



# SR 92 REALIGNMENT AND WIDENING

Project Nos. CSSTP-0007-00(691) STP-186-1(11)

CSSTP-0006-00(900) CSSTP-0006-00-(901)

P.I. Nos. 0007691/720970/0006900/0006901

Douglas and Paulding Counties, Georgia

## Value Engineering Study Report

Preliminary Design Stage

May 2008

*Design Consultant*



*Value Engineering Consultant*



**Lewis & Zimmerman Associates, Inc.**



**Lewis & Zimmerman Associates, Inc.**  
*Taking the Chance out of Change*

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May 22, 2008

Ms. Lisa L. Myers  
Design Review Engineering Manager  
Georgia Department of Transportation  
No. 2 Capitol Square, Room 266  
Atlanta, Georgia 30334

re: SR 92 Realignment and Widening, P.I. Nos. 0006900, 00066901, 72097 and 0007691  
Douglas and Paulding Counties  
Value Engineering Study Report

Dear Ms. Myers:

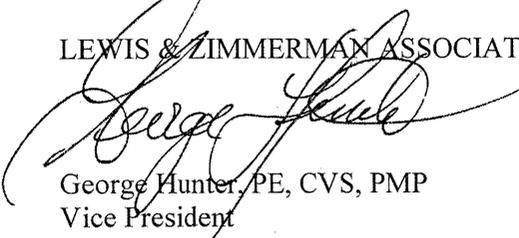
Lewis & Zimmerman Associates, Inc. (LZA) is pleased to submit the referenced value engineering (VE) study report. The objective of the VE effort was to find ways to reduce costs and improve the typical section, bridges and horizontal and vertical alignments.

The two projects have a current combined probable construction cost estimate of \$74.9 million and \$47.9 million in right-of-way and utilities. Significant savings can be achieved by overlaying and widening the existing pavement, building a four-lane highway now and widening to six lanes in the future, and reducing all lanes to 11 feet wide. This report highlights these and other promising opportunities to reduce costs and add value to the project.

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

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.



George Hunter, PE, CVS, PMP  
Vice President

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## **EXECUTIVE SUMMARY**

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### **INTRODUCTION**

This report summarizes the events and results of the value engineering (VE) study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the SR 92 Realignment and Widening project being designed by Croy Engineering and associated firms. The plans were at the preliminary stage of development at the time of the VE study, and an environmental assessment was underway.

A five-day VE workshop was conducted May 5-9, 2008 at the Department's offices in Atlanta using a multidisciplinary team comprised of highway design, structures and construction professionals. The team followed the six-phase VE Job Plan to guide its deliberations:

- Information Gathering
- Function Identification and Analysis
- Creative Idea Generation
- Evaluation of Creative Ideas
- Development of Alternatives
- Presentation of Results

### **PROJECT DESCRIPTION**

Two main segments of roadway were studied in the VE workshop. The SR 92 realignment comprises the southernmost portion in Douglas County, and the SR 92 widening comprises the northernmost portion in Douglas and Paulding Counties.

#### **SR 92 Realignment**

The realignment of SR 92 involves a new six-lane divided highway from Durelee Lane to Malone Road in Douglas County. It will divert heavy truck and automobile traffic from the downtown portion of Douglasville to the new highway. The preferred alignment avoids historical, 4F and community resources and intersects and connects ten cross roads. A grade separation between SR 92 and US 78, the Norfolk Southern Railroad and East Strickland Street will be constructed to eliminate the existing at-grade crossing. The typical section includes a 20-ft. raised median and 12-ft. urban shoulders with a multi-use path on one side and a sidewalk on the other side.

The pavement section will be Portland cement concrete (PCC). Please note that the cost estimate information shown in Table 1 reflects asphalt pavement and should be updated for PCC pavement.

<b>Table 1 – SR 92 Realignment Costs</b>				
	South Section	Middle Section	North Section	All 3 Sections
Construction	\$ 10,196,925	\$ 9,809,621	\$ 12,901,858	\$ 32,908,404
Right of Way	\$ 15,667,600	\$ 9,737,500	\$ 9,004,500	\$ 34,409,600
Reimbursable Utilities	\$ -	\$ 3,100,000	\$ 100,000	\$ 3,200,000
<b>Total Project Costs</b>	<b>\$ 25,477,221</b>	<b>\$ 23,034,425</b>	<b>\$ 22,006,358</b>	<b>\$ 70,518,004</b>

## **SR 92 Widening**

The SR 92 project involves widening the existing roadway to six lanes from Malone Road to Nebo Road in Douglas and Paulding Counties. The project will also provide a variable width median. The existing roadway is variable with two to three travel lanes and approximately 8-ft. shoulders, 2-ft. paved. Right- and left-turn lanes are provided as needed.

From Malone Road to Bill Carruth Parkway, the primary typical section would consist of six travel lanes, three in each direction with a 24-ft. raised median and 10-ft. outside shoulders, 6.5-ft. paved. From Bill Carruth Parkway to Nebo Road, the primary typical section would consist of four travel lanes, two in each direction, with a 24-ft. raised median and 10-ft. outside shoulders, 4-ft. paved.

The existing right-of-way on SR 92 is about 100 ft. Approximately 60 ft. of additional right-of-way would be required. The existing asphalt pavement will be replaced with PCC.

