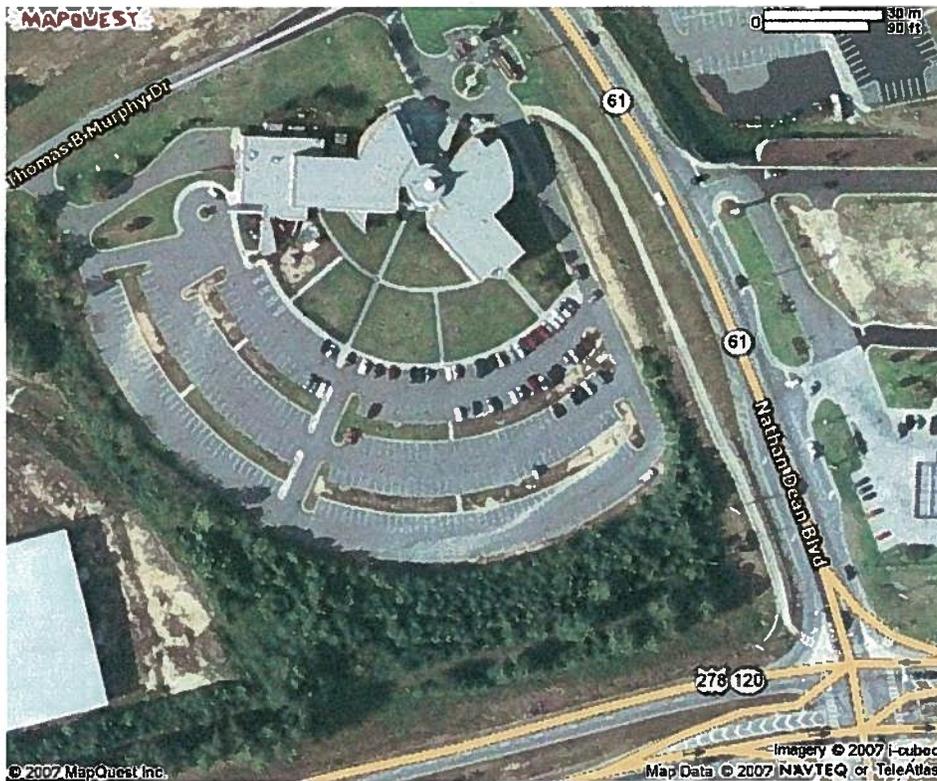


Value Engineering Study Report

*Project –NH-018-1(59)
P.I. No. – 621570*

*Widening and Reconstruction of SR 61
From SR 120 Connector
To US 278 / SR 120 / SR 6*

Paulding County



Value Management Team



Design Team



November 2007



November 29, 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 – NH-018-1(59)
Paulding County
P.I. No. – 621570
Widening and Reconstruction of SR 61
PBS&J Project Task Order No. 23

Dear Ms. Myers:

Please find enclosed four (4) hard copies and a CD of our final Value Engineering Report for the Widening and Reconstruction of SR 61 from SR 120 Connector to US 278/SR 120/ SR 6 in Paulding County, as referenced above.

This Value Engineering Study, which was performed during the period November 13 through November 16, 2007, identified **22 Alternative Ideas**, of which **12 are recommended for implementation**. The VE Team also identified **4 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 – NH-018-1(59)

P.I. No. – 621570

***Widening and Reconstruction of SR 61
From SR 120 Connector to US 278/SR 120/SR 6
Paulding County***

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- Introduction
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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 13 – November 16, 2007 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study was Project – NH-018-1(59), Paulding County, P.I. No. – 621570 Widening and Reconstruction of SR 61. Also included in the study is the widening of the existing bridge over the Silver Comet Trail. The concept designs for the project have been prepared by Georgia Department of Transportation. At the time of the workshop, the plans had advanced to the concept design level.

PROJECT DESCRIPTION

The project is located on SR 62 from SR 120 Connector/Hiram Sudie Road to just south of CR 467/Dallas Nebo Road. The length of the project is 4.1 miles.

The widening and reconstruction of SR 61 is needed to provide additional capacity required for future growth in the area. SR 61 is the only continuous north-south corridor in Paulding County linking Dallas to both Cartersville (north) and I-20 (south). The purpose of this widening project is to ease traffic congestion and increase safety along this busy roadway.

The current roadway is a 2-lane/3-lane section with 12' lanes and 4' grassed shoulders. In the proposed project's approved concept, a typical section is a 4-lane section with 12' lanes, 10' outside shoulders with 4' paved, and a 20' raised median. The design speed is 45 mph throughout the corridor. The double 5'x5' culvert at Mill Creek and the two single 4'x4' box culverts are to be extended. The existing bridge structure over the Silver Comet Trail will be widened from 38' to 92'.

The project estimated construction cost is \$33,083,865. The preliminary ROW acquisition cost is \$23,219,000.

This project is 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 project:

- This project is on the high priority list.
- There are no preliminary bridge plans. The bridge is to be widened but the length won't change. The bridge rating is low.
- There are no existing bike lanes.
- There are two signalized intersections existing and one more will possibly be added. The public wants a signal at the school.
- Alignment has changed on the project for environmental reasons including an existing cemetery, streams, and several historic resources.

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 **22 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 **4 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

SR 61 - NH-018-1(59) - P.I. No. 621570

Alternative Number	Description of Alternative	Initial Cost Savings
	Roadway (RD)	
RD-1	Increase the use of 11' travel lanes	\$559,413
RD-2	Reduce side street work on SR 120 connector	\$180,007
RD-3	Use 6'0" paved outside shoulders in-lieu of 6'6" paved outside shoulders	\$80,916
RD-4	Utilize a more consistent typical section throughout the project	\$63,487
RD-5	Re-align Campground School Road	DS
RD-6	Retain Dallas/Nebo Road intersection & improve it	\$293,330
RD-7	Re-align intersection at Aikin Drive	DS
RD-8	Use alternate walls in lieu of C.I.P.	\$1,000,259
RD-9	Sta. 90+00 to Sta. 125+00 : Obtain environmental permit in-lieu of realignment	5,082,800
RD-10	Eliminate Aikin Ridge and Country Square Way intersections at Sta. 140+00 to +/- Sta. 152+00	\$229,710
RD-11	Reconfigure intersection at 212+00 split intersection from 1-4 leg to 2 -2 leg	DS
RD-13	Reduce turn lane storage addition on 278	DS
	Bridge (BR)	
BR-1	Use a single span bridge structure to cross trail and future track	\$510,336
BR-2	Construct a 10'x12'x100' Box Culvert in-lieu of a new bridge	\$1,369,344
BR-3	Use a "One-Span" BEBO precast structure in-lieu of a new bridge (trail and track)	\$494,505
BR-5	Use a single span bridge structure to cross only the existing trail	\$647,245

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

SR 61 - NH-018-1(59) - P.I. No. 621570

Alternative Number	Description of Alternative	Initial Cost Savings
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Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:
RD-1

DESCRIPTION: **INCREASE THE USE OF 11' TRAVEL LANES**

SHEET NO.: 1 of 4

Original Design:

The original utilizes 12'-0" travel lanes throughout the project with the exception of the area in the vicinity of Bethany Christian Church and the cemeteries.

Alternative:

The alternative design proposes using 11'-0" throughout the majority of the project.

Opportunities:

- Reduction in pavement costs.
- Reduction in earthwork costs.
- Reduction in right of way costs.

Risks:

- Moderate increase in design effort.
- Requires an exception to GDOT policy.

Technical Discussion:

Reduction of width of travel lanes throughout the project would result in 4' of full build-up widening that would not have to be constructed, resulting in significant cost savings. Although 11' lanes would require an exception to GDOT policy, AASHTO's "Policy on Geometric Design of Highways 2004" states that 11' lanes are permissible. It also states that under interrupted-flow operating conditions at low speeds (45 mph or less), narrower lanes are normally adequate and have some advantages. (See Pages 472-473). It should also be noted that the designer currently uses 11'-0" lanes for a portion of the project to reduce potential impacts in the area of two cemeteries.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 559,413	\$	\$ 559,413
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 559,413	\$	\$ 559,413

Illustrations



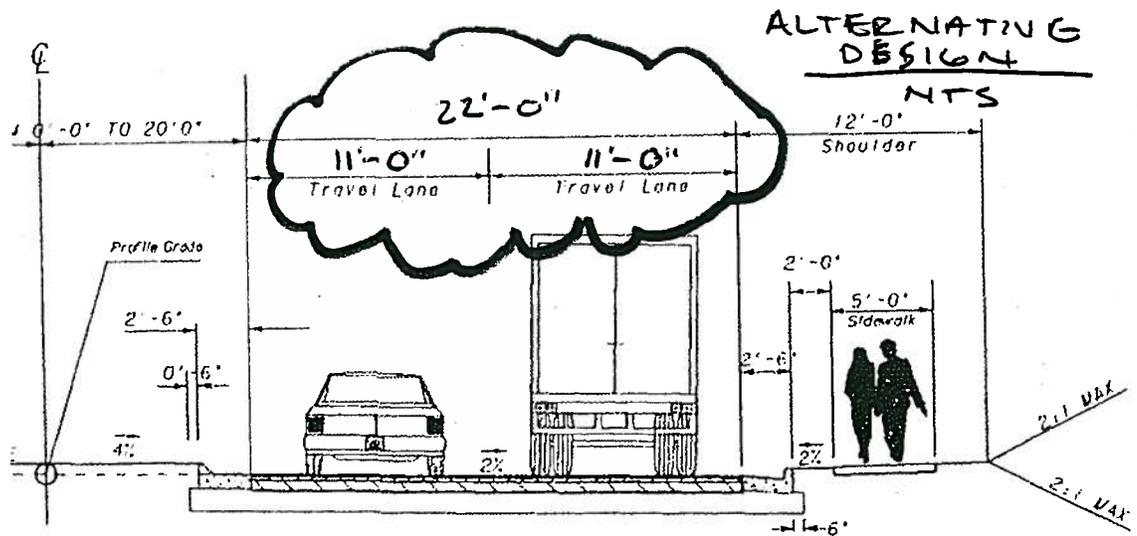
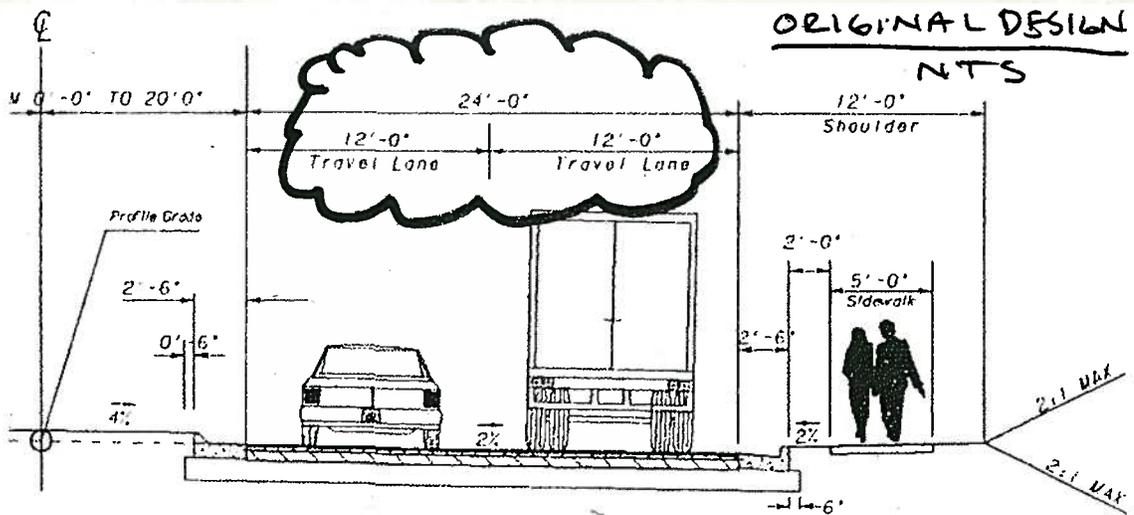
PROJECT: **Georgia Department of Transportation**
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-1

DESCRIPTION: **INCREASE THE USE OF 11' TRAVEL LANES**

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-1

DESCRIPTION: **INCREASE THE USE OF 11' TRAVEL LANES**

SHEET NO.: 3 of 4

Area of paving: Assume additional 20,000 lf x 4' = 80,000sf / (9sf/sy) => 8889 sy

Earthwork: Assume average 1.5' depth over the width of the backbone. The project appears to be in a significant borrow situation so assume saving is for both in place embankment and borrow.
(1.5' depth x 4.0' width x 20,000' / (27cy/cf) => 4444 cy

Right of way

(4' x 20,000') / (43560 sf / acre) => 1.85 a

Pro rata cost per acre- Commercial: (7.10ac / 71.1ac x \$75,000) = \$7,500

Residential: (64.0ac / 71.1 ac x \$15,000) = \$13,500

Total => \$21,000

Alternative:

Reduction in Quantity-

Earthwork: From above => 4444 cy

12" GAB- (80,000 sf) x (12"/12") x (135#/cf) / (2000#/ton) => 5400 tons

12.5 mm Superpave- (8889 sy) x (165#/sy) / (2000#/ton) => 733 tons

19.0 mm Superpave- (8889 sy) x (220#/sy) / (2000#/ton) => 978 tons

25.0 mm Superpave- (8889 sy) x (440#/sy) / (2000#/ton) => 1956 tons

Right of way: Net cost 1.85 ac x \$21,000 = \$38,850

Scheduling @ 55% = \$21,368

Court cost @ 60% = \$23,310

Inflation @ 65% = \$25,253

Total = \$108,781

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-2

DESCRIPTION: **REDUCE SIDE STREET WORK ON SR 120 CONNECTOR.**

SHEET NO.: 1 of 4

Original Design:

The plans as designed show improvements on the SR 120 Connector for approximately 1,500 LF on the east side, and 1,550 LF on the west side of the SR 61 intersection.

Alternative:

The alternative suggested is to reduce work on the SR 120 Connector alignment, making ties as close to the SR 61 intersection as is practicable.

Opportunities:

- Significant cost savings in construction
- Reduces construction time

Risks:

- Moderate design impacts
- May require less than optimal vertical side street ties

Technical Discussion:

The intent of the alternative is to reduce the scope of work shown in the plans for the SR 120 intersection and along its alignment on the east and west sides of the SR 61 intersection. Use appropriate drainage ties to existing structures. Maximize side road vertical ties if necessary. Minimize or eliminate obliteration of existing pavement to lower grade if possible. Minimize the overlay length along the SR 120 Connector alignment.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,830,458	\$	\$ 2,830,458
ALTERNATIVE	\$ 2,650,452	\$	\$ 2,650,452
SAVINGS	\$ 180,007	\$	\$ 180,007

Illustrations



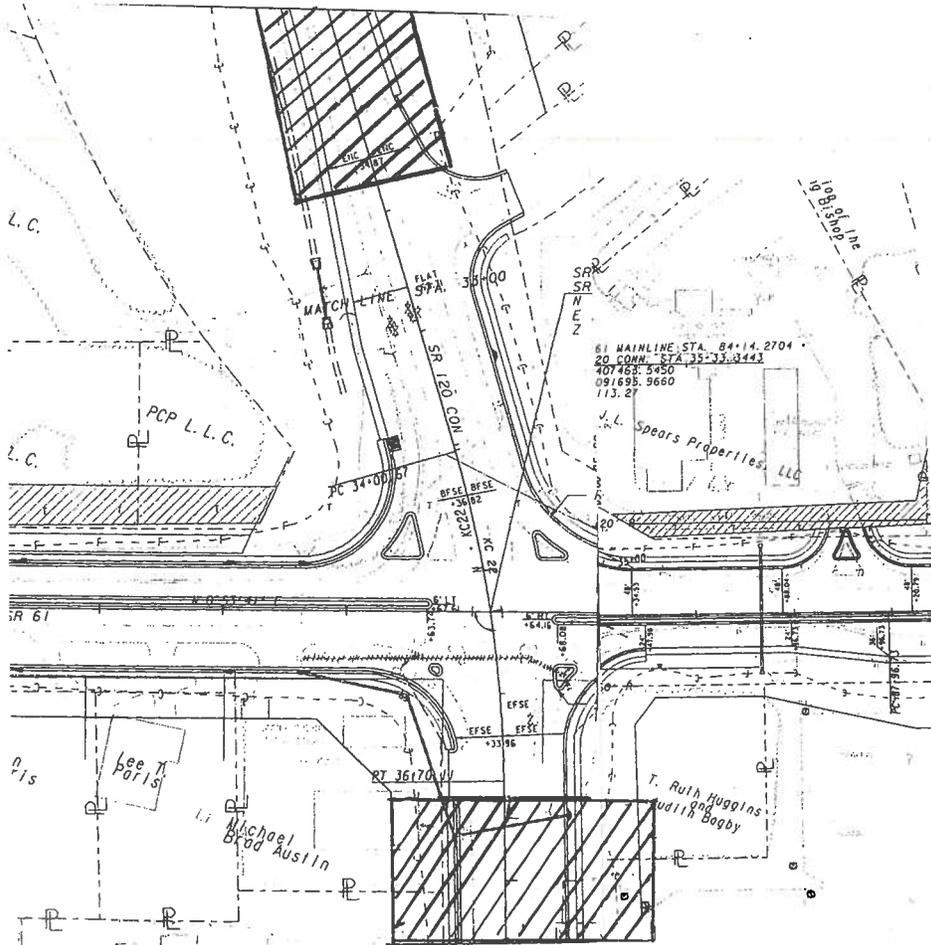
PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-2

DESCRIPTION: REDUCE SIDE STREET WORK ON SR 120 CONNECTOR.

SHEET NO.: 2 of 4



Calculations



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-2

DESCRIPTION: REDUCE SIDE STREET WORK ON SR 120 CONNECTOR.

SHEET NO.: 3 of 4

Reduce the amount of asphalt overlay on SR 120 Connector alignment near SR 61 intersection.

A. SR 120 Connector improvements- STA 53+00- STA 15+00= 3,800 LF. Reduce to 500 LF per side for overlay. 3,800 LF -1,000 LF= 2,800 LF

Average width= 60' Application Rate (Seal Asphalt)= 165lb/sy

$2,800 \text{ LF} \times 60' / 9 = 18,667 \text{ SY} \times 165 \text{ lb/sy} = 3,080,000 / 2,000 \text{ lb/ton} = 1,540 \text{ tons overlay saved.}$

$1,540 \text{ tons} \times \$66.26/\text{ton} = \$102,040 \text{ saved}$

B. Excavation:

Per profile, there is an average 7' cut from STA 37+00 to STA 47+00 along the SR 120 Connector alignment.

