

Value Engineering Study Report

Project STP-004-2(31)

P.I. No. 322540

North Gray Bypass

Jones County



Value Management Team



Design Team



November 2007



November 28, 2007

Ms. Lisa Myers
Design Review Engineer Manager
Georgia Department of Transportation
#2 Capitol Square, Room 266
Atlanta, GA 30334

RE: Submittal of the final Value Engineering Report
Project STP-004-2(31)
Jones County
P.I. No. 322540
North Gray Bypass
PBS&J Project Task Order No. 22

Dear Ms. Myers:

Please find enclosed four (4) hard copies and a CD of our final Value Engineering Report for the North Gray Bypass in Jones County, as referenced above.

This Value Engineering Study, which was performed during the period November 6 through November 9, 2007, identified **30 Alternative Ideas**, of which **12 are recommended for implementation**. The VE Team also identified **5 Design Suggestion Ideas** which are recommended for the Engineer to consider in his final design. We believe that the **12 Alternative Ideas** recommended may have a significant positive affect on the project.

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

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

Yours truly,

PBS&J

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

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

Value Engineering Study Report

Project STP-004-2(31)

P.I. No. 322540

North Gray Bypass

Jones County

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

This report summarizes the analysis and conclusions by the PBS&J Value Engineering workshop team as they performed a VE study during the period of November 6 – November 9, 2007 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study was Project STP-004-2(31), Jones County, City of Gray, bypass. The concept designs for the projects have been prepared by the Georgia Department of Transportation. At the time of the workshop the plans had advanced to the concept design level.

PROJECT DESCRIPTION

Project STP-004-2(31), Jones County, is proposed to construct a by-pass to the North of the City of Gray. The project is proposed to begin at the intersection of SR 18 with SR 22, just west of Clinton. The road then proceeds in a northwesterly, thence northerly, thence easterly and thence southeasterly to a terminus with SR 22, at mile post 11.21 east of the City of Gray. The total length of the project is approximately 6.0 miles.

To accommodate the traffic projections, the typical section will be a rural four lane roadway with a 44 foot depressed median on a 250 foot of Right-of-Way. The design speed is 55 mph.

To enhance the safety at the Norfolk Southern Railroad, the crossing of the railroad is proposed to be grade separated. Two parallel bridges approximately 230 feet in length are proposed to be constructed over SR 11 and the railroad.

The project estimated construction cost is \$22,739,131. The preliminary ROW acquisition cost is \$3,628,000.

These projects are rather fully described in the documentation that is located in Tab 4 of this report, entitled *Project Description*.

PROJECT CONCERNS AND OBJECTIVES

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

- To avoid historical resources – old turpentine mill - oldest still standing in Ga.
- Design to minimize affects to existing wetlands and streams.

VALUE ENGINEERING PROCESS

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

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

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

CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified *30 Alternative Ideas* that appeared to hold potential for reducing the construction cost, improving the end product and/or reducing the difficulty and time of project construction.

After the evaluation phase was completed, *12 Alternative Ideas* and *5 Design Suggestions* remained for further consideration. These Alternative Ideas and Design Suggestions may be found, in their documented form, in the section of this report entitled *Study Results*. The following *Summary of Alternatives and Design Suggestions* coupled with the documentation of the developed alternatives should provide the reader with the information required to fully evaluate the merits of each of the alternatives.

These and the other alternatives and design suggestions may be reviewed more thoroughly where they are documented in the third tab of this report entitled *Study Results*.

SUMMARY OF ALTERNATIVES & DESIGN SUGGESTIONS



Georgia Department of Transportation

North Gray Bypass - Jones County - STP-004-2(31) - P.I. No. 322540

Alternative Number	Description of Alternative	Initial Cost Savings
	ROADWAY (RD)	
RD-1	Use 6'-0" paved outside shoulders in lieu of 6'-6" paved outside shoulders	\$142,121
RD-2	Reduce 44' median; utilize a median with positive barrier	\$10,154,132
RD-5	Relocate SR-11 connector to south of bypass	\$324,636
RD-6	Close CR-26/Old Highway 18 – eliminate intersection/median break	Design Suggestion
RD-9	Evaluate realigning the intersection at SR-22 and the North Gray Bypass (Both Ends)	Design Suggestion
RD-10	Reduce ROW – acquire only that required for construction	\$84,150
RD-11	Consider locations for right turns and eyebrow pavement	Design Suggestion
RD-13	Bifurcate roadway to reduce earthwork	\$387,365
RD-16	Steepen grade at NSRR bridge approach to reduce the volume of fill	\$7,133,537
RD-17	Reduce median width to 24' raised median	\$6,775,917
RD-19	Lower profile in selected areas to reduce borrow	\$4,701,105
RD-20	Realign drainage structure at Station 263+50	Design Suggestion
	BRIDGE (BR)	
BR-1	Use 2' inside buffer in lieu of a 4' shoulder	\$92,268
BR-2	Use 6' outside shoulder and 2' inside buffer in lieu of 10' outside and 4' inside shoulders	\$276,804
BR-4	Use 3 span bridge with MSE wall abutments	\$54,855
BR-6	Use MSE wall abutments on west end of bridge	\$105,019
BR-7	Route farm access road through separate structure such as a culvert of ConSpan-type structure	Design Suggestion

Study Results

Study Results

Introduction

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

The documented alternatives also include Design Suggestions (DS). As their name implies, these are short write-ups making note of VE perspectives on technical issues and sharing some thoughts for consideration as the design moves forward.

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

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

Cost Calculations

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

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

SUMMARY OF ALTERNATIVES & DESIGN SUGGESTIONS



Georgia Department of Transportation

North Gray Bypass - Jones County - STP-004-2(31) - P.I. No. 322540

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Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation STP-004-2(31) – P.I. No. 322540 North Gray Bypass - Jones County	ALTERNATIVE NO.:	RD-1
DESCRIPTION:	USE 6'-0" PAVED OUTSIDE SHOULDERS IN LIEU OF 6'-6" PAVED OUTSIDE SHOULDERS	SHEET NO.:	1 of 4

Original Design:

The original design utilizes a 10'-0" improved outside shoulders with 6'-6" of that being paved.

Alternative:

The alternative design proposes a 10'-0" improved outside shoulders with 6'-0" of that being paved.

Opportunities:

- Reduce paving costs.

Risks:

- Minimal increase in design effort

Technical Discussion:

Since the subject project is not a designated bike route a minimum 6'-6" paved shoulder is not required.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 9,503,863	\$	\$ 9,503,863
ALTERNATIVE	\$ 9,361,742	\$	\$ 9,361,742
SAVINGS	\$ 142,121	\$	\$ 142,121

Illustrations



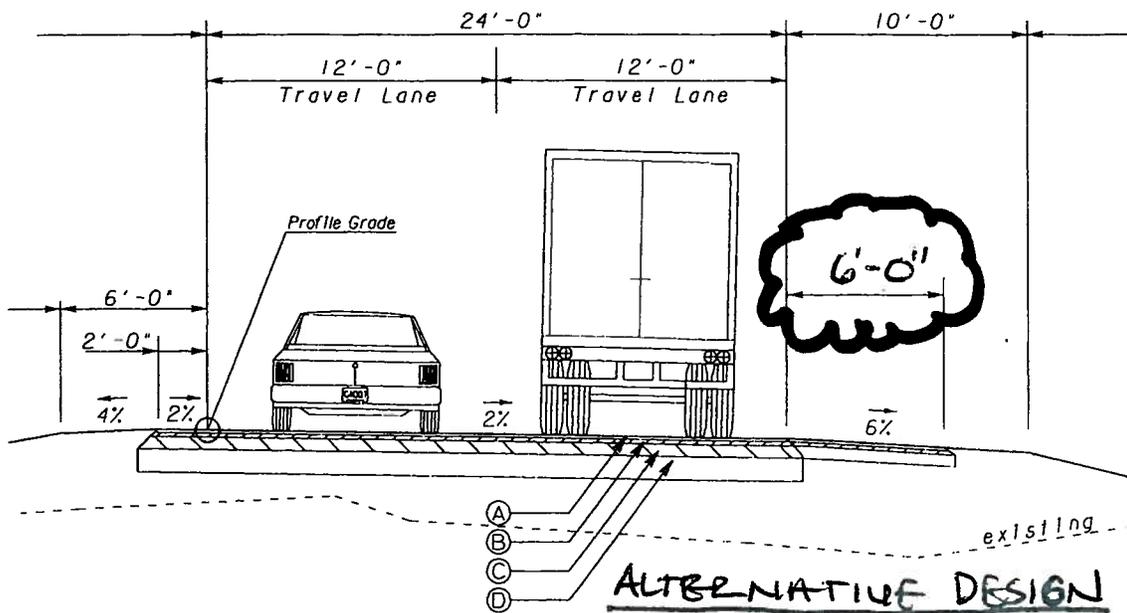
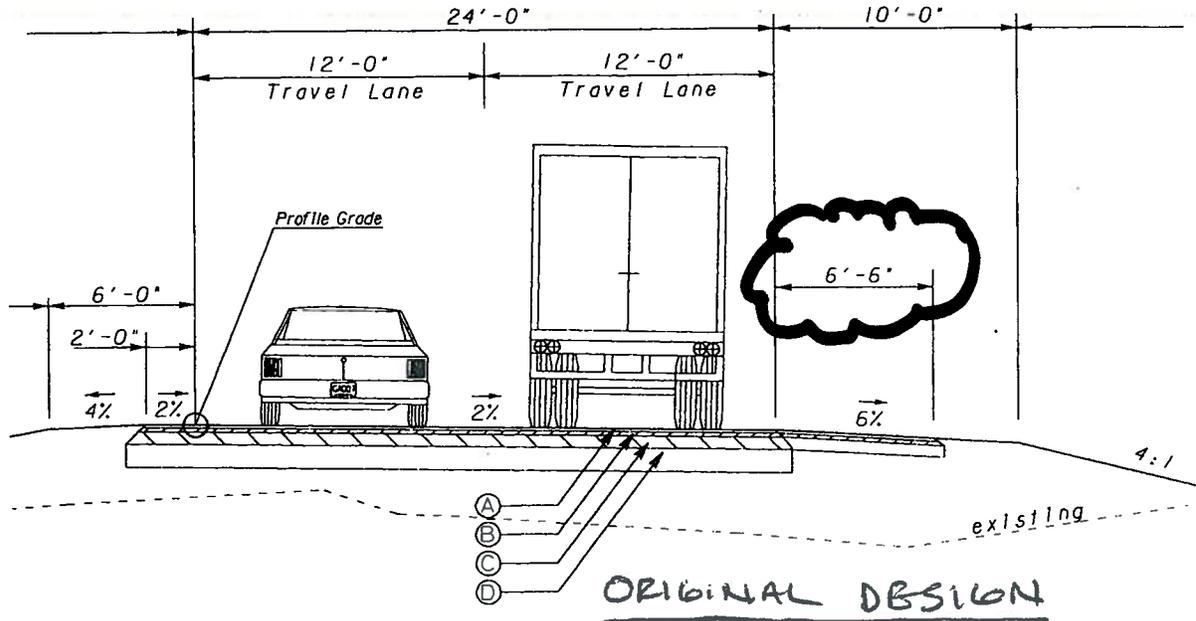
PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-1

DESCRIPTION: USE A 6'-0" PAVED OUTSIDE SHOULDERS IN LIEU OF
6'-6" PAVED OUTSIDE SHOULDERS

SHEET NO.: 2 of 4



NOT TO SCALE

Calculations



PROJECT: **Georgia Department of Transportation**
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-1

DESCRIPTION: **USE 6'-0" PAVED OUTSIDE SHOULDERS IN LIEU OF 6'-**
6" PAVED OUTSIDE SHOULDERS

SHEET NO.: 3 of 4

Project length-31,500lf

Reduction in paving area: $(31,500 \text{ lf} \times 1 \text{ ft}) \Rightarrow 31,500 \text{ sf}$
 $(31,500 \text{ cf}) / (9\text{sf/sy}) \Rightarrow 3500 \text{ sy}$

AFFECTED PAY ITEMS:

Original- Reduction = Alternative

12" GAB- $(31,500 \text{ sf} \times 1\text{ft}) \times (135\#/\text{cf}) / (2000\#/\text{ton}) \Rightarrow 2126 \text{ tons}$ 143,995 tons - 2126 tons = 141,869 tons
9.5 mm Superpave- $(3500 \text{ sy} \times 165\#/\text{sy}) / (2000\#/\text{ton}) \Rightarrow 289 \text{ tons}$ 17,559 tons - 289 tons = 17,270 tons
19.0 mm Superpave- $(3500 \text{ sy} \times 220\#/\text{sy}) / (2000\#/\text{ton}) \Rightarrow 385 \text{ tons}$ 35,199 tons - 385 tons = 34,814 tons
25.0 mm Superpave- $(3500 \text{ sy} \times 440\#/\text{sy}) / (2000\#/\text{ton}) \Rightarrow 770 \text{ tons}$ 46,932 tons - 795 tons = 46,137 tons

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation STP-004-2(31) – P.I. No. 322540 North Gray Bypass - Jones County	ALTERNATIVE NO.: RD-2
DESCRIPTION: REDUCE 44' MEDIAN; UTILIZE A 10' MEDIAN WITH A POSITIVE BARRIER	SHEET NO.: 1 of 4

Original Design:

The original design called for a rural four lane divided roadway with a 44' median on 250 foot of right-of-way.

Alternative:

The proposed alternative would reduce the 44' median to a 10' median with a positive median barrier.

Opportunities:

- Reduce Construction Cost
- Reduced Wetland Impacts
- Reduced ROW Acquisition Costs

Risks:

- Minimal Design Effort

Technical Discussion:

Cost savings achieved with the decrease in median width include minimization of the clearing and grubbing within the construction limits, reduced fill required, reduced ROW acquisition costs, a positive median barrier, reduced wetland impacts and compatibility with other cost saving proposals which provide positive improvements to the project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 50,139,600	\$	\$ 50,139,600
ALTERNATIVE	\$ 39,985,468	\$	\$ 39,985,468
SAVINGS	\$ 10,154,132	\$	\$ 10,154,132

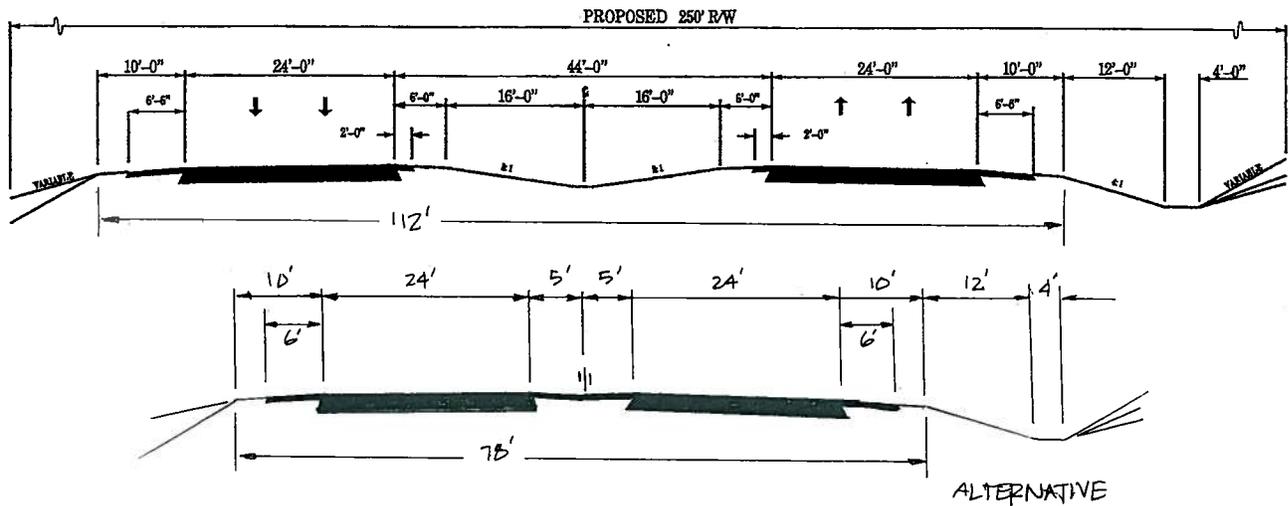
PROJECT: Georgia Department of Transportation
 STP-004-2(31) – P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-2

DESCRIPTION: REDUCE 44' MEDIAN; UTILIZE A 10' MEDIAN WITH A POSITIVE BARRIER

SHEET NO.: 2 of 4



Typical Cross Section
NORTH GRAY BYPASS
STP 004-2(31), JONES COUNTY
 FROM SR 22 AT SR 18 WEST OF CLINTON
 TO SR 22 EAST OF GRAY

Not To Scale

Calculations



PROJECT: Georgia Department of Transportation
 STP-004-2(31) - P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-2

DESCRIPTION: REDUCE 44' MEDIAN; UTILIZE A 10' MEDIAN WITH A POSITIVE BARRIER

SHEET NO.: 3 of 4

ROW - LESS 34' Median for 6 miles = $1,077,120 \text{ SF} / 43,560 = 24.73 \text{ AC}$
 $24.73 \text{ AC} @ \$2500/\text{AC} = \$61,825.$

CLEAR/GRUBS @ \$1.2 million LS for 200 AC = \$6,000/AC
 so $24.73 \text{ AC} @ \$6,000/\text{AC} = \$143,380.$

DOUBLE-FACE GUARDRAIL -
 say 5.5 mi = $29,040 \text{ LF} @ \$24.36/\text{LF} = \$707,414.$

FILL full width section $\pm 124'$ for 6 miles = $436,480 \text{ sy}$ or 7.95 cy per sy
 34' median section = $119,680 \text{ sy} * 7.95 \text{ cy} = 951,456 \text{ cy}$
 in place embankment = $3,469,134 \text{ cy} * 10.78 = \$37,397,265.$
 less $951,456 \text{ cy} @ \$10.78/\text{cy}$
 $2,517,678 @ \$10.78/\text{cy}$
 $= 27,140,568.$

BORROW @ \$5.88/cy
 in place @ 4.90/cy
 \$10.78/cy

PAVING $2(3'-0") * 31,680 \text{ LF} = 21,120 \text{ sy}$ $\Delta = \$10,256,697.$

GAB - mm in median

12.5 mm	-	21,120 sy @ 165#/sy = 1,742 TN @ \$69.44 = \$120,964
19.0 mm	"	@ 220#/sy = 2,323 TN @ 64.12 = 148,951
25.0 mm	"	@ 440#/sy = 4,646 TN @ 61.84 = 287,309.