The combined construction and right-of-way costs for the widening project are \$52.3 million, comprising \$42 million for construction, \$9.2 million for right of way, and \$1.1 million for reimbursable utilities. Please note that the cost estimate information shown in Table 1 reflects asphalt pavement and should be updated for PCC pavement.

## **ISSUES AND OBJECTIVES**

The key project issues and constraints are listed below:

- The grade separation detour in the Realignment Project needs to be defined better. A north and south shifted detour was studied, and the south shifted detour was chosen. It comes close to the Mill property, an historical property.
- Pavement will be concrete in lieu of asphalt as indicated in the current estimates.
- Soundwalls will be determined after consultation with the landowners.
- The Realignment Project alignment is set to avoid 4F, historical properties, wetlands and community resources.
- The Widening Project will be accomplished by holding an edge of travel way. The selection of which side to hold varies depending on the particular location.
- The curve at Alice Hawthorne Community in the Realignment Project can be tightened.
- The grade separation will be railroad steel I-beams and highway prestressed AASHTO beams.

GDOT and the designers requested that the VE team retain the following project features:

- Avoidance of 4F and historical properties, i.e., do not propose major horizontal alignments to the Realignment Project.
- Do not propose any “flyover” concepts at the grade separation location.

The VE team was requested to investigate the following:

- Improved constructability
- Improved detour
- Reduced costs
- Accelerated schedule
- Geometric and typical section alternatives

## RESULTS

Twenty-six alternatives and three design suggestions were developed, the most promising of which are highlighted below.

### Realignment

#### Typical Section

The alternatives in this category suggest modifying the surfacing from PCC to asphalt concrete on the multi-use trail, using smaller curb and gutters, and using 11-ft. lanes in lieu of 12-ft. lanes. Alternative Number (Alt. No.) TS-R-7, which suggests using rural shoulders for the northernmost portion of the realignment project, is not recommended but is provided to support the current design.

#### Horizontal Alignment

- Tighten the curve at the north end and tie in the horizontal alignment and vertical alignment sooner (Alt. No. HA-R-1). This would maintain the required design speed while improving the vertical alignment and the super transition (by eliminating a horizontal S-curve), eliminate a commercial property take, and move the highway farther from the community center and Davis Park. Davis Street would need to be realigned (may impact properties), and the skew angle at Malone Street intersection would be increased.
- Replace the broken back curve under the railroad bridge with a single curve (Alt. No. HA-R-2). As the alternative alignment is very near the original design alignment, no cost savings or additions are anticipated.
- Adjust the layout of the proposed roadway network that ties old SR 92/Davis Street/Malone Street and proposed SR 92 (Alt. No. HA-R-3A). This proposal reduces the reconstruction of approximately 1,000 ft. along Davis Street and reduces the right-of-way take.
- Alt. No. HA-R-3B builds on the Alt. No. HA-R-3A concept by adjusting the alignment of old SR 92 opposite the existing position of Malone Street at their intersection with SR 92. The impacts to the large residential parcel south of Malone Street/Davis Street and the Sheltering Arms Daycare commercial property are reduced. The two alternatives are mutually exclusive.

- Connect only Hospital Drive to SR 92 and cul-de-sac Fairburn Road (Alt. No. HA-R-5). The school access would be provided opposite the Hospital Drive intersection with SR 92. The commercial right-of-way take would be eliminated and the median opening spacing improved.
- Eliminate the reconstruction of Cooper Street southeast of Dorsett Avenue with resulting right-of-way and pavement reductions (Alt. No. HA-R-9).
- Build the tie-in for cross roads beginning north of Cooper Street with 11-ft.-wide lanes (Alt. No. HA-R-10). This assumes the existing cross roads have 11-ft.-wide lanes.
- Revise the Brown Street/SR 92 intersection by eliminating the median opening in the current design and only allow a right-in right-out movement (Alt. No. HA-R-11).
- Relocate and consolidate the Brown Street/SR 92 intersection opposite Colquitt Street (Alt. No. HA-R-12).

### Retaining Wall

These alternatives eliminate the retaining walls in the southwest and northeast quadrants along the approaches to the grade separation. The retaining wall in the southwest quadrant would use the parcel that is to be purchased, whereas the retaining wall in the northeast quadrant would require an additional property acquisition.

### Bridges

- Use mechanically stabilized embankment (MSE) retaining walls at the ends of the US 78 and East Strickland Street bridge and cast-in-place abutments at the railroad bridge to shorten the bridges' span lengths (Alt. No. B-R-1).
- Construct the US 78 bridge to the current requirements: two through lanes with one turning lane in lieu of building for a future condition consisting of eight lanes with sidewalks (Alt. No. B-R-2).

### Bridge Construction

- Shift US 78 once to its permanent location, eliminating temporary pavement and one stage of construction but requiring environmental analysis of the impacts of the new permanent location (Alt. No. BC-R-3).
- Evaluate the viability of jacking and boring twin precast boxes under the railroad and roads at the grade separation location (Alt. No. BC-R-5). The cost of the grade separation bridges, SR 78 detour and the railroad detour and re-tracking would need to offset the jack and bore operation.