$7' \text{ Avg.} \times 60' \text{ Avg width} \times 1,000 \text{ LF} / 27 = 15,556 \text{ CY excavation saved.}$

Unclassified Excavation weighted avg. price = \$3.96/CY

$15,556 \text{ CY} \times \$3.96 = \$61,602 \text{ saved}$

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-3

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. Curb and gutter sections of the project have no accommodation for bicycle traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 80,916	\$	\$ 80,916
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 80,916	\$	\$ 80,916

Illustrations

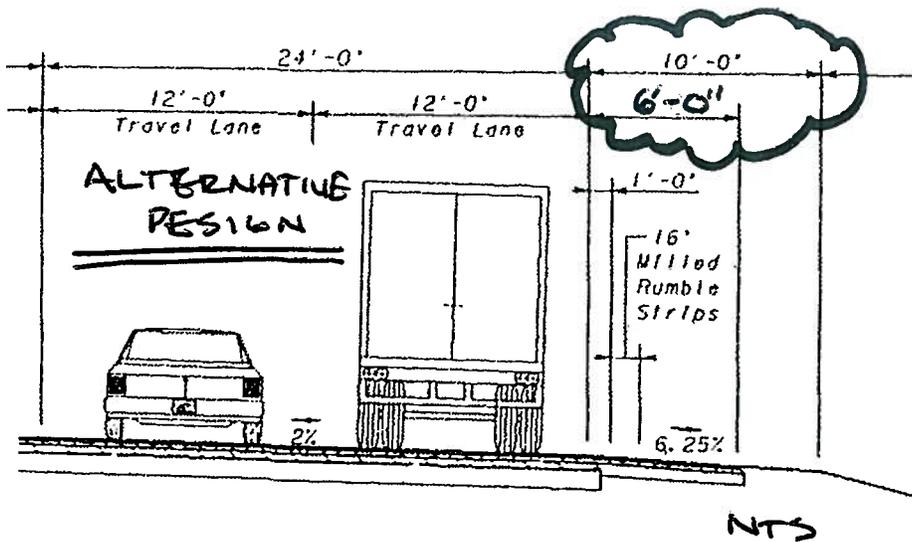
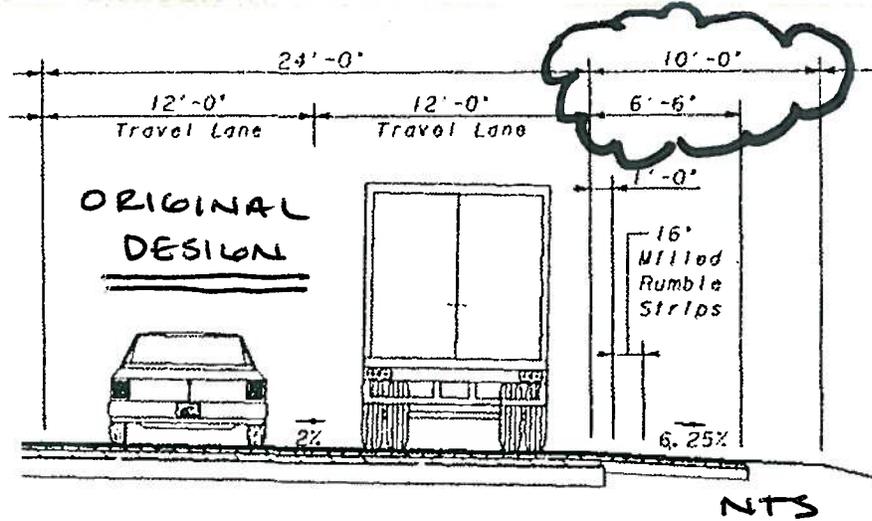


PROJECT: Georgia Department of Transportation
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-3

DESCRIPTION: USE 6'-0" PAVED OUTSIDE SHOULDERS IN LIEU OF 6'-6"
PAVED OUTSIDE SHOULDERS SHEET NO.: 2 of 4



Calculations



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-3

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

SHEET NO.: 3 of 4

2-shoulders

Station 26+50 to Station 68+50=> 4200' x 2 ea = 8400 lf
Station 89+20 to Station 110+60=> 2140' x 2 ea = 4280 lf
Station 124+85 to Station 173+65=> 4880' x 2 ea = 9760 lf
Station 178+30 to Station 236+50=> 5820' x 2 ea = 11640 lf
Dallas/Nebo road=> 1600' x 2 ea = 3200 lf
SR-120=> 2300' x 2 ea = 4600 lf
Country Square Trail 300' x 2 ea = 600 lf
Country Square Way 100' x 2 ea = 200 lf
Aiken Drive 300' x 2 ea = 600 lf
Old Villa Ricca Road 300' x 2 ea = 600 lf
Vernon Aiken Road 500' x 2 ea = 1000 lf
Hay Renfroe Road 600' x 2 ea = 1200 lf

1-shoulder

Station 85+50 to Station 89+20=> 370' x 1 ea = 370 lf
Station 110+60 to Station 124+85=> 1425' x 1 ea = 1425 lf
Station 173+65 to Station 178+30=> 465' x 1 ea = 465 lf
SR-120=> 600' x 1 ea = 600 lf

Shoulder length - 48,940 lf

Reduction in paving area: (48,940 lf x 0.5 ft) => 24,470 sf
(24,470 sf) / (9sf/sy) => 2719 sy

AFFECTED PAY ITEMS:

9.5 mm Superpave- (2719 sy X 165#/sy) / (2000#/ton) => 224 tons
19.0 mm Superpave- (2719 sy X 220#/sy) / (2000#/ton) => 299 tons
25.0 mm Superpave- (2719 sy X 440#/sy) / (2000#/ton) => 598 tons

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-4

DESCRIPTION: **UTILIZE A MORE CONSISTENT TYPICAL SECTION
 THROUGHOUT THE PROJECT**

SHEET NO.: 1 of 5

Original Design:

The original design uses a variety of typical sections, curbed with a raised median, curbed with a flush median, outside shoulders with a raised median, outside shoulder on one side with a curb on the other and a raised median, outside shoulder on one side with a curb on the other and a flush median, outside shoulders and a flush median,

Alternative:

The alternative design proposes using more consistent typical throughout the majority of the project. The VE team recommends the use of an urban typical section with curb and gutter and a 20' median (16' raised). The use of an 8 (4' raised) median in the vicinity of the cemeteries may further reduce impacts and the requirements for retaining walls.

Opportunities:

- Reduction in pavement costs.
- Reduction in earthwork costs.
- Reduction in right of way costs.
- Simplify construction

Risks:

- Significant increase in design effort.
- Increase in drainage and curb and gutter costs

Technical Discussion:

The use of an urban typical section with curb and gutter and a raised median throughout the project should provide safety, operational, environmental and economic advantages. The primary advantages will be a reduction in right of way impacts, more consistent access management and a roadway that is less likely to violate "driver expectation" therefore improving safety and operations. The GDOT design team stated that they anticipated having to remove significant portions of the existing roadway with this being the case a curb and gutter roadway could be lowered 1'-3' more than proposed and reduce what appears to be a significant borrow situation. Additional opportunities for cost savings also exist. It may be possible to reduce the required right of way in the roadway relocation from station 160+00 to station 175+00 and retaining walls in the area of the cemetery may potentially be shortened. This estimate does not take into account any damages or displacements that may be reduced in addition to any reduction in wetland impacts..

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,633,289	\$	\$ 2,633,289
ALTERNATIVE	\$ 2,569,802	\$	\$ 2,569,802
SAVINGS	\$ 63,487	\$	\$ 63,487

PROJECT: Georgia Department of Transportation
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

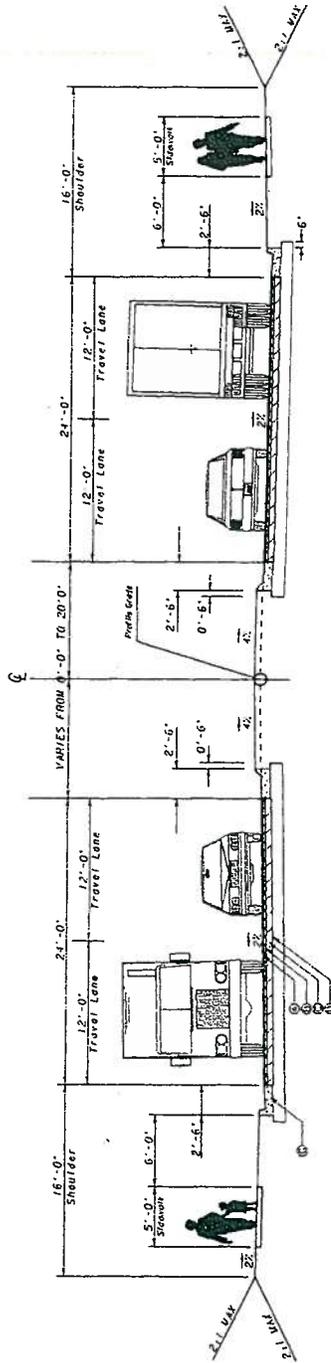
ALTERNATIVE NO.:

RD-4

DESCRIPTION: UTILIZE A MORE CONSISTENT TYPICAL SECTION
THROUGHOUT TO PROJECT

SHEET NO.: 2 of 5

S.R. 61 - Villa Rica Highway



Urban 4-Lane 20' Raised Median (16' Shoulder)

ALTERNATIVE
DESIGN
NTS

Calculations



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-4

DESCRIPTION: UTILIZE A MORE CONSISTENT TYPICAL SECTION
THROUGHOUT TO PROJECT

SHEET NO.: 3 of 5

2-shoulders

Station 26+50 to Station 68+50=> 4200' x 2 ea = 8400 lf
Station 89+20 to Station 110+60=> 2140' x 2 ea = 4280 lf
Station 124+85 to Station 173+65=> 4880' x 2 ea = 9760 lf
Station 178+30 to Station 236+50=> 5820' x 2 ea = 11640 lf
Dallas/Nebo road=> 1600' x 2 ea = 3200 lf
SR-120=> 2300' x 2 ea = 4600 lf
Country Square Trail 300' x 2 ea = 600 lf
Country Square Way 100' x 2 ea = 200 lf
Aiken Drive 300' x 2 ea = 600 lf
Old Villa Ricca Road 300' x 2 ea = 600 lf
Vernon Aiken Road 500' x 2 ea = 1000 lf
Hay Renfroe Road 600' x 2 ea = 1200 lf

1-shoulder

Station 85+50 to Station 89+20=> 370' x 1 ea = 370 lf
Station 110+60 to Station 124+85=> 1425' x 1 ea = 1425 lf
Station 173+65 to Station 178+30=> 465' x 1 ea = 465 lf
SR-120=> 600' x 1 ea = 600 lf
Shoulder length - 48,940 lf
Reduction in paving area: (48,940 lf x 6.5 ft) => 318,110 sf
(318,110 sf) / (9sf/sy) => 35,346 sy

Right of way:

Assume the removal of a shoulder will allow reduction of the back bone by an average of 10'.

$(48,940 \text{ lf} \times 10') / (43560 \text{ sf} / \text{acre}) = 11.24 \text{ ac}$

Pro rata cost per acre- Commercial: $(7.10 \text{ ac} / 71.10 \text{ ac} \times \$75,000) = \$7,500$

Residential: $(64.0 \text{ ac} / 71.10 \text{ ac} \times \$15,000) = \$13,500$

=> \$21,000

Net cost 11.24 ac x \$21,000 = \$236,040

Scheduling @ 55% = \$129,822

Court cost @ 60% = \$141,624

Inflation @ 65% = \$153,426

Total = \$660,912

Clearing and Grubbing:

Pro rata cost per acre- $(11.24 \text{ ac} / 71.10 \text{ ac} \times \$2,500,000) = \$395,218$

Earthwork:

Assume average 2.0' depth over the width of the backbone. The project appears to be in a significant borrow situation so assume saving is for both in place embankment and borrow.

$(2.0' \text{ depth} \times 10.0' \text{ width} \times 48,940') / (27 \text{ cy/cf}) => 36,252 \text{ cy}$

Calculations



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-4

DESCRIPTION: UTILIZE A MORE CONSISTENT TYPICAL SECTION
THROUGHOUT TO PROJECT

SHEET NO.: 4 of 5

AFFECTED PAY ITEMS:

Reduction:

GAB 12" (318,110 sf x 1 ft) x (135#/cf) / (2000#/ton) => 21,472 tons

9.5 mm Superpave- (35,346 sy X 165#/sy) / (2000#/ton) => 2,916 tons

19.0 mm Superpave- (35,346 sy X 220#/sy) / (2000#/ton) => 3,888 tons

25.0 mm Superpave- (35,346 sy X 440#/sy) / (2000#/ton) => 7,776 tons

Additional:

Curb and Gutter: : => 48,940 lf

Manholes: assume 5 required => 5 ea

Catch Basins: assume 500' spacing 48,940 lf / (1 each /500') => 100 ea

Additional Depth: assume 100 units => 100 ea

Storm Drain Pipe: 150' / structure 200 'x 100 each => 20,000 lf (2/3-18" and 1/3 24")

Value Analysis Design Suggestion



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:
RD-5

DESCRIPTION: REALIGN CAMPGROUND SCHOOL ROAD.

SHEET NO.: 1 of 1

Original Design:

Plans do not change the alignment of the intersection of Campground School Road and SR 61.

Alternative:

Realign intersection of Campground School Road north to tie to SR 61 at 90 degrees.

Opportunities:

- Improve intersection geometry.
- Enhanced traffic operations at the intersection.

Risks:

- Minor design impacts.
- Additional construction costs.
- Additional R.O.W. acquisition costs.

Technical Discussion:

An intersection alignment appears to be desirable here to bring the intersection tie to 90 degrees. Shifting the intersection point of Campground School Road north by approximately 150' should allow a 90 degree tie to SR 61, resulting in a more desirable intersection geometry.

Value Analysis Design Alternative



**PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County**

ALTERNATIVE NO.:

RD-6

**DESCRIPTION: RETAIN DALLAS/NEBO ROAD
INTERSECTION/IMPROVE.**

SHEET NO.: 1 of 4

Original Design:

The intersection design relocates Dallas/Nebo Road to the south to tie the intersection into SR 61 at near 90 degrees, constructing two left turn lanes from SR 61 onto Dallas/Nebo. The proposed realignment aligns a fourth leg into the intersection from the west side of SR 61.

Alternative:

The alternative proposes leaving Dallas/Nebo as it is, with no realignment.

Opportunities:

- Construction cost savings.
- R.O.W. cost savings.
- Reduces construction time.

Risks:

- Moderate design impacts.

Technical Discussion:

The intent of the current design appears to modify the intersection of Dallas/Nebo and SR 61 to make it more geometrically appealing. The shift to the south of Dallas/Nebo does little or nothing to the corresponding intersection on the west side of SR 61. There are two left turn lanes on SR 61 southbound approaching Dallas/Nebo. There appears to be only one receiving lane on Dallas/Nebo. Traffic counts show that of the 3,500 ADT at the Dallas/Nebo-SR 61 intersection, 2,800 are turning right from Dallas/Nebo heading northbound on SR 61. Although the current alignment does not conform to the desired 90 angular intersection, its bias is toward where 80% of the traffic is directed. A free-right turn, or an extended acceleration lane from Dallas/Nebo onto SR 61 North may be another viable alternative to be explored.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 21,913,208	\$	\$ 21,913,208
ALTERNATIVE	\$ 21,619,878	\$	\$ 21,619,878
SAVINGS	\$ 293,330	\$	\$ 293,330

Calculations



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-6

DESCRIPTION: **RETAIN DALLAS/NEBO ROAD INTERSECTION/IMPROVE.**

SHEET NO.: 3 of 4

R.O.W Savings:

Utilize existing Dallas/Nebo alignment. $850\text{LF} \times 120'$ AVG width= $102,000\text{ SF}/43,560\text{ SF}/\text{AC}=2.34\text{ AC}$.

2.34 Acres @ \$15,000/acre(residential)= **\$35,100 R.O.W savings.**

Unclassified Excavation:

Existing Dallas/Nebo= 60' Avg. width, build-up avg.= 1.5", length=850 LF

$60' \times 1.5' \times 850'/27=2,833\text{ CY}$

Proposed Dallas/Nebo(per profile): STA 11+00- STA 17+00- Avg. 10' cut, 60' width avg.

$600' \times 10' \times 60'/27=13,333\text{ CY}$

Total Excavation= $13,333\text{ CY} + 2,833\text{ CY}=16,166\text{ CY}@\$3.96/\text{CY}=\$64,017\text{ saved.}$

Pavement Build-up: 12' lane + 12' lane + 6'6" shoulders x 2= 37' width, 850' length

$37' \times 850'/9= 3,494\text{ SY}$

GAB= $3,494\text{ SY} \times \$20.89/\text{SYCIP}= \$72,989.66$

Base= $3,494\text{ SY} \times 440\text{lb}/\text{sy}/2,000\text{lb}/\text{sy}= 769\text{ tons} @ \$63.47= \$48,808$

Binder= $3,494\text{ SY} \times 220\text{lb}/\text{sy}/2,000\text{lb}/\text{sy}=384\text{ tons} @ \$69.44=\$26,665$

Surface= $3,494\text{ SY} \times 165\text{LB}/\text{sy}/2,000\text{lb}/\text{sy}=288\text{ tons} @ \$66.26=\$19,082$

Value Analysis Design Suggestion



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-7

DESCRIPTION: **REALIGN INTERSECTION AT AIKEN DRIVE.**

SHEET NO.: 1 of 1

Original Design:

Plans show a misaligned intersection at Aiken Drive directly across from the entrance to Paulding County High School at approximate STA. 178+00 LT.

Alternative:

Match the intersection at Aiken Drive to mirror the corresponding intersection across SR 61 entering into Paulding County High School.

Opportunities:

- Improved intersection geometry.
- Enhanced traffic operations.

Risks:

- Minor design impacts.
- Minor construction cost increase.

