives which recommend reductions in the length and width of each ramp bridge; an alternative which suggests utilizing the existing westbound Liberty Expressway Ramp for left-turns onto N. Jefferson St. to enable earlier closure of the existing southbound N. Jefferson Street entrance ramp and improve facilitation of staged construction; and one alternative which recommends providing a 12-ft.-wide multi-use trail on the left side of N. Jefferson St. in lieu of the 4 ft. bike lanes and 5 ft. sidewalk.

We thank you, Albert Shelby, and Nicoe Alexander for your assistance during the course of the VE team's work. Please do not hesitate to call if you or any reviewers have questions regarding the information presented in this report.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.
an ARCADIS company

Stephen G. Havens

Stephen G. Havens, PE, CVS
Senior Project Manager

Attachment

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SECTION ONE - EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction (Project NH000-0006-25(055), P.I. No. 422550) being designed by GDOT. The workshop was performed April 11-14, 2011, in the GDOT Central Office, Atlanta, GA using the 30% design documents as the basis of the study.

Comprising the VE team were a highway design engineer, a structural engineer, a construction/cost specialist, and a Certified Value Specialist team leader from LZA. The team used the following six phase VE Job Plan to guide its deliberations:

- Information Gathering Phase
- Function Identification and Analysis Phase
- Creative Idea Generation Phase
- Evaluation/Judgment Phase
- Alternative Development Phase
- Presentation of Results Phase

PROJECT DESCRIPTION

This project is needed to address operational conflicts, significant traffic weaving, and level of service (LOS) deficiencies associated with the SR 520/US 82 Liberty Expressway/SR 133/N. Jefferson St. Interchange. The proposed interchange reconstruction includes:

1. Relocating the westbound exit and entrance ramps directly across from SR 91/Philema Rd. creating a four-legged intersection:
    a. The new westbound entrance ramp includes a new 324 ft.-6 in. long x 42 ft. wide, two-lane ramp bridge (Ramp B) over the Central of Georgia Railroad (CGR)
    b. The relocated westbound exit ramp includes a new 177 ft. long x 34 ft. wide, single-lane ramp bridge (Ramp A) over SR 133/N. Jefferson St.
2. Widening approximately 0.4 mile of SR 133/N. Jefferson St. from the SR 520/US 82 Liberty Expressway Bridge to 870 ft. north of Philema Rd to accommodate additional turning movements including:
    a. Adding two left-turn lanes at the SR 91 Philema Rd./North Jefferson St. intersection from northbound SR 133/N. Jefferson St. to the proposed new westbound SR 520/US 82 Liberty Expressway entrance ramp
    b. Adding a second right-turn lane on northbound N. Jefferson St. to eastbound Philema Rd.
    c. Adding a new right-turn lane on southbound N. Jefferson St. to the proposed new westbound SR 520/US 82 Liberty Expressway entrance ramp
    d. Adding a second left-turn lane on southbound N. Jefferson St. to Philema Rd.

e. Changing access to Telfair Ave. to right-in/right-out only
f. Adding 16-ft.-wide urban shoulders including 8 ft. sidewalks on the right side and 5 ft. sidewalks on the left side
g. Adding a 20-ft.-wide raised concrete median to the mainline
h. Adding 4-ft-wide bike lanes to the mainline
i. Installing a closed, piped drainage system with curb inlets and longitudinal reinforced concrete storm water pipes

3. Widening approximately 820 ft. of Philema Rd east of the N. Jefferson St. intersection to accommodate additional turning movements including:
   a. Adding a second left-turn lane on westbound Philema Rd. to southbound N. Jefferson St.
   b. Adding two through-lanes from westbound Philema Rd. to the proposed new westbound SR 520/US 82 Liberty Expressway entrance ramp
   c. Adding a new right-turn lane on westbound Philema Rd. to northbound N. Jefferson St.
   d. Adding 16-ft.-wide urban shoulders including 5 ft. sidewalks on both sides of the roadway
   e. Adding 4-ft-wide bike lanes to the roadway
   f. Installing a closed, piped drainage system with curb inlets and longitudinal reinforced concrete storm water pipes
4. Removing the existing westbound SR 520/US 82 Liberty Expressway entrance loop ramp from SR 133/N. Jefferson St.
5. Removing the existing westbound SR 520/US 82 Liberty Expressway exit ramp to northbound SR 133/N. Jefferson St.
6. Removing the existing westbound SR 520/US 82 Liberty Expressway exit ramp to southbound SR 133/N. Jefferson St.

The project also includes relocation of the existing 17 space park-and-ride surface parking lot to the space currently occupied by the two loop ramps to the east of N. Jefferson St. and to the north of SR 520/US 82 Liberty Expressway.

Traffic will be maintained at all times during construction.

The estimated cost of construction is $9,809,828 based upon the Revised Cost Estimate for Project NH000-0006-25(055), dated February 28, 2011. The estimated right-of-way cost is $3,260,000. This is a FY 2014 Transportation Improvement Plan project.

CONCERNS AND OBJECTIVES

This project is needed to address operational conflicts, significant traffic weaving, and heavy traffic causing level of service (LOS) deficiencies during peak hours at the SR 133/N. Jefferson St./SR 520/US 82 Liberty Expressway Interchange. Current construction staging plans require maintaining two lanes of traffic in both directions on N. Jefferson St. and Philema Rd. during peak hours and keeping the three existing loop ramps open to traffic until construction is near completion. Additionally, full-depth pavement reconstruction has been recommended on SR 133/N. Jefferson St. due to evidence of stripping in the base layers of three of the five cores taken from this area as documented in the Pavement Evaluation Summary. Also, additional turn-lanes plus bike lane and sidewalk requirements may make it difficult to acquire the necessary additional right-of-way on the

right side of N. Jefferson St., particularly adjacent to the existing gas station at the southeast corner of N. Jefferson St. and Philema Rd. These challenges will further increase the likelihood of congestion, weaving, traffic delays, and exposure to accidents during construction staging and until the proposed new ramps are open to motorists.

STUDY OBJECTIVES

To assist GDOT achieve its project goals in a cost-effective manner, it convened this VE study. The study team was tasked with identifying specific ideas that will enhance the value of the design by resolving issues, improving construction staging, improving functionality, and reducing material and labor requirements.

RESULTS OF THE STUDY

Research of the ideas identified resulted in the development of 14 VE alternatives and 5 design suggestion for consideration by the project team. The alternatives with the greatest potential to impact the project are highlighted below:

Keeping the existing northbound N. Jefferson St. entrance ramp open and adding a left turn onto southbound N. Jefferson improves constructability and improves facilitation of staged construction by enabling earlier closure and demolition of the southbound N. Jefferson St. entrance ramp (Alt. No. C-3). The left turn onto N. Jefferson St. can be added concurrently with demolition of the westbound Liberty Expressway entrance ramp during Stage 2. A temporary traffic signal will likely be required to reduce queuing and delays during peak traffic hours of operation as there is currently no traffic signal at this location.

Reducing the shoulder widths on both N. Jefferson St. and Philema Rd. from 16 ft. to 12 ft. reduces adjacent property impacts and reduces grading requirements by $120,000 (Alt. No. R-2). This alternative provides a favorable impact on right-of-way requirements, particularly at the gas station located at the southeast corner of SR 133/N. Jefferson St. and SR 91/Philema Rd.

Since the land area on the left side of N. Jefferson St. is existing GDOT right-of-way, and since the current roadway does not have sidewalks on the left side, providing a 10-ft.-wide graded rural shoulder from Sta. 123+00 to Sta. 133+20 LT eliminates the longitudinal drainage structures. This plus eliminating the full-depth paved 4 ft. bike lane provides a favorable impact on right-of-way requirements on the right side of N. Jefferson St. and saves $84,000 (Alt. No. R-9).

Another alternative for the left shoulder on N. Jefferson St. is to provide a 12-ft.-wide multi-use trail for both bikes and pedestrians from Sta. 123+00 to Sta. 133+20 LT and provide a 5-ft. sidewalk on the right side only. This alternative saves 8 ft. of full depth pavement section for the bike lanes and saves $128,000 (Alt. No. R-10). It also provides a favorable impact on right-of-way requirements on the right side of N. Jefferson St. The multi-use trail requires a wider shoulder on the left side (18-ft in lieu of 16-ft graded shoulder), however this does not require a shift in alignment due to the 4-ft. bike lanes being eliminated.

Since the 24-hour truck percentage is relatively low at 9.5%, providing 11-ft.-wide lanes in lieu of 12-ft.-wide lanes for travel on both N. Jefferson Street and Philema Road reduces pavement requirements by $79,000 and adjacent right-of-way impacts through the design corridor (Alt. No. R-4).

Reducing the outside paved shoulder from 10 ft. to 8 ft. for the entire length of Ramp A and Ramp B (including the widths of the two bridges) reduces the pavement section quantities and construction requirements for this project and saves $148,000. The 2004 AASHTO Green Book (page 838) states that, "the sum of the right and left (paved) shoulders should not exceed 10 to 12 feet", therefore a 4 ft. inside paved shoulder and an 8 ft. outside paved shoulder meet this design criteria.

The current design includes 6 ft. inside shoulders and 12 ft. outside shoulders on the Ramp A and Ramp B bridges. Per the 2004 AASHTO Green Book (page 838), the bridge shoulder widths can be made 2 ft. narrower per side. Reducing each ramp bridge width by 4 ft. matches up with the ramp paved shoulder sections and saves $71,000 on the Ramp A Bridge (Alt. No. S-1) and $130,000 on the Ramp B Bridge (Alt. No. S-2).

The lengths of the Ramp A and Ramp B bridges can be reduced. Providing a retaining wall abutment on the east end of the Ramp B Bridge reduces the length of the bridge by 52 ft. and saves $172,000 (Alt. No. S-4) while providing adequate clearance for the Central of Georgia Railroad right-of-way. Providing a retaining wall abutment on the west end of the Ramp A Bridge reduces the length of the bridge by 37 ft. and saves $121,000 (Alt. No. S-5). The disadvantage of reducing the length of the Ramp A Bridge is that sight distances for motorists traveling toward the Ramp A Bridge on N. Jefferson St. may be reduced.

Since only a small stretch of roadway on SR 133/North Jefferson St. (approximately 0.4 miles from Sta. 121+80.00 to Sta. 141+73.14) requires full-depth pavement, and since the adjacent roadway to the immediate north on SR 133/North Jefferson St. recently received a mill-and-overlay, the GDOT project team requested that the VE team provide a life cycle cost comparison between full-depth pavement and mill-and-overlay pavement for SR 133/North Jefferson St. After review of the Pavement Evaluation Summary for NH-006-2(55) Dougherty County, PI No. 42550, prepared by GDOT, dated December 29, 2008, the VE team is not recommending mill-and-overlay as a VE alternative. However, the requested (20-year) life cycle cost comparison is included in Appendix A for GDOT consideration (Alt. No. R-1).

Each of the alternatives should be given careful consideration for the potential cost savings and/or value improvement that they offer compared to the tradeoffs.

IMPLEMENTATION

This VE report is a formalization of the draft materials provided to GDOT during the out-briefing discussion on April 14, 2011. The Summary of Value Engineering Alternatives worksheets show all of the alternatives and design suggestions developed by the VE team. Some of the alternatives are mutually exclusive or interrelated, so that addition of all project cost savings does not equal the potential total cost savings for the project. The actual cost savings will have to be determined once implementation decisions are made. A full listing of the ideas considered by the VE team can be found on the Creative Idea Listing in Section Four of the report.

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550 Dougherty County, Georgia

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	ROADWAY (R)					
R-2	Use 12-ft.-wide shoulders in lieu of 16-ft.-wide shoulders on N. Jefferson St. and Philema Rd.	$120,000	$0	$120,000		$120,000
R-3	Reduce the raised median island from 20 ft. wide to 16 ft. wide on N. Jefferson St.	$34,000	$0	$34,000		$34,000
R-4	Use 11-ft.-wide lanes in lieu of 12-ft.-wide lanes on N. Jefferson St. and Philema Rd.	$79,000	$0	$79,000		$79,000
R-5	Use 11-ft.-wide inside lanes in lieu of 12-ft.-wide lanes on N. Jefferson St. and Philema Rd.	$63,000	$0	$63,000		$63,000
R-7	Eliminate guardrail and anchorages on Ramp A from Sta. 223+25 to Sta. 224+50 RT	DESIGN SUGGESTION				
R-8	Reduce the sidewalk width from 8-ft.-wide to 5-ft.-wide on the right side of N. Jefferson St.	$40,000	$25,000	$15,000		$15,000
R-9	Provide a rural shoulder in lieu of an urban shoulder on the left side of N. Jefferson St. from Sta. 123+00 LT to Sta. 133+20 LT	$110,000	$26,000	$84,000		$84,000
R-10	Provide a 12-ft.-wide multi-use trail on the left side of N. Jefferson St. in lieu of the 4 ft. bike lanes and 5 ft. sidewalk	$205,000	$77,000	$128,000		$128,000
R-13	Provide 8-ft. paved outside shoulders in lieu of 10-ft. paved outside shoulders on Ramps A and B	$148,000	$0	$148,000		$148,000

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
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	STRUCTURES (S)					
S-1	Reduce the Ramp A Bridge from 34-ft.-wide to 30-ft.-wide by narrowing the shoulders 2 ft. per side	$658,000	$587,000	$71,000		$71,000
S-2	Reduce the Ramp B Bridge from 42-ft.-wide to 38-ft.-wide by narrowing the shoulders 2 ft. per side	$1,465,000	$1,335,000	$130,000		$130,000
S-4	Reduce the length of the Ramp B Bridge by 52 ft. by providing a retaining wall abutment on the east end	$1,465,000	$1,293,000	$172,000		$172,000
S-5	Reduce the length of the Ramp A Bridge by 37 ft. by providing a retaining wall abutment on the west end	$658,000	$549,000	$109,000		$109,000
S-7	Provide a standard concrete side barrier for the retaining wall west of Ramp B from Sta. 309+50 to Sta. 313+00	DESIGN SUGGESTION				
	CONSTRUCTION STAGING (C)					
C-1	Modify sequencing of stage 1 to include removal and full depth paving of the existing median first, and then shifting traffic south on N. Jefferson St. and Philema Rd.	DESIGN SUGGESTION				
C-3	Utilize the existing WB Liberty Express exit ramp for right and left turns onto N. Jefferson St. during construction to enable earlier closure of the existing SB N. Jefferson St. entrance ramp	DESIGN SUGGESTION				
	GENERAL (G)					
G-1	Revise the 18 in. RCP at Sta. 698+00 to route it through the proposed wing wall	$658,000	$549,000	$109,000		$109,000

SECTION TWO - STUDY RESULTS

INTRODUCTION

The results of this value engineering study conducted on Project NH000-0006-25(055), P.I. No. 422550, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction portray the benefits that can be realized by GDOT and Dougherty County. The results will directly affect the project's design and require coordination by GDOT to determine the disposition of each alternative.

During the study, many ideas for potential value enhancement were conceived and evaluated by the team for technical feasibility, applicability to the project, and the ability to meet the owner's project value objectives. Research performed on those ideas considered to have potential to enhance the value of the project resulted in the development of individual alternatives identifying specific changes to the project as a whole, or individual elements that comprise the project. These may be in the form of VE alternatives (accompanied by cost estimates) or design suggestions (without cost estimates). For each alternative developed, the following information has been provided:

- A summary of the original design;
- A description of the proposed change to the project;
- Sketches and design calculations, if appropriate;
- A capital cost comparison and life cycle discounted present worth cost comparison of the alternative and original design, if appropriate;
- A descriptive evaluation of the advantages and disadvantages of selecting the alternative; and
- A brief narrative to compare the original design and the proposed change and provide a rationale for implementing the change into the project.

The capital cost comparisons for each alternative use unit quantities and prices from the Revised Cost Estimate prepared by GDOT, dated February 28, 2011. If prices quantities were not available, GDOT databases were consulted.

Each design suggestion contains the same information as the VE alternatives, except that no cost information is usually included. Design suggestions are presented to bring attention to areas of the design that, in the opinion of the VE team, should be changed for reasons other than cost. Examples of these reasons include improved facility operation, ease of maintenance, ease of construction, safer working conditions, reduction in project risk, etc. In addition, some ideas cannot be quantified in terms of cost with the design information provided; these are also presented as design suggestions and are intended to improve the quality of the project.

Each alternative developed is identified with an alternative number (Alt. No.) that can be tracked through the value analysis process and facilitate referencing between the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of Potential Cost Savings table. The Alt. No. includes a prefix that refers to one of the major project elements listed below:

PROJECT ELEMENT	PREFIX
Roadway	R
Structures	S
Construction Staging	C
General	G

A Summary of each alternative and design suggestion is provided on the Summary of Potential Cost Savings table. The table is divided into project elements for the reviewer's convenience and is used to divide the results section. The complete documentation of the developed alternatives follows the Summary of Potential Cost Savings table.

KEY ISSUES

This project is needed to address operational conflicts, significant traffic weaving, and level of service (LOS) deficiencies at the SR 133/N. Jefferson St./SR 520/US 82 Liberty Expressway Interchange. The close proximity of SR 91/Philema Rd. to the interchange creates operational conflicts with the traffic on SR 133/N. Jefferson St. Also, there is a significant amount of traffic weaving occurring on westbound SR 520/US 82 Liberty Expressway in the area of the interchange, specifically around the entrance and exit ramps to SR 133/N. Jefferson St. Additionally, 2005 traffic volumes on SR 133/N. Jefferson St. in both directions were 54,000 vehicles per day (VPD) and traffic volumes on SR 91/ Philema Rd. in both directions were 35,100 VPD resulting in an LOS "F" on the ramps and mainline. In design year 2025, traffic volumes are expected to rise to 87,000 and 59,000 VPD respectively. Without improvements, both the mainline and ramps will continue to operate at LOS of "F", with motorists experiencing increased congestion, weaving, delay, and possibly more accidents.

The following project issues were identified during the design overview held Monday, April 11, 2011:

- Current construction staging plans require keeping the three existing loop ramps open to traffic until construction is near completion. This will further increase the likelihood of congestion, weaving, delays and possibly more accidents until the new ramps are open.
- Full-depth pavement reconstruction has been recommended on SR 133/N. Jefferson St. due to evidence of stripping in the base layers of three of the five cores and full-depth block cracking in three of the five cores taken from this area.
- The location of an existing gas station at the southeast corner of N. Jefferson St. and Philema Rd. may make it difficult to acquire the necessary right-of-way for construction staging
- Existing grades around proposed Ramp A and Ramp B will require retaining walls
- An existing box culvert drainage platform at Sta. 699+00 has created a pinch point for constructing the new westbound SR 520/US 82 Liberty Expressway entrance ramp

STUDY OBJECTIVES

To assist GDOT achieve its project goals in a cost-effective manner, it convened this VE study. The study team was tasked with identifying specific ideas that will enhance the value of the design by resolving issues, improving functionality, improving construction staging, or reducing material and labor requirements.

RESULTS OF THE STUDY

Research of the ideas identified resulted in the development of 14 VE alternatives and 5 design suggestion for consideration by the project team. The alternatives with the greatest potential to impact the project are highlighted below:

Keeping the existing northbound N. Jefferson St. entrance ramp open and adding a left turn onto southbound N. Jefferson improves constructability and improves facilitation of staged construction by enabling earlier closure and demolition of the southbound N. Jefferson St. entrance ramp (Alt. No. C-3). The left turn onto N. Jefferson St. can be added concurrently with demolition of the westbound Liberty Expressway entrance ramp during Stage 2. A temporary traffic signal will likely be required to reduce queuing and delays during peak traffic hours of operation as there is currently no traffic signal at this location.

Reducing the shoulder widths on both N. Jefferson St. and Philema Rd. from 16 ft. to 12 ft. reduces adjacent property impacts and reduces grading requirements by $120,000 (Alt. No. R-2). This alternative provides a favorable impact on right-of-way requirements, particularly at the gas station located at the southeast corner of SR 133/N. Jefferson St. and SR 91/Philema Rd.

Since the land area on the left side of N. Jefferson St. is existing GDOT right-of-way, and since the current roadway does not have sidewalks on the left side, providing a 10-ft.-wide graded rural shoulder from Sta. 123+00 to Sta. 133+20 LT eliminates the longitudinal drainage structures. This plus eliminating the full-depth paved 4 ft. bike lane provides a favorable impact on right-of-way requirements on the right side of N. Jefferson St. and saves $84,000 (Alt. No. R-9).

Another alternative for the left shoulder on N. Jefferson St. is to provide a 12-ft.-wide multi-use trail for both bikes and pedestrians from Sta. 123+00 to Sta. 133+20 LT and provide a 5-ft. sidewalk on the right side only. This alternative saves 8 ft. of full depth pavement section for the bike lanes and saves $128,000 (Alt. No. R-10). It also provides a favorable impact on right-of-way requirements on the right side of N. Jefferson St. The multi-use trail requires a wider shoulder on the left side (18-ft in lieu of 16-ft graded shoulder), however this does not require a shift in alignment due to the 4-ft. bike lanes being eliminated.

Since the 24-hour truck percentage is relatively low at 9.5%, providing 11-ft.-wide lanes in lieu of 12-ft.-wide lanes for travel on both N. Jefferson Street and Philema Road reduces pavement requirements by $79,000 and adjacent right-of-way impacts through the design corridor (Alt. No. R-4).

Reducing the outside paved shoulder from 10 ft. to 8 ft. for the entire length of Ramp A and Ramp B (including the widths of the two bridges) reduces the pavement section quantities and construction requirements for this project and saves $148,000. The 2004 AASHTO Green Book (page 838) states

that, "the sum of the right and left (paved) shoulders should not exceed 10 to 12 feet", therefore a 4 ft. inside paved shoulder and an 8 ft. outside paved shoulder meet this design criteria.

The current design includes 6 ft. inside shoulders and 12 ft. outside shoulders on the Ramp A and Ramp B bridges. Per the 2004 AASHTO Green Book (page 838), the bridge shoulder widths can be made 2 ft. narrower per side. Reducing each ramp bridge width by 4 ft. matches up with the ramp paved shoulder sections and saves $71,000 on the Ramp A Bridge (Alt. No. S-1) and $130,000 on the Ramp B Bridge (Alt. No. S-2).

The lengths of the Ramp A and Ramp B bridges can be reduced. Providing a retaining wall abutment on the east end of the Ramp B Bridge reduces the length of the bridge by 52 ft. and saves $172,000 (Alt. No. S-4) while providing adequate clearance for the Central of Georgia Railroad right-of-way. Providing a retaining wall abutment on the west end of the Ramp A Bridge reduces the length of the bridge by 37 ft. and saves $109,000 (Alt. No. S-5). The disadvantage of reducing the length of the Ramp A Bridge is that sight distances for motorists traveling toward the Ramp A Bridge on N. Jefferson St. may be reduced.