### Vertical Alignment

- Flatten the grade to 5.0% at the south side of the bridges to improve the tie to existing Cooper Street and improve the ramp from SR 92 to US 78 (Alt. No. VA-R-1).
- Move the SR 92/US 78 ramp south to Cooper Street with changes in access to portions of Dorsett Street (Alt. No. VA-R-2). This alternative was proposed to reduce the grades of the ramp and eliminate closely-spaced intersections between Cooper Street and the US 78 ramps. It is presented as a VE exercise that supports the current design.

## **Widening**

### Typical Section

- The alternatives in this category suggest building smaller curbs and gutters, reducing the median width to 20 ft. and using 11-ft. in lieu of 12-ft. lanes.
- Keep the existing asphalt pavement, overlay it and add a new roadbed where additional lanes and shoulders are called for in the typical section from the southern terminus to Bill Carruth Parkway (Alt. No. TS-W-5). This alternative trades service life for cost savings.
- Provide a four-lane roadway for the opening year 2015 from Malone Road to the Bill Carruth Parkway while purchasing the right-of-way for a six-lane facility (Alt. No. TS-W-7). The additional two outside lanes within this section would be built at a later date as dictated by traffic demands.

### Bridges

Retain and widen the existing Lick Log bridge (Alt. No. B-W-3). This bridge, unlike the other bridges within the widening project, did not appear to have issues with passing a design year flood and the sufficiency rating was favorable.

## **IMPLEMENTATION**

All of the developed alternatives and design suggestions are summarized on the following Summary of VE Alternatives table and detailed in the Study Results section of the report. The electronic copy of this table has been provided and will help the Department record the results of the implementation meeting.



# SUMMARY OF VE ALTERNATIVES

**PROJECT:** SR 92 Realignment from Durelee Lane to Malone Road (P.I. No. 0006900, 0006901, 720970)  
 SR 92 Widening from Malone Road to Nebo Road (P.I. No. 0007691)  
*Georgia Department of Transportation*

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
<b>REALIGNMENT PROJECT</b>						
<b>TYPICAL SECTION- REALIGNMENT PROJECT</b>						
TS-R-1	Use asphalt concrete in lieu of precast concrete for the multi-use trail	\$423,304	\$183,665	\$239,639		\$239,639
TS-R-2	Reduce inside lane width from Plaza Ninety Two Drive to Malone Drive to 11 ft.	\$290,347	\$0	\$290,347		\$290,347
TS-R-4	Use 6 in. x 24 in. curb and gutter in lieu of 8 in. x 30 in.	\$761,710	\$591,580	\$170,130		\$170,130
TS-R-5	Reduce all lanes from Plaza Ninety Two Drive to Malone Drive to 11 ft. wide	\$871,039	\$0	\$871,039		\$871,039
TS-R-7	Use rural shoulder in lieu of urban shoulder from Hawthorne Community Center to Malone Road - NOT RECOMMENDED	\$130,504	\$239,568	(\$109,064)		(\$109,064)

<b>HORIZONTAL ALIGNMENT - REALIGNMENT PROJECT</b>						
		\$1,587,200	\$793,600	\$793,600		\$793,600
Design Suggestion						
HA-R-1	Modify horizontal alignment at north end tie in	\$271,006	\$0	\$271,006		\$271,006
HA-R-2	Consolidate the SR 92 realignment broken back curve under the railroad bridge to a single curve	\$437,174	\$0	\$437,174		\$437,174
HA-R-3A	Reconfigure the old SR 92 and realigned SR 92 intersection	\$2,370,900	\$638,410	\$1,732,490		\$1,732,490
HA-R-3B	Reconfigure the old SR 92 and realigned SR 92 intersection and the Malone Street/Davis Street intersection	\$449,799	\$0	\$449,799		\$449,799
HA-R-5	Connect Hospital Drive only to SR 92 and cul-de-sac Fairburn Road	\$33,884	\$0	\$33,884		\$33,884
HA-R-9	Reconstruct Cooper Street only between SR 92 and Dorsett Street	\$90,871	\$5,148	\$85,723		\$85,723
HA-R-10	Reduce cross roads lanes north of Cooper Street to 11 ft. wide	\$188,590	\$3,320	\$185,270		\$185,270
HA-R-11	Eliminate median opening at Brown Street and make Brown Street right-in right-out only					
HA-R-13	Hammerhead both ends of Brown Street and connect it to SR 92 opposite Colquitt Street					



# SUMMARY OF VE ALTERNATIVES

**SR 92 Realignment from Durelee Lane to Malone Road (P.I. No. 0006900, 0006901, 720970)**  
**SR 92 Widening from Malone Road to Nebo Road (P.I. No. 0007691)**  
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## REALIGNMENT PROJECT (continued)

### RETAINING WALL - REALIGNMENT PROJECT

RW-R-2A	Eliminate the SR 92/railroad/US 78 grade separation retaining walls in the southwest quadrant	\$638,000	\$33,413	\$604,587		\$604,587
RW-R-2B	Eliminate the SR 92/railroad/US 78 grade separation retaining walls in the northeast quadrant	\$478,544	\$425,382	\$53,162		\$53,162

### BRIDGES - REALIGNMENT PROJECT

B-R-1	Use retaining walls in lieu of longer spans at the bridges	\$5,003,394	\$4,330,722	\$672,672		\$672,672
B-R-2	Build US 78 bridge for current requirements and widen in the future	\$2,129,490	\$1,012,770	\$1,116,720		\$1,116,720