Technical Discussion:

The alternative suggested would match the intersection at Aiken Drive/SR 61 with the corresponding half of the intersection on the east side of SR 61 leading into Paulding County High School. The intersection, as designed, appears to be offset. It would be desirable to match the intersection for enhanced traffic operations and future signalization, if warranted.

Value Analysis Design Alternative



**PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County**

ALTERNATIVE NO.:

RD-8

DESCRIPTION: USE ALTERNATE WALLS IN LIEU OF CIP WALLS

SHEET NO.: 1 of 4

Original Design:

The original design calls for CIP walls at six locations (Walls No. 1, 2, 3, 4, 5 and 6). It was estimated that the combined length of the walls is approximately 2000 feet.

Alternative:

The alternative designs calls for the use of modular walls in lieu of CIP walls.

Opportunities:

- Potential savings in construction cost and construction time.

Risks:

Technical Discussion:

Modular walls cost is assumed to be \$15 / SF. This figure is consistent with other VE studies.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,420,289	\$	\$ 1,420,289
ALTERNATIVE	\$ 420,030	\$	\$ 420,030
SAVINGS	\$ 1,000,259	\$	\$ 1,000,259

Calculations



PROJECT: Georgia Department of Transportation
 NH-018-1(59) - P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-8

DESCRIPTION: USE ALTERNATE WALLS IN LIEU OF CIP WALLS

SHEET NO.: 2 of 4

KD-8

USING CIP WALL (AS PER SDOT WALL STANDARDS) - AS PROPOSED

Wall No 1 ⇒ H_{AVE} = 6.50' L ≈ 505 Wall thick ≈ 1.75'
 FOOTING ⇒ 12" x 5.75' wide

$$V_{W1} = 6.50 \times 505 \times 1.75 + 1 \times 5.75 \times 505 \approx 320.30 \text{ cy}$$

TYPE 2-S BARRIER ⇒ LF ≈ 505 LF (Pay Item 621-6002)

Wall No 2 . $V = 11.25 \times 400 \times 1.0 + 1.5 \times 11.25 \times 400 \approx 416.667 \text{ cy}$

Wall No 3 $V = 8 \times 340 \times 1.75 + 1.0 \times 7 \times 340 \approx 264.44 \text{ cy}$ (TYPE 2-S BARRIER)

Wall No 4 $V = 8.50 \times 205 \times 1.75 + 1.0 \times 5.75 \times 205 \approx 156.597 \text{ cy}$

TYPE 2-S BARRIER ⇒ LF ≈ 205 LF

Wall No 1 Cost

WALL = 320.30 cy × ^{CML + STEEL} 741.87 \$/cy = 237,621 } \$ 274,815
 BARRIER = 505 LF × 73.65 \$/LF = 37,193 }

Wall No 2 Cost

WALL = 416.667 × 741.87 = \$ 309,115

Wall No 3 Cost

WALL = 264.44 × 741.87 = \$ 196,180 } \$ 221,221
 BARRIER = 340 × 73.65 = \$ 25,041 }

Wall No 4 Cost

WALL = 156.597 × 741.87 = \$ 116,175 } \$ 131,275
 BARRIER = 205 × 73.65 = \$ 15,100 }

COST \$/LF WALL = (274815 + 309115 + 221221 + 131275) / (505 + 400 + 340 + 205) ≈ \$ 645/LF

Calculations



PROJECT: Georgia Department of Transportation
 NH-018-1(59) - P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:
RD-8

DESCRIPTION: USE ALTERNATE WALLS IN LIEU OF CIP WALLS

SHEET NO.: 3 of 4

NOTE: VE TEAM DID NOT RECEIVE WALL ENCLAP FOR WALL No 5
 & WALL No. 6. THEREFORE, THE COST OF THESE WALLS WILL BE
 DETERMINED BASED ON A \$/LF WALL COST. THE COST
 USED WILL BE \$645/LF OF WALL.

WALL No 5 Cost WALL \approx 350 LF \therefore Cost = \$225,750

WALL No 6 Cost WALL \approx 200 LF \therefore Cost = \$129,000

AS PROPOSED CIP TOTAL COST \approx \$1,291,176 (TOTAL LF OF WALL \approx 2000 LF)

USING MODULAR WALLS (ALTERNATIVE)

WALL No 1 \downarrow FACE HT.
 AREA = 6.50 x 505 = 3282.50 SF
 COST = 3282.50 x \$15/SF = \$49,238

WALL No 2 AREA = 11.25 x 400 = 4500 SF
 COST = 4500 x 15 = \$67,500

WALL No 3 AREA = 8 x 340 = 2720 SF
 COST = 2720 x 15 = \$40,800

WALL No 4 AREA = 8.50 x 205 = 1742.50 SF
 COST = 1742.5 x 15 = \$26,138

WALL No 5 COST = 350 x 126 = \$44,100

WALL No 6 COST = 200 x 126 = \$25,200

$\$/LF = \frac{\$183,676}{1450}$
 $= \$126/LF$

COPING COST

TOTAL LF = 2000 LF

UNIT COST = \$64.42/LF

COPING = \$128,840

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-9

DESCRIPTION: STA 90+00 TO STA 125+00: OBTAIN ENVIRONMENTAL PERMIT IN LIEU OF REALIGNMENT

SHEET NO.: 1 of 3

Original Design:

The original design calls for the relocation of the highway to avoid a possible construction delay due to the requirement to obtain an environmental permit to relocate an existing intermittent creek/ditch.

Alternative:

Prepare the plans and perform the environmental permitting to allow the relocation of the ditch to allow the construction of the highway along its present alignment.

Opportunities:

- Significant Construction Cost Savings
- Significant reduction in the relocation of people and their homes.
- Significant Construction Time Savings
- Possible no impact on actual construction completion date as there could be construction delays caused by the realignment which offset the possible construction start permitting delay.

Risks:

- Possible delay of the project start.
- Possible delay of the project completion date

Technical Discussion:

It appears reasonable to construct the project along its present alignment (as per its original design). The proposed realignment appears to be driven by potential project delays which could occur do to the relocation of an existing rainfall runoff creek or ditch. The existing rainfall runoff creek or ditch appears to actually be a ditch that was built at the time of the original roadway construction and not a natural feature.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 5,082,800	\$	\$ 5,082,800
ALTERNATIVE	\$ 0	\$	\$ 0
SAVINGS	\$ 5,082,800	\$	\$ 5,082,800

Illustrations



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-9

DESCRIPTION: STA 90+00 TO STA 125+00: OBTAIN ENVIRONMENTAL
PERMIT IN LIEU OF REALIGNMENT

SHEET NO.: 2 of 3



Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-10

DESCRIPTION: **ELIMINATE AIKEN DRIVE AND COUNTRY SQUARE
 WAY INTERSECTIONS AT APPROXIMATE STATIONS
 140+00 AND 152+00 LT.**

SHEET NO.: 1 of 4

Original Design:

The plans as designed show three intersections on the west side of SR 61 from STA 140+00 to STA 152+00 feeding a small residential development.

Alternative:

The alternative calls for eliminating Aiken Drive and Country Square Way intersections, keeping Country Square Trail open in the center to service SR 61.

Opportunities:

- Enhanced traffic operations
- Construction cost savings
- Time savings in construction

Risks:

- Minimal design impacts

Technical Discussion:

The traffic counts for Aiken Drive and Country Square Way are minimal, and with the addition of Country Square Trail as a 4-leg intersection, it may be desirable to channel local traffic west of SR 61 in that area to Country Square Trail. This would result in cost savings by not constructing right and left turn lanes, and not having additional R.O.W. acquisitions to accommodate these planned improvements. Operationally, the traffic low traffic counts would likely make the alternative feasible, and it would be desirable to reduce three intersections to one in a 1,200 LF area.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 21,088,208	\$	\$ 21,088,208
ALTERNATIVE	\$ 20,858,498	\$	\$ 20,858,498
SAVINGS	\$ 229,710	\$	\$ 229,710

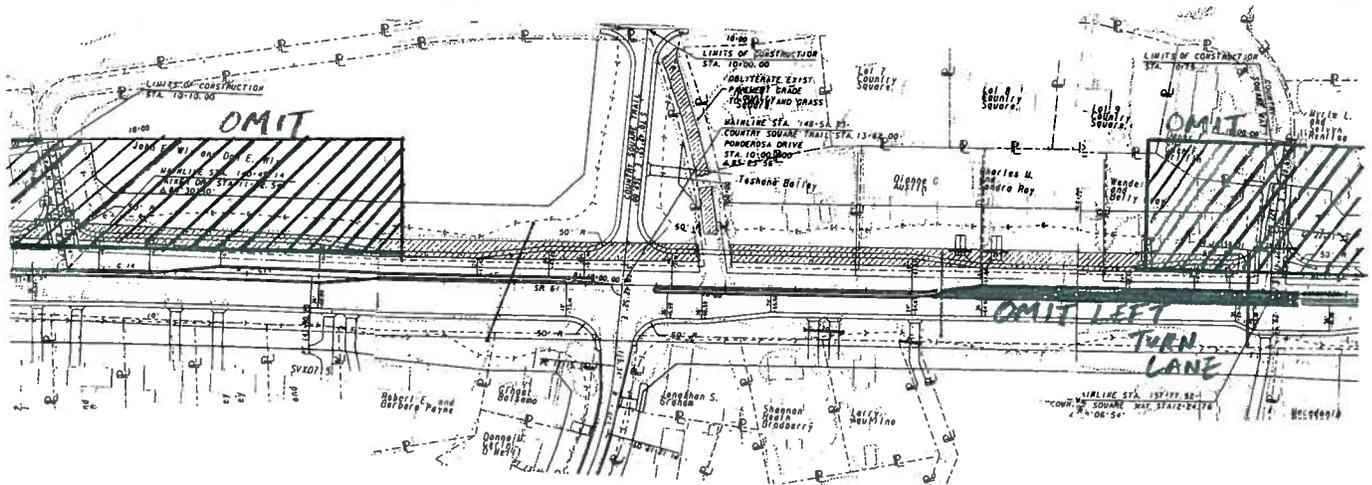
PROJECT: Georgia Department of Transportation
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-10

DESCRIPTION: ELIMINATE AIKEN DRIVE AND COUNTRY SQUARE
INTERSECTIONS AT APPROXIMATE STATIONS 140+00
AND 152+00 LT.

SHEET NO.: 2 of 4



CLOSE ACCESS TO AIKEN DRIVE AND COUNTRY SQUARE
WAY INTERSECTIONS. ALLOW ACCESS THROUGH NEWLY
CONSTRUCTED COUNTRY SQUARE TRAIL. ELIMINATE
LEFT TURN LANES, ACCELERATION LANES, AND
RIGHT TURN LANES DESIGNED TO BE CONSTRUCTED
FOR AIKEN DRIVE AND COUNTRY SQUARE WAY
INTERSECTIONS.

Calculations



PROJECT: Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-10

DESCRIPTION: **ELIMINATE AKIN DRIVE AND COUNTRY SQUARE
INTERSECTIONS AT APPROXIMATE STATIONS 140+00
AND 152+00 LT.**

SHEET NO.: 3 of 4

REDUCTION IN PAVING:

Atkins Drive:

$$\begin{aligned} \text{NB Left Turn-} & (400' \times 12') + (100' \times 12'/2) = 5,400 \text{ sf} \\ \text{SB Left Turn-} & (500' \times 12') + (100' \times 12'/2) = 6,600 \text{ sf} \\ \text{Right Turn-} & (300' \times 12') + (100' \times 12'/2) = 4,200 \text{ sf} \\ \text{Eyebrow-} & (1ea) \times (100' \times 12') + (100' \times 12'/2) = 1,800 \text{ sf} \end{aligned}$$

Country Square Way:

$$\begin{aligned} \text{NB Left Turn-} & (450' \times 12') + (100' \times 12'/2) = 6,000 \text{ sf} \\ \text{SB Left Turn-} & (500' \times 12') + (100' \times 12'/2) = 6,600 \text{ sf} \\ \text{Right Turn-} & (300' \times 12') + (100' \times 12'/2) = 4,200 \text{ sf} \\ \text{Eyebrow-} & (2ea) \times (100' \times 12') + (100' \times 12'/2) = 3,600 \text{ sf} \end{aligned}$$

$$\text{Total-} = 38,400 \text{ sf} / (9 \text{ sf/sy}) \Rightarrow 4267 \text{ sy}$$

REDUCTION IN R.O.W.:

Atkins Drive:

$$\begin{aligned} \text{Right Turn-} & (300' \times 12') + (100' \times 12'/2) = 4,200 \text{ sf} \\ \text{Eyebrow-} & (1ea) \times (100' \times 12') + (100' \times 12'/2) = 1,800 \text{ sf} \end{aligned}$$

Country Square Way:

$$\begin{aligned} \text{Right Turn-} & (300' \times 12') + (100' \times 12'/2) = 4,200 \text{ sf} \\ \text{Eyebrow-} & (1ea) \times (100' \times 12') + (100' \times 12'/2) = 1,800 \text{ sf} \end{aligned}$$

$$\text{Total-} = 12,000 \text{ sf} / (43560 \text{ sf/ac}) \Rightarrow 0.28 \text{ ac}$$

PAVEMENT TONNAGE:

$$\text{Base- } 4,267 \text{ SY} \times 440 \text{ lb/sy} / 2,000 \text{ lb/ton} = 939 \text{ tons base}$$

$$\text{Binder- } 4,267 \text{ SY} \times 220 \text{ lb/sy} / 2,000 \text{ lb/ton} = 469 \text{ tons binder}$$

$$\text{Surface- } 4,267 \text{ SY} \times 165 \text{ lb/sy} / 2,000 \text{ lb/ton} = 352 \text{ tons surface}$$

Value Analysis Design Suggestion



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-11

DESCRIPTION: **RECONFIGURE INTERSECTION AT STA 212+00; SPLIT INTERSECTION FROM 1-4 LEG TO 2-2 LEG.**

SHEET NO.: 1 of 1

Original Design:

Plans show creating a 4- leg intersection at Vernoy Aiken Road and SR 61.

Alternative:

Split the Vernoy Aiken Road/SR 61 intersection into 2-2 leg intersections.

Opportunities:

- Improved intersection geometry.

Risks:

- Minor design impacts.

Technical Discussion:

The design shows creating a 4-leg intersection with SR 61 and the east and west sections of Vernoy Aiken Road. The alternative would split the intersection into 2-2 leg intersections by moving the east side tie of Vernoy Aiken to the south, and by moving the west side tie to the north. The intersection, as designed, would provide less than optimal geometry. The intent of the alternative is to create two intersections with sufficient distance apart that would be more geometrically desirable than the one-4 leg intersection shown as designed.

Value Analysis Design Suggestion



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-13

DESCRIPTION: **MODIFY INTERSECTION DESIGN TO REDUCE TURN-
LANE STORAGE ON US-278**

SHEET NO.: 1 of 2

Original Design:

The original design proposes two thru-lanes, a double left turn of ~775' eastbound, a double left turn of ~825' westbound and channelized right turns of ~1100' both directions.

Alternative:

The alternative design proposes widening US-278 to provide three thru lanes each direction at the SR-61 intersection and shorten the left and right turn lanes. In addition it is proposed that the "Type B" left turn offset on SR-61 south bound be eliminated.

Opportunities:

- Improved LOS of the intersection.
- Accommodation of 6-lanes in the future
- Potential to reduce paving costs

Risks:

- Moderate increase in design effort

Technical Discussion:

The queue of the thru lanes on US-278 controls the required storage length of the left and right turn lanes at the SR-61 intersection. By widening the intersection to provide three thru lanes in each direction the storage lengths can be reduced in addition to reducing the "green time" for the thru movement and improving the LOS of the intersection. Existing right of way appears to be more than sufficient for the wider typical section. Although it appears that the difference in required paving would be insignificant the operational improvement and ease of construction for a future six lane section may be beneficial.