Since only a small stretch of roadway on SR 133/North Jefferson St. (approximately 0.4 miles from Sta. 121+80.00 to Sta. 141+73.14) requires full-depth pavement, and since the adjacent roadway to the immediate north on SR 133/North Jefferson St. recently received a mill-and-overlay, the GDOT project team requested that the VE team provide a life cycle cost comparison between full-depth pavement and mill-and-overlay pavement for SR 133/North Jefferson St. After review of the Pavement Evaluation Summary for NH-006-2(55) Dougherty County, PI No. 42550, prepared by GDOT, dated December 29, 2008, the VE team is not recommending mill-and-overlay as a VE alternative. However, the requested (20-year) life cycle cost comparison is included in Appendix A for GDOT consideration (Alt. No. R-1).

Each of the alternatives should be given careful consideration for the potential cost savings and/or value improvement that they offer compared to the tradeoffs.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

When reviewing the study results, the project team should consider each part of an alternative or design suggestion on its own merit. There may be a tendency to disregard an alternative because of a concern about one part of it. Each area within an alternative or design suggestion that is acceptable should be considered for use in the final design, even if the entire alternative or design suggestion is not implemented. Variations of these alternatives and design suggestions by the owner or designer are encouraged.

All alternatives and design suggestions were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some of them are "mutually exclusive," so acceptance of one may preclude the acceptance of another. In addition, some of the alternatives may be interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative. Design suggestions could also be interrelated thus precluding a part of one or more suggestions from being implemented if another design suggestion is also implemented.

GDOT should evaluate all alternatives carefully in order to select the combination of ideas with the greatest beneficial impact on the project. Once this has been accomplished, the total cost savings resulting from the VE study can be calculated based on implementing a revised, all-inclusive design solution.

SUMMARY OF POTENTIAL COST SAVINGS

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	ROADWAY (R)					
R-2	Use 12-ft.-wide shoulders in lieu of 16-ft.-wide shoulders on N. Jefferson St. and Philema Rd.	$120,000	$0	$120,000		$120,000
R-3	Reduce the raised median island from 20 ft. wide to 16 ft. wide on N. Jefferson St.	$34,000	$0	$34,000		$34,000
R-4	Use 11-ft.-wide lanes in lieu of 12-ft.-wide lanes on N. Jefferson St. and Philema Rd.	$79,000	$0	$79,000		$79,000
R-5	Use 11-ft.-wide inside lanes in lieu of 12-ft.-wide lanes on N. Jefferson St. and Philema Rd.	$63,000	$0	$63,000		$63,000
R-7	Eliminate guardrail and anchorages on Ramp A from Sta. 223+25 to Sta. 224+50 RT	DESIGN SUGGESTION				
R-8	Reduce the sidewalk width from 8-ft.-wide to 5-ft.-wide on the right side of N. Jefferson St.	$40,000	$25,000	$15,000		$15,000
R-9	Provide a rural shoulder in lieu of an urban shoulder on the left side of N. Jefferson St. from Sta. 123+00 LT to Sta. 133+20 LT	$110,000	$26,000	$84,000		$84,000
R-10	Provide a 12-ft.-wide multi-use trail on the left side of N. Jefferson St. in lieu of the 4 ft. bike lanes and 5 ft. sidewalk	$205,000	$77,000	$128,000		$128,000
R-13	Provide 8-ft. paved outside shoulders in lieu of 10-ft. paved outside shoulders on Ramps A and B	$148,000	$0	$148,000		$148,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-2**

DESCRIPTION: **USE 12-FT.-WIDE SHOULDERS IN LIEU OF 16-FT.-WIDE SHOULDERS ON N. JEFFERSON ST. AND PHILEMA RD.**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design indicates 16-ft.-wide shoulders on N. Jefferson Street and Philema Road.

ALTERNATIVE: (sketch attached)

Provide 12-ft.-wide shoulders on N. Jefferson St. and Philema Rd.

ADVANTAGES:

- Reduces grading costs
- Reduces right-of-way impacts
- Reduces construction schedule

DISADVANTAGES:

- None identified

DISCUSSION:

Reducing the shoulder widths on both N. Jefferson St. and Philema Rd. will reduce adjacent property impacts and aid in reducing grading costs for the overall project. This alternative provides a favorable impact on right-of-way requirements, particularly at the gas station located at the southeast corner of SR 133/N. Jefferson St. and SR 91/Philema Rd.

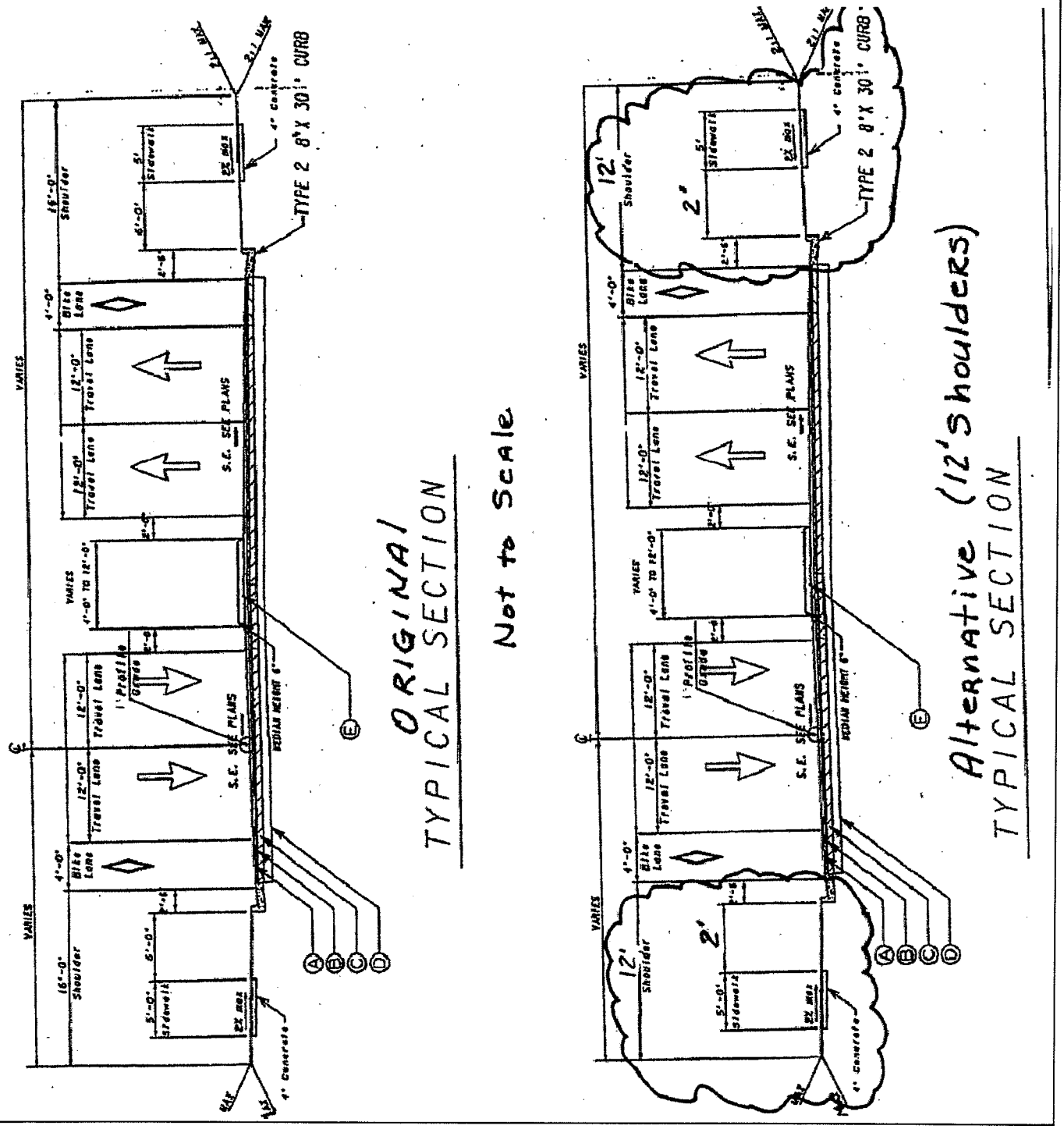
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 120,000	—	$ 120,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 120,000	—	$ 120,000

SKETCH

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-2**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒ SHEET NO.: **2 of 4**



PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-2**

SHEET NO.: **3 of 4**

N. Jefferson Street Shoulder Reduction from 121+80-ft to Sta. 141+73 Rt. & Lt.:

8-Ft. x 3-Ft. x 1993-Ft = 47,832 SF/27 = 1771.55 CY

Philema Road Shoulder Reduction between Sta. 90+43 to Sta. 98+17 Rt. & Lt.:

8-Ft. x 3-Ft. x 774-Ft = 18,576 SF/27 = 688 CY

1771.55CY + 688 = 2,460 CY

Total Cubic Yards = 2,460

R/W saved: N. Jefferson Street Shoulder Reduction = 2000' x 8' = 16,000 sf

R/W saved: Philema Road Shoulder Reduction = 750' x 8' = 6,000 sf

Total R/W saved = 22,000 sf

R/W unit cost: $2,501,000/ 700,000 sf = **$3.6/sf +/-**

R/W markup based on GaDOT R/W estimate: $3,351,650/ $2,501,000 = **1.3 Use 30%**

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-2**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Earthwork	CY	2,460	6.50	15,990			
R/W saved	SF	22,000	3.60	79,200			
R/W Subtotal				79,200			
R/W Mkup 30.00%				23,760			
Construction Subtotal				15,990			
Constr. Mkup 5.00%				800			
TOTAL				119,750			
TOTAL (ROUNDED)				120,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-3**

DESCRIPTION: **REDUCE THE RAISED MEDIAN ISLAND FROM 20 FT. WIDE TO 16 FT. WIDE ON N. JEFFERSON STREET**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (sketch attached)

The original design indicates a 20-ft.-wide raised median island on N. Jefferson Street.

ALTERNATIVE: (sketch attached)

Reduce the 20-ft.-wide median to 16-ft.-wide from Sta. 122+54 to Sta 126+00 and from Sta. 136+00 to Sta. 139+00. Keep the paved area the same as in the current design.

ADVANTAGES:

- Reduces cast-in-place concrete requirements
- Reduces construction schedule
- Allows traffic to flow more freely into left-turn lanes

DISADVANTAGES:

- None identified

DISCUSSION:

Reducing the 20-ft.-wide median on N. Jefferson reduces concrete requirements by 726 CY and creates more paved surface to allow traffic to flow more freely into left-turn lanes.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 34,000	—	$ 34,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 34,000	—	$ 34,000

CALCULATIONS

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-3**

SHEET NO.: **2 of 3**

N. Jefferson Street Concrete Median Reduction from 20-ft to 16-Ft.:

Sta. 136+00 to Sta. 137+97
A=½ (6) 230-Ft = 690 SF/9 = 77 SY

Sta. 137+97 to Sta. 139+00
A=½ (6) 103-Ft = 309 SF/9 = 34 SY

Sta. 122+54 to Sta. 126+00
A= 346 (16+16/2) = 5,536 SF/9 = 615 SY

Total Square Yards = 726 SY

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-3**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
441-0748 Concrete Median	SY	726	45.00	32,670			
Subtotal				32,670			
Markup (%) at 5.00%				1,634			
TOTAL				34,304			
TOTAL (ROUNDED)				34,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-4**

DESCRIPTION: **PROVIDE 11-FT.-WIDE TRAVEL LANES ON N. JEFFERSON ST. AND PHILEMA ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design indicates 12-ft.-wide travel lanes on N. Jefferson Street and Philema Road.

ALTERNATIVE: (sketch attached)

Reduce the travel lanes from 12 ft. wide to 11 ft. wide for both N. Jefferson Street and Philema Road. This reduction includes turning lanes.

ADVANTAGES:

- Reduces grading and paving requirements
- Eases construction staging requirements
- Reduces right-of-way impacts

DISADVANTAGES:

- Narrower lanes provided

DISCUSSION:

Due to the moderately light truck traffic (9.5%), using 11-ft.-wide lanes for travel on both N. Jefferson Street and Philema Road reduces grading and pavement requirements and adjacent impacts through design corridor. Narrower lane requirements will make it easier to manage and facilitate staged construction.

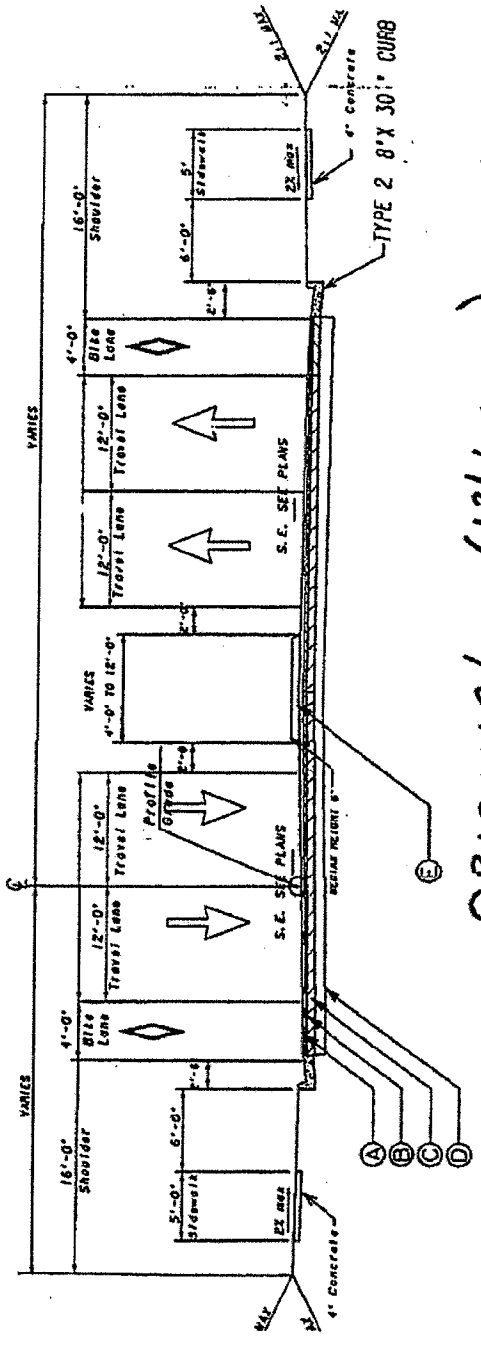
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 79,000	—	$ 79,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 79,000	—	$ 79,000

SKETCH

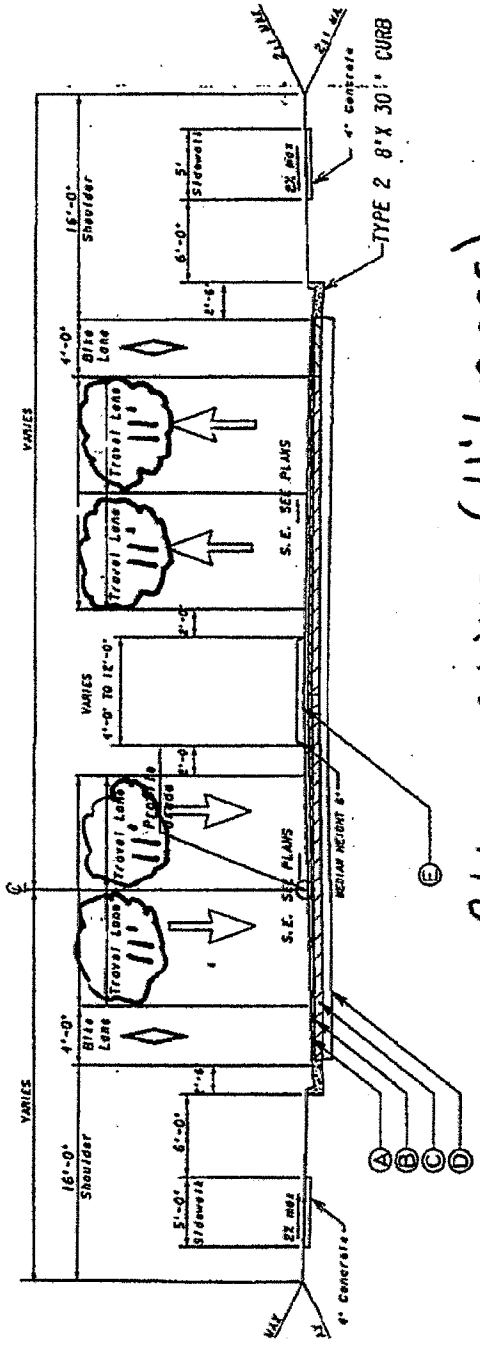
PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-4**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒ SHEET NO.: **2 of 4**



ORIGINAL (12' Lanes)
TYPICAL SECTION



Alternative (11' Lanes)
TYPICAL SECTION

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-4**

SHEET NO.: **3 of 4**

N. Jefferson Street Roadway Reduction from 121+80-Ft to Sta. 141+73 Main Line Rt. & Lt.:

2-Ft. x 1993-Ft = 3,986 SF/9 = 443 SY

N. Jefferson Street Roadway Reduction from 122+43-Ft. Rt. to Sta. 132+50 Rt.:
1-Ft. x 1007-Ft = 1,007 SF/9 = 111.89 SY

N. Jefferson Street Roadway Reduction from 130+57-Ft. Rt. to Sta. 133+00 Lt.:
1-Ft. x 243-Ft = 243 SF/9 = 27.89 SY

N. Jefferson Street Roadway Reduction from 134+00-Ft. Rt. to Sta. 140+00 Lt.:
1-Ft. x 600-Ft = 600 SF/9 = 66.67 SY

N. Jefferson Total SY = 649.45 SY

Philema Road roadway Reduction between Sta. 90+43 to Sta. 98+17 Rt. & Lt.:

6-Ft. x 774-Ft = 4,644 SF/27 = 172 SY

Total Square Yards 649.45 + 172 = 821.45SY, SAY 825 SY

Full depth asphalt section (also for Ramp shoulders):

12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/sy
19mm:	330#/sy x ton/2000# x $80/sy =	$13.20/sy
25mm:	660#/sy x ton/2000# x $80/sy =	$26.40/sy
8" GAB:	0.67ft x 147#/CF x Ton/2,000# x 9SF/SY x $30/Ton =	$13.30/sy
	Total Asphaltic Pavement Unit Cost =	**$59.50/SY**

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-4**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Full Depth Pvmt w/GAB	SY	825	59.50	49,088			
R/W saved	SF	5,840	3.60	21,024			
R/W Subtotal				21,024			
R/W Mkup 30.00%				6,307			
Construction Subtotal				49,088			
Constr. Mkup 5.00%				2,454			
TOTAL				78,873			
TOTAL (ROUNDED)				79,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-5**

DESCRIPTION: **PROVIDE 11-FT.-WIDE INSIDE TRAVEL LANES ON N. JEFFERSON ST. AND PHILEMA RD.**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design indicates 12-ft.-wide travel lanes on N. Jefferson Street and Philema Road

ALTERNATIVE: (sketch attached)

Reduce the inside travel lanes from 12 ft. wide to 11 ft. wide on both N. Jefferson Street and Philema Road.

ADVANTAGES:

- Reduces grading and paving requirements
- Reduces right-of-way impacts
- Accommodates truck traffic on the wider outside lane

DISADVANTAGES:

- Narrower inside travel lanes provided

DISCUSSION:

Using 11-ft.-wide inside lanes for travel on both N. Jefferson Street and Philema Road reduces grading and pavement requirements and adjacent impacts through the design corridor. The outside lanes will remain at 12 ft. wide to accommodate the moderately light truck traffic (9.5%). Narrower lane requirements will make it easier to manage and facilitate staged construction.