### BRIDGE CONSTRUCTION - REALIGNMENT PROJECT

BC-R-3	Build US 78 permanently at current detour location	\$335,225	\$95,590	\$239,635		\$239,635
BC-R-5	Jack and bore twin precast boxes under the railroad			Design Suggestion		

### VERTICAL ALIGNMENT - REALIGNMENT PROJECT

VA-R-1	Flatten the SR 92 mainline grades under the railroad			Design Suggestion		
VA-R-2	Realign SR 92 to the US 78 ramp - NOT RECOMMENDED	\$4,050,380	\$4,492,790	(\$442,410)		(\$442,410)



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## STUDY RESULTS

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### INTRODUCTION

The results of the value engineering study conducted on the SR 92 Realignment and Widening project portray the benefits that can be realized by GDOT and the designers. The results will directly affect the project's design and will require coordination between the owner and the design team to determine the disposition of each alternative.

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

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

The capital cost comparisons used unit quantities contained in the project cost estimate prepared by the designers, whenever possible. If unit quantities were not available, published databases, such as the one produced by the RS Means Company, or team member or owner databases were consulted. A composite markup of 10% was used to generate an all-inclusive project cost for the construction items being compared.

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

Each alternative or design suggestion developed is identified with an alternative number (Alt. No.) that can be tracked through the report and facilitate referencing among the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of VE Alternatives table. The Alt. No. includes a prefix that refers to a major project design category listed below:

<b>Design Category</b>	<b>Prefix</b>
<b>Realignment Project</b>	
Typical Sections	TS-R
Horizontal Alignment	HA-R
Retaining Walls	RW-R
Bridges	B-R
Bridge Construction	BC-R
Vertical Alignment	VA-R
<b>Widening Project</b>	
Typical Sections	TS-W
Bridge	B-W

Summaries of the alternatives and design suggestions are provided on the Summary of VE Alternatives tables. The tables are divided into project design categories and used to divide the results section. The complete documentation of the developed alternatives and design suggestions follows each of the Summary of VE Alternatives tables.

## **ISSUES AND OBJECTIVES**

The key project issues and constraints are listed below:

- The grade separation detour in the Realignment Project needs to be defined better. A north and south shifted detour was studied, and the south shifted detour was chosen. It comes close to the Mill property, an historical property.
- Pavement will be concrete in lieu of asphalt as indicated in the current estimates.
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- The grade separation will be railroad steel I-beams and highway prestressed AASHTO beams.

GDOT and the designers requested that the VE team retain the following project features:

- Avoidance of 4F and historical properties, i.e., do not propose major horizontal alignments to the Realignment Project.
- Do not propose any “flyover” concepts at the grade separation location.

The VE team was requested to investigate the following:

- Improved constructability
- Improved detour
- Reduced costs
- Accelerated schedule
- Geometric and typical section alternatives

## **RESULTS OF THE STUDY**

Research of the ideas identified as having potential for enhancing the value of the project resulted in the attached alternatives and design suggestions.

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

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

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



# SUMMARY OF POTENTIAL COST SAVINGS

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 SR 92 Widening from Malone Road to Nebo Road (P.I. No. 0007691)  
 Georgia Department of Transportation

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TS-R-4	Use 6 in. x 24 in. curb and gutter in lieu of 8 in. x 30 in.	\$761,710	\$591,580	\$170,130		\$170,130
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HA-R-2	Consolidate the SR 92 realignment broken back curve under the railroad bridge to a single curve				Design Suggestion	
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HA-R-9	Reconstruct Cooper Street only between SR 92 and Dorsett Street	\$449,799	\$0	\$449,799		\$449,799
HA-R-10	Reduce cross roads lanes north of Cooper Street to 11 ft. wide	\$33,884	\$0	\$33,884		\$33,884
HA-R-11	Eliminate median opening at Brown Street and make Brown Street right-in right-out only	\$90,871	\$5,148	\$85,723		\$85,723
HA-R-13	Hammerhead both ends of Brown Street and connect it to SR 92 opposite Colquitt Street	\$188,590	\$3,320	\$185,270		\$185,270

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-R-1**

DESCRIPTION: **CONSTRUCT MULTI-USE TRAIL WITH ASPHALT IN LIEU OF PCC**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

A 4-in.-thick, 8-ft.-wide PCC multi-use trail will be constructed on one side of the roadway.

**ALTERNATIVE:** (Sketch attached)

Construct the multi-use trail of asphalt concrete in lieu of concrete.

**ADVANTAGES:**

- Reduces cost
- More flexible surface is advantageous for bicyclists and pedestrian usage

**DISADVANTAGES:**

- Asphalt section doesn't match PCC sidewalk on the other side

**DISCUSSION:**

Multi-use trails are commonly (and preferably) constructed of asphalt concrete in other parts of the state. It is a generally accepted practice to do this in order to accommodate the "pounding of the pavement" for pedestrian use.

The VE team was not aware if life cycle cost procedures to compare asphalt vs. concrete for off-road vehicle pavements are done at GDOT.