\$557,224

? drainage
 landscape
 match

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 STP-004-2(31) – P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-5

DESCRIPTION: RELOCATE SR-11 CONNECTOR TO SOUTH OF BYPASS

SHEET NO.: 1 of 4

Original Design:

The original design has the SR-22 Connector aligned north of the Bypass.

Alternative:

The proposed alternative has a shortened Connector connecting with the Bypass from the south with the SR-11 traffic turning right after traveling under the railroad bridges.

Opportunities:

- Reduce Construction Cost
- Reduced Wetland Impacts
- Reduced ROW Acquisition Costs

Risks:

- Minimal Design Effort

Technical Discussion:

Cost savings achieved with the alternative alignment include minimization of the clearing and grubbing within the construction limits, reduced fill required, reduced ROW acquisition costs, reduced wetland impacts and compatibility with other cost saving proposals which provide positive improvements to the project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,389,952	\$	\$ 1,389,952
ALTERNATIVE	\$ 1,065,316	\$	\$ 1,065,316
SAVINGS	\$ 324,636	\$	\$ 324,636

Illustrations



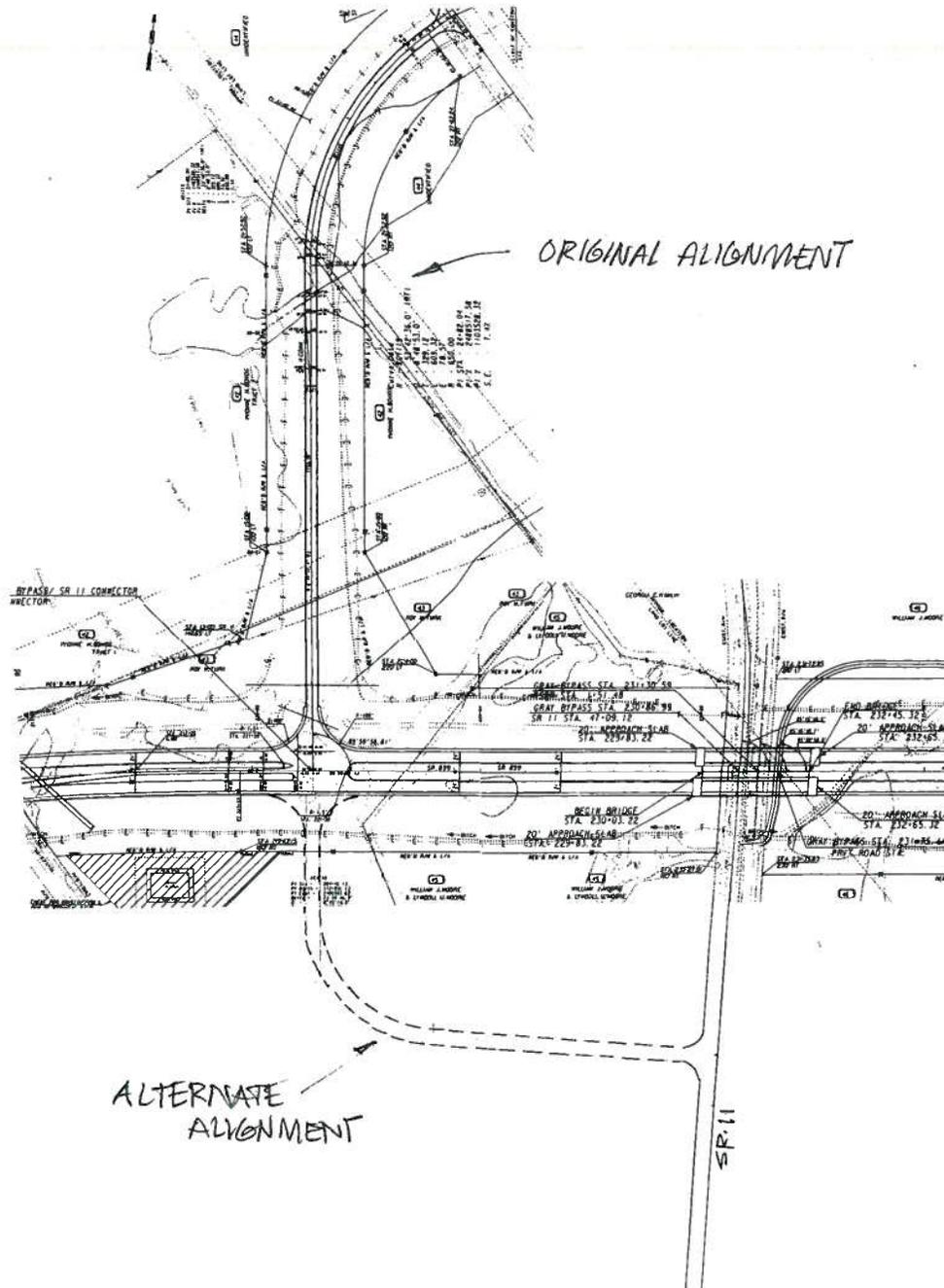
PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-5

DESCRIPTION: RELOCATE SR-11 CONNECTOR TO SOUTH OF BYPASS

SHEET NO.: 2 of 4



Calculations



PROJECT: Georgia Department of Transportation
 STP-004-2(31) - P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-5

DESCRIPTION: RELOCATE SR-11 CONNECTOR TO SOUTH OF BYPASS

SHEET NO.: 3 of 4

Design Alignment - STA 10+00 to STA 28+49.15 = 1,849.15 LF
 proposed alternate ± 1,450 LF Δ = 400 LF

SR-11 Connector - typ. section

design @ 1,849 LF - PAVING

9.5 mm	28' x 1849' = 5752 sy @ 125#/sy = 360 TN @ \$57.29 = \$20,624.
19.0 mm	28' x 1849' = 5752 sy @ 220#/sy = 633 TN @ \$64.12 = 40,588
25.0 mm	30' x 1849' = 6163 sy @ 440#/sy = 1356 TN @ 61.84 = 83,855
16" GAB	30' x 1849' = 6163 sy @ 1645#/sy = 3220 TN @ 17.17 = 55,287

design alignment 1845 LF * 28' = 5740 sy
 \$200,354 / 5740 sy = \$34.90/sy paving cost

proposed alignment 1405 LF * 28' = 4371 sy
 4371 sy @ \$34.90/sy = \$152,548.

Δ = \$47,806 paving differential

ROW

220' ROW * 1849 LF = 9.34 AC

220' ROW * 1450 LF = 7.32 AC

Δ = 2.02 AC @ \$2500/AC = \$5000 ROW saving

CLEAR/GRUBS @ \$6,000/AC = \$12,120.

FILL assume 7.95 cy/sy ... @ 56' cross section

design 1845 * 56' = 11,480 sy @ 7.95 cy/sy = 91,266 cy

alternate 1450 * 56' = 8,742 sy @ 7.95 cy/sy = 69,499 cy

Δ = 2,738 sy Δ = 21,767 cy

replace embank @ \$10.78/cy = \$234,648.

Value Analysis Design Suggestion



PROJECT: Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-6

DESCRIPTION: CLOSE CR-25/OLD HWY 18 – ELIMINATE
INTERSECTION/MEDIAN BREAK

SHEET NO.: 1 of 1

Original Design:

The original design proposes 5 signalized intersections and 6 median openings with the intent of limited access throughout the project.

Alternative:

The alternative suggestion is to reduce the number of median openings and limit the 'Full Median Breaks' to only the signalized intersections.

Opportunities:

- Improve Operations/Access Management
- More Efficient/Safe Traffic Flow
- Reduce Paving Costs

Risks:

- Minimal Design Impacts
- Resistance From Adjacent Landowners

Technical Discussion:

The proposed median break at the CR-25/Old Highway 18 intersection could be eliminated to provide more efficient traffic flow on the North Gray Bypass. As the original intent for the project was to provide limited access due to the anticipated heavy truck traffic the study team felt this could be a viable alternative.

Value Analysis Design Suggestion



PROJECT: **Georgia Department of Transportation**
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-9

DESCRIPTION: **EVALUATE REALIGNING THE INTERSECTION @ SR 22**
AND THE NORTH GRAY BYPASS (BOTH ENDS)

SHEET NO.: 1 of 2

Original Design:

The original design ties the bypass to SR-22 at a 90 degree angle.

Alternative:

The alternative design would recommend evaluating the realignment of the bypass intersections with SR-22 to provide free flow movement for the bypass traffic.

Opportunities:

- Improve traffic operations

Risks:

- Minimal design effort
- Resistance from the local population

Technical Discussion:

By providing the free flow movement to the truck traffic an improvement in traffic operations may be realized. It is unclear if this will provide any real advantage due to the fact the overall higher volumes on SR-22.

Illustrations



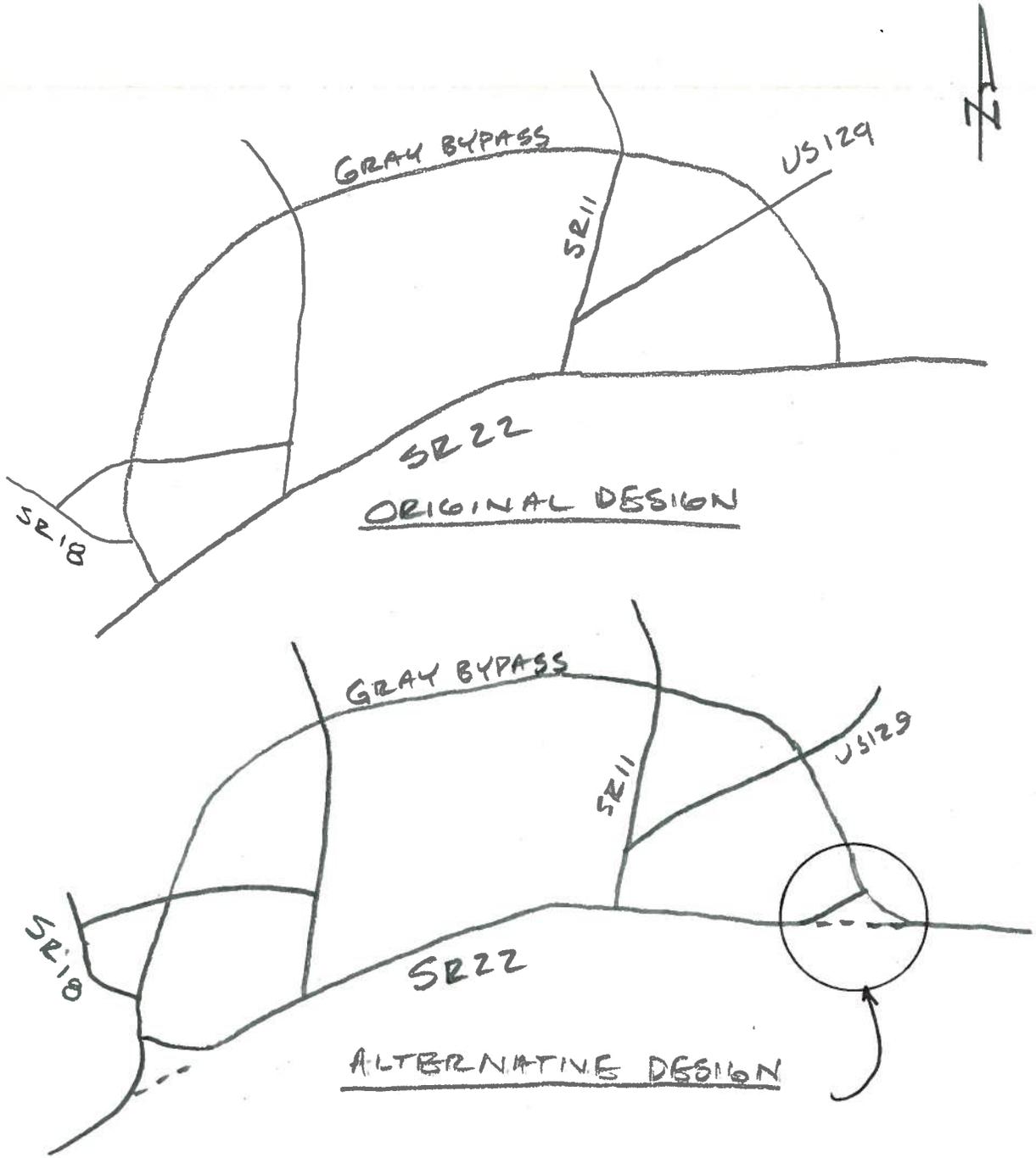
PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-9

DESCRIPTION: EVALUATE REALIGNING THE INTERSECTION @ SR 22
AND THE NORTH GRAY BYPASS (BOTH ENDS)

SHEET NO.: 2 of 2



Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation STP-004-2(31) – P.I. No. 322540 North Gray Bypass - Jones County	ALTERNATIVE NO.:	RD-10
DESCRIPTION:	REDUCE ROW-ACQUIRE ONLY THAT REQUIRED FOR CONSTRUCTION	SHEET NO.:	1 of 4

Original Design:

The original design called for the acquisition of 200 acres of ROW for the project

Alternative:

The proposed alternative would reduce the ROW profile to conform more with the construction limits.

Opportunities:

- Reduce Construction Cost
- Reduced Wetland Impacts
- Reduced ROW Acquisition Costs

Risks:

- Minimal Design Effort

Technical Discussion:

Further cost savings will be achieved with the decrease in ROW acquisition to include minimization of the clearing and grubbing and reduced wetland impacts.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,870,000	\$	\$ 1,870,000
ALTERNATIVE	\$ 1,785,850	\$	\$ 1,785,850
SAVINGS	\$ 84,150	\$	\$ 84,150

Illustrations



PROJECT: Georgia Department of Transportation
 STP-004-2(31) - P.I. No. 322540
 North Gray Bypass - Jones County

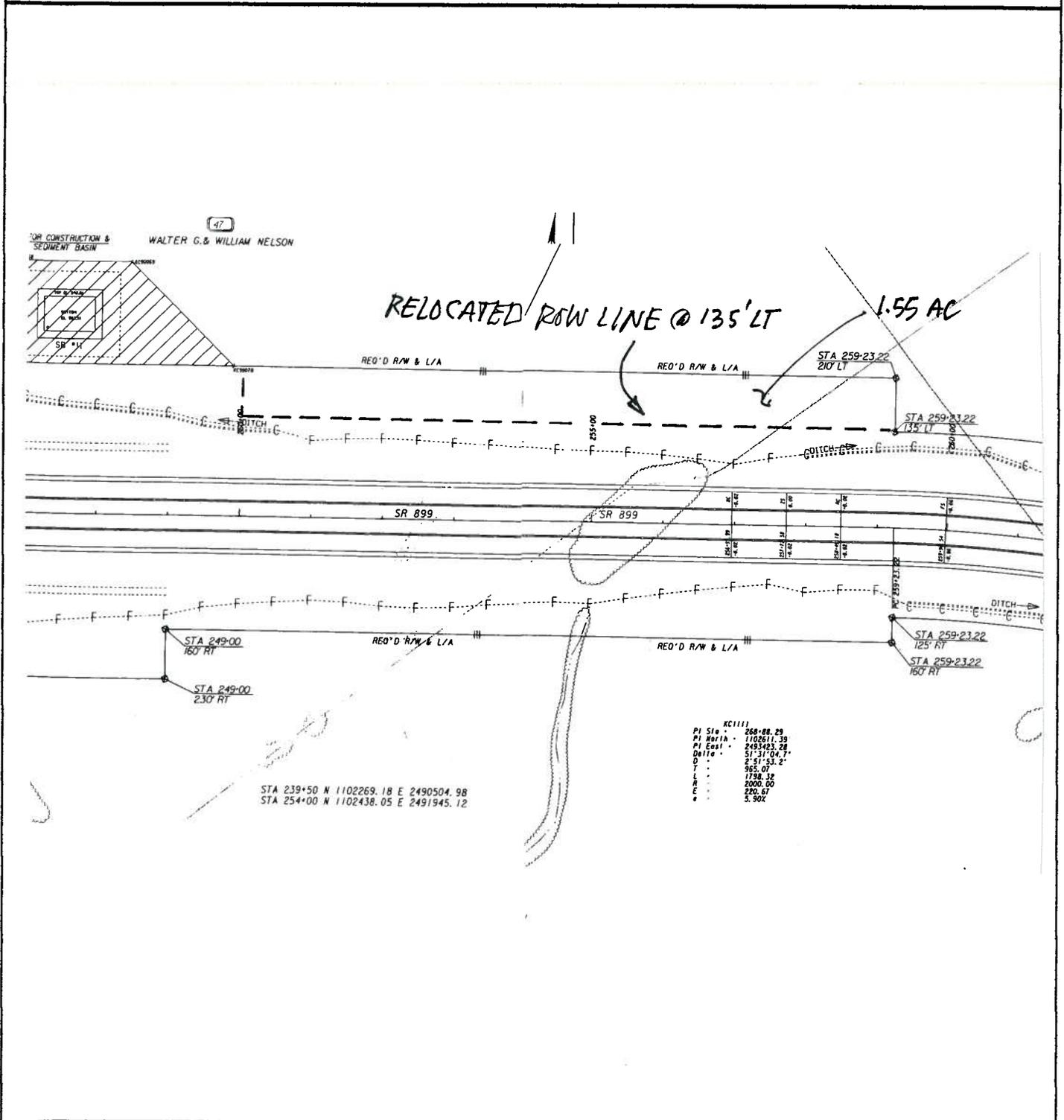
ALTERNATIVE NO.:

RD-10

DESCRIPTION: REDUCE ROW-ACQUIRE ONLY THAT REQUIRED FOR CONSTRUCTION

SHEET NO.:

2 of 4



Calculations



PROJECT: Georgia Department of Transportation
 STP-004-2(31) - P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-10

DESCRIPTION: **REDUCE ROW-ACQUIRE ONLY THAT REQUIRED FOR CONSTRUCTION**

SHEET NO.: 3 of 4

AREAS FOR POSSIBLE ROW ACQUISITION REDUCTION:

STA 281+00 to STA 302+00	from 150' LT to 110' LT	2100 * 40'	1.93 AC
STA 250+00 to STA 259+00	from 210' LT to 135' LT	900 * 75'	1.55 AC
STA 198+00 to STA 211+00	from 180' RT to 130' RT	1300 * 50'	1.49 AC
STA 315+50 to STA 326+75.21	from 160' RT to 120' RT	1125 * 40'	1.63 AC
STA 115+00 to STA 128+00	from 175' RT to 135' RT	1300 * 40'	1.19 AC
STA 231+75.83 to STA 242+00	from 230' RT to 180' LT	1024 * 50'	1.18 AC
STA 224+00 to STA 230+17.96	from 220' LT to 180' LT	618 * 40'	0.57 AC
			8.94 AC

$$\text{ROW} = 8.94 \text{ AC} @ \$2500/\text{AC} = \underline{\$22,350}$$

CLEARING/GRUBBING

$$200 \text{ AC} @ \$1.2 \text{ million} = \$6000/\text{AC}$$

$$8.94 \text{ AC} @ \$6000 = \underline{\$53,640}$$

Value Analysis Design Suggestion



PROJECT: **Georgia Department of Transportation**
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-11

DESCRIPTION: **CONSIDER LOCATIONS FOR RIGHT TURNS AND EYBROW PAVEMENT.**

SHEET NO.: 1 of 1

Original Design:

The original design makes no provisions for channelized right turn lanes at any of the intersections. The original design provides no eyebrow pavement at any median openings where u-turns are permitted.