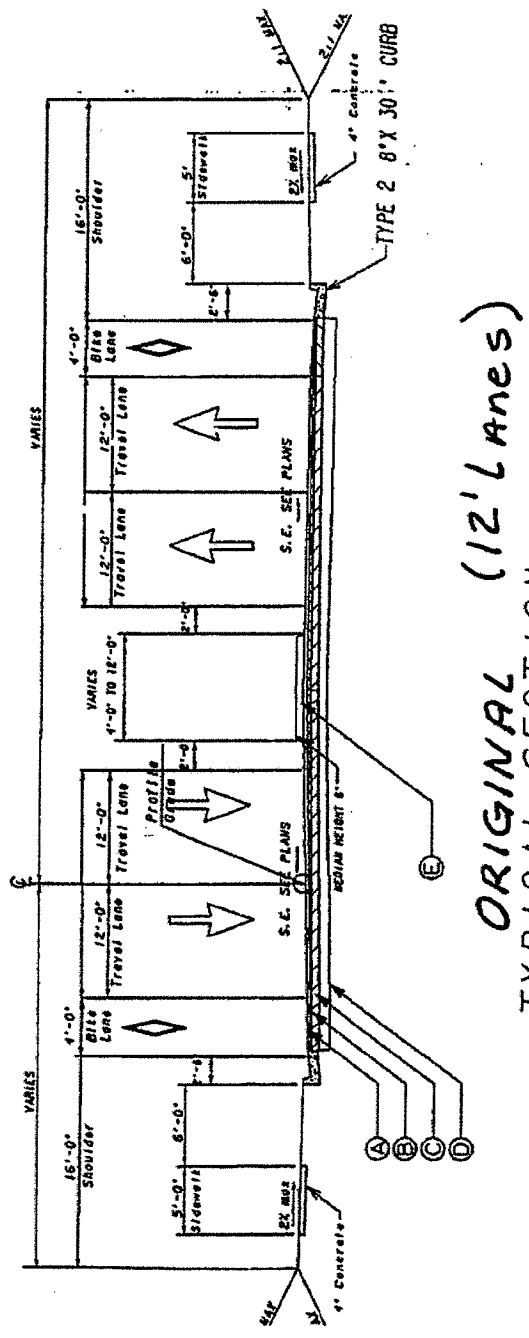
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 63,000	—	$ 63,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 63,000	—	$ 63,000

SKETCH

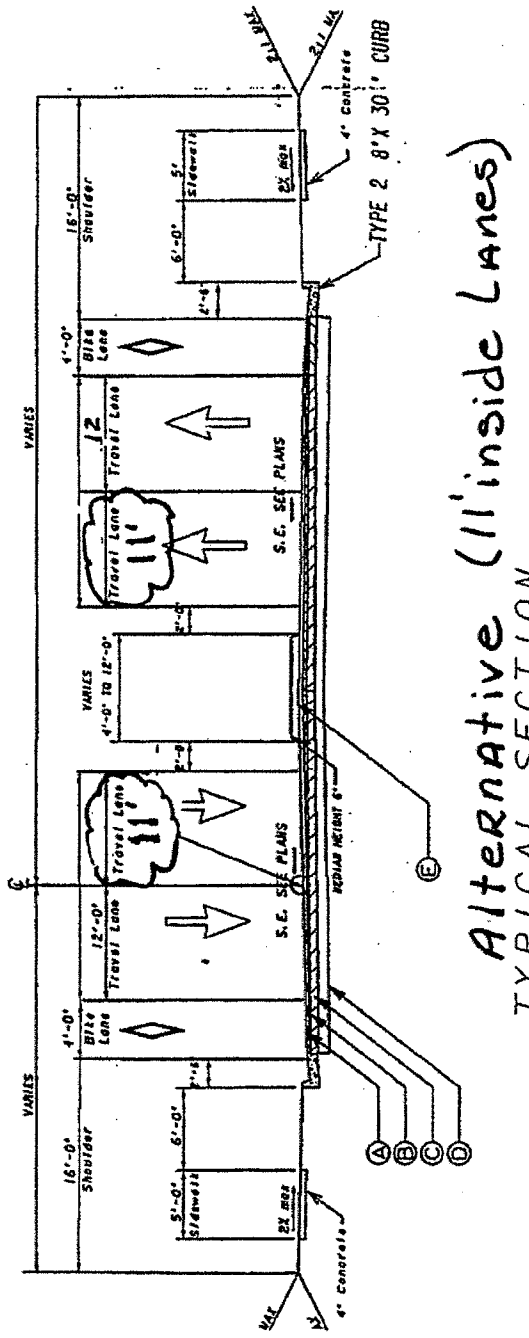
PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-5**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒ SHEET NO.: **2 of 4**



ORIGINAL (12' Lanes)
TYPICAL SECTION



Alternative (11' inside Lanes)
TYPICAL SECTION

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-5**

SHEET NO.: **3 of 4**

N. Jefferson Street Roadway Reduction from 121+80-Ft to Sta. 141+73 Main Line Rt. & Lt.:

2-Ft. x 1993-Ft = 3,986 SF/9 = 443 SY

N. Jefferson Total SY = 443 SY

Philema Road roadway Reduction between Sta. 90+43 to Sta. 98+17 Rt. & Lt.:

2-Ft. x 774-Ft = 1,548 SF/9 = 172 SY

Total Square Yards 443 + 172 = 615 SY

Full depth asphalt section (also for Ramp shoulders):

12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/sy
19mm:	330#/sy x ton/2000# x $80/sy =	$13.20/sy
25mm:	660#/sy x ton/2000# x $80/sy =	$26.40/sy

8" GAB: 0.67ft x 147#/CF x Ton/2,000# x 9SF/SY x $30/Ton = $13.30/sy

Total Asphaltic Pavement Unit Cost = $59.50/SY

R/W saved: N. Jefferson Street Roadway Reduction = 2' x 1990' = 3,800 sf

R/W saved: Philema Road roadway Reduction = 2' x 750' = 1,500 sf

Total R/W saved = 5,300 sf

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-5**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Full Depth Pvmt w/GAB	SY	615	59.50	36,593			
R/W saved	SF	5,300	3.60	19,080			
R/W Subtotal				19,080			
R/W Mkup 30.00%				5,724			
Construction Subtotal				36,593			
Constr. Mkup 5.00%				1,830			
TOTAL				63,227			
TOTAL (ROUNDED)				63,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *NH000-0006-25(055); PI No. 422550* *Dougherty County, Georgia*	ALTERNATIVE NO.: **R-7**
DESCRIPTION:	**REMOVE GUARDRAIL AND ANCHORAGES ON RAMP A FROM STA. 223+25 TO STA. 224+50 RT**	SHEET NO.: **1 of 1**

ORIGINAL DESIGN: (sketch attached)

The original design provides guardrail on the right side of Ramp A. The guardrail is in front of a 4:1 slope.

ALTERNATIVE: (sketch attached)

Remove the guardrail and anchorages from the right side of Ramp A from Sta. 223+25 to Sta. 224+50 RT.

ADVANTAGES:

- Eliminates unnecessary guardrail

DISADVANTAGES:

- None identified

DISCUSSION:

In this area, the guardrail is in front of a 4:1 slope and is therefore not needed per GDOT construction standard 4051. Eliminating the guardrail saves approximately $8,000.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-8**

DESCRIPTION: **REDUCE THE SIDEWALK WIDTH FROM 8 FT. TO 5 FT. ON THE RIGHT SIDE OF NORTH JEFFERSON STREET**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (sketch attached)

The original sidewalk width is 8 ft. on the right side of North Jefferson Street.

ALTERNATIVE: (sketch attached)

Reduce the sidewalk width to 5ft on the right side of North Jefferson Street.

ADVANTAGES:

- Reduces the sidewalk concrete

DISADVANTAGES:

- None identified

DISCUSSION:

An 8 ft. sidewalk width is not needed along the right side of North Jefferson Street with the 4 ft. bicycle lane along the roadway.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 40,000	—	$ 40,000
ALTERNATIVE	$ 25,000	—	$ 25,000
SAVINGS (Original minus Alternative)	$ 15,000	—	$ 15,000

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-8**

SHEET NO.: **2 of 3**

Sidewalk Length:

Sta. 122+43 to Sta. 128+35 = 592 ft.

Sta. 128+58 to Sta. 132+50 = 392 ft.

Sta. 133+75 to Sta.139+00 = 525 ft.

Total Length = 1509 ft.

8 ft. sidewalk area = 1509 ft. x 8 ft. x 1SY/9SF = 1341.33 SY, **Say 1340 SY**

5 ft. sidewalk area = 1509 ft. x 5 ft. x 1SY/9SF = 838.33 SY, **Say 840 SY**

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-8**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
8 ft. sidewalk	SY	1,340	28.55	38,257			
5 ft. sidewalk	SY				840	28.55	23,982
Subtotal				38,257			23,982
Markup (%) at 5.00%				1,913			1,199
TOTAL				40,170			25,181
TOTAL (ROUNDED)				40,000			25,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-9**

DESCRIPTION: **PROVIDE A RURAL SHOULDER IN LIEU OF AN URBAN SHOULDER ON THE LEFT SIDE OF N. JEFFERSON ST. FROM STA 123+00 LT TO STA 133+20 LT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The current design proposes urban shoulders on North Jefferson St. through the entire project.

ALTERNATIVE: (sketch attached)

Use a rural shoulder on North Jefferson St. from Sta.123+00 LT to Sta. 133+20 LT.

ADVANTAGES:

- Reduces the amount of drainage structures and pipe
- Reduces the construction time
- Reduces full-depth pavement requirements for the bike lane

DISADVANTAGES:

- None identified

DISCUSSION:

The land area on the left side of N. Jefferson St. is existing GDOT right-of-way. Therefore, right-of-way cost impacts are not an issue. The alternative design proposes a 10-ft.-wide graded rural shoulder of which 6.5 ft. would be paved to provide for a rumble strip and bike lane. This design saves all the longitudinal drainage structures and a roadway bike lane on the left side.

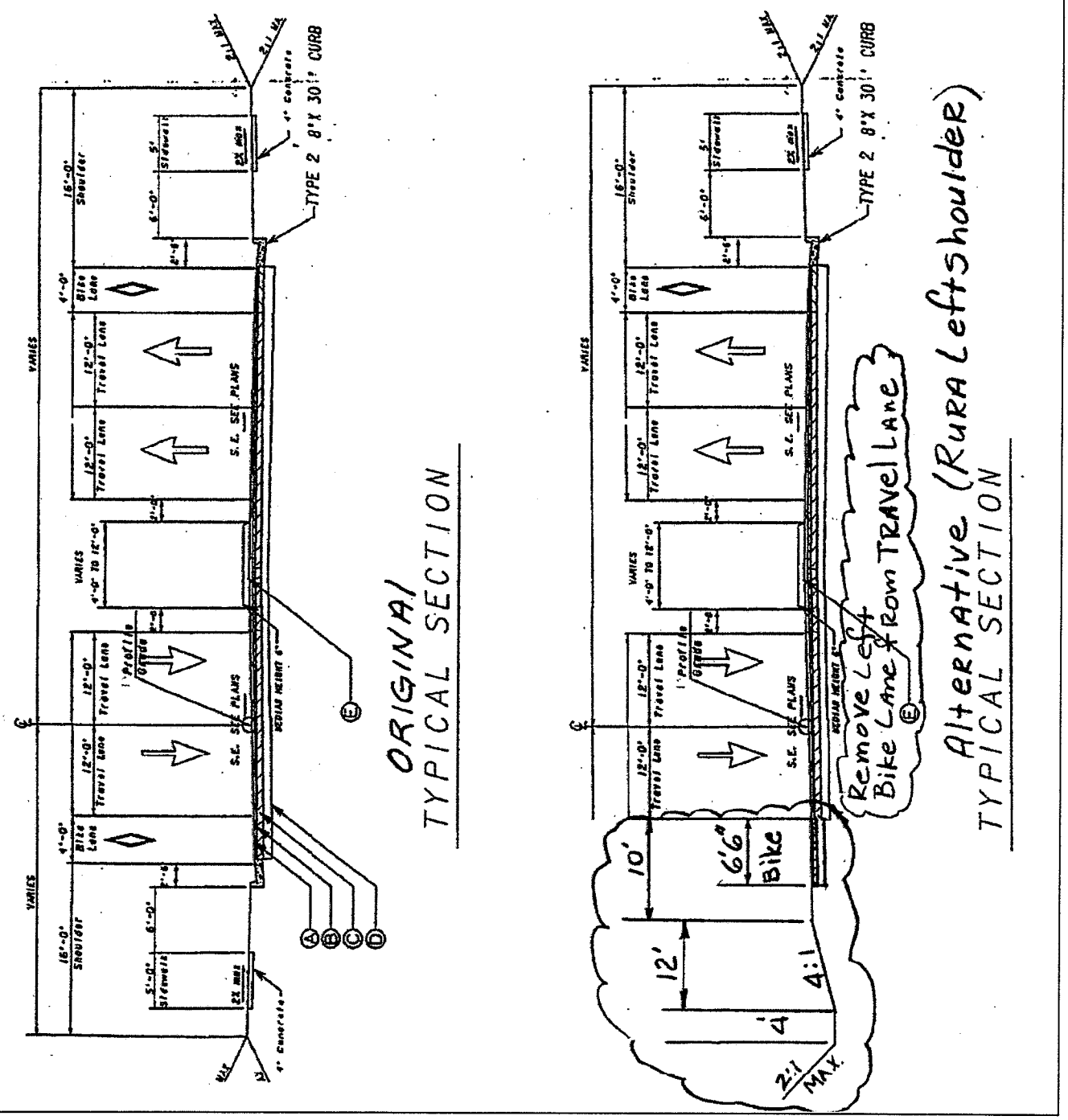
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 110,000	—	$ 110,000
ALTERNATIVE	$ 26,000	—	$ 26,000
SAVINGS (Original minus Alternative)	$ 84,000	—	$ 84,000

SKETCH

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-9**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒ SHEET NO.: **2 of 4**



PROJECT:	SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION *Dougherty County, Georgia*	ALTERNATIVE NO.: R-9 SHEET NO.: 3 of 4

Original design construction saved from Sta. 123+00 to Sta. 133+20 left on North Jefferson Street

- Catch Basins saved: 10 each
- Drop Inlets saved: 2 each
- Manholes saved: 2 each
- 18" storm drain pipe saved: 1,040 LF
- Bike lane saved (4-ft x 1,020')/ 9sf/sy = 454 SY
- Sidewalk saved (5' x 1,020)/ 9sf/sy = 567 SY

Additional Alternative Shoulder pavement quantities

- Use 165#/sy 12.5mm; 330#/sy; 6" GAB (could be used during construction staging to carry traffic) Cost $/sy
- Rural shoulder pavement = (1,020' x 6.5') 9sf/sy = 737 SY

Rural Shoulder pavement Section Unit Cost:

12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/sy
19mm:	330#/sy x ton/2000# x $80/sy =	$13.20/sy

Total Rural Paved Shoulder Unit Cost = $19.80/SY

- Additional ditch protection estimated = 300 SY of protection

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-9**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Catch Basins	EA	10	$2,200.00	$22,000			
Drop Inlets	EA	2	$1,900.00	$3,800			
Manholes	EA	2	$2,100.00	$4,200			
18 inch storm Drain Pipe	LF	1,040	$30.00	$31,200			
Bike Lane Pavement	SY	454	$59.50	$27,013			
Sidewalk Pavement	SY	567	$29.60	$16,783			
Alterernative Design Costs							
6.5' Paved Shoulder	SY				737	$29.72	$21,904
Ditch protection	SY				300	$10.00	$3,000
Subtotal				104,996			24,904
Markup (%) at 5.00%				5,250			1,245
TOTAL				110,246			26,149
TOTAL (ROUNDED)				110,000			26,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-10**

DESCRIPTION: **PROVIDE A 12-FT.-WIDE MULTI-USE TRAIL ON THE LEFT SIDE OF N. JEFFERSON ST. AND A 5-FT.-WIDE SIDEWALK ON THE RIGHT SIDE IN LIEU OF THE 4- FT.-WIDE BICYCLE LANES AND 5-FT.-WIDE SIDEWALK**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The current design proposes two 4-ft.-wide bicycle lanes in the street travelway, a 5-ft.-wide sidewalk on the left side and an 8-ft.-wide sidewalk on the right side of N. Jefferson St.

ALTERNATIVE: (sketch attached)

Provide a 12-ft. wide multi-use trail for both bikes and pedestrians on the left side of N. Jefferson Street from Sta. 123+00 to Sta. 133+20 and a 5-ft.-wide sidewalk on the right side.

ADVANTAGES:

- Removes bicycles from vehicle traffic
- Reduces labor and material requirements
- Reduces construction time
- Reduces paving quantities

DISADVANTAGES:

- None identified

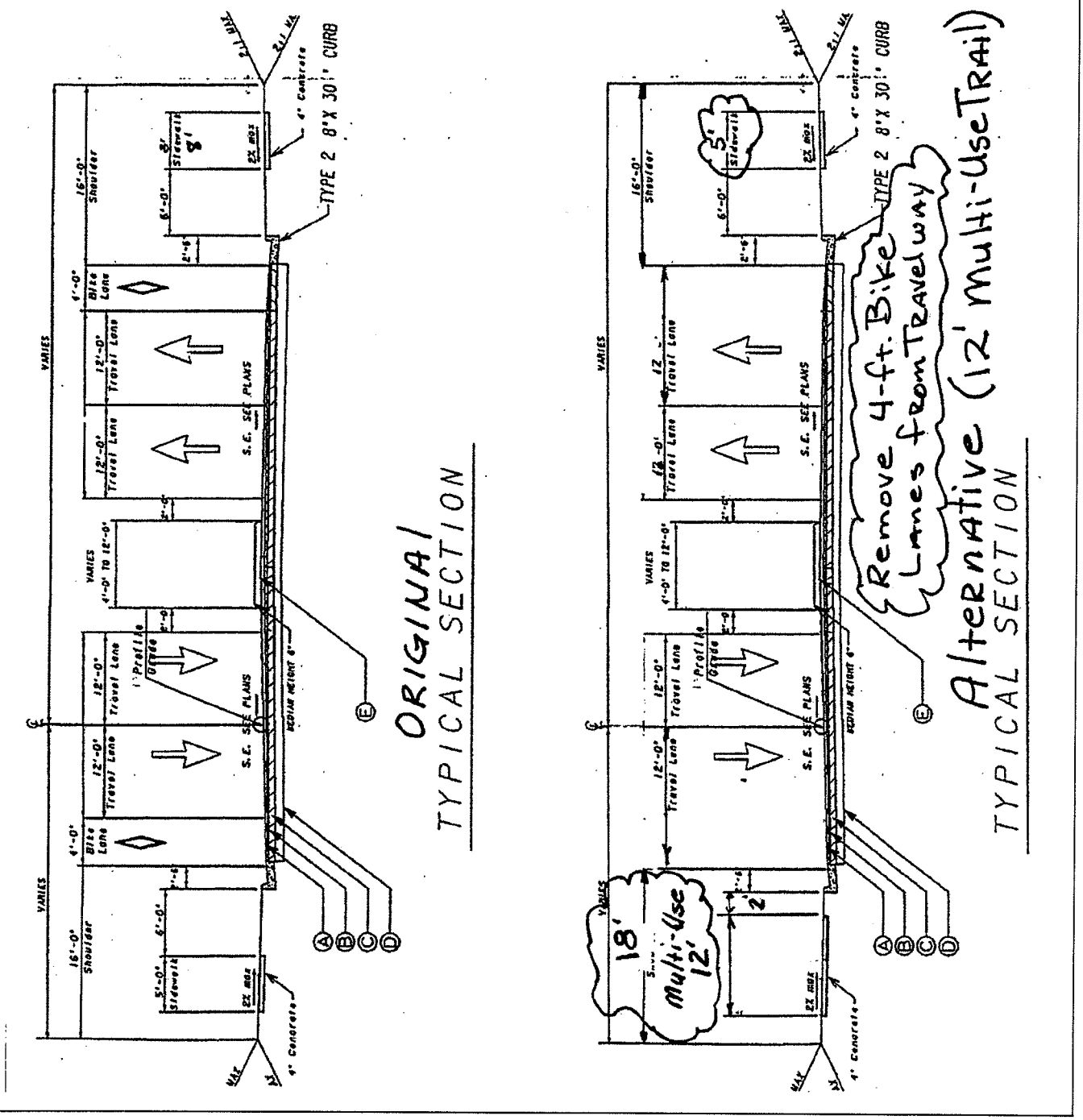
DISCUSSION:

A 12-ft.-wide multi-use trail would be located on the left shoulder thus removing the bikes from the vehicle traffic and reducing the possibility of accidents. The sidewalk on the right side of N. Jefferson St. would be reduced to a 5 ft wide sidewalk. The alternative design would save 8 ft. of full depth pavement. The multi-use trail would require a wider shoulder on the left side (18 ft. in lieu of a 16 ft. graded shoulder), however this would not cause any additional impacts since 8 ft. (two 4 ft. bicycle lanes) are being removed from the roadway.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 205,000	—	$ 205,000
ALTERNATIVE	$ 77,000	—	$ 77,000
SAVINGS (Original minus Alternative)	$ 128,000	—	$ 128,000

SKETCH

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *Dougherty County, Georgia*	ALTERNATIVE NO.: **R-10**
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐ BOTH ☒	SHEET NO.: **2 of 4**



PROJECT:	SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION *Dougherty County, Georgia*	ALTERNATIVE NO.: R-10 SHEET NO.: 3 of 4

Length of Multi-use trail on North Jefferson Street

Additional Alternative Costs:

(Sta. 141+73 to Sta. 123+00) – (160' at intersection) = 1,713' length of sidewalk or trail on one side.

(1,713' x 12')/ 9sf/sy = 2,284 sy (left side Multi-Use trail)

(1,713' x 5)/ 9sf/sy = 952 sy (right side sidewalk)

Total concrete sidewalk/trail pavement = 3236 sy

Versus Original Costs:

(1,713' x 5')/ 9sf/sy = 952 sy (left side sidewalk)

(1,713' x 8')/ 9sf/sy = 1,523 sy (right side sidewalk)

Total sidewalk pavement = 2,475 sy

Remove bike lanes from Road travelway

(2 sides x 4' x 1873')/ 9sf/sy = **1,665 sy** of full depth pavement saved

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-10**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Sidewalks- both sides	SY	3,236	$29.60	$95,786			
Full-depth pavement saved	SY	1,665	$59.50	$99,068			
Sidewalk and Multi-use trail	SY				2,475	$29.60	$73,260
Subtotal				194,854			73,260
Markup (%) at 5.00%				9,743			3,663
TOTAL				204,597			76,923
TOTAL (ROUNDED)				205,000			77,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **R-13**

DESCRIPTION: **PROVIDE 8 FT. PAVED OUTSIDE SHOULDERS IN LIEU OF 10 FT. PAVED OUTSIDE SHOULDERS ON RAMPS A AND B**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The current design proposes a 10 ft. paved shoulder and 12 ft. graded outside shoulder for Ramps A and B.

ALTERNATIVE: (sketch attached)

Use an 8 ft. paved shoulder and 12 ft. graded outside shoulder for Ramps A and B.

ADVANTAGES:

- Reduces pavement section quantities
- Reduces construction time

DISADVANTAGES:

- Narrower paved outside shoulder

DISCUSSION:

The 2004 AASHTO Green book page 838 states that, "the sum of the right and left shoulder paved shoulders should not exceed 10 to 12 feet," therefore a 4 ft. inside paved shoulder and an 8 ft. outside paved shoulder meet this design criteria. This change in design reduces the pavement section quantities and construction time for this project.

It is important to note that it is proposed to keep the same 12 ft. graded outside shoulder in order to provide sufficient space for stranded motorists.

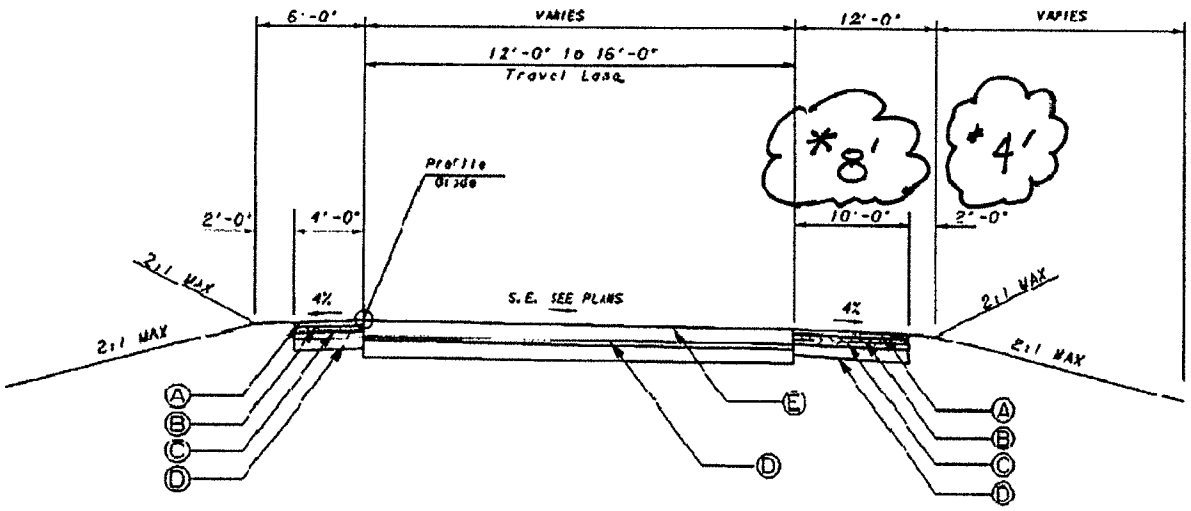
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 148,000	—	$ 148,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 148,000	—	$ 148,000

SKETCH

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

ALTERNATIVE NO.: **R-13**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒ SHEET NO.: **2 of 5**



TYPICAL SECTION
SR3\520-LIBERTY EXPRESSWAY

Ramps A & B

*Alternative Design Paved Shoulder

AASHTO—Geometric Design of Highways and Streets

Ramp Traveled-Way Widths

Width and cross section. Ramp traveled-way widths are governed by the type of operation, curvature, and volume and type of traffic. It should be noted that the roadway width for a turning roadway includes the traveled-way width plus the shoulder width or equivalent clearance outside the edges of the traveled way. The section "Widths for Turning Roadways" in Chapter 3 may be referenced for additional discussion on the treatments at the edge of traveled way. Design widths of ramp traveled ways for various conditions are given in Exhibit 10-67. Values are shown for three general design traffic conditions, as follows:

Traffic Condition A—predominantly P vehicles, but some consideration for SU trucks.