Illustrations



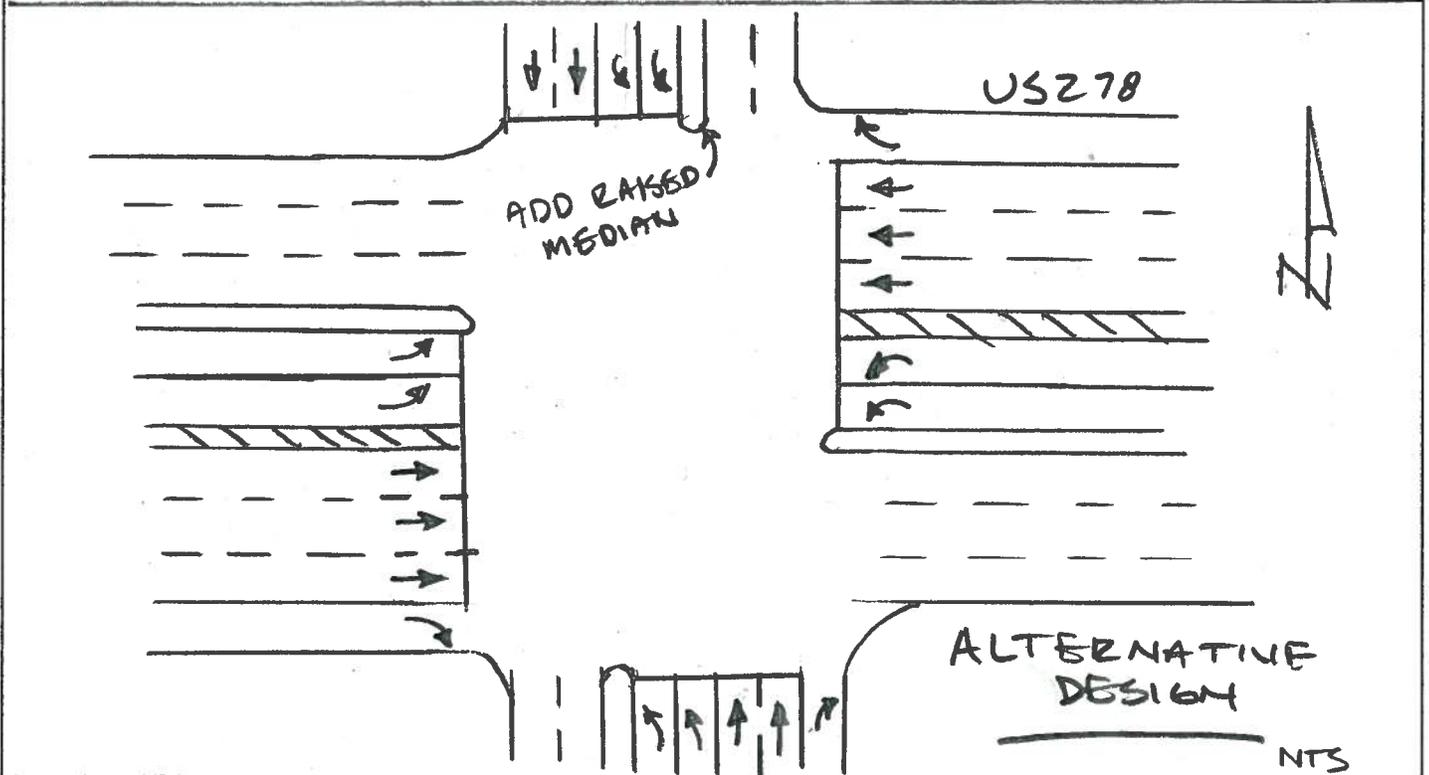
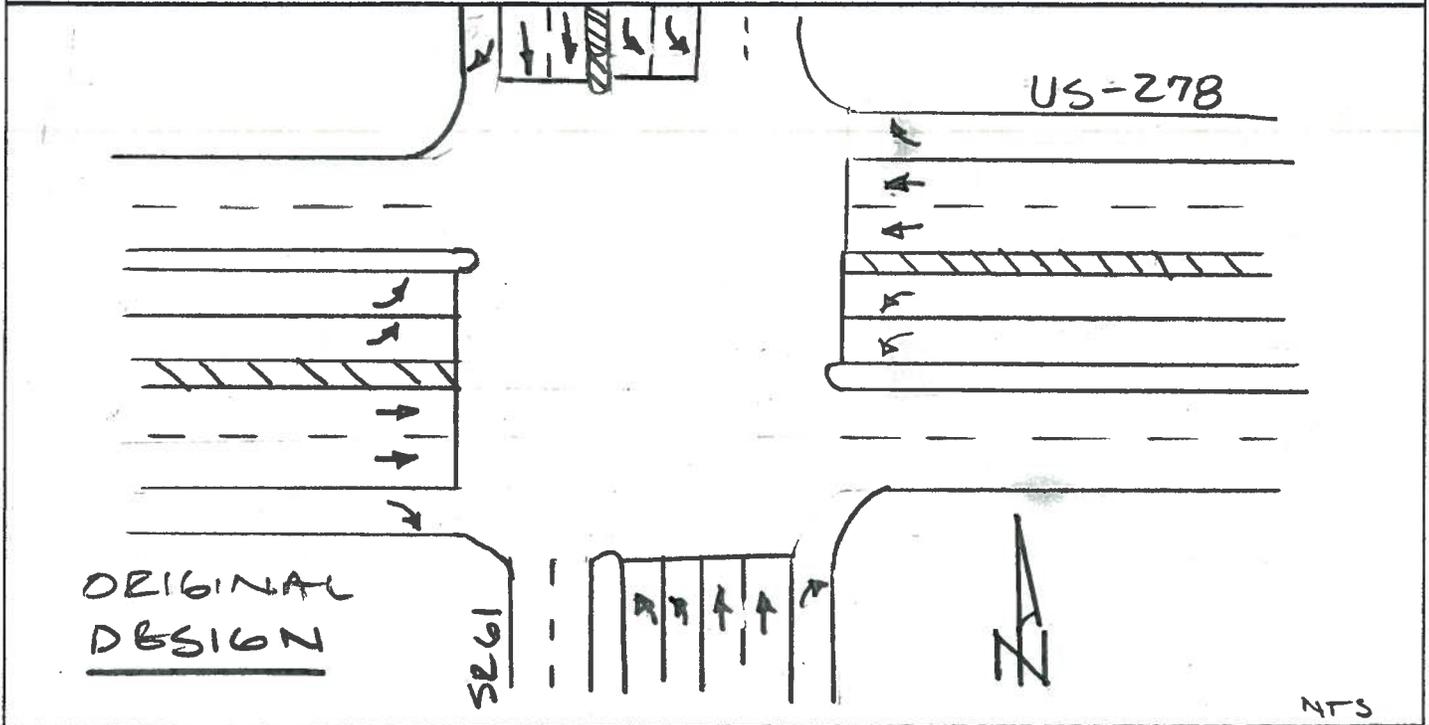
PROJECT: Georgia Department of Transportation
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

RD-13

DESCRIPTION: **MODIFY INTERSECTION DESIGN TO REDUCE TURN-LANE STORAGE ON US-278**

SHEET NO.: 2 of 2



Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation NH-018-1(59) – P.I. No. 621570 SR 61-Widening & Reconstruction - Paulding County	ALTERNATIVE NO.: BR-1
DESCRIPTION: USE A SINGLE SPAN BRIDGE TO CROSS TRAIL + FUTURE TRACK (USING PSC AASHTO TYPE III)	SHEET NO.: 1 of 5

Original Design:

The original design calls for a single span bridge structure to cross over the Silver Comet Trail. The 135'-0" long bridge will have a CIP superstructure supported by 12- PSC 72" Bulb Tees beams spaced at 7'-9". The overall out-to-out width is 91'-3" and it will provide two 6'-0" sidewalks, two 4'-4.5" outside shoulders, 2-12'-0" traffic lanes (each direction), one 20'-0" inside median (with a 4'-0" raised median). The end bents fill will be retained by MSE walls running parallel to the existing trail. The bridge will be on an 11° - 30' skew.

Alternative:

The alternative design calls for a single span bridge structure to cross over the Silver Comet Trail plus a future rail line. The 77'-9" long bridge will have a CIP superstructure supported by 12- PSC AASHTO Type III beams spaced at 7'-9". The overall out-to-out width is 87'-5" and it will provide two 6'-0" sidewalks, two 2'-6" outside shoulders, 2-12'-0" traffic lanes (each direction), one 20'-0" inside median (with a 4'-0" raised median). The end bents fill will be retained by MSE walls running parallel to the existing trail. The bridge will be on an 11° - 30' skew.

Opportunities:

- Potential saving in construction cost and construction time
- Construction staging area is same as proposed structure

Risks:

- Minimum re-design effort

Technical Discussion:

The MSE wall on the south end of the bridge (both options) will be taller than the wall on the north end because the proposed rail line will be located 14'-0" south of the center line of the existing trail. All clearance requirements are met.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,721,005	\$	\$ 1,721,005
ALTERNATIVE	\$ 1,210,670	\$	\$ 1,210,670
SAVINGS	\$ 510,336	\$	\$ 510,336

Illustrations



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

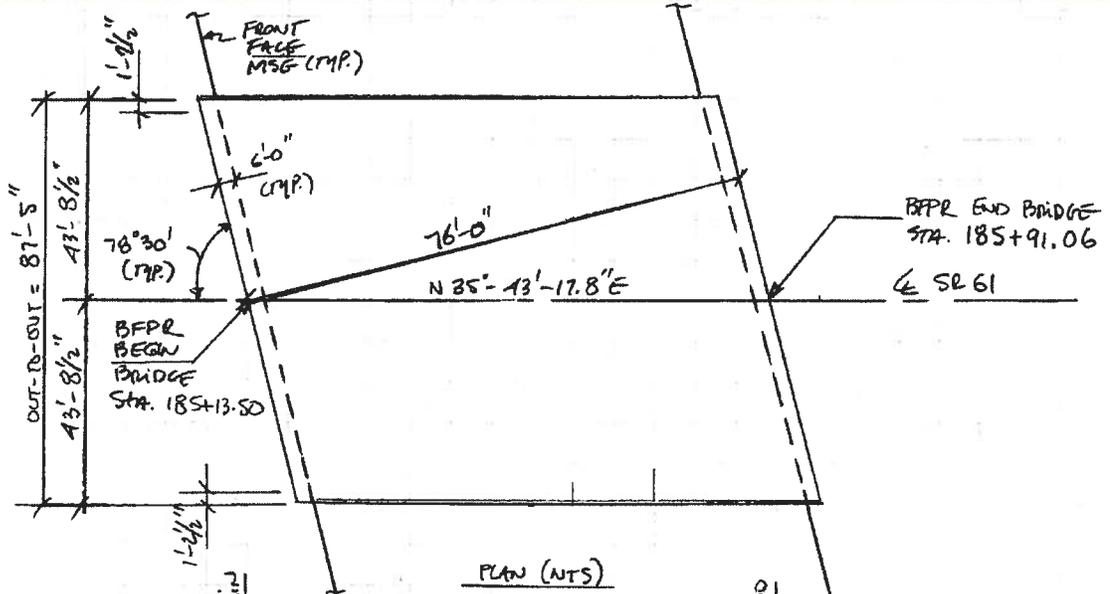
ALTERNATIVE NO.:

BR-1

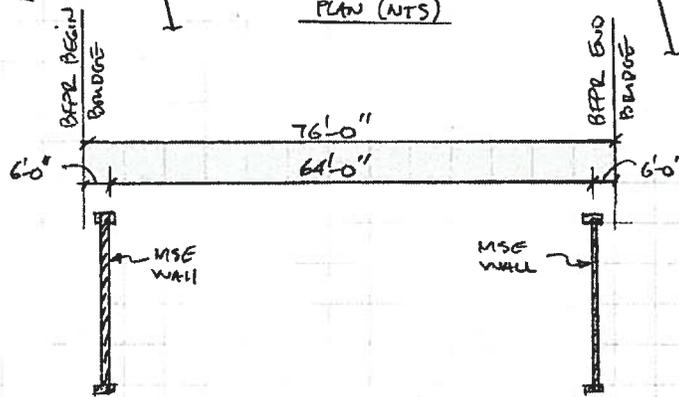
DESCRIPTION: **USE A SINGLE SPAN BRIDGE TO CROSS TRAIL + FUTURE TRACK (USING PSC AASHTO TYPE III)**

SHEET NO.: 2 of 5

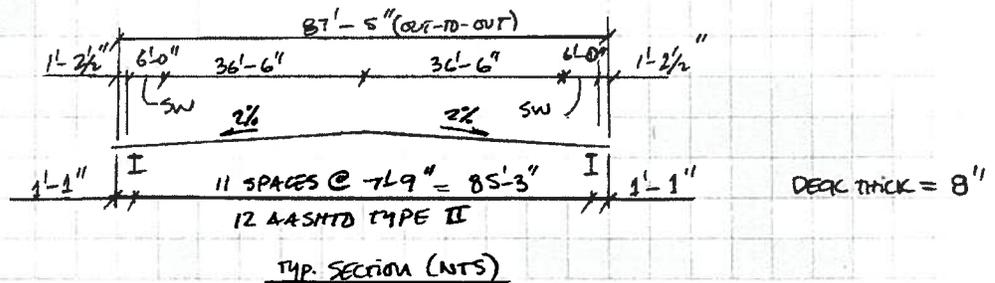
BR-1



PLAN (NTS)



ELEVATION (NTS)



TYP. SECTION (NTS)

Calculations



PROJECT: Georgia Department of Transportation
 NH-018-1(59) - P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

BR-1

DESCRIPTION: USE A SINGLE SPAN BRIDGE TO CROSS TRAIL +
 FUTURE TRACK (USING PSC AASHTO TYPE III)

SHEET NO.: 3 of 5

AS PROPOSED

ONE SPAN (135'-0") BRIDGE WITH AN OVERALL
 OUT-TO-OUT WIDTH OF 91'-3".

CIP DECK (7³/₄ SLAB) SUPPORTED BY 12 BTs
 SPACED AT 7'-9".

QUANTITIES (ESTIMATED)

$$\text{DECK} \Rightarrow V = 91.25 \times 135 \times (7.75/12) \approx 294.66 \text{ cy}$$

$$\text{MEDIAM} \Rightarrow V = 4 \times 135 \times (6/12) \approx 10 \text{ cy}$$

$$\text{SW} \Rightarrow V = 2 \times [6 \times 135 \times (6.75/12)] \approx 33.60 \text{ cy}$$

$$\text{DIAPHRAGM} \Rightarrow V \approx 22 \text{ INT} + 22 \text{ EXT} \approx 32 \text{ cy}$$

$$\text{CAP} \Rightarrow V = [2 \times 3 \times 91.25] \times 2 \approx 40.56 \text{ cy}$$

$$\text{W WALLS} \Rightarrow V = 1 \times 10 \times 12/12 \times 6.646 \approx 9.846 \text{ cy}$$

$$\text{BACK WALLS} \Rightarrow V = [91.25 \times (79.75/12) \times 8/12] \times 2 \approx 29.95 \text{ cy}$$

$$\text{BULB TEE 72"} \Rightarrow \text{LF} = 12 \times 135 \approx 1620 \text{ LF}$$

$$\text{PARAPET} \Rightarrow \text{LF} = 2 \times 135 \approx 270 \text{ LF}$$

$$\text{GROOVING} \Rightarrow \text{SY} = (91.25 - 16.25) \times 135 \approx 1125 \text{ SY}$$

$$\text{HP PILES} \Rightarrow \text{LF} = 2 \times 12(50) \approx 1200 \text{ LF}$$

$$\text{MSE No. 1} \Rightarrow \text{SF} = 30 \times 47.5 - 1/2(30 \times 27.5) \approx 4013 \text{ SF}$$

$$\text{MSE No. 2} \Rightarrow \text{SF} \approx 4013 \text{ SF}$$

$$\text{MSE Coping} \Rightarrow \text{LF} = 150 + 145 \approx 300 \text{ LF}$$

$$\text{CLASS AA} \approx 370 \text{ cy}$$

$$\text{STEEL} \approx 370 \text{ cy} \times 250 \#/\text{cy} = 92,500 \#$$

\approx

$$\text{CLASS A} \approx 81 \text{ cy}$$

$$\text{STEEL} \approx 81 \text{ cy} \times 200 \#/\text{cy} = 16,200 \#$$

$$\text{MSE SF} = 8026 \text{ SF}$$

Calculations



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

BR-1

DESCRIPTION: **USE A SINGLE SPAN BRIDGE TO CROSS TRAIL +**
FUTURE TRACK (USING PSC AASHTO TYPE III)

SHEET NO.: 4 of 5

BR-1

Quantities (ESTIMATED)

$$\text{DECK} \Rightarrow \nabla = 87.417 \times 77.75 \times 7.875/12 \cong 165.197 \text{ cy}$$

$$\text{MEQ} \Rightarrow \nabla = 4 \times 77.75 \times 6/12 \cong 5.759 \text{ cy}$$

$$\text{SW} \Rightarrow \nabla = 6 \times 77.75 \times (6.75/12) \times 2 \cong 19.351 \text{ cy}$$

$$\text{DIAP} \Rightarrow \nabla = 11 \text{ INT} + 22 \text{ END} \cong 16.629 \text{ cy}$$

$$\text{CAP} \Rightarrow \nabla = 2 \times 3 \times 87.417 \times 2 \cong 38.85 \text{ cy}$$

$$\text{W WALLS} \Rightarrow \nabla = 4 \times 1 \times 10 \times (4.406) \cong 6.52 \text{ cy}$$

$$\text{BACKWALL} \Rightarrow \nabla = 87.417 \times 8/12 \times 4.406 \times 2 \cong 19.02 \text{ cy}$$

$$\text{AASHTO TYPE III} \Rightarrow \text{LF} = 12 \times 77.75 \cong 933 \text{ LF}$$

$$\text{GRADING} \Rightarrow \text{SY} = (87.417 - 15.417) \times 77.75 \cong 622 \text{ SY}$$

$$\text{WALL No 1} \Rightarrow \text{SF} = 28 \times (56 + 95.417) \cong 4240 \text{ SF}$$

$$\text{WALL No 2} \Rightarrow \text{SF} = 4240 \text{ SF} \cong 4240 \text{ SF}$$

$$\text{MSE COPING} \Rightarrow \text{LF} = 210 + 160 \cong 370 \text{ LF}$$

$$\text{PARAPET} \Rightarrow \text{LF} = 2 \times 77.75 \cong 155.50 \text{ LF}$$

$$\text{HP PILES} \Rightarrow \text{LF} = 2 \times 12 \times 50 \cong 1200 \text{ LF}$$

$$\text{CLASS AA} \cong 207 \text{ cy}$$

$$\text{STEEL} = 207 \text{ cy} \times 250 \text{ \# / cy}$$

$$= 51,755 \text{ \#}$$

$$\text{CLASS A} \cong 65 \text{ cy}$$

$$\text{STEEL} = 65 \times 200 \text{ \# / cy} = 13,000 \text{ \#}$$

$$\text{MSE SF} = 8480 \text{ SF}$$

Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County**

ALTERNATIVE NO.:

BR-2

DESCRIPTION: **USE 10 X 12 X 100 BOX CULVERT IN-LIEU OF A NEW BRIDGE.**

SHEET NO.: 1 of 4

Original Design:

The original design calls for a single span bridge structure to cross over the Silver Comet Trail. The 135'-0" long bridge will have a CIP superstructure supported by 12- PSC 72" Bulb Tees beams spaced at 7'-9". The overall out-to-out width is 91'-3" and it will provide two 6'-0" sidewalks, two 4'-4.5" outside shoulders, 2-12'-0" traffic lanes (each direction), one 20'-0" inside median (with a 4'-0" raised median). The end bents fill will be retained by MSE walls running parallel to the existing trail. The bridge will be on an 11° - 30' skew.

Alternative:

The alternative design calls for a single box (10 x 12 x 100) culvert to span over the Silver Comet Trail. The culvert structure will be on an 11° - 30' skew.