Alternative:

The alternative design would recommend re-evaluating all roadway intersections for consideration of including channelized right turns and eyebrow pavement

Opportunities:

- Improve traffic operations
- Improve traffic safety
- Reduce maintenance costs by protecting pavement with eyebrows

Risks:

- Increased paving costs
- Minimal design effort

Technical Discussion:

The addition of right turn lanes would improve the operations at the intersections. Addition of eyebrow pavement to accommodate u=turning trucks would seem prudent due to the fact that a basic function of the roadway is to divert truck traffic from the Gray CBD.

Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

RD-13

DESCRIPTION: **BIFURCATE ROADWAY TO REDUCE EARTHWORK**

SHEET NO.: 1 of 4

Original Design:

The original design provides for both roadways to have a common profile grade line.

Alternative:

The alternative design proposes bifurcating the vertical alignment of the roadway and increase the sideslopes of the median to reduce the amount of borrow required to construct the roadway

Opportunities:

- Reduce the required borrow.

Risks:

- Moderate increase in design effort.
- Reduce median ditch capacity

Technical Discussion:

A minor bifurcation (~1 foot) in conjunction with steeper side slopes in the median will allow you to reduce the required fill material.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 387,365	\$	\$ 387,365
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 387,365	\$	\$ 387,365

Illustrations



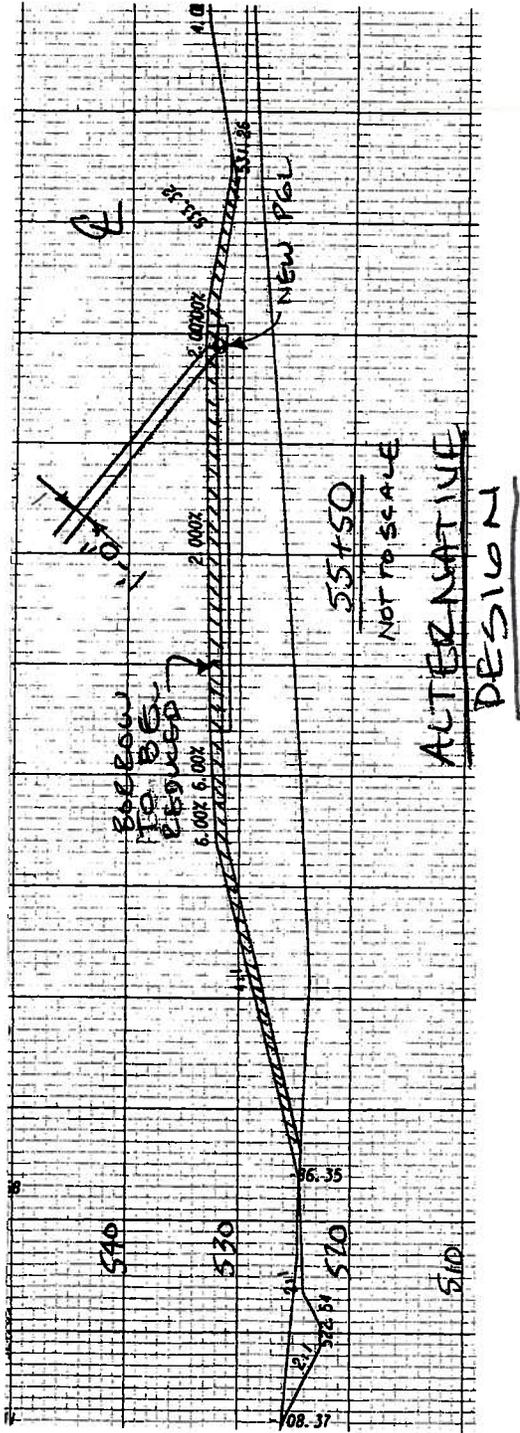
PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-13

DESCRIPTION: BIFURCATE ROADWAY TO REDUCE EARTHWORK

SHEET NO.: 2 of 4



NOT TO SCALE

Calculations



PROJECT: **Georgia Department of Transportation**
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-13

DESCRIPTION: **BIFURCATE ROADWAY TO REDUCE EARTHWORK**

SHEET NO.: 3 of 4

ASSUMPTIONS:

- Bifurcation of 1 foot
- Fill area average of 80 feet in width (1 side)
- Fill area on 35% OF THE JOB

REDUCED EMBANKMENT/BORROW:

$$(1' \times 80') \times (0.35 \times 31,500 \text{ lf}) / (27 \text{ cf/cy}) \Rightarrow 32,667 \text{ cy}$$

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation STP-004-2(31) – P.I. No. 322540 North Gray Bypass - Jones County	ALTERNATIVE NO.: RD-16
DESCRIPTION: STEEPEN GRADE AT NSRR BRIDGE APPROACH TO REDUCE THE VOLUME OF FILL.	SHEET NO.: 1 of 5

Original Design:

The original design utilizes a very flat profile (3.3117% approach/1.7429% departure) and long vertical curve (VC=1200 lf, K=237.4).

Alternative:

The alternative design proposes utilizing steeper grades(4.00% approach/4.00 % departure) and reducing the vertical curve length to 1000 feet(K=125, K min = 114).

Opportunities:

- Reduce in-place borrow
- Reduce required right-of-way
- Reduced right of way and fill on the SR-11 connector

Risks:

- Significant increase in design effort

Technical Discussion:

The proposed grade seems to be artificially high for a long way on either approach to the NSRR bridge. The grade could be lowered significantly from Station 205+00 to Station 259+00.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 7,133,537	\$	\$ 7,133,537
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 7,133,537	\$	\$ 7,133,537

Illustrations



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

RD-16

DESCRIPTION: **STEEPEN GRADE AT NSRR BRIDGE APPROACH TO
REDUCE THE VOLUME OF FILL.**

SHEET NO.: 2 of 5

The following table is an example profile grade for lowering the roadway in the vicinity of the NSRR.

VPI Station 204+77.00	Elevation-571.27
Approach Grade: +1.0526%	LC=150'
Departure Grade: +2.0068%	K= 157.2
VPI Station 215+00.00	Elevation-591.80
Approach Grade: +2.0068%	LC=300'
Departure Grade: +4.0000%	K= 150.5
VPI Station 231+30.00	Elevation-657.00
Approach Grade: +4.0000%	LC=1000'
Departure Grade: -4.0000%	K= 125.0
VPI Station 249+00.00	Elevation-586.20
Approach Grade: -4.0000%	LC=700'
Departure Grade: +1.6590%	K= 123.7
VPI Station 259+00.00	Elevation-602.79
Approach Grade: +1.6590%	LC=400'
Departure Grade: -1.6433%	K= 121.1

Illustrations



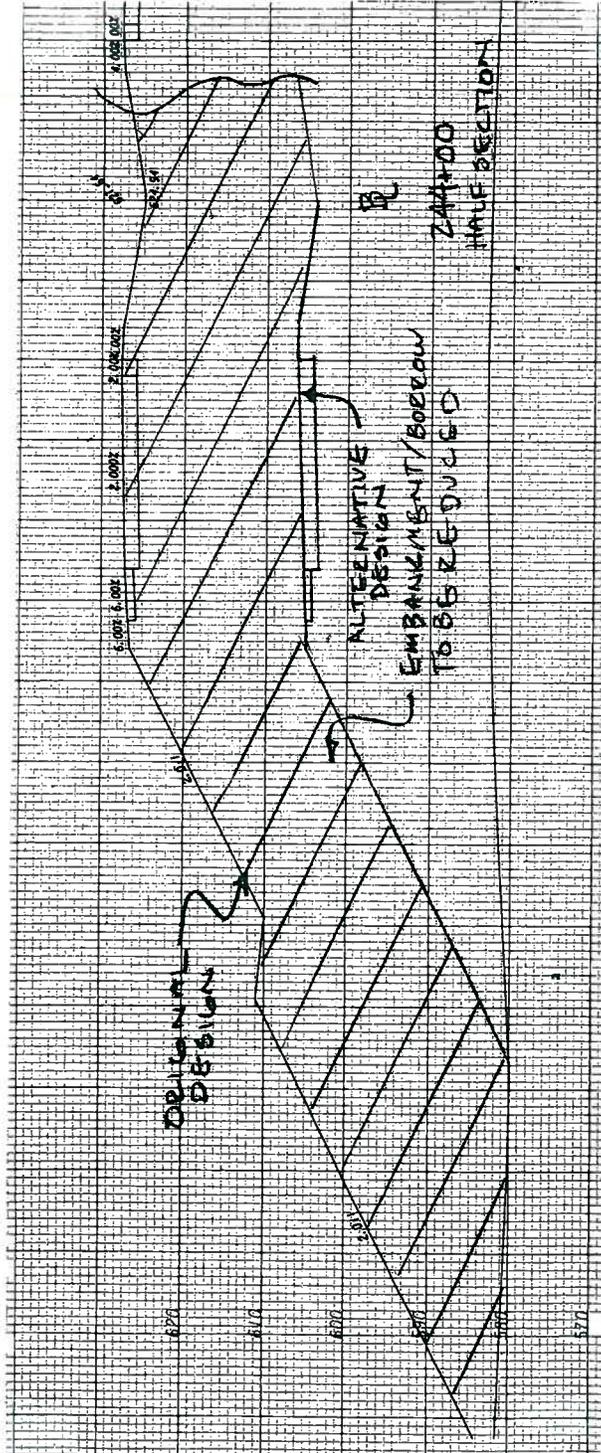
PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-16

DESCRIPTION: STEEPEN GRADE AT NSRR BRIDGE APPROACH TO
REDUCE THE VOLUME OF FILL.

SHEET NO.: 3 of 5



NOT TO SCALE

Calculations



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

RD-16

DESCRIPTION: **STEEPEN GRADE AT NSRR BRIDGE APPROACH TO
REDUCE THE VOLUME OF FILL.**

SHEET NO.: 4 of 5

REDUCED EMBANKMENT/BORROW:

Station 204+77.00 to Station 215+00.00. Assume an average 150' wide by 6.0' deep.
 $(150' \times 6.0' \times 1023') / (27 \text{cf} / \text{cy}) \Rightarrow 34,100 \text{ cy}$

Station 215+00.00 to Station 231+30.00. Assume an average 260' wide by 6.5' deep.
 $(260' \times 6.5' \times 1630') / (27 \text{cf} / \text{cy}) \Rightarrow 102,025 \text{ cy}$

Station 231+30.00 to Station 249+00. Assume an average 280' wide by 16.0' deep.
 $(280' \times 16.0' \times 1770') / (27 \text{cf} / \text{cy}) \Rightarrow 293,690 \text{ cy}$

Station 249+00 to Station 259+00. Assume an average 280' wide by 16.5' deep.
 $(280' \times 16.5' \times 1000') / (27 \text{cf} / \text{cy}) \Rightarrow 171,110 \text{ cy}$

TOTAL- 600,925 cy

REDUCED RIGHT OF WAY:

A reduction of 1 foot of fill height in a fill with 2:1 side slopes will result in a 4 foot reduction in right of way width. Assume that $\frac{1}{2}$ of that, or a 2 foot savings can be realized.

Station 204+77.00 to Station 215+00.00.
 $(2 \times 6.0' \times 1023') / (43560 \text{ sf/ac}) \Rightarrow 0.281 \text{ ac}$

Station 215+00.00 to Station 231+30.00. Assume an average 260' wide by 6.5' deep.
 $(2 \times 6.5' \times 1630') / (43560 \text{ sf/ac}) \Rightarrow 0.486 \text{ ac}$

Station 231+30.00 to Station 249+00. Assume an average 280' wide by 16.0' deep.
 $(2 \times 16.0' \times 1770') / (43560 \text{ sf/ac}) \Rightarrow 1.300 \text{ ac}$

Station 249+00 to Station 259+00. Assume an average 280' wide by 16.5' deep.
 $(2 \times 16.5' \times 1000') / (43560 \text{ sf/ac}) \Rightarrow 0.758 \text{ ac}$

TOTAL- 2.825 ac

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 STP-004-2(31) – P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-17

DESCRIPTION: **REDUCE MEDIAN WIDTH TO 24' RAISED**

SHEET NO.: 1 of 4

Original Design:

The original design called for a rural four lane divided roadway with a 44' median on 250 foot of right-of-way.

Alternative:

The proposed alternative would reduce the 44' median to a 24' raised median with 2' inside shoulders

Opportunities:

- Reduce Construction Costs
- Reduce Wetland Impacts
- Reduce ROW Acquisition Costs

Risks:

- Minimal Design Effort

Technical Discussion:

Cost savings achieved with the decrease in median width include minimization of the clearing and grubbing within the construction limits, reduced fill required, reduced ROW acquisition costs, reduced wetland impacts and compatibility with other cost saving proposals which provide positive improvements to the project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 43,006,910	\$	\$ 43,006,910
ALTERNATIVE	\$ 36,230,993	\$	\$ 36,230,993
SAVINGS	\$ 6,775,917	\$	\$ 6,775,917

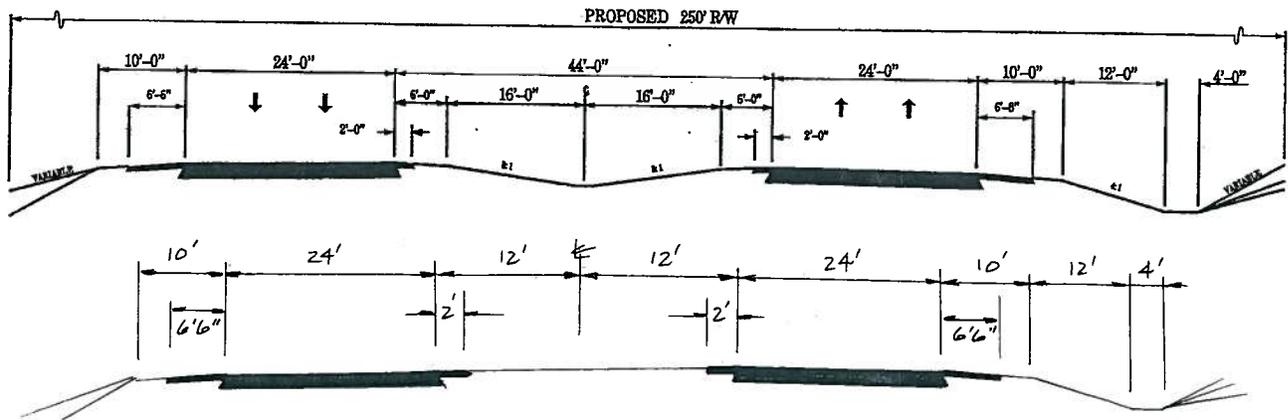
PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-17

DESCRIPTION: REDUCE MEDIAN WIDTH TO 24' RAISED

SHEET NO.: 2 of 4



ALTERNATIVE

Typical Cross Section
NORTH GRAY BYPASS
STP 004-2(31), JONES COUNTY
FROM SR 22 AT SR 18 WEST OF CLINTON
TO SR 22 EAST OF GRAY

Not To Scale

Calculations



PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:
RD-17

DESCRIPTION: REDUCE MEDIAN WIDTH TO 24' RAISED

SHEET NO.: 3 of 4

ROW 20' median for 6 miles = 633,600 SF = 14.5 AC
14.5 AC @ \$2500/AC = \$36,250.

CLEAR/GRUB - @ \$1.2 million for 200 AC = \$6,000/AC
So 14.5 AC @ \$6,000/AC = \$87,000.

EARTHWORK - fwh width ± 124' for 6 miles = 436,480 sy or 7.95cy/sy

inplace embank
3,469,134
436,480
= 7.95cy/sy

44' median sect = 154,880 sy
24' median sect = 84,480 sy
Δ = 70,400 sy

70,400 sy @ 7.95cy = 559,680 cy * \$10.78/cy =
\$6,033,350.

barrow @ 5.88/cy
inplace @ 4.90/cy
\$10.78/cy

paving remains same

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 STP-004-2(31) – P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-19

DESCRIPTION: **LOWER PROFILE IN SELECTED AREAS TO REDUCE
 BORROW**

SHEET NO.: 1 of 4

Original Design:

The original design utilizes a very flat profile that appears to be significantly higher than necessary from Station 17+00 to Station 42+00, Station 165+00 to Station 192+00 and Station 303+00 to Station 322+00.

Alternative:

The alternative design proposes utilizing lowering the profile in the selected areas from 4 to 10 feet.