Traffic Condition B—sufficient SU vehicles to govern design, but some consideration for semitrailer vehicles.

Traffic Condition C—sufficient buses and combination trucks to govern design.

Traffic conditions A, B, and C are described in broad terms because design traffic volume data for each type of vehicle are not available to define these traffic conditions with precision in relation to traveled-way width. In general, traffic condition A has a small volume of trucks or only an occasional large truck, traffic condition B has a moderate volume of trucks (in the range of 5 to 10 percent of the total traffic), and traffic condition C has more and larger trucks.

Shoulders and lateral clearances. Design values for shoulders and lateral clearances on the ramps are as follows:

- When paved shoulders are provided on ramps, they should have a uniform width for the full length of ramp. For one-way operation, the sum of the right and left shoulder widths should not exceed 3.0 to 3.6 m [10 to 12 ft]. A paved shoulder width of 0.6 to 1.2 m [2 to 4 ft] is desirable on the left with the remaining width of 2.4 to 3.0 m [8 to 10 ft] used for the paved right shoulder.
- The ramp traveled-way widths from Exhibit 10-67 for Case II and Case III should be modified when paved shoulders are provided on the ramp. The ramp traveled-way width for Case II should be reduced by the total width of both right and left shoulders. However, in no case should the ramp traveled-way width be less than needed for Case I. For example, with condition C and a 125-m [400-ft] radius, the Case II ramp traveled-way width without shoulders is 6.4 m [21 ft]. If a 0.6-m [2-ft] left shoulder and a 2.4-m [8-ft] right shoulder are provided, the minimum ramp traveled-way width should be 4.8 m [15 ft].
- Directional ramps with a design speed over 60 km/h [40 mph] should have a paved right shoulder width of 2.4 to 3.0 m [8 to 10 ft] and a paved left shoulder width of 0.3 to 1.8 m [1 to 6 ft].
- For freeway ramp terminals where the ramp shoulder is narrower than the freeway shoulder, the paved shoulder width of the through lane should be carried into the exit terminal. It should also begin within the entrance terminal, with the transition to the

PROJECT:	SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION *Dougherty County, Georgia*	ALTERNATIVE NO.: **R-13**
		SHEET NO.: **4 of 5**

Ramp "A" Sta. 200+00 to Sta. 227+20 narrower the right paved shoulder to 8 feet.

Ramp "B" Sta. 302+50 to Sta. 315+00 narrower the right paved shoulder to 8 feet.

- Ramp "A" Pavement area saved = [(10'- 8') x (2,720' – 177')]/ 9sf/sy = 566 sy saved
- Ramp "B" pavement area saved = [2' x (1250' – 324.5)]/ 9sf/sy = 206 sy

Total 772 sy

Full depth asphalt section (also for Ramp shoulders):

12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/sy
19mm:	330#/sy x ton/2000# x $80/sy =	$13.20/sy
25mm:	660#/sy x ton/2000# x $80/sy =	$26.40/sy

8" GAB: 0.67ft x 147#/CF x Ton/2,000# x 9SF/SY x $30/Ton = $13.30/sy

Total shoulder Asphaltic Pavement Unit Cost = $59.50/SY

- Ramp A Bridge saved = (10' - 8') x 177' = 354 sf saved
- Ramp B Bridge saved = (10' - 8') x 324.5' = 649 sf saved

Total 1,003 sf

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
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Dougherty County, Georgia

ALTERNATIVE NO.: **R-13**

SHEET NO.: **5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Original Costs saved:							
Pavement saved	SY	772	$59.50	$45,934			
Bridge saved	SF	1,003	$95.00	$95,285			
Subtotal				141,219			
Markup (%) at 5.00%				7,061			
TOTAL				148,280			
TOTAL (ROUNDED)				148,000			

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550 *Dougherty County, Georgia*

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	STRUCTURES (S)					
S-1	Reduce the Ramp A Bridge from 34-ft.-wide to 30-ft.-wide by narrowing the shoulders 2 ft. per side	$658,000	$587,000	$71,000		$71,000
S-2	Reduce the Ramp B Bridge from 42-ft.-wide to 38-ft.-wide by narrowing the shoulders 2 ft. per side	$1,465,000	$1,335,000	$130,000		$130,000
S-4	Reduce the length of the Ramp B Bridge by 52 ft. by providing a retaining wall abutment on the east end	$1,465,000	$1,293,000	$172,000		$172,000
S-5	Reduce the length of the Ramp A Bridge by 37 ft. by providing a retaining wall abutment on the west end	$658,000	$549,000	$109,000		$109,000
S-7	Provide a standard concrete side barrier for the retaining wall west of Ramp B from Sta. 309+50 to Sta. 313+00	DESIGN SUGGESTION				

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-1**

DESCRIPTION: **REDUCE THE RAMP A BRIDGE WIDTH FROM 34 FT. TO 30 FT.**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (sketch attached)

The original Ramp A Bridge width is 34 ft. from gutter to gutter including a 16 ft. travel lane, 12 ft. outside shoulder, and 6 ft. inside shoulder

ALTERNATIVE: (sketch attached)

Reduce the bridge width to 30 ft. from gutter to gutter including a 16 ft. travel lane, 10 ft. outside shoulder, and 4 ft. inside shoulder

ADVANTAGES:

- Reduces bridge deck width and associated material and labor requirements

DISADVANTAGES:

- Requires limited additional design effort since the bridge designs are currently preliminary

DISCUSSION:

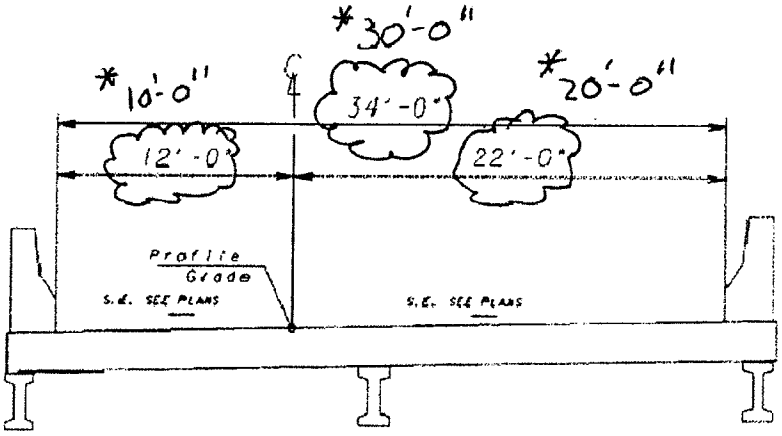
Reducing the bridge width by 4 ft. allows it to match the paved shoulder sections and reduces associated labor and material requirements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 658,000	—	$ 658,000
ALTERNATIVE	$ 587,000	—	$ 587,000
SAVINGS (Original minus Alternative)	$ 71,000	—	$ 71,000

SKETCH

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *Dougherty County, Georgia*	ALTERNATIVE NO.: **S-1**
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐ BOTH ☐	SHEET NO.: **2 of 3**

BRIDGE # 1 RAMP A



TYPICAL SECTION NO. 3

SUPER ELEVATION SECTION
APPLIES TO STA. 213+10.44 TO STA. 214+87.44
SEE DRAWING #13-01

* Reduced shoulder width by 2'-0" on each side.

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-1**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Ramp A Bridge Area	SF	6,593	95.00	626,359	5,885	95.00	559,099
Subtotal				626,359			559,099
Markup (%) at 5.00%				31,318			27,955
TOTAL				657,677			587,054
TOTAL (ROUNDED)				658,000			587,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-2**

DESCRIPTION: **REDUCE THE RAMP B BRIDGE WIDTH FROM 42 FT. TO 38 FT.**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (sketch attached)

The original Ramp B Bridge width is 42 ft. from gutter to gutter which includes two, 12 ft. through lanes, a 12 ft. outside shoulder, and a 6 ft. inside shoulder.

ALTERNATIVE: (sketch attached)

Reduce the bridge width to 38 ft. from gutter to gutter including two 12 ft. through lanes, a 10 ft. outside shoulder, and a 4 ft. inside shoulder.

ADVANTAGES:

- Reduces bridge material and labor requirements

DISADVANTAGES:

- Requires limited additional design effort since the bridge designs are preliminary

DISCUSSION:

Reducing the bridge width by 4 ft. allows it to match up with the paved sections and reduces associated labor and material requirements.

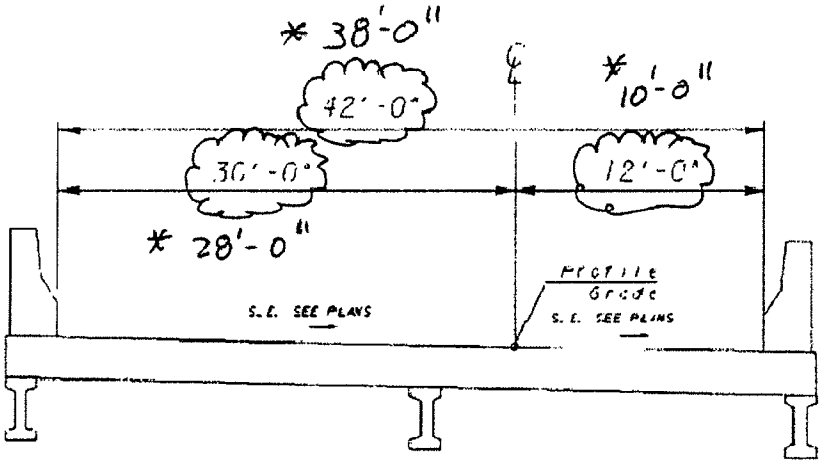
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,465,000	—	$ 1,465,000
ALTERNATIVE	$ 1,335,000	—	$ 1,335,000
SAVINGS (Original minus Alternative)	$ 130,000	—	$ 130,000

SKETCH

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-2**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒ SHEET NO.: **2 of 3**



TYPICAL SECTION NO. 4

SUPER ELEVATION SECTION

APPLIES TO STA. 306+66.57 TO STA. 309+91.07

SEE DRAWING # 11-09

* Reduce shoulder width by 2'-0" on each side.

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-2**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Ramp B Bridge Area	SF	14,684	95.00	1,394,944	13,386	95.00	1,271,634
Subtotal				1,394,944			1,271,634
Markup (%) at 5.00%				69,747			63,582
TOTAL				1,464,691			1,335,216
TOTAL (ROUNDED)				1,465,000			1,335,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-4**

DESCRIPTION: **REDUCE THE LENGTH OF THE RAMP B BRIDGE BY 52 FT. BY PROVIDING A RETAINING WALL ABUTMENT ON THE EAST END**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (sketch attached)

The original length of the Ramp B Bridge is 324 ft.-6 in. using spillways at each end.

ALTERNATIVE: (sketch attached)

Reduce the length of the Ramp B Bridge by 52 ft. by providing a retaining wall abutment on the east end.

ADVANTAGES:

- Reduces bridge material and labor requirements
- Eliminates an intermediate bridge pier

DISADVANTAGES:

- Requires limited additional design effort since the bridge designs are preliminary

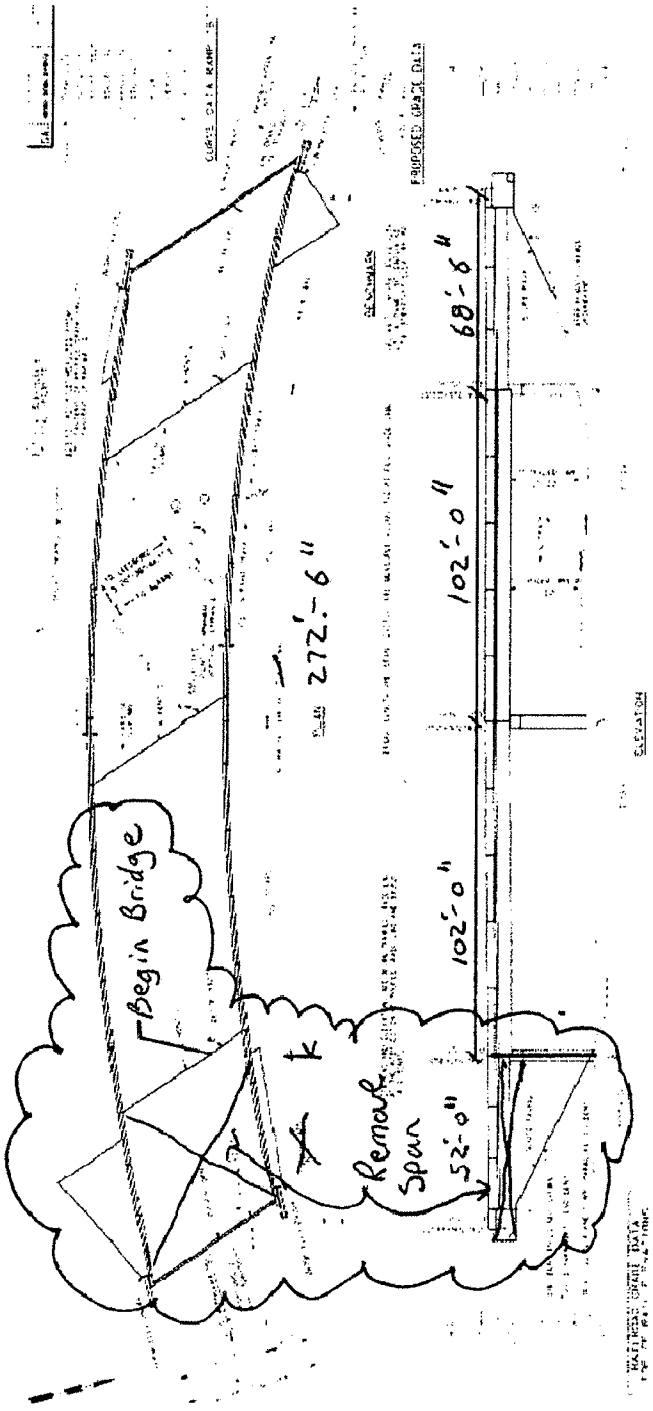
DISCUSSION:

Adding a retaining wall abutment to the east end of the Ramp B Bridge reduces the overall bridge length to 272 ft.-8 in.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,465,000	—	$ 1,465,000
ALTERNATIVE	$ 1,293,000	—	$ 1,293,000
SAVINGS (Original minus Alternative)	$ 172,000	—	$ 172,000

SKETCH

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *Dougherty County, Georgia*	ALTERNATIVE NO.: **S-4**
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐ BOTH ☒	SHEET NO.: **2 of 3**



COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-4**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Ramp B Bridge Area	SF	14,684	95.00	1,394,944	12,331	98.00	1,208,401
* Note: $98 SF is to account for the wall abutment.							
Additional Concrete Pavement	SY				139	70.30	9,749
Additional Asphalt for Shoulders	SY				81	59.50	4,813
Additional Embankment	CY				1,260	6.50	8,190
Subtotal				1,394,944			1,231,153
Markup (%) at 5.00%				69,747			61,558
TOTAL				1,464,691			1,292,711
TOTAL (ROUNDED)				1,465,000			1,293,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-5**

DESCRIPTION: **REDUCE THE RAMP A BRIDGE LENGTH BY 37 FT.**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (sketch attached)

The original length of the Ramp A Bridge is 177 ft.-0 in.

ALTERNATIVE: (sketch attached)

Add a wall abutment to the west end of the bridge and reduce the bridge length by 37 ft.

ADVANTAGES:

- Reduces bridge length and associated material and labor
- Eliminates an intermediate bridge pier

DISADVANTAGES:

- May reduce sight distance for motorists traveling on N. Jefferson St. near the Ramp Bridge A

DISCUSSION:

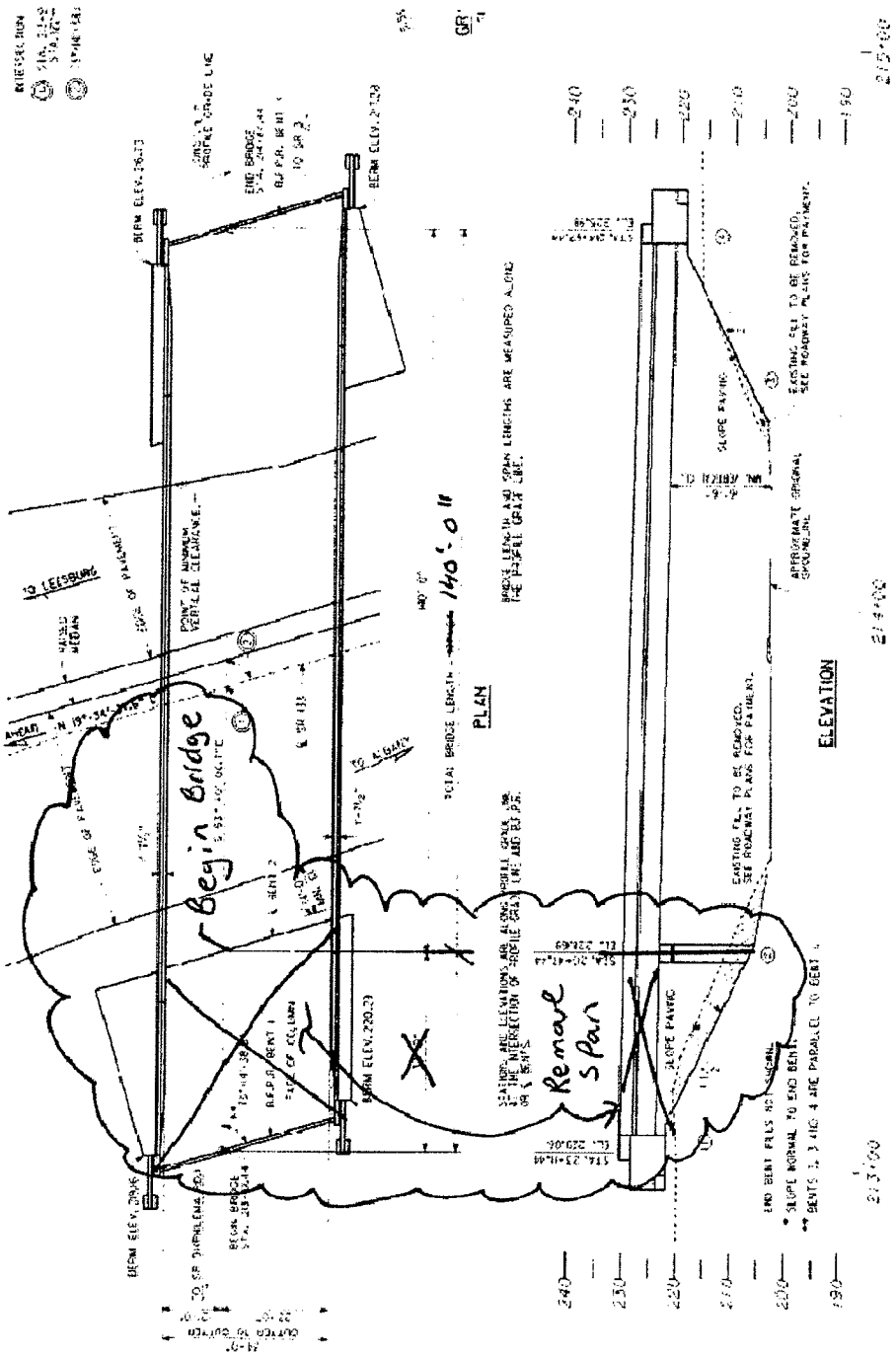
Adding a retaining wall abutment to the west end of the Ramp A Bridge reduces the overall bridge length to 140 ft.-0 in. The disadvantage is that shortening the Ramp A Bridge may reduce sight distance for motorists traveling on N. Jefferson St.

Since N. Jefferson St. is tapered on the left side directly under the proposed Ramp A Bridge, the east end of the Ramp A Bridge should remain as designed to accommodate an additional lane on the left side of N. Jefferson St. in the future.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 658,000	—	$ 658,000
ALTERNATIVE	$ 549,000	—	$ 549,000
SAVINGS (Original minus Alternative)	$ 109,000	—	$ 109,000

SKETCH

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *Dougherty County, Georgia*	ALTERNATIVE NO.: **S-5**
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐ BOTH ☒	SHEET NO.: **2 of 3**



COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-5**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Ramp A Bridge Area	SF	6,593	95.00	626,359	5,215	98.00	511,070
* Note: $98/SF to account for the wall abutment.							
Additional Concrete Pavement	SY				66	70.30	4,624
Additional Asphalt for Shoulders	SY				58	59.50	3,425
Additional Embankment	CY				605	6.50	3,930
Subtotal				626,359			523,049
Markup (%) at 5.00%				31,318			26,152
TOTAL				657,677			549,201
TOTAL (ROUNDED)				658,000			549,000

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *Dougherty County, Georgia*	ALTERNATIVE NO.: **S-7**
DESCRIPTION:	**PROVIDE A GDOT STANDARD CONCRETE SIDE BARRIER FOR THE WALL AT RAMP B FROM STA. 309+50 TO STA. 313+00**	SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The design for the retaining wall west of the Ramp B Bridge has not been determined.

ALTERNATIVE: (sketch attached)

Provide the GDOT standard concrete side barrier for the retaining wall at Ramp B.