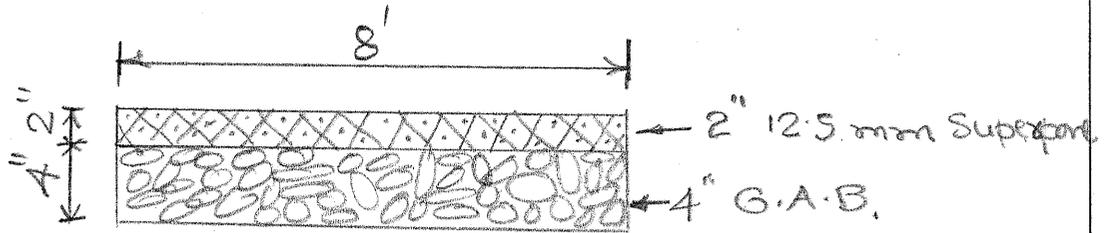
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 423,304	—	\$ 423,304
ALTERNATIVE	\$ 183,665	—	\$ 183,665
SAVINGS	\$ 239,639	—	\$ 239,639

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO  
**TS-R-1**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO **2 of 4**



Asphalt Multi-Use Trail Section

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

TS-R-1

SHEET NO

3 of 4

From Plaza 92 Drive to Thelone Road: 552+50 - 438+00  
= 11,450 feet

2" - 12.5 mm Superpave:

$$\frac{2''}{12} \times 8' \times 11,450 \times 0.076 \frac{T}{cf} = 1,160 T$$

4" G.A.B.

$$(8' \times 11,450') / 9 = 10,177.7 SY$$

Cost estimates have \$23.09 per SY for 12" thick G.A.B.

∴ for 4" thick G.A.B., it will be  $10,177.7 \times \frac{4''}{12''} = 3,392.6 SY$

From GDOT Item Mean Summary,

Cost of 4" concrete sidewalk is \$37.81/SY

concrete multiple trail is 4" thick & 8' wide.

The total SY of concrete used is:  $\frac{8 \times 11450}{9} = 10,177.7$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-R-2**

DESCRIPTION: **REDUCE INSIDE LANES FROM PLAZA NINETY TWO DRIVE TO MALONE DRIVE TO 11 FT. WIDE**

SHEET NO.: **1 of 6**

**ORIGINAL DESIGN:** (Sketch attached)

All six lanes from Plaza Ninety Two Drive to Malone Drive will be 12 ft. wide.

**ALTERNATIVE:** (Sketch attached)

Reduce the inside lanes adjacent to the median to 11 ft. wide from Plaza Ninety Two Drive to Malone Drive.

**ADVANTAGES:**

- Reduces cost
- Reduces impervious surfacing
- Reduces right-of-way

**DISADVANTAGES:**

- Requires a design exception
- Perceived loss of safety
- Eliminates a one-ft. gutter spread for inside lanes on the high side of the super elevation

**DISCUSSION:**

This alternative would save two ft. of pavement and right-of-way along the length of the project. As trucks favor the outer lanes, the lane width reduction impact is not as critical on the inside lane. The gutter spread issues for the inside lanes will only occur where the alignment curves. The inside lanes have an additional two ft. of gutter for vehicles to maneuver.

The design concept report classifies this road as an urban minor arterial. AASHTO guidelines state that 11-ft. lanes are allowable, but that 12-ft. lanes are most desirable and should be used on high speed, free flowing principal arterials. GDOT guidelines specify 12-ft. lanes. As lane widths are one of 13 FHWA controlling criteria, it appears a design exception is required.

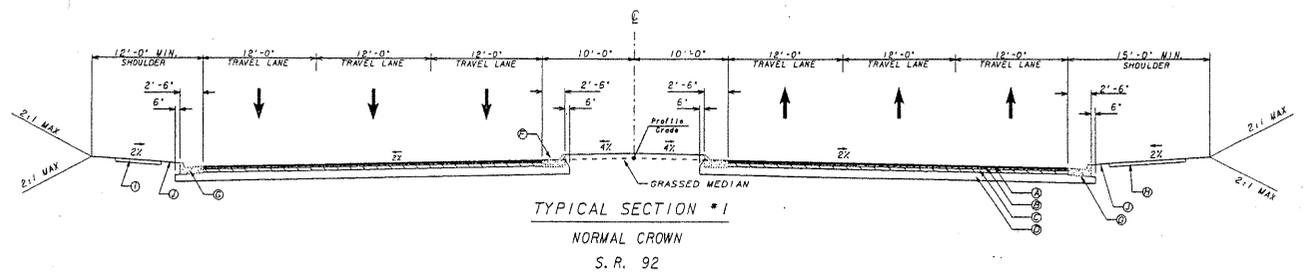
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 290,347	—	\$ 290,347
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 290,347	—	\$ 290,347

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

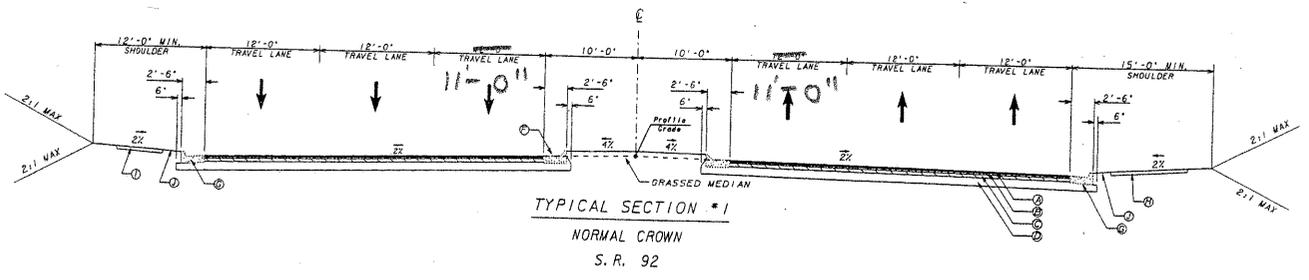
ALTERNATIVE NO  
**TS-R-2**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO **2 of 6**