Opportunities:

- Reduce in-place borrow
- Reduce required right-of-way

Risks:

- Significant increase in design effort

Technical Discussion:

The proposed grade seems to be artificially high at the above locations. The grade was lowered as the result of comments from the field plan review but could still be lowered quite a bit in some areas.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,701,105	\$	\$ 4,701,105
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 4,701,105	\$	\$ 4,701,105

Illustrations



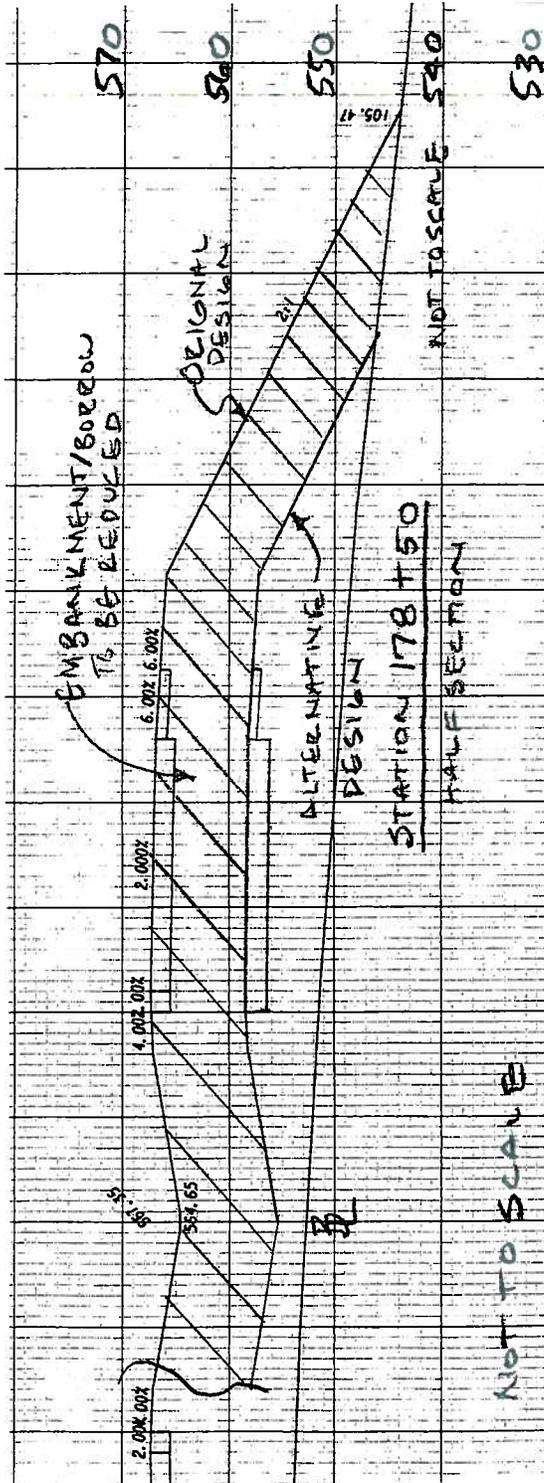
PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-19

DESCRIPTION: LOWER PROFILE IN SELECTED AREAS TO REDUCE
BORROW

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

RD-19

DESCRIPTION: **LOWER PROFILE IN SELECTED AREAS TO REDUCE
BORROW.**

SHEET NO.: 3 of 4

REDUCED EMBANKMENT/BORROW:

Station 17+00.00 to Station 42+00.00. Assume an average 180' wide by 9.0' deep.
 $(180' \times 9.0' \times 2500') / (27 \text{cf} / \text{cy}) \Rightarrow 150,000 \text{ cy}$

Station 165+00.00 to Station 192+00.00. Assume an average 170' wide by 7.5' deep.
 $(170' \times 8.5' \times 2700') / (27 \text{cf} / \text{cy}) \Rightarrow 144,500 \text{ cy}$

Station 303+00.00 to Station 322+00. Assume an average 280' wide by 8.0' deep.
 $(180' \times 8.0' \times 1900') / (27 \text{cf} / \text{cy}) \Rightarrow 101,333 \text{ cy}$

TOTAL- 395,833 cy

REDUCED RIGHT OF WAY:

A reduction of 1 foot of fill height in a fill with 2:1 side slopes will result in a 4 foot reduction in right of way width. Assume that 1/2 of that, or a 2 foot savings can be realized.

Station 17+00.00 to Station 42+00.00.
 $(2 \times 9.0' \times 2500') / (43560 \text{ sf/ac}) \Rightarrow 1.033 \text{ ac}$

Station 165+00.00 to Station 192+00.00.
 $(2 \times 7.5' \times 2700') / (43560 \text{ sf/ac}) \Rightarrow 0.930 \text{ ac}$

Station 303+00.00 to Station 322+00.
 $(2 \times 8.0' \times 1900') / (43560 \text{ sf/ac}) \Rightarrow 0.698 \text{ ac}$

TOTAL- 2.661 ac

Value Analysis Design Suggestion



PROJECT: **Georgia Department of Transportation**
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

RD-20

DESCRIPTION: **REALIGN DRAINAGE STRUCTURE @ ~STATION 263+50**

SHEET NO.:

1 of 2

Original Design:

The original design shows a structure that appears to be placed at a 80-90 degree skew with the natural drainage channel.

Alternative:

The alternative design would recommend aligning the drainage structure parallel with the natural channel.

Opportunities:

- Improve hydraulic flow

Risks:

- Minimal design effort

Technical Discussion:

By realigning the proposed drainage structure to be parallel with the natural channel the hydraulic efficiency can be improved and the roadway ditch and natural channel will be subject to less erosion.

Illustrations



PROJECT: Georgia Department of Transportation
STP-004-2(31) - P.I. No. 322540
North Gray Bypass - Jones County

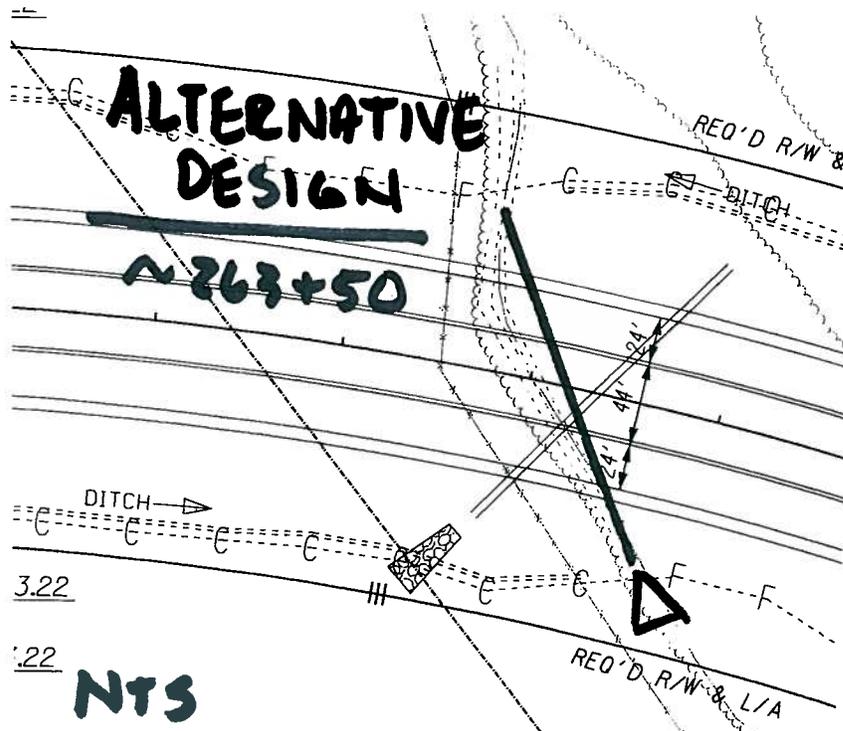
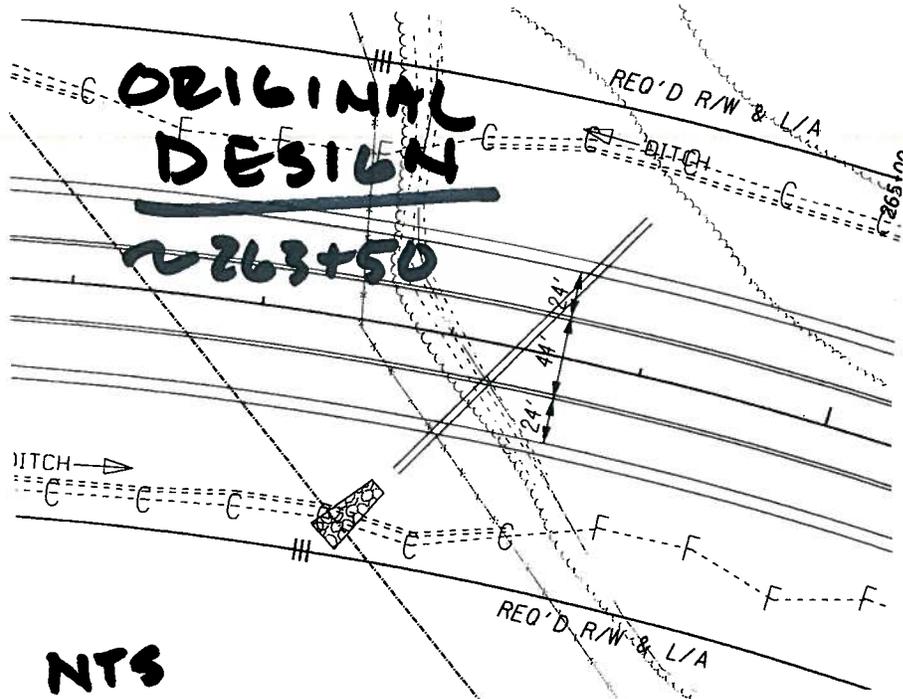
ALTERNATIVE NO.:

RD-20

DESCRIPTION: REALIGN DRAINAGE STRUCTURE @ ~STATION 263+50

SHEET NO.:

2 of 2



Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-1

DESCRIPTION: **USE 2' INSIDE BUFFER IN-LIEU OF 4' SHOULDER**

SHEET NO.: 1 of 4

Original Design:

(The VE Team is cognizant of the fact that at the time of the study the preliminary Bridge layout was under development. The study was based on available information and certain assumptions).

The original design calls for the construction of identical twin two span bridges, 233' long, to carry North Gray Bypass across SR 11, Norfolk Southern RR and Farm Access road. The bridges are each 41'-3" out-to-out and accommodate an 8' outside shoulder, 2 – 12' travel lanes and a 4' inside shoulder. The 96' span on the west side crosses SR 11. The 137' span on the east crosses Norfolk Southern RR and a Farm Access Road.

Alternative:

The Alternative suggests the use of a 2' buffers from the railing on the inside in-lieu of the 4' shoulder.

All other geometry remains the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time
- Additional construction staging area between the bridges will be available

Risks:

- Minimal redesign effort
- Design exception may be required

Technical Discussion:

A 2' buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the inside buffer width will closely match the typical roadway cross section.

The out-to-out bridge width in the Alternative will measure 39'-3".

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 92,268	\$	\$ 92,268
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 92,268	\$	\$ 92,268

Illustrations



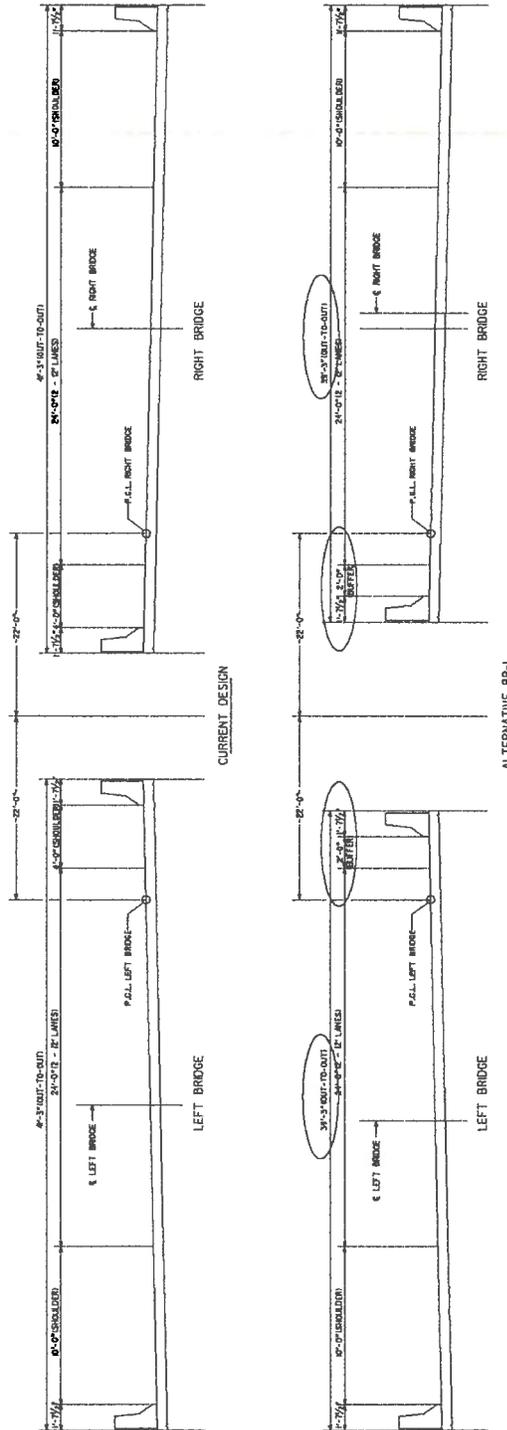
PROJECT: Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

BR-1

DESCRIPTION: **USE 2' INSIDE BUFFER IN-LIEU OF 4' SHOULDER**

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-1

DESCRIPTION: **USE 2' INSIDE BUFFER IN-LIEU OF 4' SHOULDER**

SHEET NO.: 3 of 4

Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

Current Design (Assumed):

Twin 41'-3" wide bridges.

Alternative BR-1:

This alternative proposes building the twin bridges 39'-3" wide.

Reduction in width of Deck (per bridge) = $[(41'-3") - (39'-3")] = 2'$

Total area of decreased bridge surface = $2 \times [2' \times 233'] = 932 \text{ SF}$

{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}

NOTE:

Reduction from current design = savings for alternative.

Cost of Bridge Construction assumed to be \$90 per SF.

Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-2

DESCRIPTION: **USE 6' OUTSIDE SHOULDER AND 2' INSIDE BUFFER IN-
LIEU OF 10' OUTSIDE AND 4' INSIDE SHOULDERS**

SHEET NO.: 1 of 4

Original Design:

(The VE Team is cognizant of the fact that at the time of the study the preliminary Bridge layout was under development. The study was based on available information and certain assumptions).

The original design calls for the construction of identical twin two span bridges, 233' long, to carry North Gray Bypass across SR 11, Norfolk Southern RR and Farm Access road. The bridges are each 41'-3" out-to-out and accommodate an 8' outside shoulder, 2 – 12' travel lanes and a 4' inside shoulder. The 96' span on the west side crosses SR 11. The 137' span on the east crosses Norfolk Southern RR and a Farm Access Road.

Alternative:

The Alternative suggests the use of 6' outside shoulders in-lieu of the 10' shoulders and 2' buffers from the railing on the inside in-lieu of the 4' shoulders.

All other geometry remains the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time
- Additional construction staging area between the bridges will be available

Risks:

- Minimal redesign effort
- Design exception may be required

Technical Discussion:

A 6' outside shoulder and 2' buffer on the inside between the inside travel lanes and the bridge rail may be adequate. Additionally, the shoulder and buffer widths will closely match the typical roadway cross section.

The out-to-out bridge width in the Alternative will measure 35'-3".

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 276,804	\$	\$ 276,804
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 276,804	\$	\$ 276,804

Illustrations



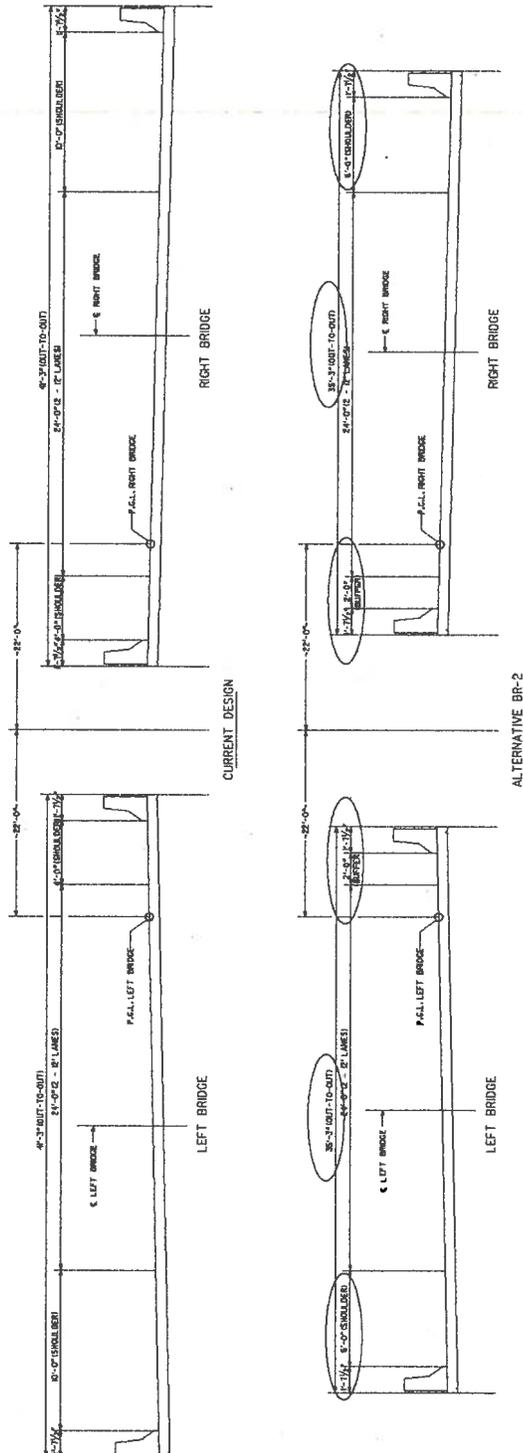
PROJECT: Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

BR-2

DESCRIPTION: **USE 6' OUTSIDE SHOULDER AND 2' INSIDE BUFFER IN-
LIEU OF 10' OUTSIDE AND 4' INSIDE SHOULDERS**

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-2

DESCRIPTION: **USE 6' OUTSIDE SHOULDER AND 2' INSIDE BUFFER IN-
LIEU OF 10' OUTSIDE AND 4' INSIDE SHOULDERS**

SHEET NO.: 3 of 4

Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

Current Design (Assumed):

Twin 41'-3" wide bridges.

Alternative BR-2:

This alternative proposes building the twin bridges 35'-3" wide.