ADVANTAGES:

- Cost effective alternative

DISADVANTAGES:

- None identified

DISCUSSION:

A maximum wall height of about 11ft. is needed at Sta. 310+00; therefore the standard concrete side barrier will be adequate and cost effective.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

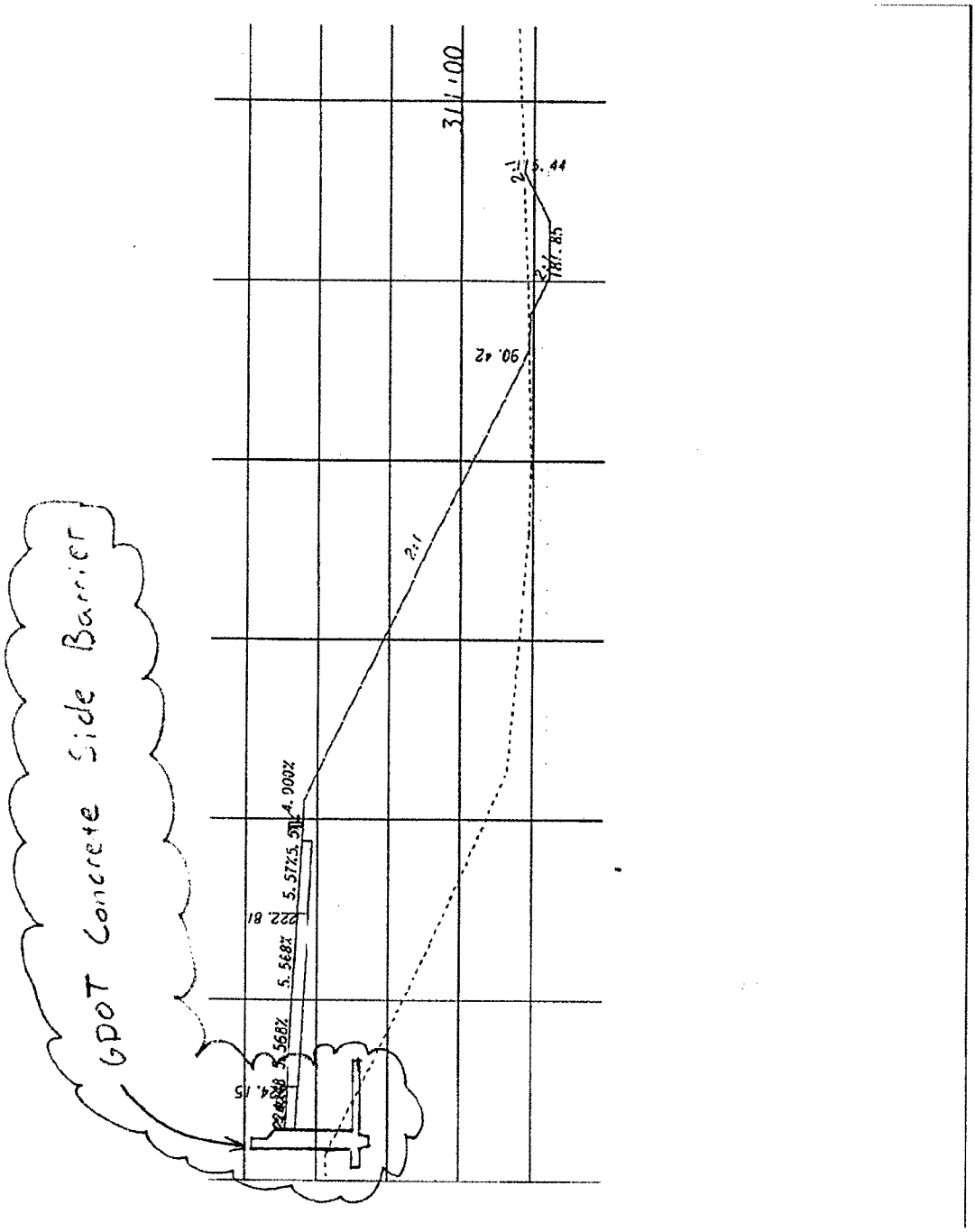
SKETCH

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **S-7**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐

SHEET NO.: **2 of 2**



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550 Dougherty County, Georgia

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	CONSTRUCTION STAGING (C)					
C-1	Modify sequencing of stage 1 to include removal and full depth paving of the existing median first, and then shifting traffic south on N. Jefferson St. and Philema Rd.	DESIGN SUGGESTION				
C-3	Utilize the existing WB Liberty Express exit ramp for right and left turns onto N. Jefferson St. during construction to enable earlier closure of the existing SB N. Jefferson St. entrance ramp	DESIGN SUGGESTION				

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *NH000-0006-25(055); PI No. 422550* *Dougherty County, Georgia*	ALTERNATIVE NO.: **C-1**
DESCRIPTION:	**MODIFY SEQUENCING OF STAGE 1 TO INCLUDE REMOVING THE RAISED MEDIAN FIRST AND THEN SHIFTING TRAFFIC ON N. JEFFERSON ST. AND PHILEMA RD. DURING STAGE 1 OF CONSTRUCTION**	SHEET NO.: **1 of 2**

ORIGINAL DESIGN: (sketch attached)

The original Construction Staging Plan calls for widening the existing pavement southbound on N. Jefferson St. during Stage 1 – Phase 1, then removing existing raised medians on N. Jefferson St. and replacing them with temporary pavement during Stage 1 – Phase 2.

ALTERNATIVE: (sketch attached)

Complete Stage 1 – Phase 2 ahead of Stage 1 – Phase 1 on N. Jefferson St. and do the same thing on Philema Rd.

ADVANTAGES:

- Enables more area to be widened to the south on N. Jefferson St. during Stage 1
- Creates more width to maintain traffic during Stage 2

DISADVANTAGES:

- Requires pinching down the inside lane on both sides to provide space to remove existing raised medians and replace them with temporary pavement

DISCUSSION:

Removing the existing raised medians on N. Jefferson St. and Philema Rd. and replacing them with Class "B" concrete base in lieu of temporary pavement during Stage 1 – Phase 1 enables more area to be widened to the south on N. Jefferson St. and to the north on Philema Rd. during Stage 1- Phase 2. This creates a greater width of new pavement to maintain traffic during Stage 2.

The challenge is that this alternative requires pinching down the inside lane while maintaining traffic on both sides of N. Jefferson St. and Philema Rd. to provide adequate space to remove and replace the raised medians.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

Alt. No. C-1
Sheet 2 of 2

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STATE	PROJECT NUMBER	SHEET NO.	TOTAL S
GA	NH000-0006-02(055)		

STAGE 1 - PHASE 1

1. PLACE ADVANCE WARNING SIGNS IN ACCORDANCE WITH THE MUTCD.
2. MAINTAIN TRAFFIC AS SHOWN ON THE PLANS WITH TRAFFIC CONTROL DEVIC
3. WIDEN EXISTING PVMT SOUTHBOUND O NORTH JEFFERSON STREET AND CONSTRUCT CURB AND GUTTER
4. WIDEN EXISTING PVMT WESTBOUND ON PHILEMA ROAD AND CONSTRUCT CURB GUTTER
5. CONSTRUCT RAMP B
6. CONSTRUCT PORTIONS OF RAMP A WHI MAINTAINING THE EXISTING RAMPS

More area to widen during Stage 1

Remove medians first, then shift traffic south on N. Jefferson Rd.

STAGE 1 - PHASE 2

1. MAINTAIN TRAFFIC AS INDICATED ON THE PLANS WITH TRAFFIC CONTROL DEVICES
2. REMOVE EXISTING RAISED MEDIANS ON N. JEFFERSON ST. AND REPLACE WITH TEMP. PVMT.
3. INSTALL PROPOSED SIGNAL AT THE INTERSECTION OF NORTH JEFFERSON STREET AND PHILEMA ROAD

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR

BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
R/W AND LIMIT OF ACCESS

GEORGIA DEPARTMENT

REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN STAGE 1

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **C-3**

DESCRIPTION: **USE THE EXISTING WESTBOUND LIBERTY EXPRESS EXIT RAM FOR RIGHT AND LEFT TURNS ONTO N. JEFFERSON STREET DURING CONSTRUCTION TO ENABLE EARLIER CLOSURE OF THE EXISTING SOUTHBOUND NORTH JEFFERSON STREET ENTRANCE RAMP**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN: (sketch attached)

The original Construction Staging Plan calls for closure and demolition of the existing northbound N. Jefferson St. entrance ramp during Stage 2.

ALTERNATIVE: (sketch attached)

Keep the existing northbound N. Jefferson St. entrance ramp open until Stage 3 of construction phasing. Add a left turn lane and use the existing traffic signal to provide access to southbound N. Jefferson St. during construction.

ADVANTAGES:

- Enables closure and demolition of the southbound N. Jefferson St entrance ramp earlier during Stage 1 of construction

DISADVANTAGES:

- Requires construction of a temporary left turn lane on the northbound N. Jefferson St. entrance ramp
- Requires installation of a temporary signal and sequencing of all movements along N. Jefferson St.

DISCUSSION:

Keeping the existing northbound N. Jefferson St. entrance ramp open and adding a left turn onto southbound N. Jefferson improves constructability and eases facilitation of staged construction by enabling earlier closure and demolition of the southbound N. Jefferson St. entrance ramp. The left turn onto N. Jefferson St. can be added concurrently with demo of the westbound Liberty Expressway entrance ramp during Stage 2. The disadvantage is that this alternative requires the installation of a temporary signal and sequencing of all movements on N. Jefferson St. at this location (approx. Sta. 125+60).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

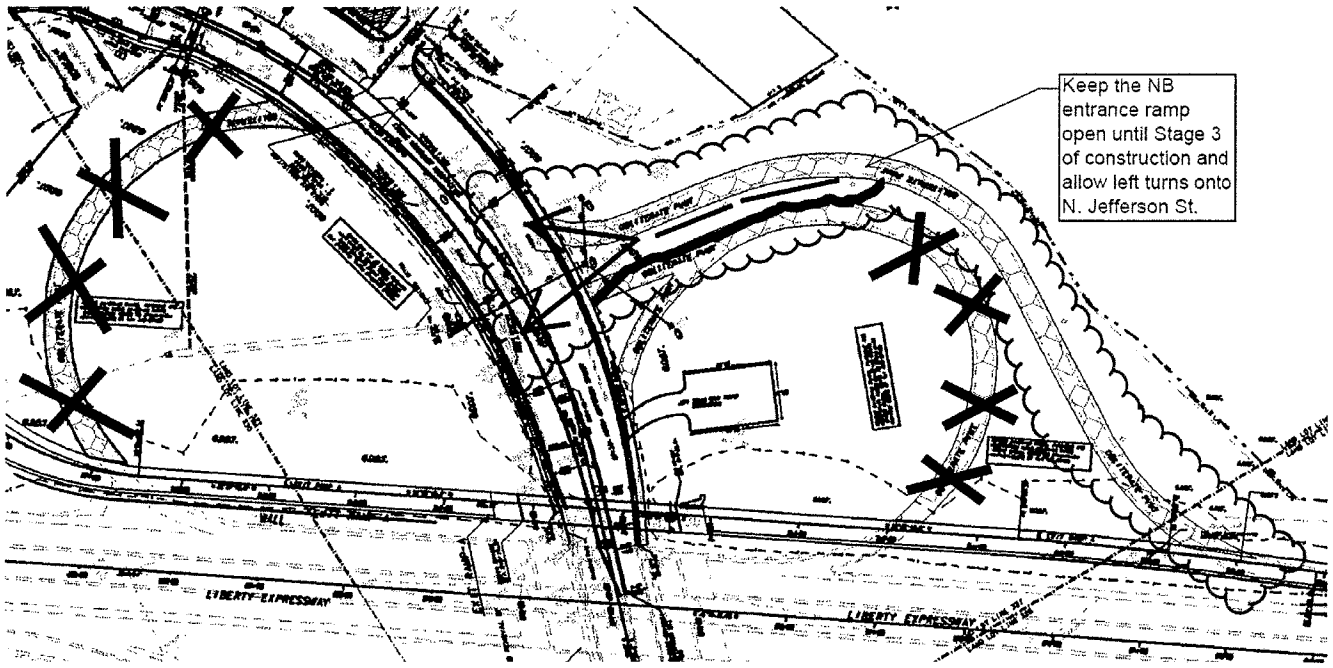
SKETCH

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **C-3**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐

SHEET NO.: **2 of 2**



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550 Dougherty County, Georgia

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
	GENERAL (G)					
G-1	Revise the 18 in. RCP at Sta. 698+00 to route it through the proposed wing wall	$658,000	$549,000	$109,000		$109,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
NH000-0006-25(055); PI No. 422550
Dougherty County, Georgia

ALTERNATIVE NO.: **G-1**

DESCRIPTION: **REROUTE THE 18 IN. RCP FROM THE EXISTING PIPE THROUGH THE PROPOSED WINGWALL AT STA. 698+00**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN: (sketch attached)

The original design extends the existing 18 in. RCP through the proposed embankment at Sta. 698+00.

ALTERNATIVE: (sketch attached)

Reroute the existing 18 in. RCP through the proposed wingwall at Sta. 698+00.

ADVANTAGES:

- Shortens the 18 in. RCP
- Removes the flared end section
- Reduces right-of-way requirements

DISADVANTAGES:

- None identified

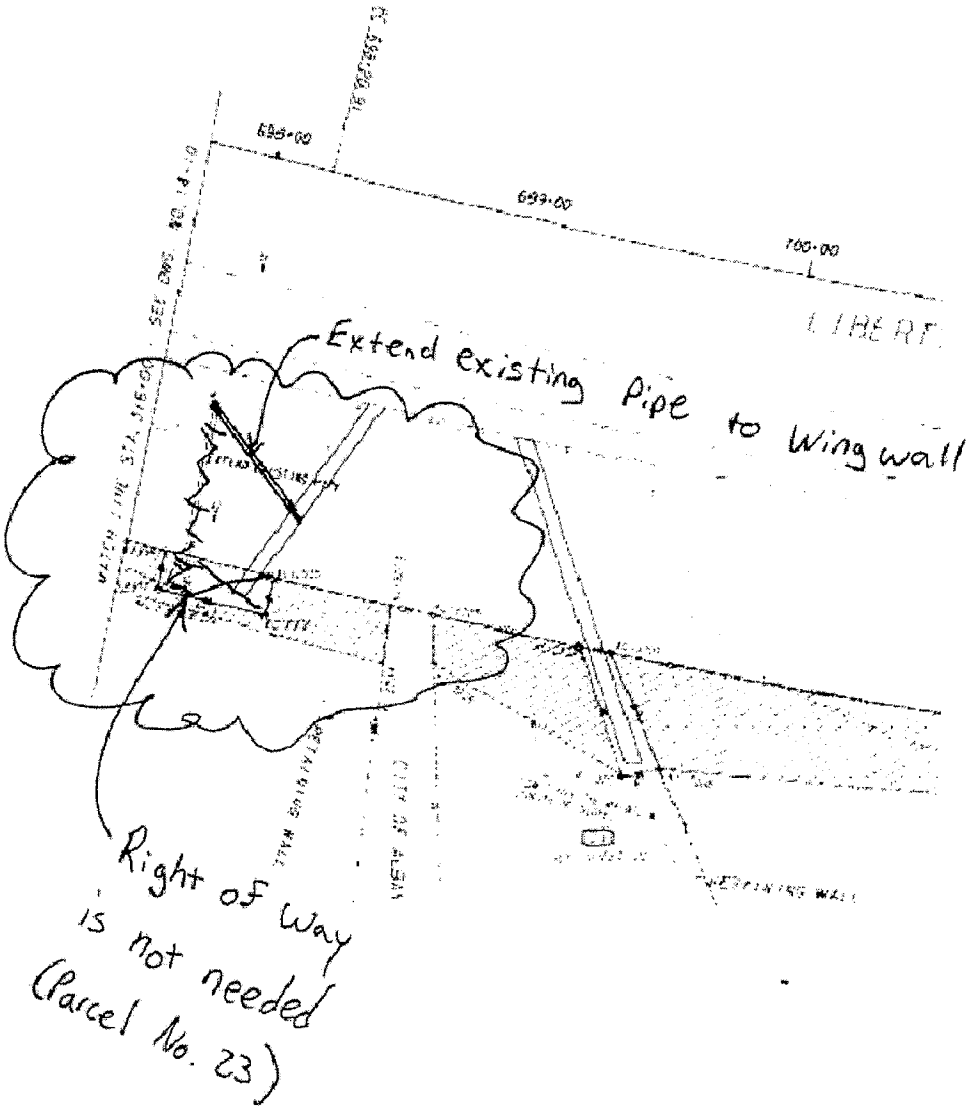
DISCUSSION:

Rerouting the existing pipe will shorten the proposed pipe length and remove the proposed flared end section. Right of way will not be required in the area at Sta. 698+00. A type 2 manhole will be needed to reroute the pipe through the wingwall. Total savings for reduced material and right-of-way is estimated at approximately $3,000.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			

SKETCH

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *Dougherty County, Georgia*	ALTERNATIVE NO.:	**G-1**
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐ BOTH ☒	SHEET NO.:	**2 of 2**



SECTION THREE - PROJECT DESCRIPTION

Project NH000-0006-25(055), P.I. No. 422550, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction is needed to address operational conflicts, significant traffic weaving, and LOS deficiencies. SR 133/N. Jefferson St. is a major north-south route through downtown Albany, GA and is classified as an urban principal arterial. SR 91/Philema Rd., which is a southwest road extending into a high growth area of Lee County, intersects with SR 133/N. Jefferson St. just north of the interchange. The close proximity of SR 91/Philema Rd. to the interchange creates operational conflicts with the traffic on SR 133/N. Jefferson St.

Secondly, there is a significant amount of traffic weaving occurring on westbound SR 520/US 82 Liberty Expressway in the area of the interchange, specifically around the entrance and exit ramps to SR 133/N. Jefferson St. 113 accidents occurred within the interchange limits between 1995-1997 and in 2001. At least 25 of these accidents were "rear-end" type accidents and 15 were "sideswipes" which suggests a weaving conflict. Finally, 2005 traffic volumes on SR 133/N. Jefferson St. in both directions were 54,000 VPD and traffic volumes on SR 91/ Philema Rd. in both directions were 35,100 VPD resulting in an LOS "F" on the ramps and mainline. In design year 2025, traffic volumes are expected to rise to 87,000 and 59,000 VPD respectively. Without improvements, both the mainline and ramps will continue to operate at LOS of "F", with motorists experiencing increased congestion, weaving, delay, and possibly more accidents.

This project addresses the aforementioned deficiencies by relocating the westbound exit and entrance ramps between SR 520/US 82 Liberty Expressway and SR 133/N. Jefferson St. to the intersection of SR 91/Philema Rd. and SR 133/N. Jefferson St. The eastern logical terminus for this project is on Philema Rd. at its intersection with Jewel St. The project's western logical terminus is on Philema Rd. at SR 520/US 82 Liberty Expressway. The northern logical terminus on N. Jefferson St. is approximately 870 ft. north of its intersection with Philema Rd. The project's southern logical terminus on N. Jefferson St. is at the SR 520/US 82 Liberty Expressway.

The proposed reconfiguration includes:

1. Relocating the westbound exit and entrance ramps directly across from SR 91/Philema Rd. and creating a four-legged intersection:
    a. The new westbound entrance ramp includes a new 324 ft., 6 in. long x 42 ft. wide, two-lane ramp bridge (Ramp B) over the Central of Georgia Railroad (CGR)
    b. The relocated westbound exit ramp includes a new 177 ft. long x 34 ft. wide, single-lane ramp bridge (Ramp A) over SR 133/N. Jefferson St.
2. Removing the existing westbound SR 520/US 82 Liberty Expressway entrance loop ramp from SR 133/N. Jefferson St.
3. Removing the existing westbound SR 520/US 82 Liberty Expressway exit ramp to northbound SR 133/N. Jefferson St.
4. Removing the existing westbound SR 520/US 82 Liberty Expressway exit ramp to southbound SR 133/N. Jefferson St.

5. Widening approximately 0.4 mile of SR 133/N. Jefferson St. from the SR 520/US 82 Liberty Expressway Bridge to 870 ft. north of Philema Rd to accommodate additional turning movements including
    a. Adding two left-turn lanes at the SR 91 Philema Rd./North Jefferson St. intersection from northbound SR 133/N. Jefferson St. to the proposed new westbound SR 520/US 82 Liberty Expressway entrance ramp
    b. Adding a second right-turn lane on northbound N. Jefferson St. to eastbound Philema Rd.
    c. Adding a new right-turn lane on southbound N. Jefferson St. to the proposed new westbound SR 520/US 82 Liberty Expressway entrance ramp
    d. Adding a second left-turn lane on southbound N. Jefferson St. to Philema Rd.
    e. Changing access to Telfair Ave. to right-in/right-out only
    f. Adding 16-ft.-wide urban shoulders including 8 ft. sidewalks on the right side and 5 ft. sidewalks on the left side
    g. Adding a 20-ft.-wide raised concrete median to the mainline
    h. Adding 4-ft-wide bike lanes to the mainline
    i. Installing a closed, piped drainage system with curb inlets and longitudinal reinforced concrete storm water pipes
6. Widening approximately 820 ft. of Philema Rd east of the N. Jefferson St. intersection to accommodate additional turning movements including:
    a. Adding a second left-turn lane on westbound Philema Rd. to southbound N. Jefferson St.
    b. Adding two through-lanes from westbound Philema Rd. to the proposed new westbound SR 520/US 82 Liberty Expressway entrance ramp
    c. Adding a new right-turn lane on westbound Philema Rd. to northbound N. Jefferson St.
    d. Adding 16-ft.-wide urban shoulders including 5 ft. sidewalks on both sides of the roadway
    e. Adding 4-ft-wide bike lanes to the roadway
    f. Installing a closed, piped drainage system with curb inlets and longitudinal reinforced concrete storm water pipes

The project includes relocation of the existing 17 space park-and-ride surface parking lot to the space currently occupied by the two loop ramps to the east of N. Jefferson St. and to the north of SR 520/US 82 Liberty Expressway.

The project includes two retaining walls along SR 520/US 82 Liberty Expressway to accommodate the new ramps.

Traffic will be maintained at all times during construction.

Construction is organized into three stages with construction of the new ramps and new pavement during stage 1, reconstruction and rehabilitation of existing pavement during stage 2, and demolition of existing ramps and relocation of the park-and-ride surface lot during stage 3. The estimated total cost of construction is $9,809,828 based upon the Revised Cost Estimate for Project NH000-0006-25(055), dated February 28, 2011. The estimated right-of-of way cost is $3,260,000. This is a FY 2014 TIP project.

Selected project drawings follow.