ORIGINAL DESIGN



ALTERNATIVE DESIGN



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

TS-R-2

SHEET NO

3 of 5

## PCC/RCC UNIT PRICE BASIS

Concrete Pavement Section for SR92  
(PCC)

OMR computed a Life Cycle Cost Analysis  
and recommended P.C.C. Pavement.

Typical Section of 12 Inch PCC with  
base of 10 In. GAB

PCC

12 Inch : \$65/sy. from a selected project bid  
tabulation occurred by the  
Engineering Services Estimators.

GAB Cost: 10" = 0.833'

$$\begin{matrix} \text{\$ 17.95} \\ \text{ton} \\ \text{wt'd value} \\ \text{from mean item summary} \end{matrix} \times \begin{matrix} 9 \text{ sf.} \\ \text{s.y.} \end{matrix} \times 0.833' \times \frac{0.75 \text{ T}}{\text{CF}} = \begin{matrix} \text{\$ 10.10} \\ \text{s.y.} \end{matrix}$$

PCC SECTION

$$\text{Total S.Y. Cost} = \begin{matrix} \text{PCC} \\ \text{\$ 65/s.y.} \end{matrix} + \begin{matrix} \text{GAB} \\ \text{\$ 10.10/s.y.} \end{matrix} = \begin{matrix} \text{PCC SECTION} \\ \text{\$ 75.10/s.y.} \end{matrix}$$

RCC

OMR recommended (RCC) Roller Compacted Concrete  
for Shoulder

with 10" GAB.

RCC shoulder = \$44/sy (RCC)

10" GAB = \$10.10/sy (GAB)