Opportunities:

- Potential saving in construction cost and construction time
- Construction staging area is same as proposed structure
- Minimum long term maintenance cost
- Structure will be buried

Risks:

- Minimum re-design effort

Technical Discussion:

GDOT box culvert Standard No. 2324 (Sheets 1 and 2). The typical section will match the proposed roadway typical section at the approaches.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,721,005	\$	\$ 1,721,005
ALTERNATIVE	\$ 351,662	\$	\$ 351,662
SAVINGS	\$ 1,369,344	\$	\$ 1,369,344

Illustrations



PROJECT: **Georgia Department of Transportation
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County**

ALTERNATIVE NO.:

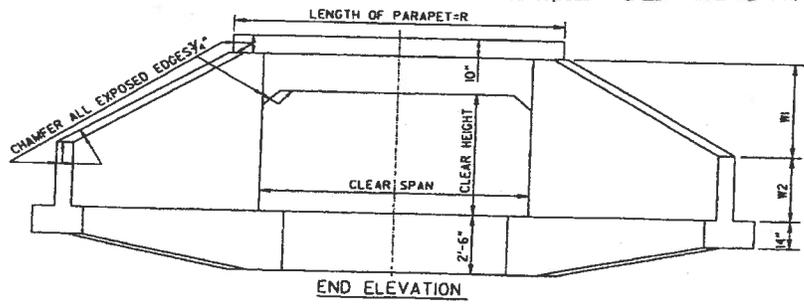
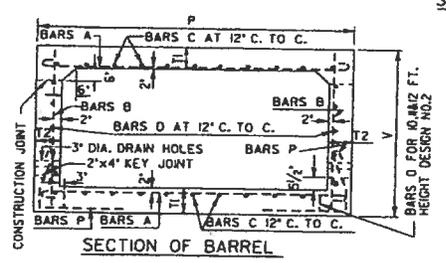
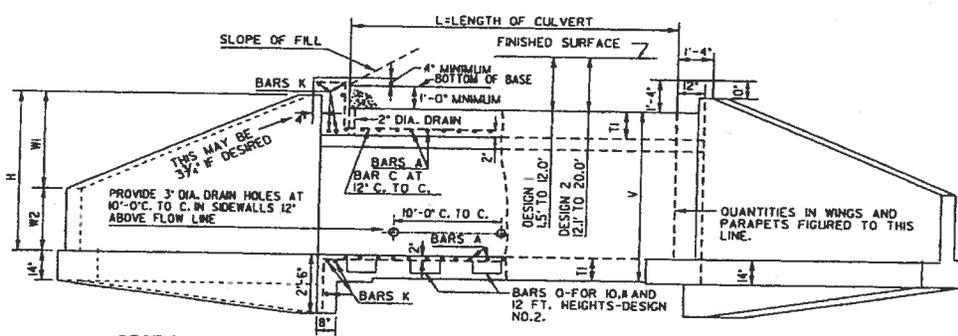
BR-2

DESCRIPTION: **USE 10 X 12 X 100 BOX CULVERT IN-LIEU OF A NEW BRIDGE.**

SHEET NO.: **2** of 4

CLEAR SPAN	CLEAR HEIGHT	1.5' TO 12.0' FILL OVER BARREL INCL. PAVING										12.1' TO 20.0' FILL														
		A BARS 1/2" DIA.		B BARS		C 1/2" DIA.		D 1/2" DIA.		P BARS 1" DIA.		A BARS 1" DIA.		B BARS		C 1/2" DIA.		D 1/2" DIA.		P BARS 1" DIA.						
		NUMBER	LENGTH	SPACING	NUMBER	SIZE	LENGTH	SPACING	NUMBER	LENGTH	NUMBER	LENGTH	SPACING	NUMBER	LENGTH	SPACING	NUMBER	LENGTH	SPACING	NUMBER	LENGTH	SPACING	SIZE			
10'	4'	13'-4"	5 1/2"		1/2" DIA.	5'-8"	12"	22"			0	0		13'-8"	6"	6'-1"	22			0	0	0	0	3/4" DIA.	NUMBER	
	5'	13'-4"	5 1/2"		1/2" DIA.	6'-8"	12"	22"			0	0		13'-8"	6"	7'-1"	22			0	0	0	0	3/4" DIA.	LENGTH	
	6'	13'-4"	5 1/2"		1/2" DIA.	7'-8"	12"	22"			0	0		14'-0"	5 1/2"	8'-4"	22			0	0	0	0	3/4" DIA.	NUMBER	
	7'	13'-4"	5 1/2"		1/2" DIA.	8'-8"	12"	22"			0	0		14'-0"	5 1/2"	9'-2"	22			0	0	0	0	3/4" DIA.	LENGTH	
	8'	13'-8"	5"		3/4" DIA.	9'-9"	12"	22"			0	0		14'-0"	5 1/2"	10'-2"	22			0	0	0	0	3/4" DIA.	NUMBER	
	9'	13'-8"	5"		3/4" DIA.	10'-9"	10"	22"			7'-0"	5"		14'-4"	5 1/2"	11'-3"	22			7'-2"	5 1/2"	5"	5"	3/4" DIA.	LENGTH	
	10'	13'-8"	5"		3/4" DIA.	11'-9"	10"	22"			7'-0"	5"		14'-4"	5 1/2"	12'-4"	22			7'-2"	5 1/2"	5"	5"	3/4" DIA.	NUMBER	
	11'	13'-8"	5"		3/4" DIA.	12'-10"	10"	22"			7'-0"	5"		14'-8"	5 1/2"	13'-4"	22			7'-2"	5 1/2"	5"	5"	3/4" DIA.	LENGTH	
	12'	13'-8"	5"		1" DIA.	13'-10"	12"	22"			7'-0"	5"		14'-8"	5 1/2"	14'-4"	22			7'-2"	5 1/2"	5"	5"	1" DIA.	NUMBER	
																									LENGTH	

CLEAR SPAN	CLEAR HEIGHT	QUANTITIES									
		REINFORCING STEEL				CONCRETE				CLEAR HEIGHT	CLEAR SPAN
		DESIGN NO. 1	DESIGN NO. 2	WINGWALLS & PARAPETS TOTAL LBS.	CU. YDS. PER L.N. FT. OF BARREL	DESIGN NO. 1	DESIGN NO. 2	WINGWALLS & PARAPETS			
4'	151.5	180.0	651	1.120	1.300	15.45	2'-4"	4'	10'	3'-9"	
5'	154.5	183.0	787	1.182	1.362	18.22	2'-4"	5'			
6'	163.3	208.8	985	1.244	1.528	21.20	2'-4"	6'			
7'	170.6	216.5	1050	1.306	1.639	23.94	2'-4"	7'			
8'	195.6	225.9	2228	1.528	1.713	32.06	2'-4 1/2"	8'			
9'	276.1	325.7	2536	1.602	1.967	37.14	2'-4 1/2"	9'			
10'	281.3	337.9	3508	1.676	2.248	43.25	2'-4 1/2"	10'			
11'	303.9	360.9	3967	1.787	2.347	49.24	2'-5"	11'			
12'	316.9	376.1	5342	1.861	2.536	55.78	2'-5"	12'			



DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

STANDARD
REINFORCED CONCRETE BOX CULVERTS
SINGLE 10'x4' THRU SINGLE 10'x12'
FOR DEPTHS OF FILL UP TO 20 FEET

REV. & REDR. NOV., 2001

NO. SCALE

DES. SUBMITTED BY: [Signature]
STATE ROAD DEPT. DESIGN ENGINEER: [Signature]
APP. BY: [Signature]
NO. 2324
SHEET 2 OF 2

Calculations



PROJECT: Georgia Department of Transportation
 NH-018-1(59) - P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

BR-2

DESCRIPTION: USE 10 X 12 X 100 BOX CULVERT IN-LIEU OF A NEW BRIDGE.

SHEET NO.: 3 of 4

BR-2

USE A 10 X 12 X 100 BOX CULVERT (Ga DOT Sm No. 1324 1/2 AND 2/2)
 w/up to 20' 0" OF FILL (FROM TABLE USE DESIGN 2)

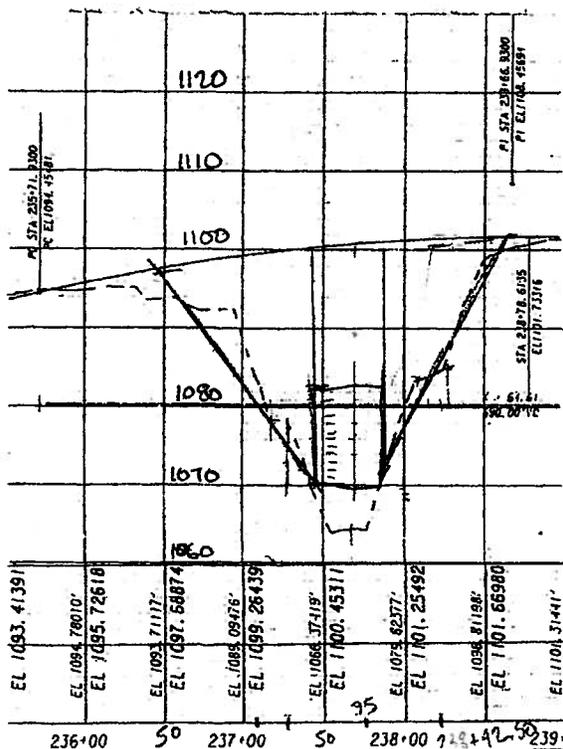
Quantities (ESTIMATED)

BARREL $\Rightarrow \nabla = 2.536 \text{ CY/LF} \rightarrow \#/\text{STEEL} = 376.1 \#/\text{LF}$

WINGS $\Rightarrow \nabla = 55.78 \text{ CY}$ (WINGS & PARAPETS) $\Rightarrow \#/\text{STEEL} = 5342 \#$

TOTAL CONC. $\nabla = 2.536 \times 100 + 55.78 \approx 310 \text{ CY} \leftarrow \text{CLASS A}$

STEEL Qty = $376.1 \times 100 + 5342 \approx 42,960 \#$



Fill Quantity (ESTIMATED)

X-SECTION AREA $\approx 12 \times 17 + 2 \times \frac{1}{2} \times 30.75 \approx 2454 \text{ SF}$

$\nabla_{\text{FILL}} = 100 \times 2454 / 27 = 9100 \text{ CY}$

USE PAY-ITEM No 212-1000 $\Rightarrow \$10.97/\text{CY}$

Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County**

ALTERNATIVE NO.:

BR-3

DESCRIPTION: **USE AN “ONE-SPAN” BEBO PRECAST STRUCTURE IN-
LIEU OF A NEW BRIDGE (TRAIL + FUTURE TRACK)**

SHEET NO.: 1 of 4

Original Design:

The original design calls for a single span bridge structure to cross over the Silver Comet Trail. The 135'-0" long bridge will have a CIP superstructure supported by 12- PSC 72" Bulb Tees beams spaced at 7'-9". The overall out-to-out width is 91'-3" and it will provide two 6'-0" sidewalks, two 4'-4.5" outside shoulders, 2-12'-0" traffic lanes (each direction), one 20'-0" inside median (with a 4'-0" raised median). The end bents fill will be retained by MSE walls running parallel to the existing trail. The bridge will be on an 11° - 30' skew.

Alternative:

The alternative design calls for an 84' (long) x 29' (raise) x 100' (long) pre-cast multi units BEBO bridge structure.

Opportunities:

- Potential savings in construction and construction time
- Minimum long term maintenance cost
- Ease of installation
- Structure will be buried
- Stage construction not an issue

Risks:

- No design required

Technical Discussion:

The typical section will match the proposed roadway typical section at the approaches.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,721,005	\$	\$ 1,721,005
ALTERNATIVE	\$ 1,226,500	\$	\$ 1,226,500
SAVINGS	\$ 494,505	\$	\$ 494,505

Calculations



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) – P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

BR-3

DESCRIPTION: **USE AN “ONE-SPAN” BEBO PRECAST STRUCTURE IN-
LIEU OF A NEW BRIDGE (TRAIL + FUTURE TRACK)**

SHEET NO.: 3 of 4

One unit = \$ 715,000.00 (Cost does not include construction cost)

Construction Cost = \$ 400,000.00 (Includes: wingwalls, headwalls, foundation, plus incidental items)

The above prices were provided by Con/Span Bridge Systems.

Value Analysis Design Alternative



PROJECT: Georgia Department of Transportation NH-018-1(59) – P.I. No. 621570 SR 61-Widening & Reconstruction - Paulding County	ALTERNATIVE NO.: <div style="text-align: center; font-size: 1.2em;">BR-5</div>
DESCRIPTION: USE A SINGLE SPAN BRIDGE STRUCTURE TO CROSS ONLY THE EXISTING TRAIL (USING PSC AASHTO TYPE II)	SHEET NO.: 1 of 4

Original Design:

The original design calls for a single span bridge structure to cross over the Silver Comet Trail. The 135'-0" long bridge will have a CIP superstructure supported by 12- PSC 72" Bulb Tees beams spaced at 7'-9". The overall out-to-out width is 91'-3" and it will provide two 6'-0" sidewalks, two 4'-4.5" outside shoulders, 2-12'-0" traffic lanes (each direction), one 20'-0" inside median (with a 4'-0" raised median). The end bents fill will be retained by MSE walls running parallel to the existing trail. The bridge will be on an 11° - 30' skew.

Alternative:

The alternative design calls for a single span bridge structure to cross over the Silver Comet Trail only. The 63'-3" long bridge will have a CIP superstructure supported by 12- PSC AASHTO Type II beams spaced at 7'-9". The overall out-to-out width is 87'-5" and it will provide two 6'-0" sidewalks, two 2'-6" outside shoulders, 2-12'-0" traffic lanes (each direction), one 20'-0" inside median (with a 4'-0" raised median). The end bents fill will be retained by MSE walls running parallel to the existing trail. The bridge will be on an 11° - 30' skew.

Opportunities:

- Shorter bridge
- Potential savings in construction cost and construction time
- Construction staging area is same as proposed structure

Risks:

- Minimum redesign effort

Technical Discussion:

All clearances are met.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,721,005	\$	\$ 1,721,005
ALTERNATIVE	\$ 1,073,761	\$	\$ 1,073,761
SAVINGS	\$ 647,245	\$	\$ 647,245

Illustrations



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

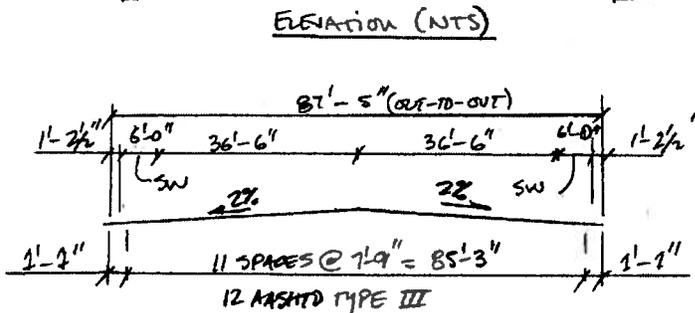
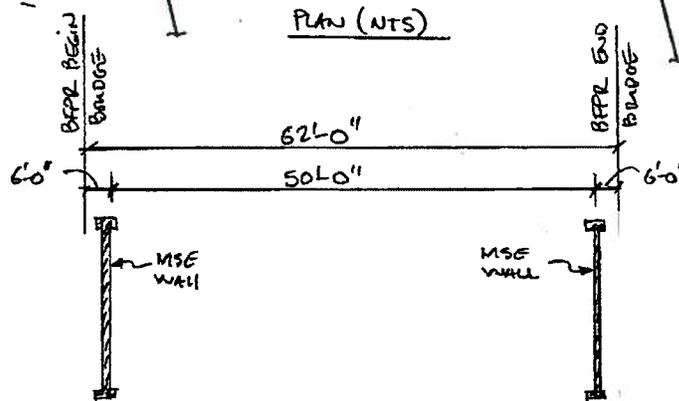
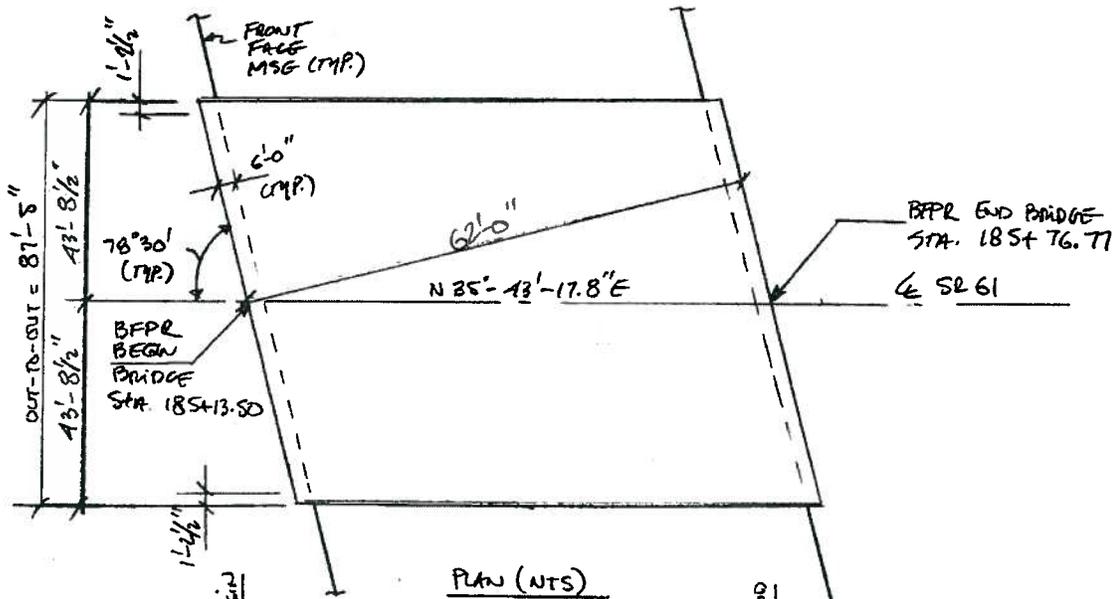
ALTERNATIVE NO.:

BR-5

DESCRIPTION: **USE A SINGLE SPAN BRIDGE STRUCTURE TO CROSS ONLY THE EXISTING TRAIL (USING PSC AASHTO TYPE II)**

SHEET NO.: 2 of 4

BR-5



Typ. Section (NTS)

Calculations



PROJECT: **Georgia Department of Transportation**
NH-018-1(59) - P.I. No. 621570
SR 61-Widening & Reconstruction - Paulding County

ALTERNATIVE NO.:

BR-5

DESCRIPTION: **USE A SINGLE SPAN BRIDGE STRUCTURE TO CROSS ONLY THE EXISTING TRAIL (USING PSC AASHTO TYPE II)**

SHEET NO.: 3 of 4

BR-5

Quantities (ESTIMATED)

DECK $\Rightarrow \nabla = 63.25 \times 87.417 \times 8/12 = 136.52 \text{ cy}$

MED $\Rightarrow \nabla = 4 \times 63.25 \times 6/12 = 4.685 \text{ cy}$

SW $\Rightarrow \nabla = 6 \times 63.25 \times (6.75/12) \times 2 = 15.813 \text{ cy}$

DIAP $\Rightarrow \nabla = 11 \text{ INT} + 2 \text{ END} \cong 12.52 \text{ cy}$

CAP $\Rightarrow \nabla = 2 \times 3 \times 87.417 \times 2 = 38.852 \text{ cy}$

WW $\Rightarrow \nabla = 4 \times 1 \times 10(3.667) = 5.432 \text{ cy}$

BACKWALL $\Rightarrow \nabla = 87.417 \times 8/12 \times 3.667 \times 2 = 15.83 \text{ cy}$

GRADING $\Rightarrow \text{SF} = (87.417 - 15.417) \times 63.25 = 566 \text{ SF}$

AASHTO TYPE II $\Rightarrow \text{LF} = 12 \times 63.25 = 759 \text{ LF}$

PARAPET $\Rightarrow \text{LF} = 2 \times 63.25 = 126.5 \text{ LF}$

HP PILES $\Rightarrow \text{LF} = 2 \times 12 \times 50 = 1200 \text{ LF}$

WALL No 1 $\Rightarrow \text{SF} = 26(56 + 95.417) \cong 3940 \text{ SF}$

WALL No 2 $\Rightarrow \text{SF} = 3940 \cong 3940 \text{ SF}$

MSE CORING $\Rightarrow \text{LF} = 210 + 160 \cong 370 \text{ LF}$

CLASS AA $\cong 170 \text{ cy}$

STEEL = $170 \times 250 \text{ #/cy} = 42,500 \text{ #}$

CLASS A $\cong 60 \text{ cy}$

STEEL = $60 \times 200 = 12,000 \text{ #}$

Project Description

PROJECT DESCRIPTION

The project is located on SR 62 from SR 120 Connector/Hiram Sudie Road to just south of CR 467/Dallas Nebo Road. The length of the project is 4.1 miles.