Reduction in width of Deck (per bridge) = $[(41'-3") - (35'-3")] = 6'$

Total area of decreased bridge surface = $2 \times [6' \times 233'] = 2796 \text{ SF}$

{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}

NOTE:

Reduction from current design = savings for alternative.

Cost of Bridge Construction assumed to be \$90 per SF.

Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation STP-004-2(31) – P.I. No. 322540 North Gray Bypass - Jones County	ALTERNATIVE NO.:	BR-4
DESCRIPTION:	USE 3 SPAN BRIDGE WITH MSE WALL ABUTMENTS	SHEET NO.:	1 of 4

Original Design: (The VE Team is cognizant of the fact that at the time of the study the preliminary Bridge layout was under development. The study was based on available information and certain assumptions).

The original design calls for the construction of identical twin two span bridges, 233' long, to carry North Gray Bypass across SR 11, Norfolk Southern RR and Farm Access road. The bridges are each 41'-3" out-to-out and accommodate an 8' outside shoulder, 2 – 12' travel lanes and a 4' inside shoulder. The 96' span on the west side crosses SR 11. The 137' span on the east crosses Norfolk Southern RR and a Farm Access Road.

Alternative:

The Alternative suggests the use of symmetric 3 span bridges, 180' long (55', 70', 55'), in-lieu of the asymmetric two span bridge in the current design. The Abutments would have MSE Walls in front of it.

The cross section of the bridges would remain the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time
- Positive separation between SR 11, RR and Farm access road for improved safety
- Potential to lower the Profile Grade by about 18" since shallower beams can be used resulting in cost savings on earthwork

Risks:

- Minimal redesign effort
- Design exception may be required

Technical Discussion:

The 190' long 3 span bridge would accommodate SR 11 with sufficient clearance under the 55' end span on the West side, the RR with provision for a future track and required clearances under the 70' intermediate span and the Farm Access road under the 55' end span on the East side.

The MSE walls would run continuous along the face of the abutments and (for the purpose of the Alternative) wrap around and extend to about 20'.

Note: Cost savings, of substantial order, that would be realized from lowering the Profile Grade by at least 18" thus reducing earthwork quantities, have not been included in the savings below.

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 457,125	\$	\$ 457,125
ALTERNATIVE	\$ 402,270	\$	\$ 402,270
SAVINGS	\$ 54,855	\$	\$ 54,855

Illustrations



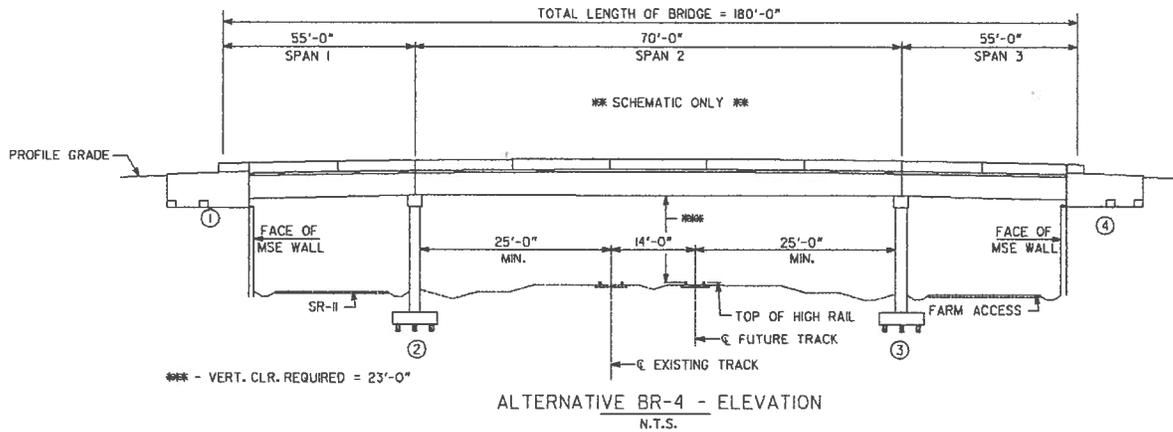
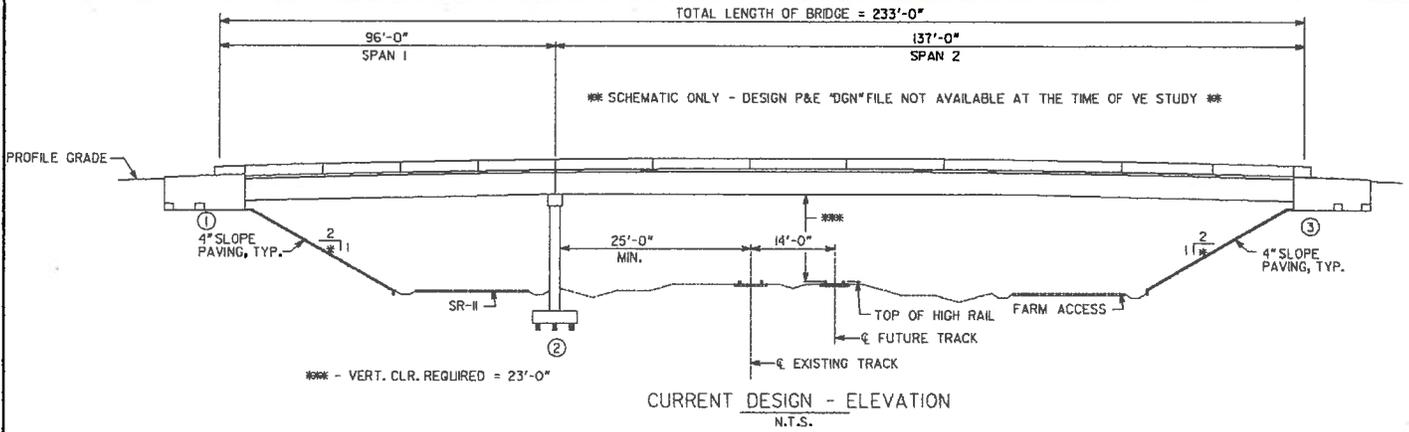
PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-4

DESCRIPTION: **USE 3 SPAN BRIDGE WITH MSE WALL ABUTMENTS**

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-4

DESCRIPTION: **USE 3 SPAN BRIDGE WITH MSE WALL ABUTMENTS**

SHEET NO.: 3 of 4

Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

Current Design (Assumed):

Twin 41'-3" wide bridges, 233' long.

Alternative BR-4:

This alternative proposes building twin, 3 span, 180' long bridges with MSE Wall Abutments.

Reduction in length of bridge (per bridge) = $[(233') - (180')] = 53'$
Total area of decreased bridge surface = $2 \times [53' \times 41.25'] = 4372.5 \text{ SF}$

Assume height of MSE Wall is 22.5' in front of the abutments, extending across the face of both abutments for a length of 120' and it varies (tapers) from 22.5' to 15' along the sides for a length of 20' parallel to the roadway.

Area of MSE Walls = $2 \times [120' \times 22.5'] + 4 \times [0.5 \times (15 + 22.5) \times 20'] = 6900 \text{ SF}$

Reduction in Sloped Paving = $2 \times [(45.25' \times (47' + 1.5'))] / 9 = 488 \text{ SY}$

{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction and \$53 per square foot has been assumed for the MSE Walls. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}

NOTE:

Reduction from current design = savings for alternative.

Cost of Bridge Construction assumed to be \$90 per SF.

Cost of MSE Wall Construction assumed to be \$53 per SF.

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 STP-004-2(31) – P.I. No. 322540
 North Gray Bypass - Jones County

ALTERNATIVE NO.:

BR-6

DESCRIPTION: USE MSE WALL ABUTMENTS ON WEST END OF
 BRIDGE

SHEET NO.: 1 of 4

Original Design:

(The VE Team is cognizant of the fact that at the time of the study the preliminary Bridge layout was under development. The study was based on available information and certain assumptions).

The original design calls for the construction of identical twin two span bridges, 233' long, to carry North Gray Bypass across SR 11, Norfolk Southern RR and Farm Access road. The bridges are each 41'-3" out-to-out and accommodate an 8' outside shoulder, 2 – 12' travel lanes and a 4' inside shoulder. The 96' span on the west side crosses SR 11. The 137' span on the east crosses Norfolk Southern RR and a Farm Access Road.

Alternative:

The Alternative suggests the use of a MSE Wall abutment on the West end of the bridge and shorten the West span to 60' in-lieu of 96' as in the current design.

The cross section of the bridges and other geometry would remain the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time
- Enhanced Aesthetics

Risks:

- Minimal redesign effort
- Design exception may be required

Technical Discussion:

The 60' long West span would accommodate SR 11 with sufficient clearance. The 137' East span would remain the same as in the current design to accommodate Norfolk Southern RR and the Farm Access road.

The MSE wall would run continuous along the face of the West abutment and (for the purpose of the Alternative) wrap around and extend to about 20' parallel to the roadway.

See following sheets for calculations in savings.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 306,154	\$	\$ 306,154
ALTERNATIVE	\$ 201,135	\$	\$ 201,135
SAVINGS	\$ 105,019	\$	\$ 105,019

Illustrations



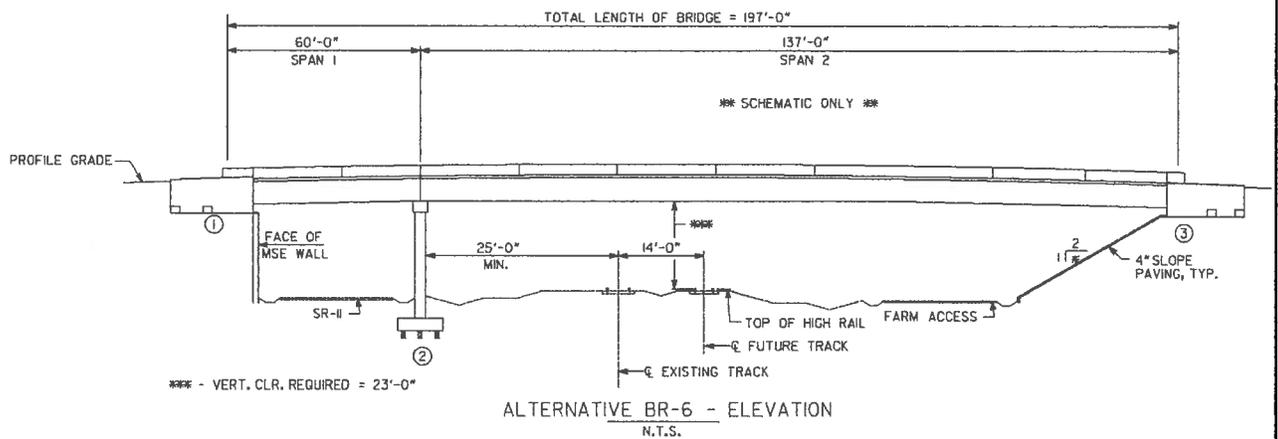
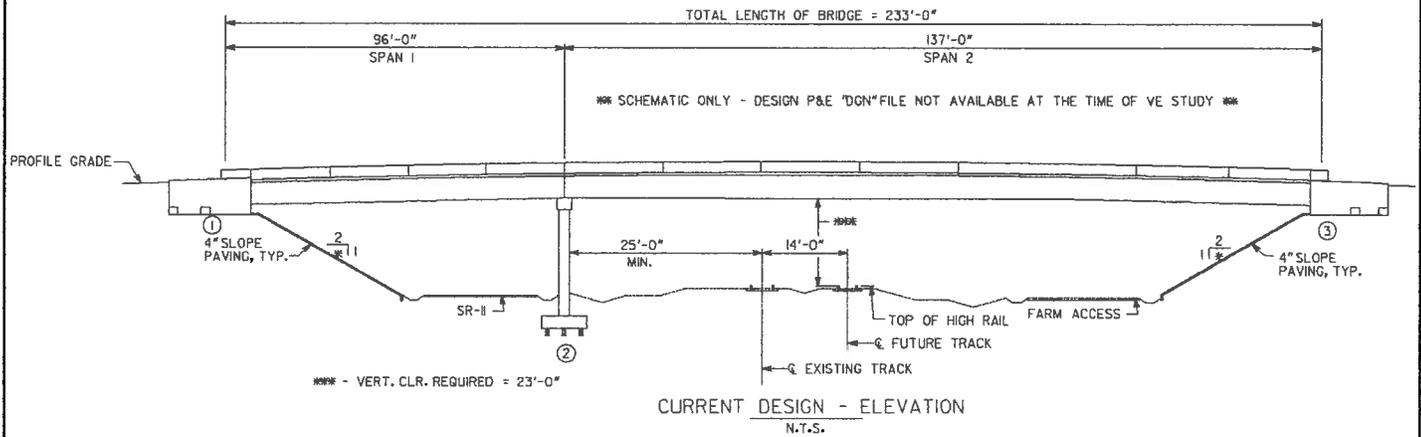
PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-6

DESCRIPTION: **USE MSE WALL ABUTMENTS ON WEST END OF
BRIDGE**

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-6

DESCRIPTION: **USE MSE WALL ABUTMENTS ON WEST END OF
BRIDGE**

SHEET NO.: 3 of 4

Note:

- 1) The VE team is cognizant of the fact that the project design is in its preliminary phase.
- 2) Calculations below are based on the Bridge Preliminary Plan & Elevation provided at the time of the VE study.
- 3) Since the substructure design had not been completed at the time of the VE study and existing conditions were not readily available, certain assumptions have been made.

Current Design (Assumed):

Twin 41'-3" wide bridges, 233' long.

Alternative BR-6:

This alternative proposes building twin, 197' long bridges with MSE Wall Abutments.

Reduction in length of bridge (per bridge) = $[(233') - (197')] = 36'$

Total area of decreased bridge surface = $2 \times [36' \times 41.25'] = 2970 \text{ SF}$

Assume height of MSE Wall is 22.5' in front of the West abutment, extending across the face of both (left and right bridge) abutments for a length of 120' and it varies (tapers) from 22.5' to 15' along the sides for a length of 20' parallel to the roadway.

Area of MSE Walls = $[120' \times 22.5'] + 2 \times [0.5 \times (15 + 22.5) \times 20'] = 3450 \text{ SF}$

Reduction in Sloped Paving = $[(45.25' \times (47' + 1.5'))] / 9 = 244 \text{ SY}$

{In comparing costs of original design and alternative, \$90 per square foot has been assumed for the bridge construction and \$53 per square foot has been assumed for the MSE Walls. A more detailed cost analysis may be performed when the bridge design progresses sufficiently to be able to itemize major components. A detailed analysis may show greater cost savings than that shown. Detailed estimate should include savings in substructure components (piles, piers, caps, and superstructure components.)}

NOTE:

Reduction from current design = savings for alternative.

Cost of Bridge Construction assumed to be \$90 per SF.

Cost of MSE Wall Construction assumed to be \$53 per SF.

Value Analysis Design Suggestion



PROJECT: **Georgia Department of Transportation**
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County

ALTERNATIVE NO.:

BR-7

DESCRIPTION: **ROUTE FARM ACCESS ROAD THROUGH SEPARATE**
CULVERT STRUCTURE

SHEET NO.: 1 of 2

Original Design:

(The VE Team is cognizant of the fact that at the time of the study the preliminary Bridge layout was under development. The study was based on available information and certain assumptions).

The original design calls for the construction of identical twin two span bridges, 233' long, to carry North Gray Bypass across SR 11, Norfolk Southern RR and Farm Access road. The bridges are each 41'-3" out-to-out and accommodate an 8' outside shoulder, 2 – 12' travel lanes and a 4' inside shoulder. The 96' span on the west side crosses SR 11. The 137' span on the east crosses Norfolk Southern RR and a Farm Access Road.

Alternative:

The Alternative suggests the routing of the Farm Access road through a separate culvert structure at a suitable distance from the location of the current bridge.

Opportunities:

- Relocation of the Access road from the proximity of the RR for additional safety
- Potential reduction in span length of the current bridge for cost savings
- May leave additional room for future RR expansion
- Potential lowering of Profile Grade which in turn reduces earthwork and ROW requirements

Risks:

- Minimal redesign effort
- Design of a new culvert structure

Technical Discussion:

The relocation of the Access road to cross the North Gray Bypass under a separate culvert structure may provide an opportunity for reduction of the East side span of the current bridge from 137' to approximately 110'. The reduction in span length may allow the use of a shallower beam (perhaps a BT 54) which in turn would allow lowering the Profile Grade by at least 18". Lowering of the Profile Grade would significantly reduce earthwork required for the embankments on the bridge approaches.

Note: Exact savings/costs can be determined by comparing more detailed itemized costs after performing a preliminary design.