Total shoulder \$54.10/sy RCC Section

RCC Wtd Item  
Selected

CALCULATIONS

ALTERNATIVE NO

TS-R-2

SHEET No 4 of 6

ITEM CODE	ITEM DESCRIPTION	QUANTITY	USE	UM	MEAN	WTD AVG
441-0206	PLAIN CONC DITCH PAVING, 6 IN	2000.00	2	SY	50.75	44.27
441-0300	CONC SPILLWAY, SPL DES	7.00	4	EA	1986.13	2175.19
441-0301	CONC SPILLWAY, TP 1	399.00	33	EA	2248.99	2176.21
441-0302	CONC SPILLWAY, TP 2	31.00	7	EA	2096.03	2381.86
441-0303	CONC SPILLWAY, TP 3	312.00	29	EA	2348.80	2207.74
441-0304	CONC SPILLWAY, TP 4	27.00	7	EA	2365.69	2399.24
441-0600	CONC HEADWALLS	117.00	6	CY	895.16	858.87
441-0700	CONCRETE MEDIAN, VARB TK	80.00	1	SY	78.28	78.28
441-0740	CONCRETE MEDIAN, 4 IN	40186.00	26	SY	44.67	31.90
441-0748	CONCRETE MEDIAN, 6 IN	11424.00	19	SY	76.49	55.26
441-0754	CONCRETE MEDIAN, 7 1/2 IN	14559.00	10	SY	55.95	56.22
441-0762	CONCRETE MEDIAN, 9 1/2 IN	2700.00	1	SY	71.00	71.00
441-3999	CONCRETE V GUTTER	45838.00	18	LF	25.14	21.48
441-4000	CONC VALLEY GUTTER, SPLC DES	11341.00	2	SY	51.24	35.38
441-4020	CONC VALLEY GUTTER, 6 IN	5750.00	13	SY	42.77	42.54
441-4030	CONC VALLEY GUTTER, 8 IN	22319.00	27	SY	57.48	54.52
441-4050	CONC VALLEY GUTTER WITH CURB, 8 IN	549.00	3	SY	78.31	84.43
441-5001	CONCRETE HEADER CURB, 4 IN, TP 1	45.00	1	LF	17.50	17.50
441-5002	CONCRETE HEADER CURB, 6 IN, TP 2	28087.00	24	LF	22.42	21.48
441-5003	CONCRETE HEADER CURB, 8 IN, TP 3	1628.00	2	LF	21.00	21.59
441-5004	CONCRETE HEADER CURB, 10 IN, TP 4	244.00	3	LF	31.17	18.09
441-5007	CONCRETE HEADER CURB, 8 IN, TP 7	300.00	1	LF	26.26	26.26
441-5008	CONCRETE HEADER CURB, 6 IN, TP 7	2700.00	1	LF	13.90	13.90
441-5052	CONC DOWELED INTEGRAL CURB, TP 2, INCL DOWELS	3200.00	1	LF	27.10	27.10
441-5057	CONC DOWELED INTEGRAL CURB, TP 7, INCL DOWELS	2450.00	1	LF	10.25	10.25
441-6002	CONC CURB & GUTTER, 6 IN X 18 IN, TP 2	300.00	1	LF	14.30	14.30
441-6012	CONC CURB & GUTTER, 6 IN X 24 IN, TP 2	12810.00	8	LF	28.70	30.93
441-6022	CONC CURB & GUTTER, 6 IN X 30 IN, TP 2	13070.00	21	LF	21.01	19.98
441-6216	CONC CURB & GUTTER, 8 IN X 24 IN, TP 2	2378.00	3	LF	22.60	17.86
441-6221	CONC CURB & GUTTER, 8 IN X 30 IN, TP 1	9091.00	3	LF	20.64	16.62
441-6222	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	230102.00	59	LF	27.51	19.26
441-6720	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	12470.00	2	LF	21.41	15.55
441-6740	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	53702.00	11	LF	19.31	15.30
442-0100	ROLLER COMPACTED CONCRETE PAVEMENT	124803.00	1	SY	44.00	44.00
443-1000	ELASTOMERIC PROFILE BRIDGE JOINT SEALS, BR NO -	4.00	2	EA	15000.00	15000.00
444-1000	SAWED JOINTS IN EXIST PAVEMENTS - PCC	21604.00	24	LF	10.01	7.70
445-0500	WATERPROOFING PVMT JOINTS AND CRACKS -	41000.00	1	LF	1.00	1.00
446-1100	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	961591.00	61	LF	8.24	2.79
446-1200	PVMT REINF FABRIC FULL WIDTH, TYPE 2	8000.00	1	SY	2.30	2.30
446-2118	HIGH STRENGTH PVMT REINF FABRIC, 18 IN WIDTH	81576.00	10	LF	9.91	5.00
446-3500	HIGH STRENGTH PVMT REINF FABRIC -	229750.00	4	LF	7.45	4.41
447-1050	MODULAR EXPANSION JOINT, BR. NO -	1.00	1	EA	65000.00	65000.00
449-1000	BRIDGE DECK JOINT SEAL, BRIDGE NO. BENT NO.	1.00	1	EA	0.00	0.00
449-1605	LOW-DENSITY, CLOSED CELL, X-LINKED, ETHYLENE VINYL ACETATE,	2026.00	22	LF	197.70	198.70
449-1620	LOW-DENSITY, CLOSED-CELL, X-LINKED, ETHYLENE VINYL ACETATE,	20393.00	361	LF	39.34	38.27
451-1100	PATCHING PCC PAVEMENT	5900.00	2	SF	129.40	128.99
452-1000	FULL DEPTH SLAB REPLACEMENT	800.00	1	CY	380.00	380.00
453-1000	PORTLAND CEMENT CONCRETE WHITETOPPING	2384.00	3	CY	654.71	643.62
455-1000	FILTER FABRIC FOR EMBANKMENT STABILIZATION	563205.00	13	SY	4.77	3.63
456-2012	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (CONTINUOUS)	347.00	19	GLM	2022.06	945.28
456-2015	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (SKIP)	306.89	38	GLM	1760.99	860.01
456-2025	INDENTATION CENTERLINE RUMBLE STRIPS-GROUND	2.00	1	GLM	1450.00	1450.00

# CALCULATIONS



PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
Georgia Department of Transportation

ALTERNATIVE NO  
TS-R-2

SHEET NO 5 of 6

From Plaza 92 Drive to Malone Drive, the roadway length is  $(552+50) - (438+0) = 11,450$  feet

One foot reduction in pavement width on both sides of the median implies a total saving of

$$\frac{11,450 \times (1+1)}{9} = 2,544.4 \text{ SY}$$

Savings will also result from not having to acquire 2' of additional R/W. Savings will not result from improvements, relocation & damages which will still have to be done.

Total cost of land acquired from all 3 phases

$$(1,238,059 + 2,117,566 + 985,828) \cdot 2.48 = 10,766,803$$

Total square feet acquired =

$$(188,362 + 782,232 + 695,047) + (352,048 + 202,711) + (69,418 + 782,232) = 3,072,052 \text{ sf}$$

$$\text{Average cost of land} = \frac{10,766,803}{3,072,052} = \$8.5/\text{sf}$$

$$\text{Total land saved: } 11,450 \times (1+1) = 22,900 \text{ sf}$$

# COST WORKSHEET

PROJECT: **SR 92 Realignment & Widening**  
**(Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO.:  
**TS-R-2**

SHEET NO.: **6 of 6**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
PCC Pavement	SY	2544.4	75.1	191,088			
10% Const. markup				19,109			
Sub-total:				210,197			
R/w Saved (markup included)	SF	22,900	3.5	80,150			
Subtotal				290,347			0
Markup (%) at (included)				-			-
TOTAL				290,347			0

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-R-4**

DESCRIPTION: **USE 6 IN. X 24 IN. CURB AND GUTTER IN LIEU OF 8 IN. X 30 IN. CURB AND GUTTER**

SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:**

The current design calls for 8 in. x 30 in. curb and gutter for both the inside and outside of the roadbed on both the north- and southbound SR 92 roadways.

**ALTERNATIVE:**

Reduce the curb and gutter to 6 in. x 24 in.