The widening and reconstruction of SR 61 is needed to provide additional capacity required for future growth in the area. SR 61 is the only continuous north-south corridor in Paulding County linking Dallas to both Cartersville (north) and I-20 (south). The purpose of this widening project is to ease traffic congestion and increase safety along this busy roadway.

The current roadway is a 2-lane/3-lane section with 12' lanes and 4' grassed shoulders. In the proposed project's approved concept, a typical section is a 4-lane section with 12' lanes, 10' outside shoulders with 4' paved, and a 20' raised median. The design speed is 45 mph throughout the corridor. The double 5'x5' culvert at Mill Creek and the two single 4'x4' box culverts are to be extended. The existing bridge structure over the Silver Comet Trail will be widened from 38' to 92'.

The project estimated construction cost is \$33,083,865. The preliminary ROW acquisition cost is \$23,219,000.

REPRESENTATIVE DOCUMENTS

- Construction Drawings and Plans
- GDOT Concept Report
- Detailed Cost Estimate
- Right-of-Way Cost Estimate
- Typical Sections
- Traffic Signalization Report

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

Representative documents follow:

5. MISCELLANEOUS

a. LIGHTING	\$0.00
b. SIGNING, STRIPING, SIGNAL	\$500,000.00
c. GUARDRAIL	\$65,700.00
d. SIDEWALK	\$194,460.00
e. CURB AND GUTTER	\$1,334,150.00

SUBTOTAL_{C5} \$2,094,310.00

6. SPECIAL FEATURES \$0.00

SUBTOTAL_{C6} \$1,528,610.00

ESTIMATE SUMMARY

A. Right of Way LOC GOV \$23,219,000.00

SUBTOTAL_A \$23,219,000.00

B. Reimbursable Utilities LOC GOV \$0.00

SUBTOTAL_B \$0.00

C. CONSTRUCTION:

1. MAJOR STRUCTURES	\$1,365,500.00
2. GRADING & DRAINAGE	\$1,595,000.00
3. BASE & PAVING	\$18,342,821.00
4. LUMP ITEMS	\$5,150,000.00
5. MISCELLANEOUS	\$2,094,310.00
6. SPECIAL FEATURES	\$1,528,610.00

SUBTOTAL_C \$30,076,241.00

E & C (10%) \$3,007,624.10

SUBTOTAL_{E&C} \$3,007,624.10

TOTAL CONSTRUCTION ESTIMATE

TOTAL_{CONST} \$33,083,865.10

GRAND TOTAL PROJECT COST ESTIMATE

TOTAL \$56,302,865.10

Department of Transportation State of Georgia

Interdepartmental Correspondence

FILE R/W Cost Estimate **OFFICE** Atlanta
DATE October 18, 2007

FROM Phil Copeland, Right of Way Administrator

TO Brent A. Story, P.E. / MG, State Road and Airport Design Engineer
ATTN: Walt Taylor

SUBJECT **Preliminary Right of Way Cost Estimate**
Project: NH-018-1(59)Paulding **UPDATE**
PI. No.: 621570
Description: SR 61 Widening Alternate #2

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

Please note the area of Required R/W was furnished with your request. **Please include total Required R/W areas for the entire corridor in all future requests.**

If you have any questions, please contact Jerry Milligan at the Chamblee Right of Way Office at (770) 986-1541.

PC:GAM

Attachments

cc: Brian Summers, Engineering Services
Wes Brock, R/W
Windy Bickers, Financial Management
File

Preliminary Right of Way Cost Estimate

Date: July 26, 2007
Project: NH-018-1 (59) Paulding, Alternate # 2
Existing/Required R/W: Varies/Varies
Project Termini: SR 61 Widening
Project Description: SR 61 Widening

P.L Number: 621570
No. Parcels: 98

Land:

Commercial			
7.10 Acres @ \$ 75,000 / Acre =	\$	532,500	
Residential			
64.00 Acres @ \$ 15,000 / Acre =	\$	<u>960,000</u>	
	\$		1,492,500

Improvements:

6 Com., 23 Res. & Misc. Site Improvements	\$		3,925,000
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Relocation:

6 Commercial @ \$ 25,000 =	\$	150,000	
23 Residential @ \$ 20,000 =	\$	<u>460,000</u>	
	\$		610,000

Damages:

18 Proximity	\$	360,000	
8 Cost To Cures	\$	200,000	
2 Consequential	\$	<u>100,000</u>	
	\$		<u>660,000</u>

\$ 6,687,500

Net Cost	\$	6,687,500
Scheduling Contingency 55 %	\$	3,678,125
Adm/Court Cost 60 %	\$	6,219,375
Market Appreciation 40 %	\$	<u>6,634,000</u>
	\$	23,219,000

Total Cost \$ 23,219,000

Prepared By : *[Signature]*
 Real Estate Acquisition Consultants, Inc.

Approved : *[Signature]*
 GDOT R/W

Paulding County Land Sales

<u>Highest & Best Use</u>	<u>Size (Acres)</u>	<u>Value/Acre</u>	<u>Sales Price</u>
Commercial	1.122	\$ 76,000	\$ 85,272
	1.233	\$ 87,970	\$ 108,467
	2.876	\$ 86,918	\$ 249,976
	3.334	\$ 79,980	\$ 266,653
Residential	0.348	\$ 33,600	\$ 11,693
	0.754	\$ 32,756	\$ 24,698
	1.248	\$ 15,000	\$ 18,720
	2.370	\$ 13,500	\$ 31,995

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

RECEIVED
AUG 10 2004
BY:

INTERDEPARTMENT CORRESPONDENCE

FILE NH-018-1(59) Paulding OFFICE Road Design
PI # 621570
DATE August 10, 2004
FROM *Gerald M. Ross*
Gerald M. Ross, P.E., State Road and Airport Design Engineer
TO Meg Pirkle, P.E., Assistant Director of Preconstruction
SUBJECT Revised Project Concept Report: *Widening and reconstruction of SR61 from SR 120 Connector to US278/SR 120/SR 6.*

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

The original south project terminus for SR 61 was at the SR 120 Connector (Hiram Sudie Road). Original traffic forecasts showed a decrease in traffic on SR 61 south of the SR 120 Connector. Traffic forecasts for 2007 and 2027 now show that the decrease in traffic on SR 61 occurs south of CR 467 (Dallas Nebo Road). It is proposed that the terminus be moved from the SR 120 Connector to approximately 950-ft south of CR 467.

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).

GMR:JGM:WT:ss

Attachment: Revised Project Concept Report

Joseph P. Pirkle
State Transportation Planning Administrator

8/18/04
Date

cc: David Mulling, Project Review Engineer
Harvey Keepler, State Environmental/Location Engineer
Phillip Allen, State Traffic Safety and Design Engineer
Joe Palladi, State Transportation Planning Administrator
Jamie Simpson, Financial Management Administrator
Kent Sager, District 6 Engineer
Paul Liles, State Bridge Engineer

ROUTING

<input type="checkbox"/>	<i>Joe</i>
<input checked="" type="checkbox"/>	<i>Harvey</i>
<input checked="" type="checkbox"/>	<i>Phillip</i>
<input checked="" type="checkbox"/>	<i>Meg</i>
<input checked="" type="checkbox"/>	<i>Paul</i>

REVISED PROJECT CONCEPT REPORT

Need and Purpose: Project NH-018-1(59) provides additional capacity required for future growth in the area as SR 61 is the only continuous north-south corridor in Paulding County linking Dallas to both Cartersville (north) and I-20 (south). The purpose of this widening project is to ease traffic congestion and increase safety along this busy stretch of roadway.

Project location: SR 61 from SR 120 Connector/Hiram Sudie Rd to US 278/SR 120/SR 6/Dallas Bypass in Paulding County.

Description of the approved concept: The approved concept for Project No. STP-018-1(59) consists of widening and reconstruction of SR 61. The existing roadway is a 2-lane/3-lane section with 12 ft lanes and 4 ft grassed shoulders. The proposed project's approved concept typical section is a 4-lane section with 12 ft lanes, 10 ft outside shoulders with 4 ft paved, and a 20 ft raised median. The double 5' X 5' culvert at Mill Creek and the two single 4' X 4' box culverts are to be extended. The project is 3.2 miles long. The existing bridge structure, project number BRN-NH-018-1(60), over the Silver Comet Trail will be widened from 38 ft to 92 ft.

PDP Classification: Major Project

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

Functional Classification: Rural Minor Arterial

U.S. Route Number(s):

State Route Number(s): 61

Traffic (AADT) as shown in the approved concept:

Current Year: 16,850 (1998)

Design Year: 29,650 (2018)

Proposed features to be revised: In order to address the increased traffic on SR 61 between SR 120 Connector/Hiram Sudie Rd and CR 467/Dallas Nebo Road, it is proposed that the southern project terminus be moved south of CR 467/Dallas Nebo Rd.

Describe the revised features to be approved: The proposed revision to the approved concept report is to extend the southern terminus of the project from SR 120 Connector/Hiram Sudie Rd (mile point 7.10) to just south of CR 467/Dallas Nebo Rd. (mile point 6.20) adding 0.9 miles to the project length.

Update traffic data (AADT):

Current Year: 23,350 (2007)

Design Year: 38,700 (2027)

Programmed/Schedule:

P.E.: Underway

R/W: 2004 (proposed 2006)

Construction: 2007 (proposed 2008)

Revised cost estimates:

Construction cost including inflation and E&C: \$10,275,500

1. Right of way: \$5,687,600
2. Utilities: Local Government

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

Project NH-018-1(59) is ARC Project No. PA-003 in the Atlanta Region 2025 Regional Transportation Plan (RTP) with project termini of SR 120 Connector and US 278/SR 6 and a Network Year of 2010. The 2025 RTP also has ARC Project No. PA-021 in Long Range status with SR 61 termini of CR 277 (Nebo Road) and SR 120 Connector and a Network Year of 2010. Extending Project NH-018-1(59) south as proposed should be in compliance with the 2025 RTP since both ARC projects are roadway capacity expanding SR 61 from 2 to 4 thru lanes. ARC project fact sheets for PA-003 and PA-021 are attached.

Recommendation: It is recommended that these changes be approved.

Concur: 
Director of Preconstruction

Approve: 
Chief Engineer

Attachments:

- Location Sketch Map
- ARC Project Fact Sheets
- Updated Traffic Data Diagrams
- Revised Cost Estimate

PROJECT FACT SHEET

PROJECT DEFINITION

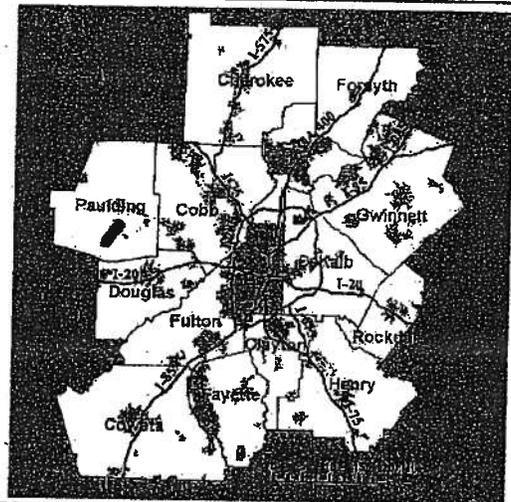
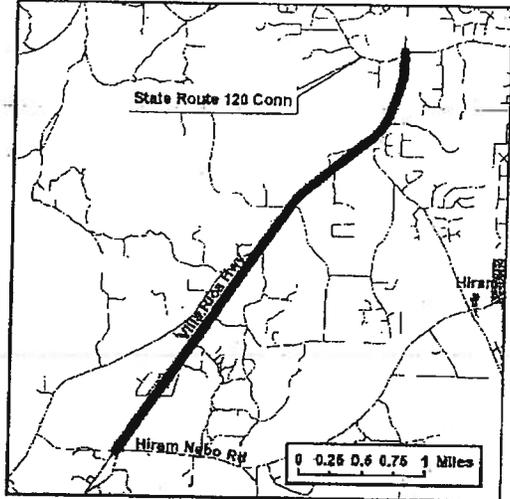
Short Title
SR 61 FROM NEBO RD TO SR 120 CONN

GDOT Project No.

Federal ID No.

Status
Long Range

Detailed Description and Justification



Service Type
Roadway Capacity

Sponsor
GDOT

Jurisdiction
Paulding County

Congress District

Completion Date

Existing Thru Lane
 (applicable for roadway projects only)

Planned Thru Lane
 (applicable for roadway projects only)

Corridor Length
 miles (not applicable for all project types)

PLANNING AND IMPLEMENTATION DETAILS

Analysis Level

Network Year
 (required if modeled for conformity)

Total Project Cost

Funded in Previous TIP

Funded in Current TIP
 (see table below for details)

Future Long Range Funds (RTP)
 (see table below for details)

Primary Funding Source
GDOT - Funding by GA Department of Transportation

Phase Status and Funding Information for 03-05 TIP

Phase	Funding Source					
	Federal	State	Local	Other	Total	Match
Preliminary Engineering / Design / Study			\$0	\$0	\$0	\$0
Right-of-way Acquisition			\$0	\$0	\$0	\$0
Construction / Implementation (Year 1)			\$0	\$0	\$0	\$0
Construction / Implementation (Year 2)			\$0	\$0	\$0	\$0
Construction / Implementation (Year 3)			\$0	\$0	\$0	\$0
Future Long Range Funds (RTP)		N/A	\$12,000,000	\$0	\$12,000,000	\$0

? All projects listed are contained in the 2025 Regional Transportation Plan. Some or all may also be included in the FY 2003-2005 Transportation Improvement Program. For additional information about this project, please visit the Atlanta Regional Commission at www.atlantaregional.com or call (404) 463-3100.



PROJECT FACT SHEET

PROJECT DEFINITION

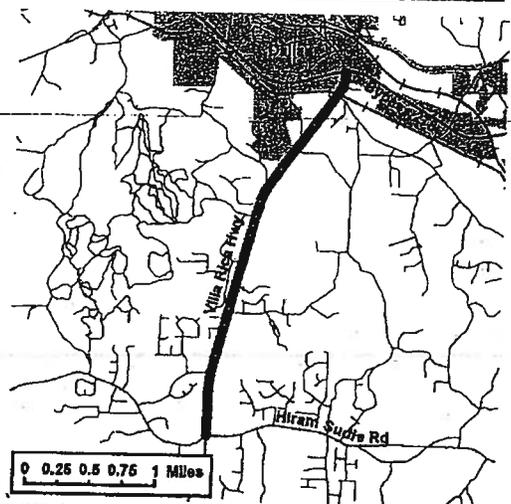
Short Title
SR 61 FROM SR 120 CONN - HIRAM-SUDIE ROAD TO US 278/SR 6-JIMMY LEE CAMPBELL PKWY

GDOT Project No. 621570

Federal ID No.