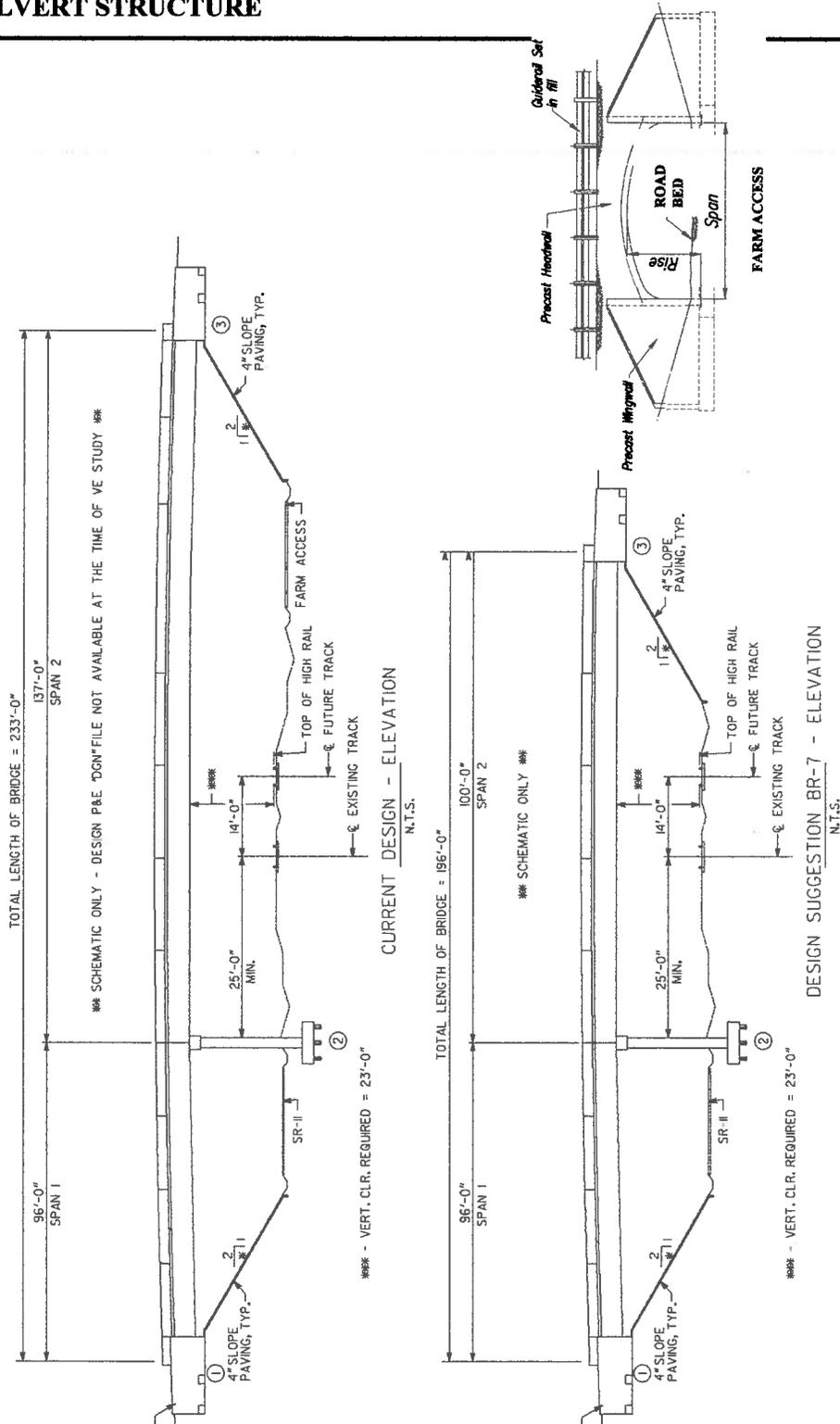
PROJECT: **Georgia Department of Transportation
STP-004-2(31) – P.I. No. 322540
North Gray Bypass - Jones County**

ALTERNATIVE NO.:

BR-7

DESCRIPTION: **ROUTE FARM ACCESS ROAD THROUGH SEPARATE
CULVERT STRUCTURE**

SHEET NO.: 2 of 2



Project Description

PROJECT DESCRIPTION

Project STP-004-2(31), Jones County, is proposed to construct a by-pass to the North of the City of Gray. The project is needed to provide improved travel conditions for the public and the fluid movement of increased freight on US129/SR22.

The project is proposed to begin at the intersection of SR 18 with SR 22, just west of Clinton. The road then proceeds in a northwesterly, northerly easterly and thence southeasterly to a terminus with SR 22, at mile post 11.21 east of the City of Gray. The total length of the project is approximately 6.0 miles.

To accommodate the traffic projections, the typical section will be a rural four lane roadway with a 44 foot depressed median on a 250 foot of Right-of-Way. The design speed is 55 mph.

To enhance the safety at the Norfolk Southern Railroad, the crossing of the railroad is proposed to be grade separated. Two parallel bridges approximately 230 feet in length are proposed to be constructed over SR 11 and the railroad.

The project estimated construction cost is \$22,739,131. The preliminary ROW acquisition cost is \$3,628,000.

REPRESENTATIVE DOCUMENTS

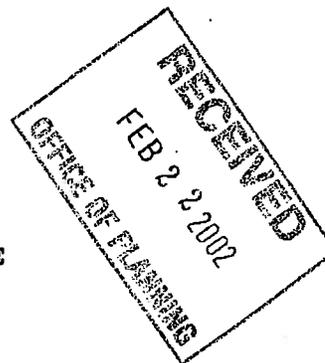
- Approved Concept Report
- Construction and Right-of-Way Cost Estimates
- Traffic Data
- Two-Way Stop Control Traffic Capacity Analysis
- Pavement Design

The VE Team utilized the supplied project materials noted above and the current GDOT standard drawings, details and specifications.

Representative documents follow:

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE



FILE: STP-004-2(31), Jones County
P.I. No. 322540
OFFICE: Environment/Location
DATE: February 20, 2002

FROM: *Harvey D. Kepler/Kel*
Harvey D. Kepler, State Environment/Location Engineer

TO: Wayne Hutto, Assistant Director of Preconstruction

SUBJECT: Revised Project Concept Report – North Gray Bypass

Attached is the original copy of the revised Concept Report for your further handling for approval in accordance with the Plan Development Process (PDP).

The proposed changes to the approved concept would be revisions to the typical section, beginning terminus, and the addition of a railroad grade separation. The typical section would be revised from a rural two lane roadway on a 130 foot of right-of-way to a rural four lane divided roadway with a 44 foot median on 250 foot of right-of-way. The beginning terminus would be revised from tying into Greene Settlement Road to tying into SR 22 at SR 18, west of Clinton. The proposed at grade crossing of the Norfolk Southern Railway near SR 11 would be revised to grade separation over the railroad.

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

DATE 2-26-02

Marta V. R...
State Transportation Planning Administrator

Distribution:

David Mulling, Project Review Engineer
Phillip Allen, State Traffic Safety and Design Engineer
~~Marta Rosen, State Transportation Planning Administrator~~
Herman Griffin, State Transportation Programming Engineer
Glen Durrence, Thomaston District Engineer
Ben Buchan, State Consultant Design Engineer
Paul Liles, State Bridge and Structural Design Engineer

REVISED PROJECT CONCEPT REPORT

Need and Purpose: The proposed project is needed to provide improved travel conditions for the public and the fluid movement of freight on US 129/SR22. The bypass could function as a rural major collector by collecting and distributing trips within the Gray and Clinton areas. The project has independent utility in that it requires no other improvements to serve as a useful transportation function or need. Constructing the bypass will provide a safer environment for trucks to operate, facilitate the movement of freight more efficiently and improve the safety and operational characteristics of the cities of Gray and Clinton.

Project Location: Project STP-004-2(31), Jones County would construct a bypass on new location to the north of Gray from SR 22, at SR 18, mile post 7.46 west of Clinton, to SR 22, mile post 11.21 east of Gray. The total length of the project is approximately 6.0 miles.

Description of Approved Concept: Project STP-004-2(31) would construct a bypass to the north of Gray from Greene Settlement Road just north of the Clinton City limits, to SR 22 east of Gray. The new location proposal would be a rural two lane roadway on 130 foot of right-of-way. The design speed is 55 mph and the length is 4.5 miles

The project would begin just north of Clinton City limits on Greene Settlement Road/CR 290 and just south of Bray Creek. It would proceed on new location in a northwest direction to the Georgia Power transmission line just south of Mason Creek. It then would turn in a north east direction paralleling the transmission line on the north side. The alignment would cross CR 290/Greene Settlement Road, and CR 40/ Oliver Greene Road and then turn in an easterly direction. It would cross the transmission line, CR 360/ Weidner Road, Bay Branch, SR 11, and the Norfolk Southern Railway at grade. The proposed roadway would continue on new location for approximately 3000 feet, then turn in a southeasterly direction and cross US 129/SR 44 approximately 4000 feet north of the intersection of US 129/SR 44 and CR 199/Industrial Boulevard. It would continue in a southeasterly direction and tie into SR 22 approximately 3500' east of the Gray City limits. Greene Settlement Road, Oliver Greene Road, and Weidner Road would be relocated to tie into the proposed alignment.

PDP Classification: Major/Construction on existing location

Full Oversight (), Exempt (X), SF (), Other ()

Functional Classification: Rural Minor Arterial

U.S. Route Number(s): N/A **State Route Number(s):** N/A

Traffic (AADT) as shown in the approved concept:

Current Traffic
Year: 2001 AADT: 7,000

Design Traffic
Year: 2021 AADT: 12,000

Proposed features to be revised:

1. To accommodate the increased traffic projections, the proposed typical is recommended for revision.
2. To avoid impacting the Clinton historic district with the necessary widening of Green Settlement Road due to increased traffic projections, the limits of the bypass project are recommended to be revised.
3. To enhance the safety at the Norfolk Southern Railway the proposed crossing is recommended to be revised.

Description of Revised features to be approved:

1. To accommodate the increased traffic projections, the typical section is proposed to be revised from a two lane rural roadway on 130 feet of right-of-way to a rural four lane roadway with a 44 foot median on 250 feet of right-of-way.
2. To avoid impacting the Clinton historic district, the begin terminus is proposed to be revised from tying in at Greene Settlement Road to tying into SR 22 at SR 18 west of Clinton. The project would begin at the intersection of SR 18 with SR 22, west of Clinton, and proceed on new location in a northwesterly direction for approximately 2000 feet. SR 18 would be relocated to tie into the proposed bypass. The proposed roadway would then turn in a northerly direction and cross CR 25/Old Highway 18 and Bray Branch before turning in a northeasterly direction. It would cross the Georgia Power transmission line and Greene Settlement Road where it ties into the approved alignment paralleling the north side of the transmission line. Greene Settlement Road would be relocated to tie into the proposed alignment. The total length of the project would change from 4.5 miles to 6.0 miles.
3. To enhance the safety at the Norfolk Southern Railway, the crossing of the railroad is proposed to be grade separated. Due to its proximity to the railroad, two parallel bridges approximately 230 feet in length are proposed to be constructed over SR 11 and the railroad. Access to SR 11 from the proposed mainline is proposed to be constructed with a slip ramp tying into SR 11 approximately 1800 feet north of the alignment.

Updated Traffic Data (AADT):

Current Traffic
Year: 2008 AADT: 10,800

Design Traffic
Year: 2028 AADT: 18,100

Programmed/Schedule:

P.E.: Jan. 1999

R/W: 2003

Construction: 2004

STP-004-2(31), Jones County
Revised Project Concept
February 20, 2002
Page 4 of 4

Revised Cost Estimates:

Construction cost including inflation and E&C:	\$ 16,143,000
Right-of-Way:	\$ 3,628,000
Utilities:	\$ 5,027,000

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

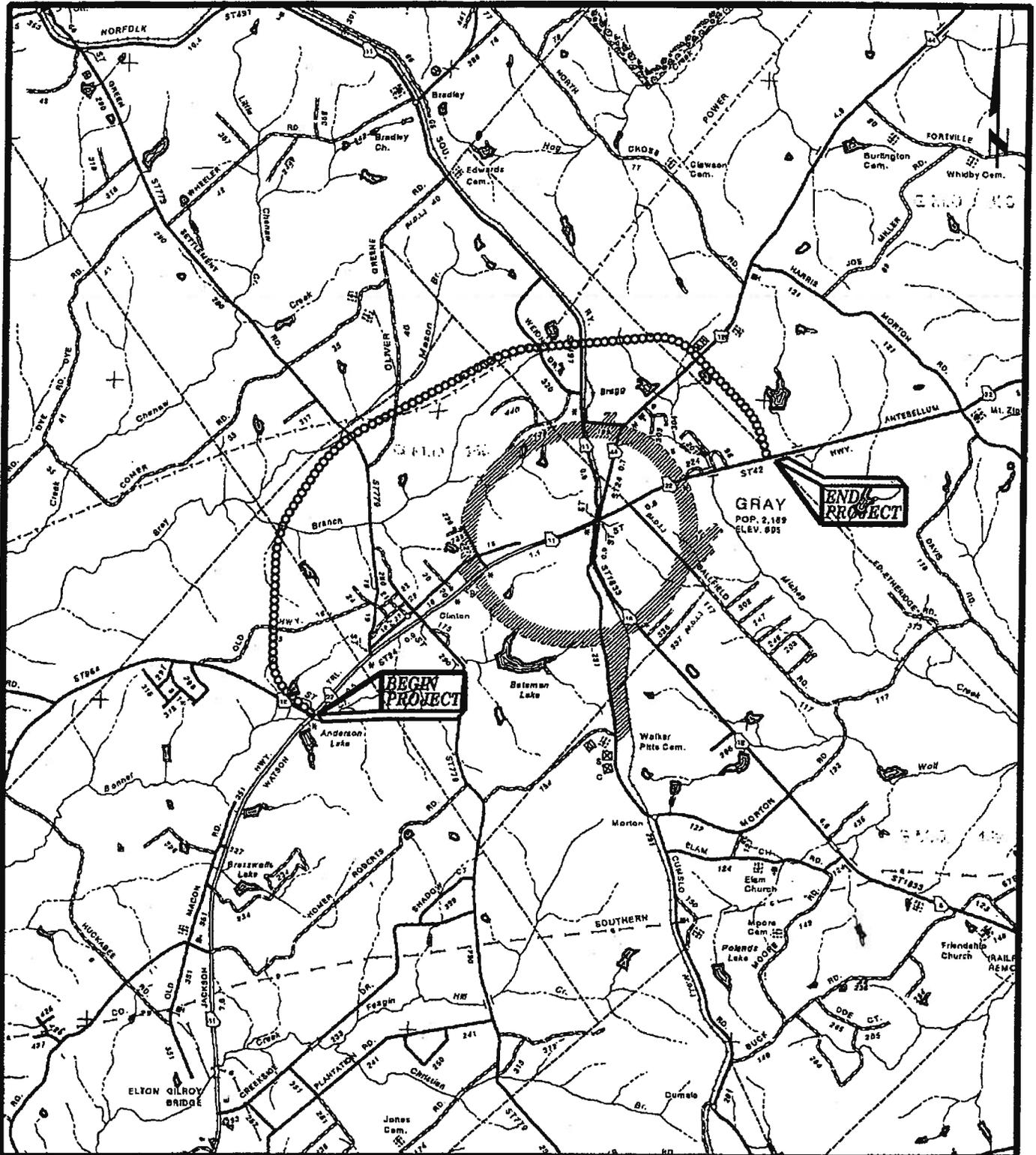
Recommendation: It is recommended that the proposed revisions to this concept be approved for implementation.

HDK/KET/fm

Attachments: Sketch Map
Cost Estimate
Typical Section

Concur: Thomas L. Turner
Thomas L. Turner, P.E.
Director of Pre-Construction

Approve: Frank L. Danchetz
Frank L. Danchetz, P.E.
Chief Engineer



LOCATION

STP 004-2(31)
NORTH GRAY BYPASS
JONES COUNTY

P.I.# 322540

SOURCE: GENERAL HIGHWAY MAP, BIBB CO., GEORGIA
PREPARED BY THE GEORGIA DEPARTMENT OF TRANSPORTATION

September 11, 2001

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE STP-004-2(31)

OFFICE ROAD DESIGN

Pl. No. 322540

SR899/GRAY N. BYPASS FM SR18 NE TO SR 22

DATE DECEMBER 14, 2006

FROM *Brent A. Story*
BRENT A. STORY, P.E., STATE ROAD & AIRPORT DESIGN ENGINEER

TO Brian Summers, P.E., Project Review Engineer

SUBJECT REVISIONS TO PROGRAMMED COST

NO REVISION REQUIRED YES

Project Manager: CLB

PROGRAMMED COST:

Last Estimate Date: 3-07-06

- Construction Cost \$20,000,000
- Right of Way Cost \$3,345,000
- Reimbursable Utility Cost

NEW COST ESTIMATES:

- Construction Cost * \$22,739,131
- Right of Way Cost \$3,628,000
- Reimbursable Utility Cost N/A

* Contains 10% E & C

Reasons for the cost revisions: CONSTRUCTION COSTS INCREASED AS THE PLAN
PROGRESSION MOVES CLOSER TO PFPR. REVISION TO PROGRAMMED COST ESTIMATE WAS SUBMITTED
FEB. 8, 2006 BUT NO UPDATED OCCURRED.

c: Jamie Simpson, Financial Management Administrator

Estimate Report for file "322540"

Section ROADWAY ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
210-0100	1	LS	2500000.00	GRADING COMPLETE -	2500000.00
310-1101	143995	TN	17.17	GR AGGR BASE CRS, INCL MATL	2472394.15
402-3110	17599	TN	57.29	RECYCLED ASPH CONC 9.5 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	1008246.71
402-3121	46932	TN	61.84	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	2902274.88
402-3190	35199	TN	64.12	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	2256959.88
413-1000	21748	GL	1.84	BITUM TACK COAT	40016.32
641-1200	4600	LF	18.54	GUARDRAIL, TP W	85284.00
641-5012	20	EA	1871.80	GUARDRAIL ANCHORAGE, TP 12	37436.00
999-2015	1	Lump Sum	804300.00	DRAINAGE	804300.00
Section Sub Total:					\$12,106,911.94

Section EROSION CONTROL					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0232	180	AC	571.97	TEMPORARY GRASSING	102954.60
163-0240	2610	TN	183.84	MULCH	479822.40
163-0300	6	EA	2872.37	CONSTRUCTION EXIT	17234.22
163-0502	15	EA	553.85	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 2	8307.75
163-0531	10	EA	8070.58	CONSTRUCT AND REMOVE SEDIMENT BASIN, TP 1, STA NO -	80705.80
163-0550	98	EA	308.76	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	30258.48
165-0030	63360	LF	1.83	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	115948.80
165-0060	10	EA	1213.72	MAINTENANCE OF TEMPORARY SEDIMENT BASIN, STA NO -	12137.20
165-0086	15	EA	245.00	MAINTENANCE OF SILT CONTROL GATE, TP 2	3675.00
165-0105	98	EA	110.84	MAINTENANCE OF INLET SEDIMENT TRAP	10862.32
166-0650	2	EA	14450.00	RESTORATION OF LAKE, STA -	28900.00
167-1500	24	MO	1035.76	WATER QUALITY INSPECTIONS	24858.24
716-2000	35000	SY	1.15	EROSION CONTROL MATS, SLOPES	40250.00
Section Sub Total:					\$955,914.81

Section BRIDGE ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
999-2015	1	Lump Sum	1325027.00	BRIDGES - preliminary cost estimate	1325027.00
999-2015	1	Lump Sum	510000.00	BRIDGE CULVERTS - Preliminary Cost Estimate	510000.00
Section Sub Total:					\$1,835,027.00

Section MISC					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	1	LS	262000.00	TRAFFIC CONTROL -	262000.00
201-1500	1	LS	1200000.00	CLEARING & GRUBBING -	1200000.00
999-2015	1	Lump Sum	521000.00	LANDSCAPING	521000.00
Section Sub Total:					\$1,983,000.00