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STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0006-02(055)	1	

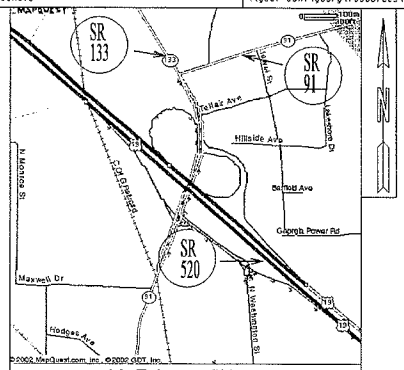
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED
SR133/ NORTH JEFFERSON STREET FROM SR520/US82 LIBERTY EXPRESSWAY TO SR 91/ PHILEMA ROAD INTERCHANGE RECONSTRUCTION
NH000-0006-02(055)
DOUGHERTY COUNTY
FEDERAL AID PROJECT

FEDERAL ROUTE No. 82/19

STATE ROUTE No. 133/91/520/3

P.I.NO. 422550



LOCATION SKETCH

DESIGN DATA: NH000-0006-02(055)
TRAFFIC A.D.T.: 27,400 (2009)
TRAFFIC A.D.T.: 47,400 (2029)
TRAFFIC D.H.V.: 3,430 (2009)
DIRECTIONAL DIST: 50%
% TRUCKS: 6%
24 HR. TRUCKS: 9%
SPEED DESIGN: 45MPH ON N. JEFFERSON
SPEED DESIGN: 40MPH ON PHILEMA
SPEED DESIGN: 40MPH ON EXIT RAMP A
SPEED DESIGN: 55MPH ON ENTRANCE RAMP B

LOCATION & DESIGN APPROVAL DATE:

FUNCTIONAL CLASS:
URBAN PRINCIPAL ARTERIAL

THIS PROJECT IS 100% IN DOUGHERTY COUNTY AND IS 100% IN CONG. DIST. NO. 2

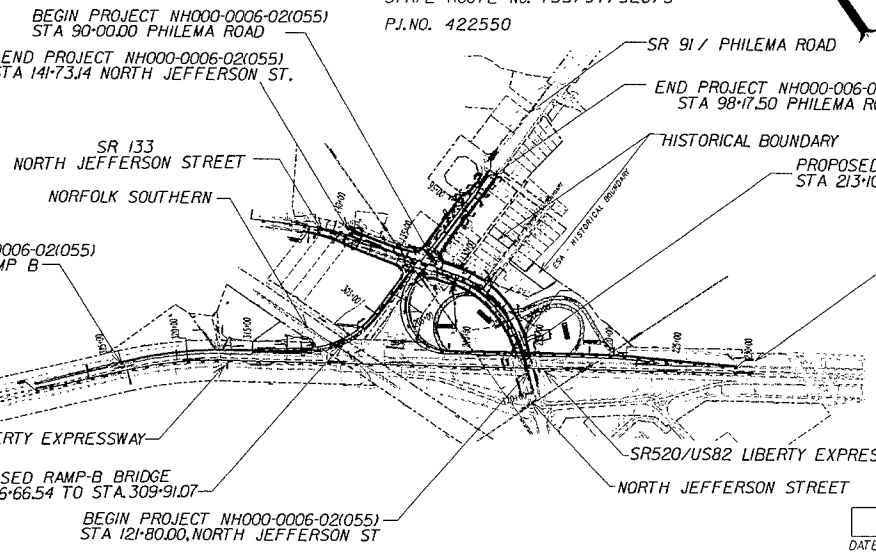
PROJECT DESIGNATION: EXEMPT

DESIGNED IN ENGLISH UNITS.

THIS PROJECT HAS BEEN PREPARED USING THE HORIZONTAL GEORGIA COORDINATE SYSTEM OF 1984 (NAD 1983)1/94 WEST ZONE, AND THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

MID-POINT COORDINATES
STA 130+62.87
N 585059.68
E 2300324.07

THE DATA, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY, WHETHER BY DRAWINGS OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT OF TRANSPORTATION IN ANY WAY. THE ATTENTION OF BIDDER IS SPECIFICALLY DIRECTED TO SUBSECTIONS 102.04, 102.05, AND 104.03 OF THE SPECIFICATIONS.



NOTE:
ALL REFERENCES IN THIS DOCUMENT, WHICH INCLUDES ALL PAPERS, WRITINGS, DOCUMENTS, DRAWINGS, OR PHOTOGRAPHS USED, OR TO BE USED IN CONNECTION WITH THIS DOCUMENT, TO "STATE HIGHWAY DEPARTMENT OF GEORGIA", "STATE HIGHWAY DEPARTMENT", "GEORGIA STATE HIGHWAY DEPARTMENT", "HIGHWAY DEPARTMENT", OR "DEPARTMENT" WHEN THE CONTEXT THEREOF MEANS THE STATE HIGHWAY DEPARTMENT OF GEORGIA, AND SHALL BE DEEMED TO MEAN THE DEPARTMENT OF TRANSPORTATION.

PREPARED BY: TRAVIS S. MCDONALD
DESIGN GROUP MANAGER

RECOMMENDED FOR SUBMISSION BY: _____
ASST. URBAN DESIGN ENGINEER

SUBMITTED BY: _____
STATE URBAN DESIGN ENGINEER

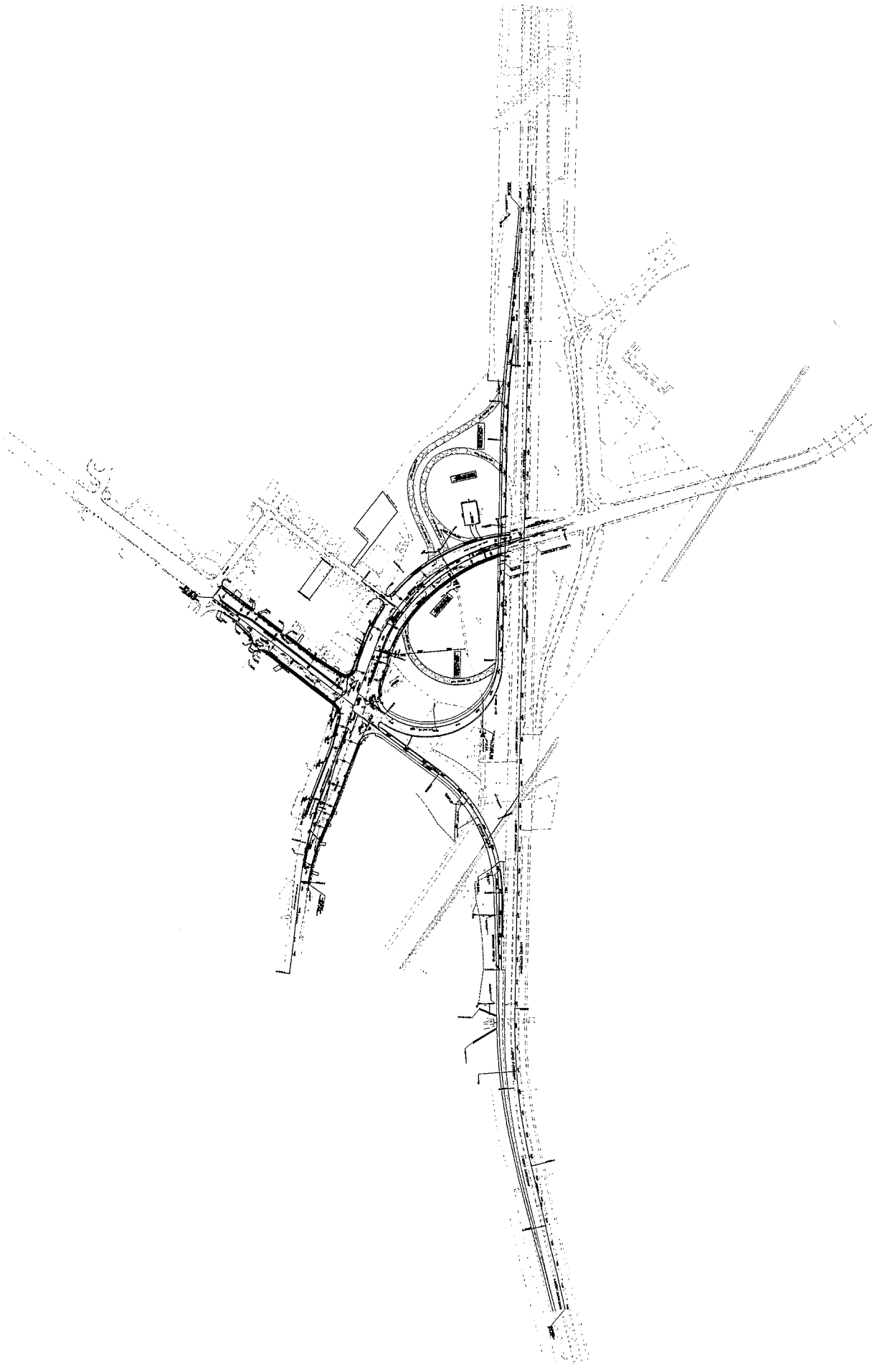
DATE CHIEF ENGINEER

LENGTH OF PROJECT	COUNTY NO. 095 PROJECT NO. NH000-0006-02(055) MILES
NET LENGTH OF ROADWAY	1.57
NET LENGTH OF BRIDGES	0.075
NET LENGTH OF PROJECT	1.65
NET LENGTH OF EXCEPTIONS	0.00
GROSS LENGTH OF PROJECT	1.65

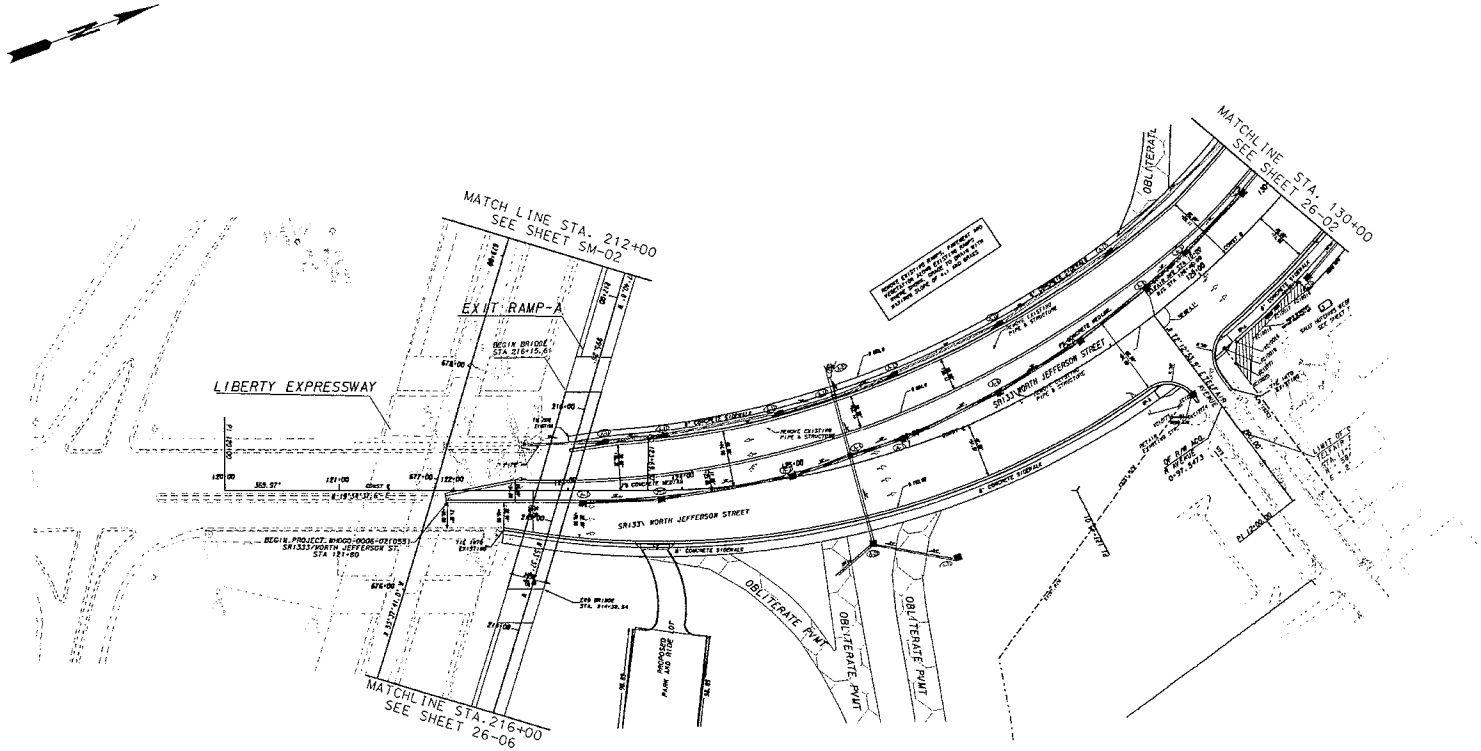
SCALE IN FEET
0 300 600 1200

PLANS COMPLETED	- -
REVISIONS	

12/15/2007



			COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
			DOUGHERTY	NH-006-2(55)		



DESIGNED BY: TF	CHECKED BY: CCB	DATE:	**GEORGIA** DEPARTMENT OF TRANSPORTATION	50 0 50 100 SCALE IN FEET	DATE	REVISIONS
	REVIEWED BY:	DATE:				

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: TRAFFIC SAFETY & DESIGN

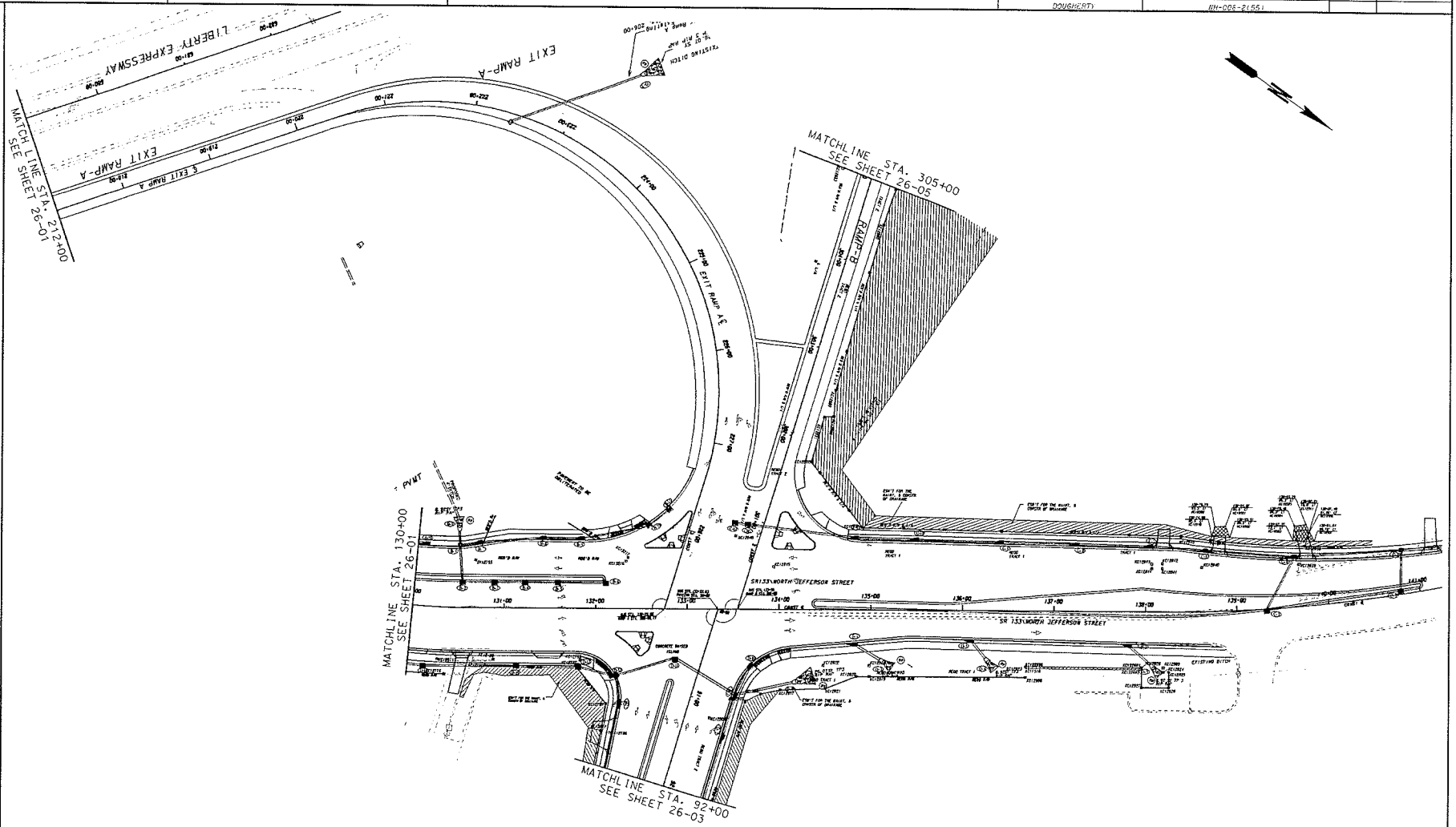
SIGNING AND MARKING PLANS

SR 133 / NORTH JEFFERSON ST

STA. 121+78 TO STA. 130+00

DRAWING NO. 26-01

COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
DOUGHERTY	NH-008-2(55)		



DESIGNED BY: TF	CHECKED BY: CCB	DATE:
	REVIEWED BY:	DATE:

GEORGIA
DEPARTMENT OF TRANSPORTATION

50 0 50 100
SCALE IN FEET

DATE	REVISIONS

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: TRAFFIC SAFETY & DESIGN

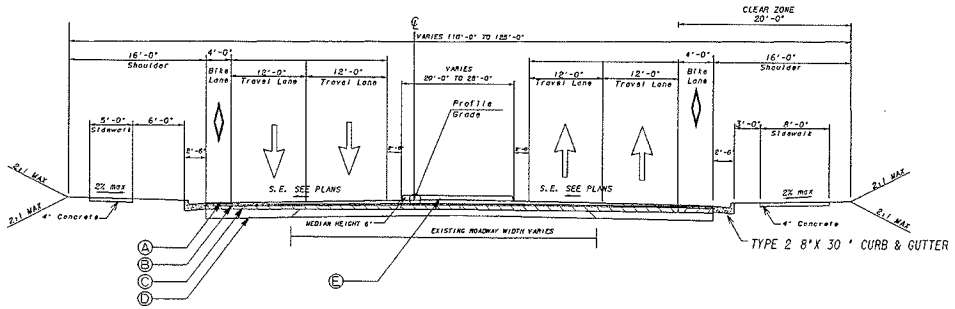
SIGNING AND MARKING PLANS

SR 133/NORTH JEFFERSON ST AT SR 91/PHILEMA RD/RAMP A & B

STA. 130+00 TO 139+68

DRAWING NO. 26-02

3/28/2011 tmcdonald	Mon Mar 28 11:46:33 2011	\\gdot-dan1\gecfg\resources\gdot2007_Ktp.tbl	M:\UDS\422550-LibertyExpdnJefferson\DGN\422550TY01.dgn	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
				GA	NH000-0006-02(055)		

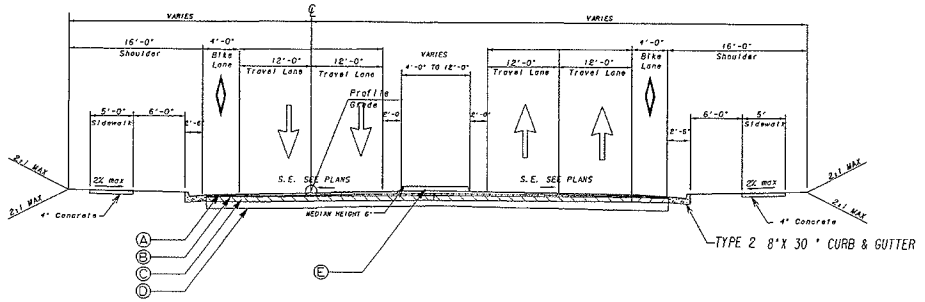


TYPICAL SECTION NO. 1

4 -LANE MEDIAN DIVIDED WITH BIKE LANES & TURN LANES

NORTH JEFFERSON STREET

STA. 121+80.00 TO STA. 141+73.14



TYPICAL SECTION NO. 2

PHILEMA ROAD

4 -LANE MEDIAN DIVIDED WITH BIKE LANES & TURN LANES

STA. 90+00 TO STA. 98+17.50

A- 165 lbs/yd^2 RECEYCLED ASPH CONC 12.5 MM SUPERPAVE GP 1 OR 2, INCL BITUM MATL AND H LIME

B- 330 lbs/yd^2 RECEYCLED ASPH CONC 19 MM SUPERPAVE GP 1 OR 2, INCL BITUM MATL AND H LIME

C- 660 lbs/yd^2 RECEYCLED ASPH CONC 25 MM SUPERPAVE GP 1 OR 2, INCL BITUM MATL AND H LIME

D- GRADED AGGR BASE CRS, 8 INCH INCL MATL

E- 7½ CONCRETE MEDIAN (Type 7)

GEORGIA
DEPARTMENT OF TRANSPORTATION

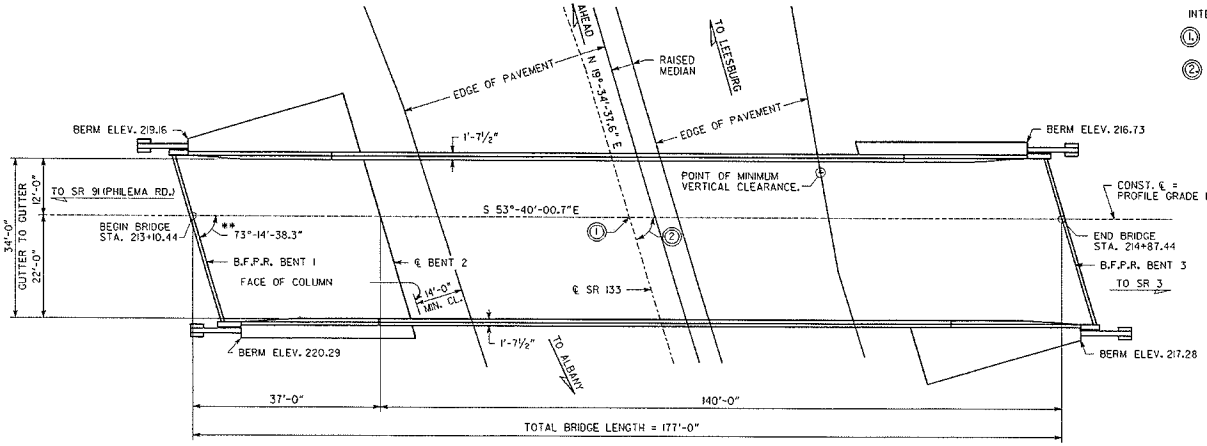
NOT TO SCALE

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN
TYPICAL SECTIONS
N. JEFFERSON AT LIBERTY EXPRESSWAY
DRAWING No. 5-01

3/1/2007 GPLB

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	M006-0006-02-(055)		



PLAN

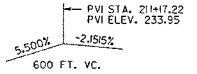
INTERSECTION OF SR 3 (RAMP "A") AND SR 133.