Status Programmed

Detailed Description and Justification



Service Type Roadway Capacity

Sponsor GDOT

Jurisdiction Paulding County

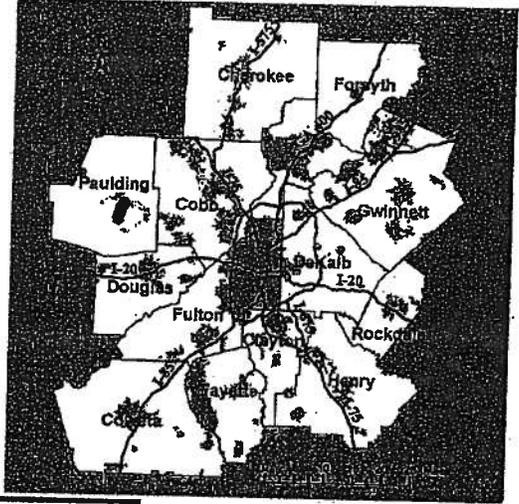
Congress District 7

Completion Date 2007

Existing Thru Lane 2 (applicable for roadway projects only)

Planned Thru Lane 4 (applicable for roadway projects only)

Corridor Length 3.00 miles (not applicable for all project types)



PLANNING AND IMPLEMENTATION DETAILS

Analysis Level NW

Network Year 2010 (required if modeled for conformity)

Total Project Cost \$13,761,000

Funded in Previous TIP \$0

Funded in Current TIP \$13,761,000 (see table below for details)

Future Long Range Funds (RTP) \$0 (see table below for details)

Primary Funding Source Q05 - National Highway System

Phase Status and Funding Information for 03-05 TIP

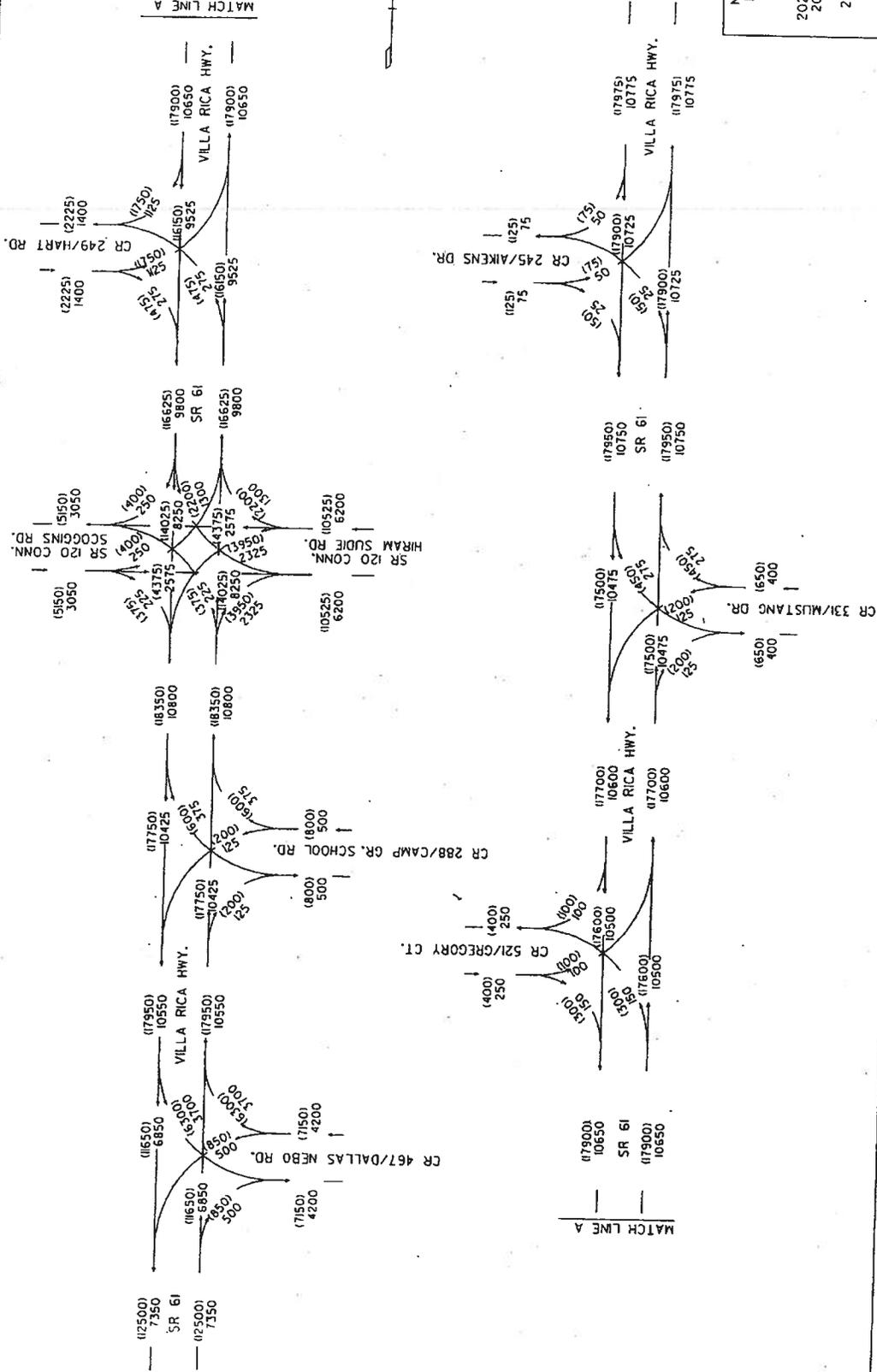
Activity	Year	Funding	Funding	Funding	Funding	Funding
Preliminary Engineering / Design / Study	AUTH	\$0	\$0	\$0	\$0	\$0
Right-of-way Acquisition	2004	\$4,375,000	\$3,500,000	\$875,000	\$0	\$0
Construction / Implementation (Year 1)	2005	\$9,386,000	\$7,508,800	\$1,877,200	\$0	\$0
Construction / Implementation (Year 2)		\$0	\$0	\$0	\$0	\$0
Construction / Implementation (Year 3)		\$0	\$0	\$0	\$0	\$0
Future Long Range Funds (RTP)	N/A	\$0	\$0	\$0	\$0	\$0

All projects listed are contained in the 2025 Regional Transportation Plan. Some or all may also be included in the FY 2003-2005 Transportation Improvement Program. For additional information about this project, please visit the Atlanta Regional Commission at www.atlantaregional.com or call (404) 463-3100.



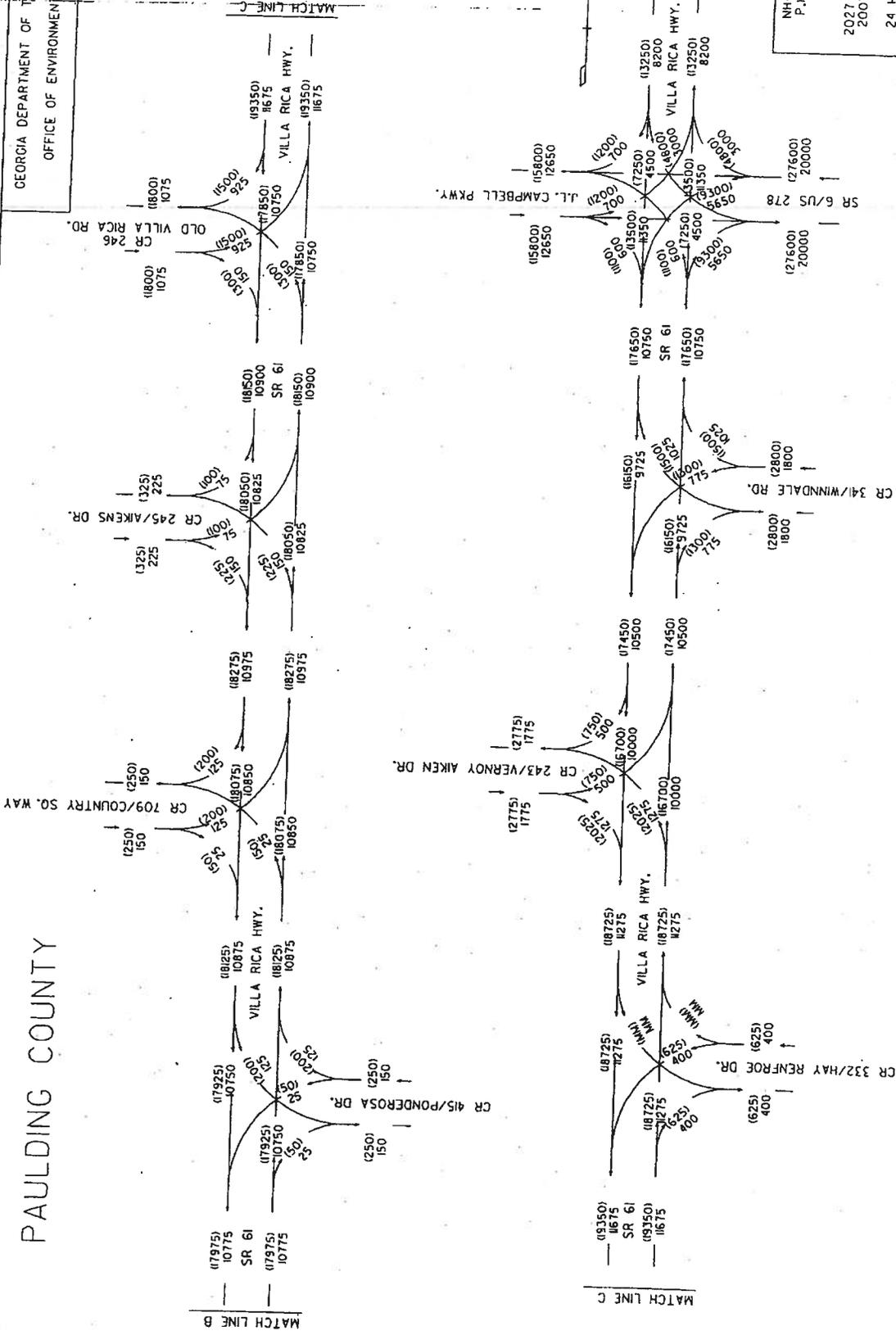
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENT/LOCATION

PAULDING COUNTY



PAULDING COUNTY

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENT/LOCATION



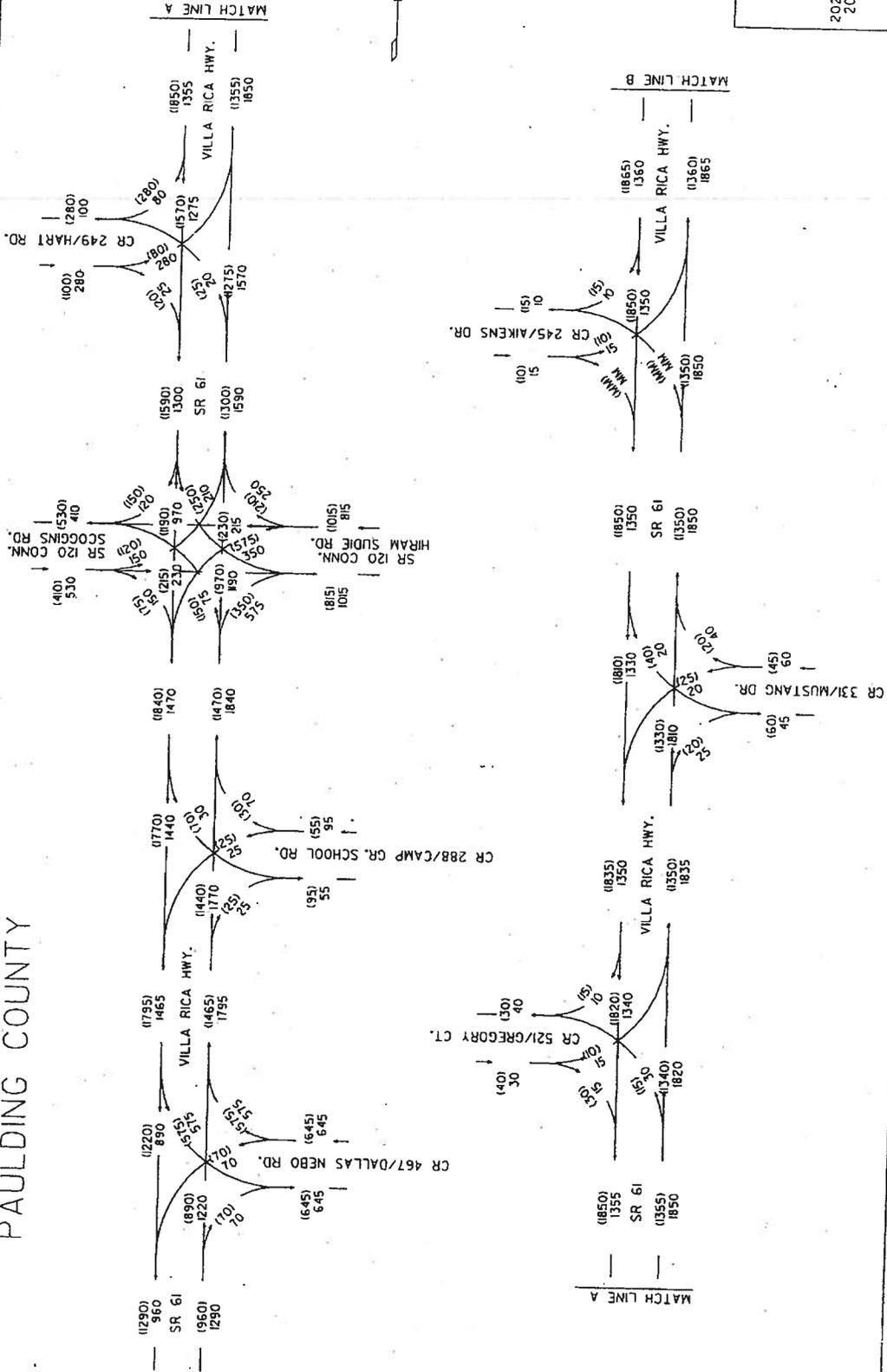
NH-018-1159)
P.J.# 62570
PAULDING
SR-61

2027 ADT = 1000
2007 ADT = 000

24 HR. T = 8%
S.U. = 7%
COMB. = 1%

TJW
06/02

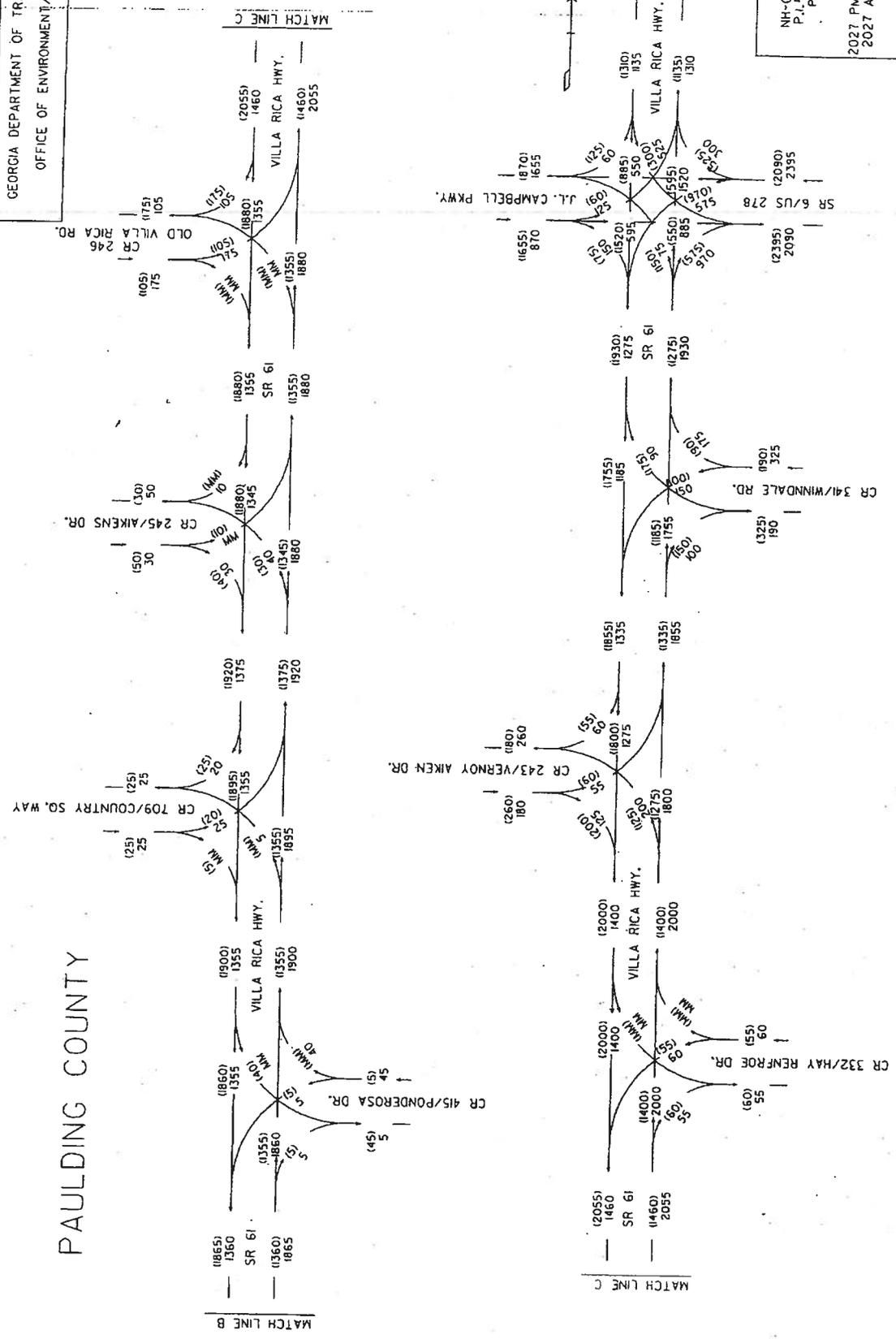
PAULDING COUNTY



NH-018-1(59)
P.I.# 62570
PAULDING
SR-61
2027 PM DHV = 1000
2027 AM DHV = 000
T = 7%
LW
06/02

PAULDING COUNTY

PAGE 4 OF 4



NH-018-1(59)
P.L.# 621570
PAULDING
SR-61
2027 PM DHV = 000
2027 AM DHV = 000
T = 72
LJW
06/02

CULVERTS / BRIDGES over SILVER COMET TRAIL

COBB / PAULDING COUNTIES

PAULDING COUNTY

SR 6 / US 278 West of Dallas – Culvert

SR 120 West of SR 6 – Culvert (under construction)

SR 61 South of SR 6 – Bridge (Proposed 4 lane project 2010) – Adequate clearance

Harris Road – Between SR 6 and Winndale Rd – Existing bridge closed – New bridge in design stages – Adequate clearance

SR 92 in Hiram – Existing Bridge adequate clearance - (Proposed 4 lane project 2011)

Cleburne Parkway – Existing at grade crossing – Culvert proposed in Eat Hiram Parkway project

COBB COUNTY

Powder Springs – Dallas Rd (Old SR 6) – Existing bridge w/ substandard clearance

SR 176 – Existing bridge – adequate clearance

Powder Springs Rd – Existing bridge - adequate clearance

Ewing Rd – Existing bridge – unsure of clearance

Concord Rd – Existing Bridge – adequate clearance – bridge to be reconstructed

East – West Connector – Adequate clearance

Engineer's Name: C. SAWYER
Project Number: 621570
Signal Description: DALLAS NEBO @ SR 61
Date: Thursday, November 15, 2007

Calculation Factors:
 AM Cycle Length: 81.00 sec
 PM Cycle Length: 60.00 sec
 Length of Pass. Car: 20.00 ft
 Spacing Gap: 5.00 ft
 Equiv. Veh. Factor: 1.50