Section SIGNING & MARKING/SIGNAL					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
999-2015	1	Lump Sum	126000.00	SIGNING-STRIPING-SIGNAL	126000.00
Section Sub Total:					\$126,000.00

Total Estimated Cost: \$17,006,853.75

Subtotal Construction Cost \$17,006,853.75

E&C Rate 10 % \$1,700,685.38

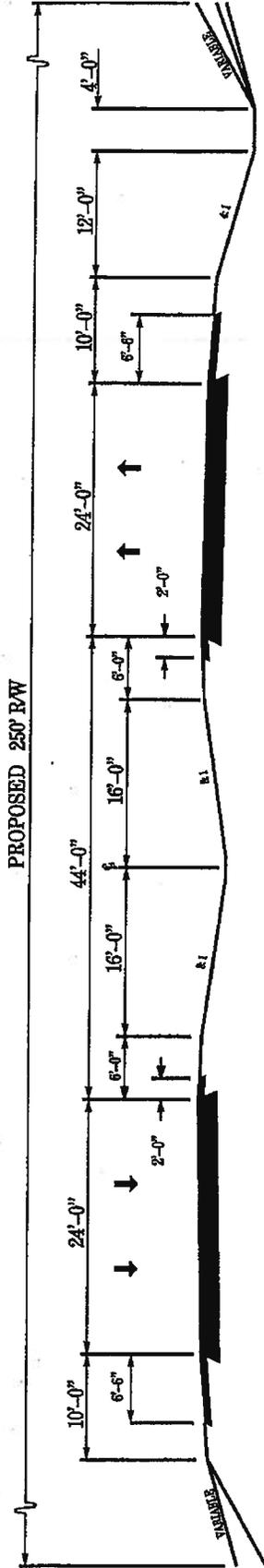
Inflation Rate 5 % @ 4 Years \$4,031,591.60

Total Construction Cost \$22,739,130.73

Right Of Way \$3,628,000.00

ReImb. Utilities \$0.00

Grand Total Project Cost \$26,367,130.73



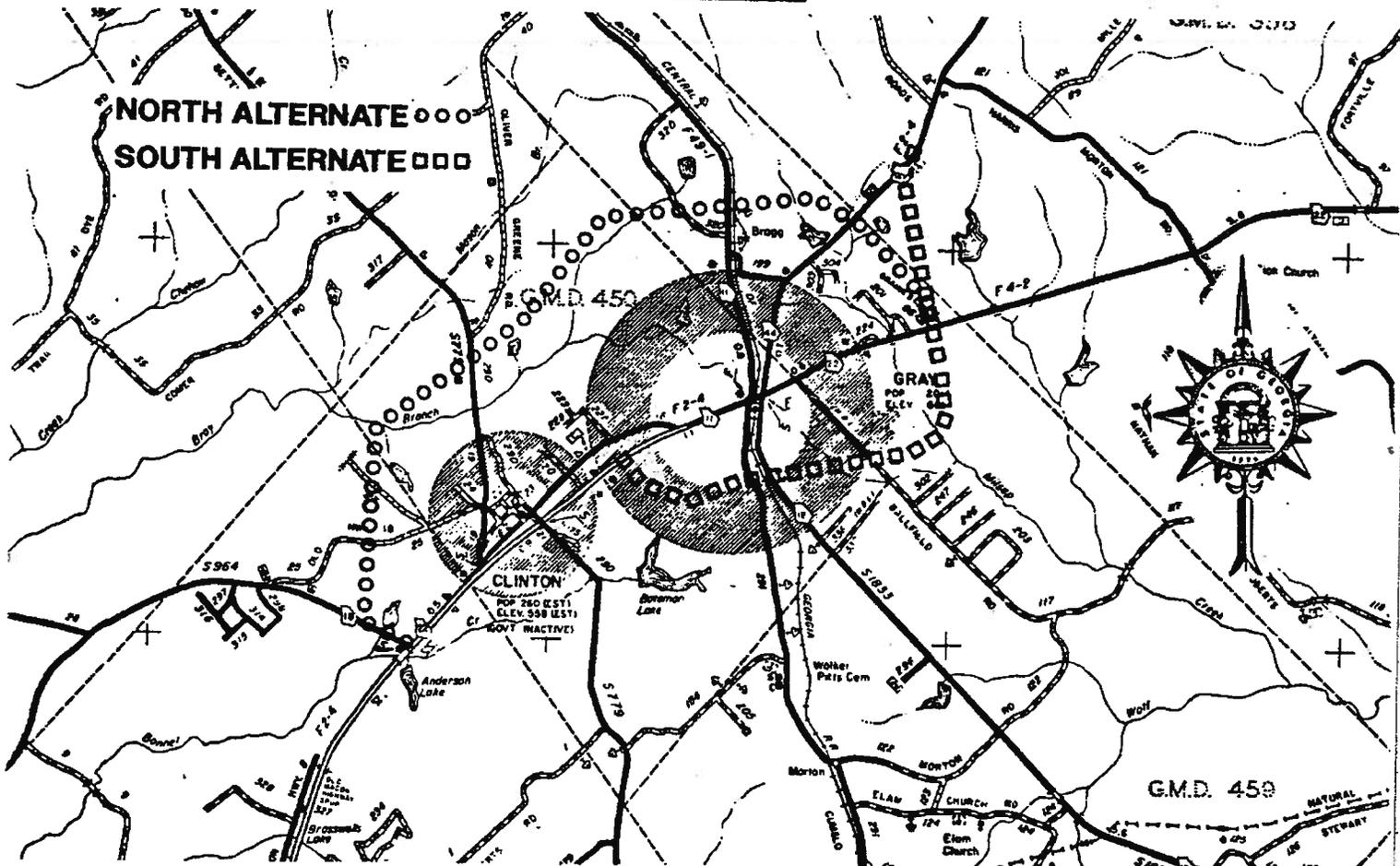
Typical Cross Section
NORTH GRAY BYPASS
STP 004-2(31), JONES COUNTY
FROM SR 22 AT SR 18 WEST OF CLINTON
TO SR 22 EAST OF GRAY

Not To Scale

OFFICE OF ENVIRONMENT/LOCATION

PROJECT CONCEPT REPORT

Project Number: STP-004-2(31)
County: JONES
P.I. Number: 322540
Federal Route Number: F2-4/F4-2
State Route Number: S.R.22/S.R.44



RECOMMENDATION FOR APPROVAL:

DATE 7/30/92

DATE

DATE

DATE

DATE

[Signature]
STATE ENVIRONMENTAL/LOCATION ENGINEER

STATE ROAD AND AIRPORT DESIGN ENGINEER

STATE TRAFFIC AND SAFETY ENGINEER

STATE BRIDGE AND STRUCTURAL DESIGN ENGINEER

DISTRICT ENGINEER/ THOMASTON

TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	Moussa Issa				Intersection	SR 18 / Gray Byp		
Agency/Co.	DOT / RD 3				Jurisdiction	Jones		
Date Performed	7/23/2007				Analysis Year	2029		
Analysis Time Period	Morning AM							
Project Description STP-004-2(31) PI # 322540								
East/West Street: SR 18					North/South Street: Gray Bypass			
Intersection Orientation: North-South					Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	225	420	0	0	750	75		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	250	466	0	0	833	83		
Percent Heavy Vehicles	11	-	-	11	-	-		
Median Type	Two Way Left Turn Lane							
RT Channelized			0				0	
Lanes	1	2	0	0	2	1		
Configuration	L	T		LT	T	R		
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	95	0	375		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	0	0	0	105	0	416		
Percent Heavy Vehicles	0	0	0	11	0	11		
Percent Grade (%)	0			-2				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	1	0	1		
Configuration				L		R		
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT				L		R
v (vph)	250	0				105		416
C (m) (vph)	687	1031				209		561
v/c	0.36	0.00				0.50		0.74
95% queue length	1.67	0.00				2.53		6.37
Control Delay	13.2	8.5				38.4		27.6
LOS	B	A				E		D
Approach Delay	-	-				29.8		
Approach LOS	--	--				D		

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Version 4.1f

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	Moussa Issa			Intersection	SR 18 / Gray Byp			
Agency/Co.	DOT / RD 3			Jurisdiction	Jones			
Date Performed	7/23/2007			Analysis Year	2029			
Analysis Time Period	AFTERNOON PM							
Project Description STP-004-2(31) PI # 322540								
East/West Street: SR 18				North/South Street: Gray Bypass				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	375	750	0	0	420	95		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	416	833	0	0	466	105		
Percent Heavy Vehicles	11	--	--	0	--	--		
Median Type	Two Way Left Turn Lane							
RT Channelized			0				0	
Lanes	1	2	0	0	2	1		
Configuration	L	T	TR	LT	T	R		
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	75	0	255		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	0	0	0	83	0	283		
Percent Heavy Vehicles	0	0	0	11	0	11		
Percent Grade (%)	0			-2				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				1	
Lanes	0	0	0	1	0	1		
Configuration				L		R		
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT				L		R
v (vph)	416	0				83		283
C (m) (vph)	938	809				101		742
v/c	0.44	0.00				0.82		0.38
95% queue length	2.31	0.00				4.57		1.79
Control Delay	11.9	9.4				122.2		12.8
LOS	B	A				F		B
Approach Delay	--	--				37.6		
Approach LOS	--	--				E		

SR 22 - SR 11 - SR 18 / US 129
as major street direction.

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	Moussa Issa			Intersection	SR 11-18-22-US 129 / Gray Byp			
Agency/Co.	DOT / RD 3			Jurisdiction	Jones			
Date Performed	7/23/2007			Analysis Year	2029			
Analysis Time Period	Morning AM							
Project Description STP-004-2(31) PI # 322540								
East/West Street: SR 22-11-18 / US 129				North/South Street: Gray Pypass				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	550	1375	0	0	1675	125		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	611	1527	0	0	1861	138		
Proportion of heavy vehicles, P _{HV}	11	-	-	0	-	-		
Median type	Two Way Left Turn Lane							
RT Channelized?			0				0	
Lanes	1	2	0	0	2	1		
Configuration	L	T			T	R		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	0	0	0	200	0	925		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	0	0	222	0	1027		
Proportion of heavy vehicles, P _{HV}	0	0	0	11	0	11		
Percent grade (%)	0			1				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
Lanes	0	0	0	1	0	1		
Configuration				L		R		
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
Volume, v (vph)	611					222		1027
Capacity, c _m (vph)	251							252
v/c ratio	2.43							4.08
Queue length (95%)	49.62							100.70

for 2 lanes

Control Delay (s/veh)	688.2							1422
LOS	F							F
Approach delay (s/veh)	--	--						
Approach LOS	--	--						

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TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	Moussa Issa				Intersection	SR 11-18-22-US 129 / Gray Byp		
Agency/Co.	DOT / RD 3				Jurisdiction	Jones		
Date Performed	7/20/2007				Analysis Year	2029		
Analysis Time Period	Afternoon PM							
Project Description STP-004-2(31) PI # 322540								
East/West Street: SR 22- SR 11 -SR 18/ US 129					North/South Street: Gray Bypass			
Intersection Orientation: East-West					Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	925	1675	0	0	1375	200		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	1027	1861	0	0	1527	222		
Proportion of heavy vehicles, P _{HV}	11	-	-	0	-	-		
Median type	Two Way Left Turn Lane							
RT Channelized?			0				0	
Lanes	1	2	0	0	2	1		
Configuration	L	T			T	R		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	0	0	0	125	0	550		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	0	0	138	0	611		
Proportion of heavy vehicles, P _{HV}	0	0	0	11	0	11		
Percent grade (%)	0			-1				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
Lanes	0	0	0	1	0	1		
Configuration				L		R		
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
Volume, v (vph)	1027					138		611
Capacity, c _m (vph)	318							327
v/c ratio	3.23							1.87
Queue length (95%)	92.78							41.08

Control Delay (s/veh)	1036							429.2
LOS	F							F
Approach delay (s/veh)	--	--						
Approach LOS	--	--						

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TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	Moussa Issa			Intersection	Green Settlement Road			
Agency/Co.	DOT/ RD 3			Jurisdiction	Jones			
Date Performed	7/23/2007			Analysis Year	2029			
Analysis Time Period	Morning AM							
Project Description STP-004-2(31) PI # 322540								
East/West Street: Green Settlement				North/South Street: Gray Bypass				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	65	440	10	10	660	15		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	72	488	11	11	733	16		
Percent Heavy Vehicles	11	--	--	11	--	--		
Median Type	Two Way Left Turn Lane							
RT Channelized			0			0		
Lanes	1	2	0	1	2	0		
Configuration	L	T	TR	L	T	TR		
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	10	70	10	35	160	155		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	11	77	11	38	177	172		
Percent Heavy Vehicles	11	11	11	11	11	11		
Percent Grade (%)	3			-3				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	1		
Configuration		LTR		LT		R		
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LT	R	
v (vph)	72	11	99			215	172	
C (m) (vph)	799	1001	240			279	599	
v/c	0.09	0.01	0.41			0.77	0.29	
95% queue length	0.30	0.03	1.90			5.83	1.18	
Control Delay	10.0	8.6	30.1			50.8	13.4	
LOS	A	A	D			F	B	
Approach Delay	--	--	30.1			34.2		
Approach LOS	--	--	D			D		

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TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	Moussa Issa				Intersection	Green Settlement Road		
Agency/Co.	DOT/ RD 3				Jurisdiction	Jones		
Date Performed	7/23/2007				Analysis Year	2029		
Analysis Time Period	PM AFTERNOON							
Project Description STP-004-2(31) PI # 322540								
East/West Street: Green Settlement					North/South Street: Gray Bypass			
Intersection Orientation: North-South					Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments								
Major Street		Northbound			Southbound			
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	155	660	10	10	440	35		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	172	733	11	11	488	38		
Percent Heavy Vehicles	11	--	--	11	--	--		
Median Type	Two Way Left Turn Lane							
RT Channelized			0				0	
Lanes	1	2	0	1	2	0		
Configuration	L	T	TR	L	T	TR		
Upstream Signal		0			0			
Minor Street		Westbound			Eastbound			
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	10	160	10	15	70	65		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	11	177	11	16	77	72		
Percent Heavy Vehicles	11	11	11	11	11	11		
Percent Grade (%)	3			-3				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	1		
Configuration		LTR		LT		R		
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LT		R
v (vph)	172	11	199			93		72
C (m) (vph)	977	803	191			121		709
v/c	0.18	0.01	1.04			0.77		0.10
95% queue length	0.64	0.04	9.15			4.41		0.34
Control Delay	9.5	9.5	127.7			96.7		10.7
LOS	A	A	F			F		B
Approach Delay	--	--	127.7			59.2		
Approach LOS	--	--	F			F		

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TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	Moussa Issa				Intersection	Gray Bypass at SR 22		
Agency/Co.	DOT / RD 3				Jurisdiction	Jones		
Date Performed	7/24/2007				Analysis Year	2029		
Analysis Time Period	Morning AM							
Project Description STP-004-2(31) PI # 322540								
East/West Street: SR 22					North/South Street: Gray Bypass			
Intersection Orientation: North-South					Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	310	0	50	0	0	0		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	344	0	55	0	0	0		
Percent Heavy Vehicles	11	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	0	1	0	0	0		
Configuration	L		R					
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	40	595	0	0	695	380		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	44	661	0	0	772	422		
Percent Heavy Vehicles	11	11	0	0	11	11		
Percent Grade (%)	2							
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	1		
Configuration	LT				T	R		
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT				T	R
v (vph)	344		705				772	422
C (m) (vph)	1566		0				260	1059
v/c	0.22						2.97	0.40
95% queue length	0.84						68.24	1.94
Control Delay	7.9						925.4	10.6
LOS	A		F				F	B
Approach Delay	--	--					602.1	
Approach LOS	--	--					F	

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	Moussa Issa			Intersection	Gray Bypass at SR 22			
Agency/Co.	DOT / RD 3			Jurisdiction	Jones			
Date Performed	7/24/2007			Analysis Year	2029			
Analysis Time Period	Afternoon PM							
Project Description STP-004-2(31) PI # 322540								
East/West Street: SR 22				North/South Street: Gray Bypass				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	380	0	40	0	0	0		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	422	0	44	0	0	0		
Percent Heavy Vehicles	11	-	-	0	-	-		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	0	1	0	0	0	0	
Configuration	L		R					
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	50	695	0	0	565	310		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	55	772	0	0	627	344		
Percent Heavy Vehicles	11	11	0	0	11	11		
Percent Grade (%)	2			-2				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	1	0	0	1	1		
Configuration	LT				T	R		
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		LT				T	R
v (vph)	422		827				627	344
C (m) (vph)	1566		0				200	1059
v/c	0.27						3.13	0.32
95% queue length	1.10						57.47	1.42
Control Delay	8.1						1009	10.0
LOS	A		F				F	B
Approach Delay	--	--					655.4	
Approach LOS	--	--					F	

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	Moussa Issa			Intersection	Gray Bypass at SR 44 & US 129		
Agency/Co.	DOT / RD 3			Jurisdiction	Jones		
Date Performed	7/23/2007			Analysis Year	2029		
Analysis Time Period	Morning AM						
Project Description STP-004-2(31)							
East/West Street: SR 44 / US 129				North/South Street: Gray Bypass			
Intersection Orientation: North-South				Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments							
Major Street	Northbound			Southbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume	190	310	15	20	370	30	
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR	211	344	16	22	411	33	
Percent Heavy Vehicles	11	-	-	0	-	-	
Median Type	Two Way Left Turn Lane						
RT Channelized			0			0	
Lanes	1	2	0	1	2	0	
Configuration	L	T	TR	L	T	TR	
Upstream Signal		0			0		
Minor Street	Westbound			Eastbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume	15	330	10	40	510	300	
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR	16	366	11	44	566	333	
Percent Heavy Vehicles	11	11	11	11	11	11	
Percent Grade (%)	2			-2			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	1	0	0	1	1	
Configuration		LTR		LT		R	
Delay, Queue Length, and Level of Service							
Approach	NB	SB	Westbound			Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration	L	L	LTR			LT	R
v (vph)	211	22	393			610	333
C (m) (vph)	1051	1210	0			0	755
v/c	0.20	0.02					0.44
95% queue length	0.75	0.06					2.27
Control Delay	9.3	8.0					13.5
LOS	A	A	F			F	B
Approach Delay	-	-					
Approach LOS	-	-					