① STA. 213+99.44, SR 3 = STA. 122+78.58, SR 133

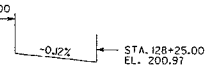
② 73°-14'-38.3"

P.I. STA. = 127+45.01
Δ = 54°-23'-01.3" LT.
E = 90.7 FT
T = 375.04 FT.
L = 692.9 FT.
R = 730 FT.
S.E. = NORMAL CROWN

HORIZONTAL CURVE DATA
SR 133



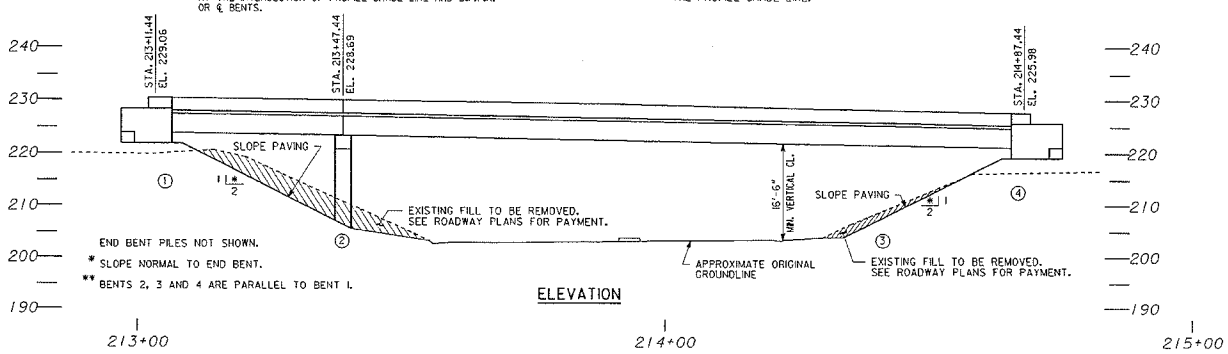
GRADE DATA
SR 3 RAMP A



GRADE DATA
SR 133

STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ℄ BENTS.

BRIDGE LENGTH AND SPAN LENGTHS ARE MEASURED ALONG THE PROFILE GRADE LINE.



END BENT PILES NOT SHOWN.
* SLOPE NORMAL TO END BENT.
** BENTS 2, 3 AND 4 ARE PARALLEL TO BENT 1.

ELEVATION

BENCHMARK

8" NAIL 88.7 FT. RT. OF RAMP A ℄
STA. 217+20.68 ELEV. 218.16

PROJECT P.I. NO. 422550

BRIDGE NO. 1

BRIDGE CONSISTS OF

1- 37'-0" TYPE I MOD PSC BEAM SPAN ---------- SPECIAL DESIGN
1- 140'-0" 72 IN BULB TEE BEAM SPAN ---------- SPECIAL DESIGN
1- 37'-0" TYPE I MOD PSC BEAM SPAN WITH BULB TEE, 72 IN, PSC FASCIA BEAMS -------- SPECIAL DESIGN
2- PILE END BENTS ---------- SPECIAL DESIGN
1- CONCRETE INTERMEDIATE BENTS ---------- SPECIAL DESIGN

TRAFFIC DATA

TRAFFIC ---------- ADT = 783 (2009)
ADT = 1275 (2029)
DESIGN SPEED ---------- 55 MPH

DESIGN DATA

SPECIFICATIONS ---------- AASHTO 2002 17TH EDITION (DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS20-44 AND/OR MILITARY LOADING ------- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ---------- 30 PSF

TEMPORARY SHORING WILL NOT BE MEASURED FOR PAYMENT BUT SHALL BE INCLUDED IN OVERALL BID SUBMITTED

BRIDGE PLANS — DRAWING NO. 35-01

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
SR 3 RAMP "A" OVER
SR 133 (NORTH JEFFERSON STREET)
DOUGHERTY COUNTY NHS-06-2(55)

NO SCALE MARCH 2007

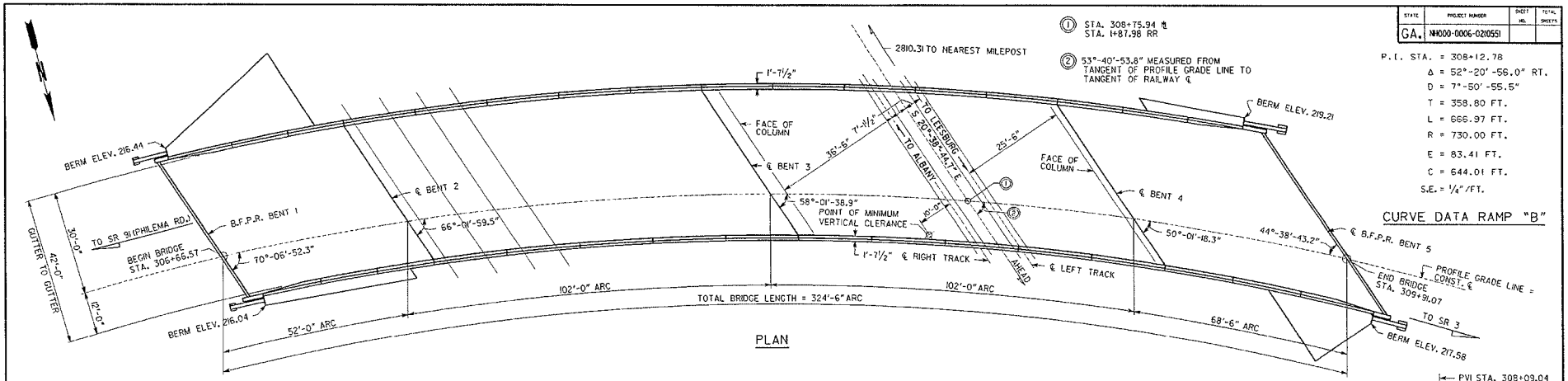
BRIDGE SHEET 1 OF 1

BY	DATE	REVISIONS

DESIGNED VMW | CHECKED EJC | REVIEWED WEI
DRAWN DM | DESIGN GROUP EJC | APPROVED PVL

DOUGHERTY1.DGN

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0006-021055I		



PLAN

P.I. STA. = 308+12.78
Δ = 52°-20'-56.0" RT.
D = 7°-50'-55.5"
T = 358.80 FT.
L = 666.97 FT.
R = 730.00 FT.
E = 83.41 FT.
C = 644.01 FT.
S.E. = 1/4"/FT.

CURVE DATA RAMP "B"

BENCHMARK

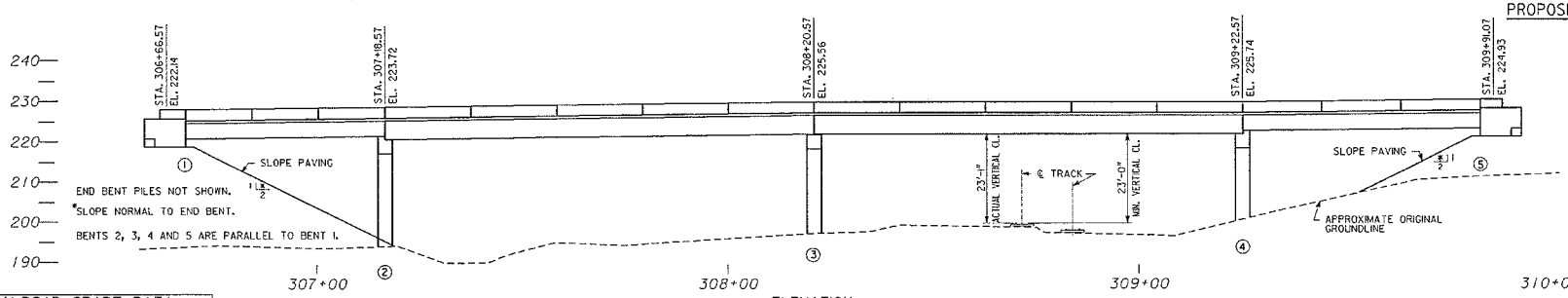
DISTRICT CONTROL DELTA 8.39 FT.
℄ OF RAMP "B" CENTERLINE
STA. 308+40.53 ELEV. 195.456

PVI STA. 308+09.04
ELEV. 232.62
+5.9635%
-3.6153%
600 FT. V.C.

PROPOSED GRADE DATA

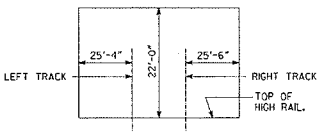
STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ℄ BENTS.

BRIDGE LENGTH AND SPAN LENGTHS ARE MEASURED ALONG THE PROFILE GRADE LINE.

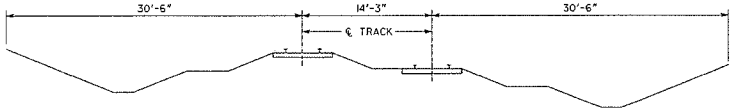


ELEVATION

RAILROAD GRADE DATA TOP OF RAIL ELEVATIONS		
STATION	LEFT TRACK	RIGHT TRACK
0+4.98	197.650	-
0+38.98	-	197.070
0+45.35	-	197.230
0+59.66	-	197.060
1+90.98	196.890	-
1+94.72	196.780	-
2+10.64	-	196.530
2+17.93	-	196.420
3+75.71	196.190	-



CONSTRUCTION CLEARANCE DIAGRAM



ENDFILL CONTROL DIAGRAM

BRIDGE CONSISTS OF

1- 52'-0" TYPE II, PSC BEAM SPAN ---------- SPECIAL DESIGN
2- 102'-0" 54 IN BULB TEE BEAM SPAN ---------- SPECIAL DESIGN
1- 68'-6" TYPE III, PSC BEAM SPAN ---------- SPECIAL DESIGN
2- PILE END BENTS ---------- SPECIAL DESIGN
3- CONCRETE INTERMEDIATE BENTS ---------- SPECIAL DESIGN

TRAFFIC DATA

TRAFFIC ---------- ADT = 700 (2009)
ADT = 12100 (2029)
DESIGN SPEED ---------- 55 MPH

DESIGN DATA

SPECIFICATIONS ---------- AASHTO 17TH EDITION, 2002
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS20-44 AND/OR MILITARY LOADING ------- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ---------- 30 PSF

PROJECT P.I. NO. 422550
BRIDGE NO. 2

TEMPORAY SHORING WILL NOT BE MEASURED FOR PAYMENT BUT SHALL BE INCLUDED IN OVERALL BID SUBMITTED

BRIDGE PLANS | DRAWING NO. 35-02

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
SR 3 RAMP "B" OVER
CENTRAL OF GEORGIA RAILROAD
DOUGHERTY COUNTY NHS-006-2(55)

NO SCALE MARCH 2007

DESIGNED VMW CHECKED EJC REVIEWED WEI
DRAWN DM DESIGN GROUP EJC APPROVED PVL

BRIDGE SHEET 1 OF 1

DOUGHERTY2.DGN

SECTION FOUR - VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

This section describes the value analysis (VA) procedure used during the VE study conducted for GDOT by Lewis & Zimmerman Associates, Inc. on the SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction project in Dougherty County, Georgia. The workshop was performed at the 30% design completion stage. GDOT has provided information for the VE team to use as the basis of the study.

A systematic approach was used in the VE study and the key procedures involved were organized into three distinct parts: 1) preparation; 2) VE workshop; and 3) post-study. A Task Flow Diagram that outlines each of the procedures included in the VE study is attached for reference.

Following this description of the VA procedure, separate narratives and supporting documentation identify the following:

- VE workshop participants
- Economic data
- Cost model
- Function analysis
- Creative ideas and evaluations

PREPARATION EFFORT

Preparation for the workshop consisted of scheduling workshop participants and tasks and gathering necessary project documents for team members to review before attending the workshop. Documents such as those listed below were used as the basis for generating VE alternatives and for determining the cost implications of the selected VE alternatives:

- Plan and Profile of Proposed SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction, Dougherty County, NH000-0006-02(055), P.I. No. 422550, prepared by GDOT, dated 12/15/2007
- Project Concept Report Approval, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction, Dougherty County, NH000-0006-02(055), P.I. No. 422550, prepared by GDOT, dated May 20, 2004
- Detailed Right-of-Way Cost Estimate Worksheets, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction, Dougherty County, NH000-0006-02(055), P.I. No. 422550, prepared by GDOT, dated January 31, 2011
- Revised Cost Estimate, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction, Dougherty County, NH000-0006-02(055), P.I. No. 422550, prepared by GDOT, dated February 28, 2011
- Pavement Evaluation Summary, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction, Dougherty County, NH000-0006-02(055), P.I. No. 422550, prepared by GDOT, dated December 29, 2008

Value Engineering Study Task Flow Diagram

Preparation Effort

Coordination Project
- Verify Schedule
- Suggest Format for Designer Presentation
- Outline Project Responsibilities
- Outline Needed Background Data
- Define *Project Value Objectives*
- Identify Project Constraints

→

Prepare for Workshop
- Collect Project Data
- Distribute Data to Team Members
- Team Members Become Familiar with Project

→

Construct Cost Models
- Construct Cost Models
- Construct Graphic Function Analysis
- Outline High Cost Areas

→

LCC Model
- Roadway
- Bridges
- MOT
- Energy
- User Impact

Workshop Effort

Information Phase
- Introduction by VETL
- Project Description and Presentation by Designer
- Outline Owner Requirements
- Review Project Data
- Visit Project Site (Alt.)

→

Function Identification and Analysis Phase
- Analyze Project Costs and Energy Usage
- Perform Function Analysis and FAST Diagram
- Identify High Cost and Energy Areas
- Calculate Cost/Worth Ratios
- Identify Paradigms

List Ideas Generated During Function Analysis

→

Speculation Phase
- Introduction by VETL
- Creative Idea Listing:
  - Quantity of ideas
  - Association of Ideas
- Brainstorm
- Do Creative Thinking
  - Group Thinking
  - Individual Thinking
- Use Checklist for Ideas

→

Evaluation Phase
- Eliminate Impractical Ideas
- Rank Ideas with Advantages/ Disadvantages
- Evaluate Alternatives (Include Non-Economic considerations: Safety, Reliability, Environment, Aesthetics, O&M, etc.)
- Select Best Ideas for Implementation

→

Development Phase
- Develop Proposed Alternatives
- Prepare Alternative Design Sketches
- Estimate Costs
- Perform Life Cycle Comparison
  - Initial Cost
  - Redesign Cost
  - O&M Cost
  - LCC Cost

→

Presentation Phase
- Summarize Findings
- Present VE Ideas to Owner/ User/Designer
- Oral Presentation

Post-Workshop Effort

VE Study Report
- Develop Implementation VE Report
- Designer Prepares Responses to VE Report
- Owner Evaluates Recommendations

→

Implementation Phase
- Participate in Implementation Meeting with Owner/User/ Designer/ VE Team, as needed
- Prepare Final VE Report

→

Final Acceptance
- Redesign by Designer

- Soil Survey Summary, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction, Dougherty County, NH000-0006-02(055), P.I. No. 422550, prepared by GDOT, dated June 6, 2005
- VE Study Constraints Form, SR 133/N. Jefferson St. From SR 520/US 82 Liberty Expressway to SR 91/Philema Rd. Interchange Reconstruction, Dougherty County, NH000-0006-02(055), P.I. No. 422550, prepared by GDOT
- Item Mean Summary for January 2010 to December 2010, prepared by GDOT
- A Policy on Geometric Design of Highways and Streets, 2004, AASHTO
- GDOT Standard Specifications, Construction of Transportation Systems, 2001 Edition
- GDOT Design Policy Manual, Revised June 11, 2010
- GDOT Traffic Signal Design Guidelines, Revision: 1.2, November 2003
- Guide for the Planning, Design, and Operation of Pedestrian Facilities, AASHTO, July 2004
- Guide for the Development of Bicycle Facilities, 1999, AASHTO
- Manual on Uniform Traffic Control Devices for Streets and Highways, AASHTO, 2009 Edition
- GDOT Bridge and Structures Design Policy Manual, Office of Bridge and Structure Design, Revised June 2010
- Roadside Design Guide, 2002, AASHTO

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a 3-½ day effort beginning with an orientation/kickoff meeting on Monday, April 11, 2011, and concluding with the final VE Presentation on Thursday, April 14, 2011. During the workshop, the VE Job Plan was followed in compliance with the U.S. Federal Highway Administration guidelines for conducting a VE study. The Job Plan guided the search for alternatives to mitigate or eliminate high-cost drivers, secondary functions providing little or no value, and potential project risks. Alternatives to specifically address the owner's project concerns and enhance value by improving operations, reducing maintenance requirements, enhancing constructability, and providing missing functions were also considered. The Job Plan includes six phases:

- Information Phase
- Function Identification and Analysis Phase
- Creative Phase
- Evaluation Phase
- Development Phase
- Presentation Phase

Information Phase

At the beginning of the study, the decisions that have influenced the project's design and proposed construction methods have to be reviewed and understood. For this reason, the workshop began with a presentation of the project by GDOT to the VE team. The presentation highlighted the information provided in the documentation reviewed by the VE team before the workshop and expanded on it to include a history of the project's development and any underlying influences that caused the design to develop to its current state. During this presentation, VE team members were given the opportunity to ask questions and obtain clarification about the information provided.

Function Identification and Analysis Phase

Having gained some information on the project, the VE team proceeded to define the functions provided by the project, identifying the costs to provide these functions, and determining whether the value provided by the functions has been optimized. Function analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project or if there are disproportionate amounts of money spent on support functions. Elements performing support functions add cost to the project but have a relatively low worth to the basic function.

Function is defined as the intended use of a physical or process element. The team attempted to identify functions in the simplest manner using measurable noun/verb word combinations. To accomplish this, the team first looked at the project in its entirety and randomly listed its functions, which were recorded on Random Function Analysis Worksheets (provided in the Function Identification and Analysis section). After identifying the functions, the team classified the functions according to the following:

Abbreviation	Type of Function	Definition
HO	Higher Order	The primary reason the project is being considered or project goal.
B	Basic	A function that must occur for the project to meet its higher order functions.
S	Secondary	A function that occurs because of the concept or process selected and may or may not be necessary.
RS	Required Secondary	A secondary function that may not be necessary to perform the basic function but must be included to satisfy other requirements or the project cannot proceed.
G	Goal	Secondary goal of the project.
O	Objective	Criteria to be met.
LO	Lower Order	A function that serves as a project input.

Higher order and basic functions provide value, while secondary functions tend to reduce value. The goal of the next job phase is to reduce the impact of secondary functions and thereby enhance project value.

To further clarify the impact of the various functions, the team assigned costs to provide the functions or group of functions indicated by a specific project element using the cost estimate and cost model. Where possible, they seek to find the lowest cost to perform the function. This is accomplished using published data from other sources or team knowledge obtained from working on other similar projects to establish cost goals and then comparing them to the current costs. The team also used the cost model to seek out the areas where most of the project funds are being applied. Because of the absolute magnitude of these high-cost elements or functions, they also became initial targets for value enhancement.

Overall, these exercises stimulated the VE team members to focus on apparently low value areas and initially channel their creative idea development in these places.

Creative Phase

This VE study phase involved the creation and listing of ideas. Creative idea worksheets were organized by project element. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower cost to the owner, or to improve the quality of the

project. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and association of ideas.

GDOT may wish to review the creative list since it may contain ideas that can be further evaluated for potential use in the design.

Evaluation Phase

During this phase of the workshop, the VE team judged the ideas generated during the creative phase. Advantages and disadvantages of each idea were discussed to find the best ideas for development. Ideas found to be irrelevant or not worthy of additional study were discarded. Those that represented the greatest potential for cost savings or improved functionality were then developed further.

Each idea or alternative was compared with the present design in terms of how well it met the design intent. Advantages and disadvantages were discussed, and each team member rated the ideas on a scale of one to five, with the best ideas rated 4 or 5. Only those ideas rated 4 or 5 were developed into alternatives. In cases where there was little cost impact but an improvement to the project was anticipated, the designation DS, for design suggestion, was used. The project team should review this listing for possible incorporation of ideas into the project.

The creative listing was re-evaluated frequently during the process of developing alternatives. As the relationship between creative ideas became more clearly defined, their importance and ratings may have changed, or they may have been combined into a single alternative. For these reasons, some of the originally high-rated items may not have been developed into alternatives.

Development Phase

During the development phase, each highly rated idea was expanded into a workable solution. The development consisted of a description of the alternative, life cycle cost comparisons, where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed alternatives. Each alternative was written with a brief narrative to compare the original design to the proposed change. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in Section Two.

Design suggestions include the same information as the alternatives except that no cost analysis is performed. They too are included in Section Two.

Presentation Phase

The goals of the last phase of the workshop were to summarize the results of the study, to prepare draft Summary of Potential Cost Saving worksheets to hand out at the presentation, and to present the key VE alternatives and design suggestions to GDOT. The presentation was held on Thursday, April 14, 2011, at the GDOT Headquarters office in Atlanta, Georgia. The purpose of the meeting was to provide the attendees with an overview of the suggestions for value enhancement resulting from the VE study and afford them the opportunity to ask questions to clarify specific aspects of the alternatives presented. Draft copies of the Summary of Potential Cost Savings worksheets were given to the GDOT project team to facilitate a timely review and speedy implementation of the selected ideas.

POST-WORKSHOP EFFORT

The post-workshop portion of the VE study included the preparation of this report. Personnel from the GDOT project team will analyze each alternative and prepare a short response, recommending incorporation of the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. LZA is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise on the unique project elements involved. Team members consisted of a multidisciplinary group with highway design, bridge/structures design, and construction experience and a working knowledge of VE procedures. The VE team included the following professionals:

Joe Leoni, PE	Highway Design Engineer	ARCADIS U.S., Inc.
Harley Griffin, PE	Construction/Civil Engineer	Delon Hampton & Assoc., Inc.
Michael Moilanen, PE	Structural Engineer	ARCADIS U.S., Inc.
Stephen G. Havens, PE, CVS	VE Team Leader	Lewis & Zimmerman Associates

OWNER/DESIGNER PRESENTATION

Representatives from GDOT presented an overview of the project on Monday, April 11, 2011. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE study, was to bring the VE team "up-to-speed" regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING TEAM PRESENTATION

A presentation was conducted by the VE team on Thursday, April 14, 2011, at the GDOT Headquarters office in Atlanta, Georgia to review VE alternatives with the owner and representatives from the design team. Copies of the Draft Summary of Potential Cost Savings worksheet were provided to the attendees.