Signal Description and Movement		Design Vehicles / Hour	Number of Lanes in Group	Cycle Length	Number Of Cycles / Hour	Number of Vehicles Queuing / Cycle	Length of Passenger Car	Spacing Gap	Factor for Equivalent Vehicle	Calculated Storage Length	Required Storage Length
Project Number: 621570 DALLAS NEBO @ SR 61											
EBL											
EBT											
EBR											
WBL	70	1	81.00	44.44	2.00	20.00	5.00	1.50	75.00	263	
WBT											
WBR	575	2	81.00	44.44	7.00	20.00	5.00	1.50	262.50	263	
SBL	575	2	81.00	44.44	7.00	20.00	5.00	1.50	262.50	413	
SBT	890	2	81.00	44.44	11.00	20.00	5.00	1.50	412.50	413	
SBR											
NBL											
NBT	1220	2	81.00	44.44	14.00	20.00	5.00	1.50	525.00	525	
NBR	70	1	81.00	44.44	2.00	20.00	5.00	1.50	75.00	525	

AM

Engineer's Name: C. SAWYER
Project Number: 621570
Signal Description: DALLAS NEBO @ SR 61
Date: Thursday, November 15, 2007

Calculation Factors:
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Project Number: 621570 DALLAS NEBO @ SR 61										
Signal Description and Movement	Design Vehicles / Hour	Number of Lanes in Group	Cycle Length	Number of Cycles / Hour	Number of Vehicles Queuing / Cycle	Length of Passenger Car	Spacing Gap	Factor for Equivalent Vehicle	Calculated Storage Length	Required Storage Length
EBL										
EBT										
EBR										
WBL	70	1	60.00	60.00	2.00	20.00	5.00	1.50	75.00	263
WBT										
WBR	575	2	60.00	60.00	5.00	20.00	5.00	1.50	187.50	263
SBL	575	2	60.00	60.00	5.00	20.00	5.00	1.50	187.50	413
SBT	1220	2	60.00	60.00	11.00	20.00	5.00	1.50	412.50	413
SBR										
NBL										
NBT	890	2	60.00	60.00	8.00	20.00	5.00	1.50	300.00	525
NBR	70	1	60.00	60.00	2.00	20.00	5.00	1.50	75.00	525

PM

Engineer's Name:
 Project Number:
 Signal Description:
 Date:

NH-018-1(59)
 SR 61 @ SR 120 Conn
 Thursday, November 15, 2007

Calculation Factors:

AM Cycle Length: 114.60 sec
 PM Cycle Length: 110.20 sec
 Length of Pass. Car: 20.00 ft
 Spacing Gap: 5.00 ft
 Equiv. Veh. Factor: 1.50

Signal Description and Movement	Design Vehicles / Hour	Number of Lanes in Group	Cycle Length	Number Of Cycles / Hour	Number of Vehicles Queuing / Cycle	Length of Passenger Car	Spacing Gap	Factor for Equivalent Vehicle	Calculated Storage Length	Required Storage Length
AM										
Project Number: NH-018-1(59) SR 61 @ SR 120 Conn										
EBL	150	1	114.60	31.41	5.00	20.00	5.00	1.50	187.50	188
EBT	230	2	114.60	31.41	4.00	20.00	5.00	1.50	150.00	150
EBR	150	1	114.60	31.41	5.00	20.00	5.00	1.50	187.50	188
WBL	350	2	114.60	31.41	6.00	20.00	5.00	1.50	225.00	338
WBT	215	2	114.60	31.41	4.00	20.00	5.00	1.50	150.00	150
WBR	250	1	114.60	31.41	8.00	20.00	5.00	1.50	300.00	300
SBL	210	1	114.60	31.41	7.00	20.00	5.00	1.50	262.50	713
SBT	970	2	114.60	31.41	16.00	20.00	5.00	1.50	600.00	713
SBR	120	1	114.60	31.41	4.00	20.00	5.00	1.50	150.00	713
NBL	75	1	114.60	31.41	3.00	20.00	5.00	1.50	112.50	713
NBT	1190	2	114.60	31.41	19.00	20.00	5.00	1.50	712.50	713
NBR	575	1	114.60	31.41	19.00	20.00	5.00	1.50	712.50	713

Engineer's Name:
 Project Number:
 Signal Description:
 Date:

NH-018-1(59)
 SR 61 @ SR 120 Conn
 Thursday, November 15, 2007

Calculation Factors:

AM Cycle Length: 114.60 sec
 PM Cycle Length: 110.20 sec
 Length of Pass. Car: 20.00 ft
 Spacing Gap: 5.00 ft
 Equiv. Veh. Factor: 1.50

Signal Description and Movement	Design Vehicles / Hour	Number of Lanes in Group	Cycle Length	Number of Cycles / Hour	Number of Vehicles Queuing / Cycle	Length of Passenger Car	Spacing Gap	Factor for Equivalent Vehicle	Calculated Storage Length	Required Storage Length
PM										
Project Number: NH-018-1(59) SR 61 @ SR 120 Conn										
EBL	120	1	110.20	32.67	4.00	20.00	5.00	1.50	150.00	188
EBT	215	2	110.20	32.67	4.00	20.00	5.00	1.50	150.00	150
EBR	75	1	110.20	32.67	3.00	20.00	5.00	1.50	112.50	188
WBL	575	2	110.20	32.67	9.00	20.00	5.00	1.50	337.50	338
WBT	230	2	110.20	32.67	4.00	20.00	5.00	1.50	150.00	150
WBR	210	1	110.20	32.67	7.00	20.00	5.00	1.50	262.50	300
SBL	250	1	110.20	32.67	8.00	20.00	5.00	1.50	300.00	713
SBT	1190	2	110.20	32.67	19.00	20.00	5.00	1.50	712.50	713
SBR	150	1	110.20	32.67	5.00	20.00	5.00	1.50	187.50	713
NBL	150	1	110.20	32.67	5.00	20.00	5.00	1.50	187.50	713
NBT	970	2	110.20	32.67	15.00	20.00	5.00	1.50	562.50	713
NBR	350	1	110.20	32.67	11.00	20.00	5.00	1.50	412.50	713

Engineer's Name: C. Sawyer
Project Number: NH-018-1(59)
Signal Description: US 278 / SR 6
Date: Thursday, November 15, 2007

Calculation Factors:
 AM Cycle Length: 98.50 sec
 PM Cycle Length: 102.00 sec
 Length of Pass. Car: 20.00 ft
 Spacing Gap: 5.00 ft
 Eqiv. Veh. Factor: 1.50

Signal Description and Movement	Design Vehicles / Hour	Number of Lanes in Group	Cycle Length	Number Of Cycles / Hour	Number of Vehicles Queuing / Cycle	Length of Passenger Car	Spacing Gap	Factor for Equivalent Vehicle	Calculated Storage Length	Required Storage Length
Project Number: NH-018-1(59) US 278 / SR 6										
EBL	125	2	98.50	36.55	2.00	20.00	5.00	1.50	75.00	825
EBT	595	2	98.50	36.55	9.00	20.00	5.00	1.50	337.50	825
EBR	150	1	98.50	36.55	5.00	20.00	5.00	1.50	187.50	825
WBL	575	2	98.50	36.55	8.00	20.00	5.00	1.50	300.00	788
WBT	1520	2	98.50	36.55	21.00	20.00	5.00	1.50	787.50	788
WBR	300	1	98.50	36.55	9.00	20.00	5.00	1.50	337.50	788
SBL	525	2	98.50	36.55	8.00	20.00	5.00	1.50	300.00	488
SBT	550	2	98.50	36.55	8.00	20.00	5.00	1.50	300.00	488
SBR	60	1	98.50	36.55	2.00	20.00	5.00	1.50	75.00	488
NBL	75	2	98.50	36.55	2.00	20.00	5.00	1.50	75.00	1013
NBT	885	2	98.50	36.55	13.00	20.00	5.00	1.50	487.50	488
NBR	970	1	98.50	36.55	27.00	20.00	5.00	1.50	1012.50	1013

AM

Engineer's Name: C. Sawyer
Project Number: NH-018-1(59)
Signal Description: US 278 / SR 6
Date: Thursday, November 15, 2007

Calculation Factors:
 AM Cycle Length: 98.50 sec
 PM Cycle Length: 102.00 sec
 Length of Pass. Car: 20.00 ft
 Spacing Gap: 5.00 ft
 Equiv. Veh. Factor: 1.50

Signal Description and Movement		Design Vehicles / Hour	Number of Lanes in Group	Cycle Length	Number Of Cycles / Hour	Number of Vehicles Queuing / Cycle	Length of Passenger Car	Spacing Gap	Factor for Equivalent Vehicle	Calculated Storage Length	Required Storage Length
Project Number: NH-018-1(59) US 278 / SR 6											
EBL		60	2	102.00	35.29	1.00	20.00	5.00	1.50	37.50	825
EBT		1520	2	102.00	35.29	22.00	20.00	5.00	1.50	825.00	825
EBR		75	1	102.00	35.29	3.00	20.00	5.00	1.50	112.50	825
WBL		970	2	102.00	35.29	14.00	20.00	5.00	1.50	525.00	525
WBT		595	2	102.00	35.29	9.00	20.00	5.00	1.50	337.50	788
WBR		525	1	102.00	35.29	15.00	20.00	5.00	1.50	562.50	563
SBL		300	2	102.00	35.29	5.00	20.00	5.00	1.50	187.50	488
SBT		885	2	102.00	35.29	13.00	20.00	5.00	1.50	487.50	488
SBR		125	1	102.00	35.29	4.00	20.00	5.00	1.50	150.00	488
NBL		150	2	102.00	35.29	3.00	20.00	5.00	1.50	112.50	1013
NBT		550	2	102.00	35.29	8.00	20.00	5.00	1.50	300.00	488
NBR		575	1	102.00	35.29	17.00	20.00	5.00	1.50	637.50	1013

PM

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 13 – November 16, 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:

Les M. Thomas, P.E., CVS-Life	Certified Value Specialist
Luke Clarke, P.E.	Highway Design Engineer
Kevin Martin, P.E.	Highway Construction Specialist
Randy S. Thomas, AVS	Assistant Team Leader
Faabricio Quinonez, 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**
 - **Improve Level of Service**
 - **Increase Capacity**
 - **Separate Traffic**
 - **Provide for future growth**
 - **Project Basic Functions**
 - **Construct Additional Traffic Lanes**
 - **Construction Additional 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

PROJECT: GEORGIA DEPARTMENT OF TRANSPORTATION
 NH-018-1(59) - P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

SHEET NO.: 1 of 2

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	OVERALL PROJECT	Increase	Traffic Capacity	B	56,303	50,000	C/W = 1.12
		Facilitate	Access	B			
		Enhance	Safety	S			
2	BASE AND PAVING	Create	Lanes	B	18,342	15,000	C/W = 1.2
		Increase	Capacity	B			
		Enhance	Safety	RS			
3	CLEARING & GRUBBING	Remove	Vegetation	S	2,500	2,000	C/W = 1.25
4	BRIDGE				1,529		
5	TRAFFIC CONTROL	Facilitate	Safe Construction	S	1,500	1,000	C/W = 1.5
6	CURB & GUTTER	Route	Stormwater	S	1,334	1,000	C/W = 1.3
7	EROSION CONTROL	Stabilize	Earthwork	S	1,000	1,000	C/W = 1
		Protect	Environment	RS			

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
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

SHEET NO.: 2 of 2

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
8	DRAINAGE (DR)	Convey	Storm Water	B	845	845	C/W = 1.00
		Facilitate	Utilities	S			
9	EARTHWORK (EW)	Support	Road	S	750	750	C/W = 1.00
		Avoid	Flooding	RS			
10	BOX CULVERT	Transfer	Stormwater	RS	700	700	C/W = 1.00
11	RETAINING WALLS	Protect	Slope	S	666	500	C/W = 1.3
12	SIGNING & MARKING	Enhance	Directions	S	500	500	CW = 1.00
		Channelize	Traffic	S			
13	SIDEWALK	Support	Pedestrians	S	194	194	C/W = 1.00
14	LANDSCAPING	Enhance	Beauty	S	150	150	C/W = 1.00
8	GUARDRAIL & ANCHORING SYSTEMS	Enhance	Safety	B	66	66	C/W = 1.00
		Reduce	Earthwork	S			
		Enhance	Safety	RS			

Function defined as: Action Verb
 Measurable Noun

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

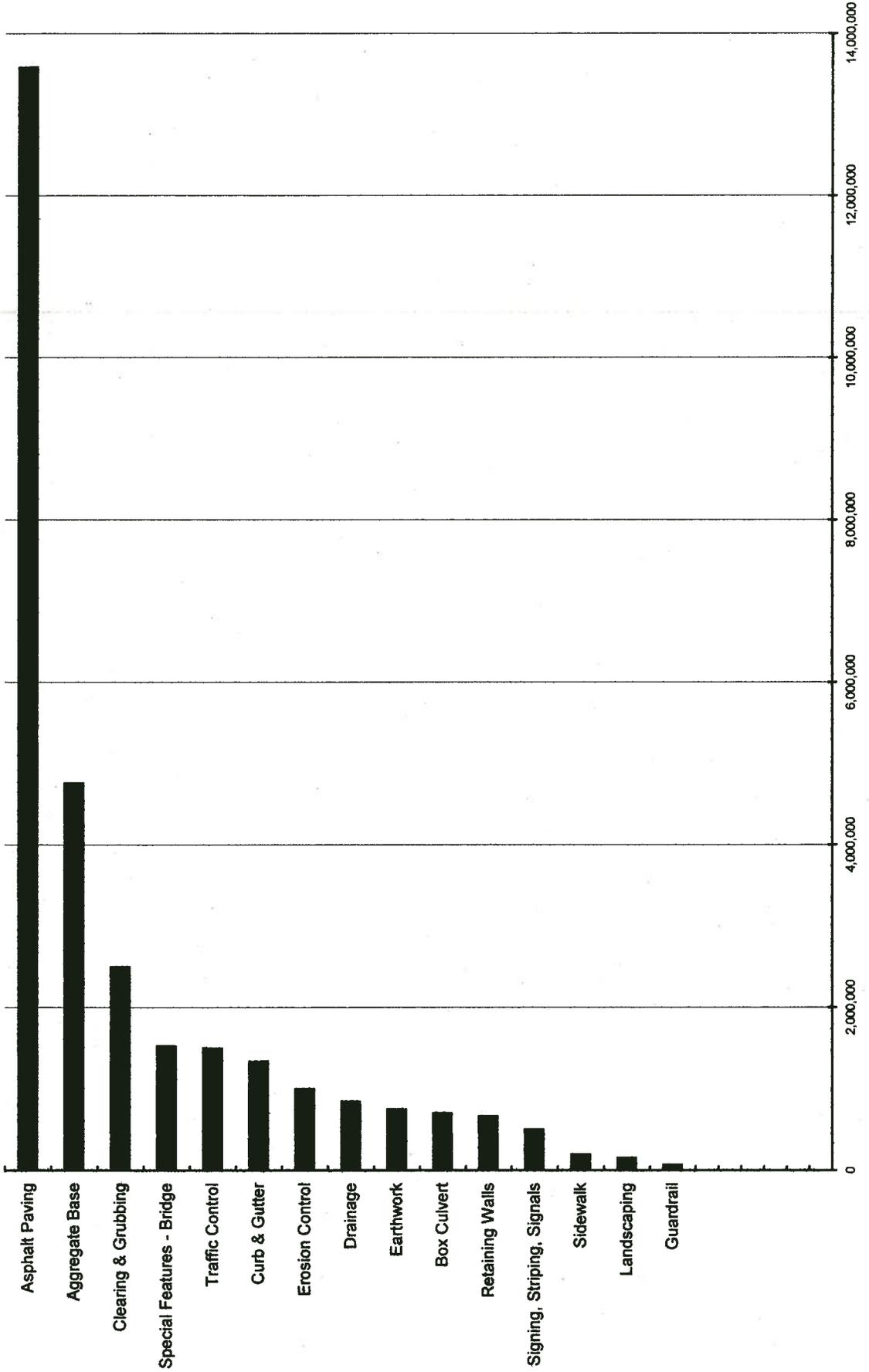
HO = Higher Order
 LO = Lower Order

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

Pareto Chart 2



NH-018-1(59) - P.I. No. 621570
SR 61 - Pauiding County



DESIGNER PRESENTATION

MEETING PARTICIPANTS



November 13, 2007

Geogla Department of Transportation NH-018-1(59) - P.I. No. 621570 - Paulding County		MEETING PARTICIPANTS		
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CREATIVE IDEA LISTING & EVALUATION



PROJECT: Georgia Department of Transportation
 NH-018-1(59) – P.I. No. 621570
 SR 61-Widening & Reconstruction - Paulding County

SHEET NO.: 1 of 1

NO.	IDEA DESCRIPTION	RATING
Roadway (RD)		
RD-1	Increase use of 11' travel lanes	4
RD-2	Reduce side street work on SR 120 connector	4
RD-3	Use 6' in lieu of 6'6" shoulder	5
RD-4	Choose consistent typical section	5
RD-5	Re-align Campground School Road	DS
RD-6	Retain Dallas/Nebo Road intersection & improve it	5
RD-7	Re-align intersection at Akin Drive	DS
RD-8	Use alternate walls in lieu of C.I.P.	5
RD-9	From Sta. 90+00 to Sta. 125+00 use minimum section in lieu of relocation	5
RD-10	Eliminate Akin Ridge and Country Square intersections at Sta. 140+00 to +/- Sta. 152+00	5
RD-11	Reconfigure intersection at 212+00 split intersection from 1-4 leg to 2 -2 leg	DS
RD-12	Utilize rap from sections to be relocated	3
RD-13	Reduce turn lane storage addition on US 278	DS
RD-14	Improve access management – Right in/Right out with U-turns	1
RD-15	Modify Section 70+00 to 75+00 to reduce walls at cemetery	1
RD-16	Delete intersection Ponderosa ext. at 148+00 Country Square Traail	1
RD-17	Retain and signalize existing Dallas Nebo Drive / eliminate proposed Dallas/Nebo	1
Bridge (BR)		
BR-1	Use a single span bridge structure	5
BR-2	Construct a Box Culvert in-lieu of a new bridge	4
BR-3	Use a "on-Span" structure in-lieu of a new bridge	5
BR-4	Reduce roadway grade	3
BR-5	Use a single span bridge structure to cross only the existing trail	5

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