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TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	Moussa Issa				Intersection	Gray Bypass at SR 44 & US 129		
Agency/Co.	DOT / RD 3				Jurisdiction	Jones		
Date Performed	7/23/2007				Analysis Year	2029		
Analysis Time Period	AFTERNOON PM							
Project Description STP-004-2(31)								
East/West Street: SR 44 / US 129					North/South Street: Gray Bypass			
Intersection Orientation: North-South					Study Period (hrs): 0.25			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	300	370	15	10	310	40		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	333	411	16	11	344	44		
Percent Heavy Vehicles	11	-	-	11	-	-		
Median Type	Two Way Left Turn Lane							
RT Channelized			0				0	
Lanes	1	2	0	1	2	0		
Configuration	L	T	TR	L	T	TR		
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	15	510	20	30	330	190		
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate, HFR	16	566	22	33	366	211		
Percent Heavy Vehicles	11	11	11	11	11	11		
Percent Grade (%)	2			-2				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	1		
Configuration		LTR		LT		R		
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LT	R	
v (vph)	333	11	604			399	211	
C (m) (vph)	1105	1067	0			0	788	
v/c	0.30	0.01					0.27	
95% queue length	1.28	0.03					1.06	
Control Delay	9.7	8.4					11.2	
LOS	A	A	F			F	B	
Approach Delay	-	-						
Approach LOS	-	-						

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FLEXIBLE PAVEMENT DESIGN ANALYSIS

Project: STP-004-2 (31)

County: JONES

P.I. no.: 322540

Description: NORTH GRAY BYPASS

Traffic Data (NOTE: AADTs are one-way)

24-hour Truck Percentage: 14.00%

AADT initial year of design period: 4,500 vpd (2009)

AADT final year of design period: 7,400 vpd (2029)

Mean AADT (one-way): 5,950 vpd

Design Loading

Mean AADT	*	LDF	*	Trucks	*	18-K ESAL	=	Total Daily Loads
5,950		1.00		0.140		1.06		884

Total predicted design period loading = $884 * 20 * 365 = 6,453,200$

Design Data

Terminal Serviceability Index: 2.50

Soil Support: 2.50

Regional Factor: 1.60

PROPOSED FLEXIBLE PAVEMENT STRUCTURE

Material	Inches	Thickness (mm)	Structural Coefficient	Structural Value
9.5 mm Superpave	1.25	(32)	0.44	0.55
19 mm Superpave	2.00	(51)	0.44	0.88
25 mm Superpave	1.25	(32)	0.44	0.55
	4.75	(121)	0.30	1.43
Graded Aggregate Base	12.00	(305)	0.16	1.92

Required SN = 5.88

Proposed SN = 5.33

>>> Proposed pavement is 9.4% Underdesign <<<

Remarks: SR 44 / US 129 - Full Depth 9.5 mm Type II

Prepared by MOUSSA ISSA August 2, 2007
Date

Recommended State Road Design Engineer Date

Approved State Pavement Engineer Date

FLEXIBLE PAVEMENT DESIGN ANALYSIS

Project: STP-004-2 (31)

County: JONES

P.I. no.: 322540

Description: NORTH GRAY BYPASS

Traffic Data (NOTE: AADTs are one-way)

24-hour Truck Percentage: 14.00%

AADT initial year of design period: 2,500 vpd (2009)

AADT final year of design period: 4,050 vpd (2029)

Mean AADT (one-way): 3,275 vpd

Design Loading

Mean AADT	LDF	Trucks	18-K ESAL	Total Daily Loads
3,275 *	1.00 *	0.140 *	1.06	= 487

Total predicted design period loading = $487 * 20 * 365 = 3,555,100$

Design Data

Terminal Serviceability Index: 2.50

Soil Support: 2.50

Regional Factor: 1.60

PROPOSED FLEXIBLE PAVEMENT STRUCTURE

Material	Thickness Inches	(mm)	Structural Coefficient	Structural Value
9.5 mm Superpave	1.25	(32)	0.44	0.55
19 mm Superpave	2.00	(51)	0.44	0.88
25 mm Superpave	1.25	(32)	0.44	0.55
	3.75	(95)	0.30	1.13
Graded Aggregate Base	12.00	(305)	0.16	1.92

Required SN = 5.43

Proposed SN = 5.03

>>> Proposed pavement is 7.3% Underdesign <<<

Remarks: SR 18 RELOCATION FULL DEPTH- Type II 9.5 mm SP

Prepared by MOUSSA ISSA August 2, 2007
Date

Recommended _____
State Road Design Engineer Date

Approved _____
State Pavement Engineer Date

FLEXIBLE PAVEMENT DESIGN ANALYSIS

Preliminary
(no soil survey info)

Project: STP-004-2 (31)
 P.I. no.: 322540
 Description: NORTH GRAY BYPASS

County: JONES

Traffic Data (NOTE: AADTs are one-way)

24-hour Truck Percentage: ~~14.00%~~
 AADT initial year of design period: 5,400 vpd (2009)
 AADT final year of design period: 9,050 vpd (2029)
 Mean AADT (one-way): 7,225 vpd

Design Loading

Mean AADT * LDF * Trucks * 18-K ESAL = Total Daily Loads
 7,225 * 0.80 * 0.140 * 1.06 = 859

4-LANE URBAN FREEWAY (MAX)

HEAVY STATE ROUTE

Total predicted design period loading = 859 * 20 * 365 = 6,270,700

Design Data

Terminal Serviceability Index: 2.50
 Soil Support: 2.50 → default value < Jones County
 Regional Factor: 1.60

PROPOSED FLEXIBLE PAVEMENT STRUCTURE

Material	Thickness Inches	(mm)	Structural Coefficient	Structural Value
12.5 mm Superpave	1.50	(38)	0.44	0.66
19 mm Superpave	2.00	(51)	0.44	0.88
25 mm Superpave	1.00	(25)	0.44	0.44
	5.00	(127)	0.30	1.50
Graded Aggregate Base	12.00	(305)	0.16	1.92

Required SN = 5.85

Proposed SN = 5.40

>>> Proposed pavement is 7.8% Underdesign <<<

Remarks: BYPASS FULL DEPTH

Prepared by MOUSSA ISSA August 2, 2007
Date

Recommended _____
Date

State Road Design Engineer

Approved _____
Date

State Pavement Engineer

Preliminary Right of Way Cost Estimate


Harvey P. Booker
 Right of Way Administrator
 By Rick Ford

Date: January 16, 2002
Project: SFP-004-2 (31)-Jones, Alt. A4
Existing/Required R/W: Varies/Varies
Project Termini: North Gray Bypass
Project Description: North Gray Bypass New Location

P.I. Number: 322540
No. Parcels: 45

Land:	Residential / Agricultural 200 acres x \$ 2,500 / acre =	\$ 500,000	
Improvements:	5 houses, signs, landscaping, and misc. site improvements	\$ 425,000	
Relocation:	Residential 5 Parcels	\$ 120,000	
Damages:	None	\$ 0	\$ 1,045,000
	Net Cost	\$ 1,045,000	
	Scheduling Contingency 55%	\$ 470,250	
	Adm. / Court Cost 60%	\$ 909,150	
	Inflation Factor 40%	\$ 969,760	
		\$ 3,394,160	

Total Cost \$ 3,394,200

Department of Transportation State of Georgia

----- Interdepartmental Correspondence

FILE	R/W Cost Estimate	OFFICE	Atlanta
	<i>HAB/RCF</i>	DATE	January 16, 2002
FROM	Harvey P. Booker, Right of Way Administrator		
TO	Phillip M. Allen, State Environmental/Location Engineer		

ATTN: Fred Matheny

SUBJECT **Preliminary Right of Way Cost Estimate**
Project: STP-004-2 (31) Jones
P.I. No.: 322540
Description: North Gray Bypass

As per your request, attached is the approved Preliminary Right of Way Cost Estimate on the above referenced project.

Please note the area of Required Right of Way was furnished with your request and is very much appreciated.

If you have any questions, please contact Rick Ford at the West Annex Right of Way Office at (404) 463-2575.

DPM:RCF:rf
Attachments

c: David Mulling, Engineering Services
Joe Pugh, R/W
File

Value Engineering Process

VALUE ENGINEERING PROCESS

Introduction

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE Study during the period of November 6 – November. 9, 2007 in Atlanta, Georgia, for the Georgia Department of Transportation.

The Value Engineering Study team and its leadership were provided by PBS&J. This VE Team consisted of the following:

Charles R. McDuff, P.E., CVS-Life	Certified Value Specialist
Les M. Thomas, P.E., CVS-Life	Certified Value Specialist
Luke Clarke, P.E.	Highway Design Engineer
Ron Hale, P.E.	Highway Construction Specialist
Randy S. Thomas, AVS	Assistant Team Leader
Ramesh Kalvakaalva, P.E.	Bridge Design

The Value Engineering Team followed the Seven Step Value Engineering job plan as promulgated by SAVE International. This Seven Step job plan includes the following:

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

- The important functions of the project were identified as follows:
 - **Project Objective/Goals**
 - **Bypass the City of Gray**
 - **Expedite transient traffic**
 - **Separate Traffic**
 - **Provide for future growth**
 - **Project Basic Functions**
 - **Construct new Traffic Lanes**
 - **Construction new Turn Lanes**
 - **Provide Separation of Traffic**
 - **Provide “U” Turn Lanes**
 - **Provide Traffic Controls**
- **Speculation Phase** - The VE team performed a brainstorming session to identify ideas that might help meet the project objectives:
 - Improve Level of Service
 - Improve Safety
 - Increase Capacity
 - Reduce construction and life cycle costs
 - Reduce the time of construction

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

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

- Following that selection process, the VE Team used the following values as measures of whether or not an alternative had enough merit to be carried forward in the VE process:
 - Construction Cost Savings
 - Maintainability
 - Ability to Implement the Idea
 - General Acceptability of the Alternatives
 - Constructability

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

- **Development Phase** – During this phase, the VE Team developed each of the selected design alternatives. This effort included a detailed explanation of the idea with sketches as appropriate to clarify the idea from the original concept, advantages and disadvantages, a technical explanation and an estimation of the cost and resultant savings if implemented. (see the tabbed section – Study Results)
- **Recommendation Phase** – During this phase the VE Team reviews the alternative ideas to confirm which ones are appropriate for the project, have an opportunity for success and which will improve the value of the project if implemented.
- **Presentation Phase** – As noted earlier, the team made an informal “out-briefing” on the last day of the workshop, designed to inform the Owners and the Designers of the initial findings of the VE Study. This written report is intended to formalize those findings.

The following **Function – Worth - Cost Analysis**, was utilized to focus the team and stimulate brainstorming; a copy of the **Attendance Sheets** is also attached so that the reader can be informed about who participated in the Study proceedings.



FUNCTION ANALYSIS AND COST-WORTH

SHEET NO.: 1 of 2

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 Project: Project - STP-004-2(31), P.I. No. - 32540, North Gray Bypass
 Jones County

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	OVERALL PROJECT	Increase	Traffic Capacity	B	26,367	20,000	C/W = 1.32
		Facilitate	Access	B			
		Enhance	Safety	S			
3	BASE AND PAVING	Create	Lanes	B	8,679	8,679	C/W = 1.00
		Increase	Capacity	B			
		Enhance	Safety	RS			
4	GRADING	Support	Road	S	2,500	2,000	C/W = 1.25
		Avoid	Flooding	RS			
		Connect	Points	B			
5	BRIDGE	Cross	River	B	1,835	1,500	C/W = 1.22

Function defined as: Action Verb
 Measurable Noun

Kind: B = Basic
 S = Secondary
 RS = Required Secondary

HO = Higher Order
 LO = Lower Order

Cost/Worth Ratio =
 (Total Cost ÷ Basic Worth)



FUNCTION ANALYSIS AND COST-WORTH

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 Project: Project – STP-004-2(31), P.I. No. – 32540, North Gray Bypass
 Jones County

SHEET NO.: 2 of 2

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
6	CLEARING & GRUBBING	Remove	Vegetation	S	1,200	800	C/W = 1.50
7	EROSION CONTROL	Stabilize	Earthwork	S	955	955	C/W = 1.00
		Protect	Environment	RS			
8	DRAINAGE (DR)	Convey	Storm Water	B	804	804	C/W = 1.00
		Facilitate	Utilities	S			
12	LANDSCAPING	Stabilize	Earthwork	S	521	521	CW = 1.00
10	TRAFFIC CONTROL	Facilitate	Movement	S	262	262	C/W = 1.00
		Enhance	Safety	RS			
11	SIGNING & MARKING	Enhance	Directions	S	126	126	CW = 1.00
		Channelize	Traffic	S			
9	GUARDRAIL & ANCHORING SYSTEMS	Enhance	Safety	B	122	122	C/W = 1.00
		Reduce	Earthwork	S			

Function defined as: Action Verb
 Measurable Noun

Kind: B = Basic
 S = Secondary
 RS = Required Secondary

HO = Higher Order
 LO = Lower Order

Cost/Worth Ratio =
 (Total Cost + Basic Worth)

DESIGNER PRESENTATION MEETING PARTICIPANTS



Geogia Department of Transportation		November 6, 2007		
STP-004-2(31) - P.I. No. 322540 County: Jones				
NAME	ORGANIZATION & TITLE	E-MAIL	PHONE	
Lisa Myers	 GDOT - Engineering Services	lisa.myers@dot.state.ga.us	404-651-7468	
Ron Wishon	 GDOT - Engineering Services	ron.wishon@dot.state.us.ga.us	(404)651-7470	
Brian Summers	 GDOT - Engineering Services	brian.summers@dot.state.us.ga.us		
Kevin Ellis	 GDOT -Macon District Office	kevin.ellis@dot.state.ga.us	478-757-2881	
Fletcher Miller	 GDOT-Road Design	fletcher.miller@dot.state.ga.us	404-656-5383	
Paul DeNard	 GDOT - Traffic Safety & Design	paul.denard@dot.state.ga.us	404-635-8278	
Cynthia Burney	 GDOT-TO/TMC	cynthia.burney@dot.state.ga.us	404-635-8149	
Bruce Hart	 OEL	bruce.hart@dot.state.ga.us	404-699-6883	
Moussa Issa	 GDOT-Road Design	moussa.issa@dot.state.ga.us	404-656-5383	
Brent A. Story	 GDOT-Road Design	brent.story@dot.state.ga.us	404-656-5386	
Lyn Clements	 GDOT-Bridge	lyn.clements@dot.state.ga.us	404-656-5289	
Les Thomas	 PBS&J	lmthomas@pbsi.com	678-677-6420	
Luke Clarke	 PBS&J - Highway/Roadway Design	lwcclarke@pbsi.com	205-969-3776	
Randy Thomas	 PBS&J	rsthomas@pbsi.com	770-883-1545	
Ron Hale	 PBS&J	rdhale@pbsi.com	770-933-0280	
Ramesh Kalivakaalva	 Civil Services, Inc.	rameshk@civilservicesinc.com	404-685-8001	

VE TEAM PRESENTATION MEETING PARTICIPANTS



Georgia Department of Transportation STP-004-231) - P.I. No. 322540 County: Jones		November 9, 2007		
NAME	ORGANIZATION & TITLE	E-MAIL	PHONE	
Lisa Myers	 GDOT - Engineering Services	lisa.myers@dot.state.ga.us	404-651-7468	
Ron Wishon	 GDOT - Engineering Services	ron.wishon@dot.state.us.ga.us	(404)651-7470	
Brian Summers	 GDOT - Engineering Services	brian.summers@dot.state.us.ga.us		
Fletcher Miller	 GDOT-Road Design	fletcher.miller@dot.state.ga.us	404-656-5383	
Moussa Issa	 GDOT-Road Design	moussa.issa@dot.state.ga.us	404-656-5383	
Brent A. Story	 GDOT-Road Design	brent.story@dot.state.ga.us	404-656-5386	
Chandria Brown	 GDOT-Road Design	chandria.brown@dot.state.ga.us	404-656-5383	
Jason McCook	 GDOT-Road Design	jason.mccook@dot.state.ga.us	404-657-8249	
Charles McDuff	 Charles McDuff	cmcduff@pbsj.com	919-431-5300	
Luke Clarke	 PBS&J - Highway/Roadway Design	lwclarke@pbsj.com	205-969-3776	
Ron Hale	 PBS&J	rdhale@pbsj.com	770-933-0280	
Ramesh Kalvakaalva	 Civil Services, Inc.	rameshk@civilservicesinc.com	404-685-8001	

CREATIVE IDEA LISTING & EVALUATION



PROJECT: **Georgia Department of Transportation**
STP-004-2(31) – P.I. No. 322540
North Gray Bypass – Jones County

SHEET NO.: **1 of 2**

NO.	IDEA DESCRIPTION	RATING
	Roadway (RD)	
RD-1	Use 6' shoulders in lieu of 6' – 6"	5
RD-2	Reduce median width. Use Positive barrier	5
RD-3	Use 11' travel lanes	2
RD-4	Utilize Wiedner Road in lieu of new road	1
RD-5	Relocate SR 11 connector to south of bypass	4
RD-6	Close CR 25/ Old Highway 18 – eliminate intersection	DS
RD-7	Utilize Green Settlement Road in lieu of new alignment	2
RD-8	Reduce Oliver Green (CR 40) Realignment	2
RD-9	Realign Intersection @ SR 22	DS
RD-10	Reduce R/W acquisition to the minimum required for construction	5
RD-11	Consider locations for right turn lanes and eyebrows	DS
RD-12	Utilize concrete pavement in lieu of asphalt pavement	2
RD-13	Bifurcate roadway to reduce earthwork	4
RD-14	Steepen fill slopes	2
RD-15	Flatten fill slopes	2
RD-16	Steepen grade at railroad bridge approach to reduce fill	5
RD-17	Reduce median width to 24' raised	4
RD-18	If "waste" job, use more earth on site	1
RD-19	Utilize multiple strategies to reduce borrow	4
RD-20	Align drainage – Station 263+50	DS
RD-21	Utilize precast in lieu of cast in place culvert	2
RD-22	Minimize clearing and grubbing	2
RD-23	Use reinforced earth walls in lieu of benched embankment	2

Rating: 1→2 = Generally not acceptable; 3 = Little Opportunity for Positive Change; 4→5 = Most likely to be Developed;
 DS = Design Suggestion; ABD = Already Being Done