A copy of the meeting participants is attached for reference.

GDOT VE STUDY SIGN-IN SHEET

Meeting Days | **Project No.: NH000-0006-02(055) P.I. No. 422550** | **County: Laurens** | **Date: April 11-14, 2011**

IN-BRIEF	OUT-BRIEF	NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
✓		Lisa L. Myers		Engineering Services	404-631-1770	lmyers@dot.ga.gov
✓	✓	Matt Sanders		Engineering Services	404-631-1752	msanders@dot.ga.gov
✓	✓	Bill DuVall		GDOT Bridge Design	404-631-1883	bduvall@dot.ga.gov
✓		Ken Werho		Traffic Operations	404-635-8144	kwerho@dot.ga.gov
✓	✓	Ron Wishon		Engineering Services	404-631-1753	rwishon@dot.ga.gov
✓	✓	Steve Havens		Lewis & Zimmerman Assoc.	608-438-8227	shavens@lza.com
✓	✓	Joe Leoni		ARCADIS	770-384-8666	joe.leoni@arcadis-us.com
✓	✓	Mike Moilanen		ARCADIS	770-431-8666	michael.moilanen@arcadis-us.com
✓	✓	Harley Griffin		Delon Hampton & Assoc.	404-524-8030	hgriffin@delonhampton.com
✓	✓	Travis McDonald		Roadway Design	404-631-1677	tmcdonald@dot.ga.gov
✓	✓	Albert Shelby		Program Delivery	404-631-1758	ashelby@dot.ga.gov
✓		Chuck Hasty		Roadway Design	404-631-1704	chasty@dot.ga.gov
✓		Amber Phillips		GDOT-Env.	404-631-1117	aphillips@dot.ga.gov
✓		Nicoe Alexander		GDOT-Roadway	404-631-1717	nalexander@dot.ga.gov
	✓	Delon Hampton		Delon Hampton & Assoc.	202-898-1999	drhampton@delonhampton.com
	✓	Russell McMurray		GDOT-Roadway	404-613-1700	rmcmurray@dot.ga.gov

Check all that attend

14 Attended Project Overview (Day 1)
6 via video District #4

11 Attended Project Presentation (Day 4)
0 via video District #4

GDOT VE STUDY SIGN-IN SHEET

Meeting Days | **Project No.: NH000-0006-02(055) P.I. No. 422550** | **County: Laurens** | **Date: April 11-14, 2011**

IN-BRIEF	OUT-BRIEF	NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
✓		Brent Thomas		GDOT	229-386-3300	bthomas@dot.ga.gov
✓		Tony Cravey		GDOT-District 4	229-430-4198	tcravey@dot.ga.gov
✓		Scott Chambers		GDOT-District 4 Construction	229-386-3304	schambers@dot.ga.gov
✓		Van Mason		GDOT-D4 Traffic	229-386-3435	
✓		Geno Hasty		GDOT-Traffic Ops	229-386-3435	ghasty@dot.ga.gov
✓		Joe Sheffield		GDOT D4	229386-3280	josheffield@dot.ga.gov

Check all that attend

14 Attended Project Overview (Day 1)
6 via video District #4

11 Attended Project Presentation (Day 4)
0 via video District #4

ECONOMIC DATA

The comparisons of life cycle costs between the VE alternatives and the current design solutions were performed on the basis of discounted present worth. To accomplish this, the VE team developed economic criteria to use in its calculations based on information gathered from GDOT and the project team. The following parameters were used when calculating discounted present worth:

Year of Analysis:	2011
Construction Start Date:	2014
Construction Completion:	2015
Planning Period (n):	20
Discount Rate:	3%

COST ESTIMATE SUMMARY AND COST MODEL

The VE team prepared a Pareto Chart, or Cost Histogram, for the project that follows this page. This Cost Histogram displays the major construction elements identified in the cost estimate prepared by GDOT in descending order of magnitude and thus identifies the high cost areas in the project. The high cost elements provide the VE team with one focus for its work during the study.

The project elements contributing most to the cost of the project include:

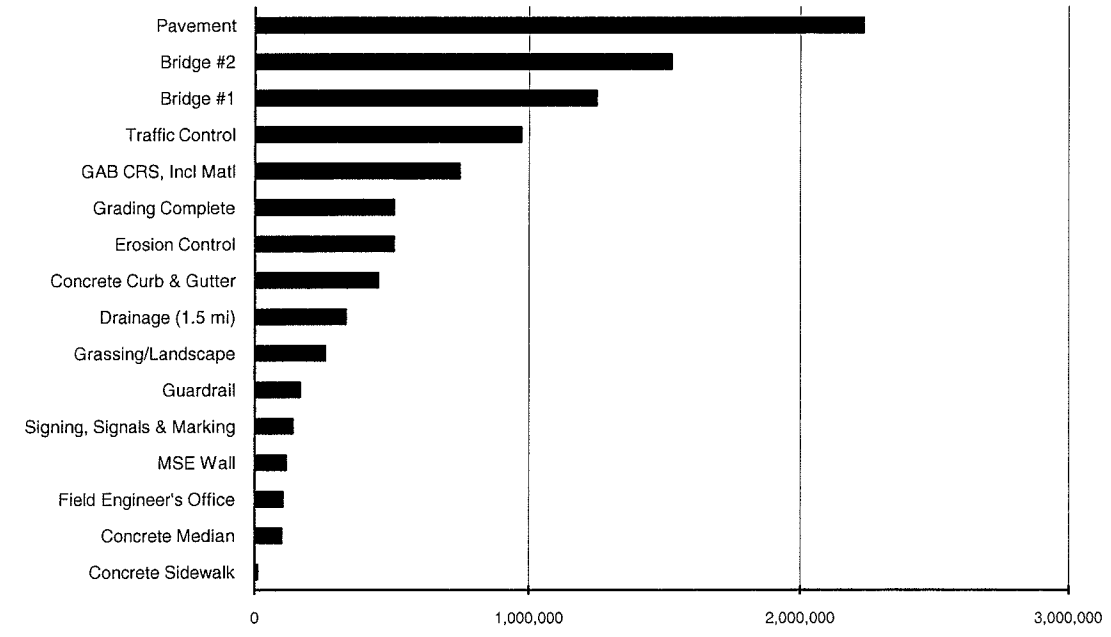
- Right-of-Way
- Pavement
- Ramp Bridges
- Traffic Control

COST HISTOGRAM

PROJECT: SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY
TO SR 91/PHILEMA RD INTERCHANGE RECONSTRUCTION
NH000-0006-02(055); PI No. 422550

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Pavement	2,231,788	23.89%	23.89%
Bridge #2	1,526,720	16.34%	40.23%
Bridge #1	1,248,000	13.36%	53.59%
Traffic Control	970,000	10.38%	63.97%
GAB CRS, Incl Matl	741,540	7.94%	71.91%
Grading Complete	500,000	5.35%	77.26%
Erosion Control	500,000	5.35%	82.61%
Concrete Curb & Gutter	442,735	4.74%	87.35%
Drainage (1.5 mi)	325,000	3.48%	90.83%
Grassing/Landscape	250,000	2.68%	93.50%
Guardrail	160,153	1.71%	95.22%
Signing, Signals & Marking	134,000	1.43%	96.65%
MSE Wall	110,000	1.18%	97.83%
Field Engineer's Office	100,000	1.07%	98.90%
Concrete Median	94,365	1.01%	99.91%
Concrete Sidewalk	8,392	0.09%	100.00%
Subtotal (Not Including ROW)	$ 9,342,693	100.00%	
E&C Rate 5.00%	$ 467,135		
TOTAL CONSTRUCTION COSTS	$ 9,809,828		
Right of Way (ROW)	$ 3,260,000		
Utilities	N/A		
GRAND TOTAL PROJECT COST	$ 13,069,828	Comp Mark-up:	5%

82%



Costs in graph are not marked-up.

FUNCTION ANALYSIS

A function analysis was performed to (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic functions needed to attain the given project purpose and need, (4) identify other goals, and (5) identify secondary functions that should be addressed by the VE team. The Random Function Analysis worksheet completed by the team for the project in its entirety and the various elements follow.

The functions with the greatest potential to add value to the project include the following:

- Accommodate Pedestrians/Bicyclists
- Span Roadway
- Span Railroad
- Add Lanes
- Stage Construction
- Extend Pavement Life

These functions became the initial areas of focus for value enhancement.

RANDOM FUNCTION ANALYSIS

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
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Dougherty County, Georgia

SHEET NO.: **1 of 2**

DESCRIPTION		FUNCTION		
		VERB	NOUN	KIND
Project Functions		Maintain	LOS	HO
		Increase	Capacity	B
		Accommodate	Bicyclists	B
		Accommodate	Pedestrians	B
		Reduce	Delays	B
		Enhance	Safety	HO
		Reduce	Crashes	B
		Exclude	Weaving	B
		Reduce	Conflicts	B
		Accommodate	Businesses	B
Right-Of-Way	**$3.26M**	Acquire	Right-Of-Way	B
Roadway (Pavement) Functions	**$3.0M**	Extend	Service Life	B
		Add	Lanes	B
		Raise	Median	B
		Widen	Shoulders	B
		Support	Vehicles	B
		Park	Vehicles	S
Bridges	**$2.8M**	Span	Railroad	B
		Span	SR 133	B
		Support	Loads	B
Traffic Control (During Construction)	**$0.97M**	Maintain	Traffic	B

Function defined as: Action Verb, Measurable Noun

Kind: B = Basic; S = Secondary; RS = Required Secondary; HO = Higher Order; LO = Lower Order; G = Goal

RANDOM FUNCTION ANALYSIS

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SHEET NO.: **2 of 2**

DESCRIPTION		FUNCTION		
		VERB	NOUN	KIND
Drainage/Curb & Gutter Functions	**$0.78M**	Convey	Storm Water	B
		Catch	Storm Water	RS
Grading Functions	**$0.5M**	Match	Profile / Elevations	B
Erosion Control	**$0.5M**	Control	Runoff	S

Function defined as: Action Verb, Measurable Noun

Kind: B = Basic; S = Secondary; RS = Required Secondary; HO = Higher Order; LO = Lower Order; G = Goal

CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

During the Creativity Phase, numerous ideas were generated using conventional brainstorming techniques. These ideas were recorded and are shown with their corresponding ranking on the attached Creative Idea Listing Worksheets. For the convenience of tracking an idea through the VA process, the ideas were grouped according to the following project elements and numbered in the order in which they were conceived. The following letter prefixes were used to identify the categories.

PROJECT ELEMENT	PREFIX
Roadway	R
Structures	S
Construction Staging	C
General	G

Creative Idea Evaluation

After discussing each idea, the team evaluated the ideas by consensus. The evaluations produced 13 ideas rated 4 or 5 to research and develop into formal VE alternatives and 4 ideas to develop as design suggestions to be included in Section Two of the report. Highly rated ideas that were not developed further may have been combined with another related idea or discarded as a result of additional research indicating the concept as not being cost effective or technically feasible. The reader is encouraged to review the Creative Idea Listing and Evaluation worksheet since it may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING

PROJECT:	**SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION** *Dougherty County, Georgia*	SHEET NO.:	**1 of 2**

NO.	IDEA DESCRIPTION	RATING
	ROADWAY (R)	
R-1	Overlay existing pavement in lieu of providing full depth pavement on N. Jefferson St. and Philema Rd.	4
R-2	Provide 12-ft.-wide shoulders in lieu of 16-ft.-wide shoulders on N. Jefferson St. and Philema Rd.	4
R-3	Reduce the median island from 20-ft.-wide to 16-ft.-wide on N. Jefferson St.	4
R-4	Provide 11-ft.-wide lanes on N. Jefferson St. and Philema Rd.	4
R-5	Provide 11-ft.-wide inside lanes on N. Jefferson St. and Philema Rd.	4
R-6	Keep the park-and-ride near the existing location with right-in/right-out access from N. Jefferson St.	2
R-7	Eliminate guardrail on all slopes 4:1 or flatter per AASHTO Road Design Guide Figure 5.1b.	DS
R-8	Reduce the sidewalk width from 8-ft. to 5 ft. on Philema Rd. RT	5
R-9	Provide a rural shoulder in lieu of an urban shoulder on the left side of N. Jefferson St. and eliminate sidewalks	4
R-10	Provide an 8-ft.-wide multi-use trail on the left side of N. Jefferson St. in lieu of 4-ft.-wide bicycle lanes	4
R-11	Provide a 12-ft.-wide multi-use trail on the right side of N. Jefferson St. in lieu of 4-ft.-wide bicycle lanes and 5-ft.-wide sidewalk	2
R-12	Make Ramp A into a collector distributor and receive traffic from NB SR 133 onto WB Liberty Expressway	2
R-13	Provide 8 ft. paved outside shoulders in lieu of 10 ft. paved outside shoulders on Ramps A and B	4

Rating: 1→2 = Not to be developed 3→4 = Varying degrees of development potential 5 = Most likely to be developed
DS = Design suggestion ABD = Already being done

CREATIVE IDEA LISTING

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
Dougherty County, Georgia

SHEET NO.: **2 of 2**

NO.	IDEA DESCRIPTION	RATING
	STRUCTURES (S)	
S-1	Reduce Bridge #1 from 34-ft.-wide to 30-ft.-wide	5
S-2	Reduce Bridge #2 from 42-ft.-wide to 38-ft.-wide	5
S-3	Use an MSE wall along Ramp A	2
S-4	Shorten Bridge #2 by providing a retaining wall abutment on the east end	4
S-5	Shorten Bridge #1 on the east end by 37 ft.	4
S-6	Use a tie-back wall for Ramp A in lieu of a cantilever wall	2
S-7	Provide a cantilever wall for Ramp B	DS
	CONSTRUCTION STAGING (C)	
C-1	Modify sequencing of stage 1 to include removal full depth paving of the existing median first, then shift traffic south on N. Jefferson Rd.	DS
C-2	Use all 11-ft.-wide temporary lanes during construction	ABD
C-3	Utilize the existing WB Liberty Express Exit Ramp for right and left turns onto N. Jefferson St. during construction to enable early closure of the existing SB ramp onto N. Jefferson St.	DS
	GENERAL (G)	
G-1	Revise the 18 in. RCP at Sta. 698+00 to route through the proposed wing wall	DS
G-2	Provide metered access from Ramp B to Liberty Expressway to merge traffic from two lanes to one lane prior to merging onto Liberty Expressway	2

Rating: 1→2 = Not to be developed 3→4 = Varying degrees of development potential 5 = Most likely to be developed
DS = Design suggestion ABD = Already being done

APPENDIX A

APPENDIX A

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
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ALTERNATIVE NO.: **R-1**

DESCRIPTION: **MILL AND OVERLAY EXISTING PAVEMENT IN LIEU OF PROVIDING FULL DEPTH PAVEMENT ON N. JEFFERSON ST.**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The basis of the Pavement Evaluation Summary for NH-006-2(55), PI No. 422550, dated December 29, 2008, indicates full-depth pavement for N. Jefferson Street from Sta. 121+80 to Sta. 141+73.14 without use of existing pavement for overall asphalt structure as recommended.

ALTERNATIVE: (sketch attached)

Mill 1.5 in. and overlay 5.5 in. over the existing pavement structure in lieu of using full-depth pavement reconstruction.

ADVANTAGES:

- Reduces asphalt costs
- Reduces construction schedule
- Improves construction staging
- Takes advantage of existing grade since a profile change is not required

DISADVANTAGES:

- Less remaining useful life of overall pavement structure compared with full-depth replacement

DISCUSSION:

Due to the moderately light truck traffic (9.5%), and based on an average COPACES rating of 71 for SR 133/Jefferson St., milling 1.5 in. and overlaying 5.5 in. over the existing pavement structure will provide an additional 20 years useful life. Additional core samples may be needed to verify that the existing pavement structure is adequate.

It should be noted that the VE team is not recommending this alternative due to evidence of stripping in the base layers of three out of the five cores taken from this area as documented in the Pavement Evaluation Summary dated December 29, 2008. This 20 year life cycle cost comparison is being provided at the request of the project team.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 2,262,000	$ 489,000	$ 2,751,000
ALTERNATIVE	$ 1,529,000	$ 489,000	$ 2,018,000
SAVINGS (Original minus Alternative)	$ 733,000	$ 0	$ 733,000

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
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ALTERNATIVE NO.: **R-1**

SHEET NO.: **2 of 5**

Full depth asphalt section (also for Ramp shoulders):

12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/sy
19mm:	330#/sy x ton/2000# x $80/sy =	$13.20/sy
25mm:	660#/sy x ton/2000# x $80/sy =	$26.40/sy

8" GAB: 0.67ft x 147#/CF x Ton/2,000# x 9SF/SY x $30/Ton = $13.30/sy

Total Asphaltic Pavement Unit Cost = $59.50/SY

Mill 1.5" and Overlay 3.5" of Asphaltic Concrete:

Mill existing pavement 1.5 inches	=	1.28/sy
Total mill and overlay Unit Cost	=	**$21.08/SY**
12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/syz
19mm:	220#/sy x ton/2000# x $80/sy =	$8.80/sy

Mill 1.5" and Overlay 5.5" of Asphaltic Concrete:

Mill existing pavement 1.5 inches	=	1.28/sy
12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/sy
19mm:	440#/sy x ton/2000# x $80/sy =	$17.60/sy
Total mill and overlay Unit Cost	=	**$25.48/SY**

Mill 3" and Overlay 3.5" of Asphaltic Concrete: (every 10 years)

Mill existing pavement 3 inches	=	$2.75/sy
12.5mm:	165#/sy x ton/2000# x $80/sy =	$6.60/sy
19mm:	220#/sy x ton/2000# x $80/sy =	$8.80/sy
Total mill and overlay Unit Cost	=	**$18.15/SY**

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ALTERNATIVE NO.: **R-1**

SHEET NO.: **3 of 5**

Existing Section - N. Jefferson Street

Sta. 122+73 to Sta. 125+00
1) A= S(L1+L2/2) = 227'(95'+105'/2) = 22,700 SF
Sta. 125+00 to Sta. 130+00
2) A= S(L1+L2/2) = 500'(105'+115'/2) = 55,000 SF
Sta. 130+00 to Sta. 135+00
3) A= S(L1+L2/2)= 500'(115'+107'/2) = 55,000 SF
Sta. 135+00 to Sta. 138+36
4) A= S(L1+L2/2) = 336'(107'+105'/2) = 35,616 SF
Sta. 138+36 to Sta. 140+00
5) A= S(L1+L2/2) = 115'(65'+50'/2) = 6,612.50 SF
Sta. 140+00 to Sta. 142+10
6) A= S(L1+L2/2) = 210'(47'+35'/2) = 8,610 SF

Total Area (N. Jefferson St.) 183,538.50 SF/9 = **20,393.17 SY, Say 20,400 SY**

Widened Section - N. Jefferson Street Left Side

Sta. 123+73 to Sta. 129+00
1) A=1/2b*h= 1/2 25(150)= 1,875 SF
Sta. 129+00 to Sta. 130+00
2) A= S(L1+L2/2) = 500'(49'+102'/2) = 37,750 SF
Sta. 130+00 to Sta. 135+00
3) A= S(L1+L2/2)= 500'(102'+110'/2) = 53,000 SF
Sta. 135+00 to Sta. 138+36
4) A= S(L1+L2/2) = 336'(102'+102'/2) = 34,272 SF
Sta. 138+36 to Sta. 140+00
5) A= S(L1+L2/2) = 115'(60'+47'/2) = 6,152.50 SF
Sta. 140+00 to Sta. 142+10
6) A= S(L1+L2/2) = 210'(47'+35'/2) = 8,610 SF

Total Area for Widening & Overlay (N Jefferson St.) – **141,659.50 SF/9 = 15,739.44, Say 15,800 SY**

COST WORKSHEET

PROJECT: **SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION**
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ALTERNATIVE NO.: **R-1**

SHEET NO.: **4 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Full Depth Asphalt Section							
N. Jefferson St. Existing Sections	SY	20,400	59.50	1,213,800			
N. Jefferson St. Widened Sections	SY	15,800	59.50	940,100	15,740	59.50	936,530
Mill 1.5 in. and Overlay 5.5 in. Asphaltic Concrete							
N. Jefferson St. Existing Sections	SY				20,400	25.48	519,792
Subtotal				2,153,900			1,456,322
Markup (%) at 5.00%				107,695			72,816
TOTAL				2,261,595			1,529,138
TOTAL (ROUNDED)				2,262,000			1,529,000

LIFE CYCLE COST WORKSHEET

PROJECT: SR 133/N. JEFFERSON ST. FROM SR 520/US 82 LIBERTY EXPRESSWAY TO SR 91/PHILEMA RD. INTERCHANGE RECONSTRUCTION
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ALTERNATIVE NO.: **R-1**

SHEET NO.: **5 of 5**

LIFE CYCLE PERIOD: 20 years
INTEREST RATE: 3.00% ESCALATION RATE:

						ORIGINAL	PROPOSED
A.	INITIAL COST					2,262,000	1,529,000
	Useful Life (Years)						
					INITIAL COST SAVINGS		733,000
B.	RECURRENT COSTS (Annual Expenditures)						
	1. Maintenance						
	2. Operating						
	3. Energy						
	4.						
	5.						
					Total Annual Costs	-	-
					Present Worth Factor	14.8775	14.8775
					Present Worth of RECURRENT COSTS	-	-
C.	SINGLE EXPENDITURES		Year	Amount	PW factor	Present Worth	Present Worth
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)					
x	x	1. Mill 3 in. and Overlay 3.5 in.	10	657,030	0.7441	488,892	488,892
		2.			1.0000	-	-
		3.			1.0000	-	-
		4.			1.0000	-	-
		5.			1.0000	-	-
		6.			1.0000	-	-
		7.			1.0000	-	-
		8.			1.0000	-	-
D.	SALVAGE VALUE		Year	Amount	PW factor	Present Worth	Present Worth
		1.			(1.0000)	-	-
		2.			(1.0000)	-	-
					Present Worth of SINGLE EXPENDITURES	488,892	488,892
E.	Total Recurrent Costs & Single Expenditures (B + C + D)					488,892	488,892
					RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS		-
					TOTAL PRESENT WORTH COST (A + E)	2,750,892	2,017,892
					TOTAL LIFE CYCLE SAVINGS		**733,000**