**ADVANTAGES:**

- Reduces cost
- Reduces right-of-way

**DISADVANTAGES:**

- Eliminates 6 in. of gutter spread
- May require additional catch basins

**DISCUSSION:**

The maximum gutter spread is eight feet measured from the face of the 30-in. curb. Reducing the curb and gutter to a 24-in. curb modifies the maximum gutter spread to 7.5 ft. The reduction of gutter spread may increase slightly the number of drainage inlets, but the VE team felt that it was insignificant. There will be a total of two ft. (4 in. x 6 in.) of right-of-way saved from the SR 92 roadbed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 761,710	—	\$ 761,710
ALTERNATIVE	\$ 591,580	—	\$ 591,580
SAVINGS	\$ 170,130	—	\$ 170,130

# CALCULATIONS



PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
Georgia Department of Transportation

ALTERNATIVE NO  
**TS-R-4**

SHEET NO **2** of **3**

length of roadway from beginning of the project at Plaza 92 Drive to end of project at Malene Drive  
 $(552 + 50) - (438 + 0) = 11,450$  feet.

For Type 2 C&G, on both sides of the road, the total length is  $11,450 \times 2 = 22,900'$

There will be reduction in length due to the intersection of cross roads with realigned SR 92.

The total length of the gaps is  $1,450'$ . Therefore the net length of C&G is  $22,900 - (1,450 \times 2) = 20,000$  ft.

Similarly, Type 7 C&G will also be  $20,000$  feet. Unit costs are obtained from GOOT means Summary

Savings will not materialize from reductions in improvement relocations & damages because only one foot of R/W will be reduced on each side. However savings will result from not having to acquire a total of 2 feet of right-of-way.

Total cost of land acquired in all 3 phases: \$10,766,803

Total area of R/W acquired in all 3 phases: 3,072,052

Average cost of land acquired =  $\frac{10,766,803}{3,072,052} = \$3.5/\text{sf}$

Total land saved =  $11,450 \times 2 = 22,900$  feet

# COST WORKSHEET



PROJECT: **SR 92 Realignment & Widening  
(Douglas & Paulding Counties)**  
Georgia Department of Transportation

ALTERNATIVE NO.:  
**TS-R-4**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Type 2-8"x30" C&G	LF	20,000	17.34	346,800			
Type 7-8"x30" C&G	LF	20,000	13.64	272,800			
Sub-total				619,600			
10% mark-up				61,960			
Sub-total				681,560			
R/w Cost (mark up included)	SF	22,900	3.5	80,150			
Type 2-6"x24" C&G	LF				20,000	15.43	308,600
Type 7-6"x24" C&G	LF				20,000	11.46	229,200
Sub-total							537,800
10% Const. markup							53,780
							<u>591,580</u>
Subtotal				761,710			591,580
Markup (%) at included							
TOTAL				761,710			591,580

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-R-5**

DESCRIPTION: **REDUCE ALL LANES FROM PLAZA NINETY TWO DRIVE TO MALONE DRIVE TO 11 FT. WIDE**

SHEET NO.: **1 of 6**

**ORIGINAL DESIGN:** (Sketch attached)

All six lanes from Plaza Ninety Two Drive to Malone Drive will be 12 ft. wide.

**ALTERNATIVE:** (Sketch attached)

Reduce all lanes from Plaza Ninety Two Drive to Malone Drive to 11 ft. wide.

**ADVANTAGES:**

- Reduces cost
- Reduces impervious surfacing
- Reduces right-of-way

**DISADVANTAGES:**

- Requires a design exception
- Perceived loss of safety
- Eliminates one ft. gutter spread for outside lanes
- Eliminates one ft. gutter spread for inside lanes on the high side of the super-elevation

**DISCUSSION:**

This alternative would save six ft. of pavement and right-of-way along the length of the project. The gutter spread issues for the inside lanes will only occur where the alignment curves.

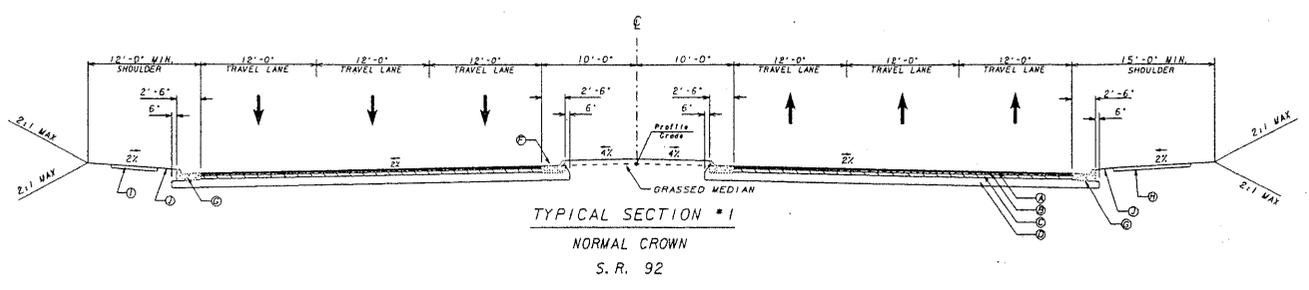
The inside lanes and outside lanes have two ft. of additional room owing to the gutter width. The middle lane should have the most constrained situation for this alternative.

The design concept report classifies this road as an urban minor arterial. AASHTO guidelines state that 11-ft. lanes are allowable, but that 12-ft. lanes are most desirable and should be used on high speed, free flowing principal arterials. GDOT guidelines specify 12-ft. lanes. As lane widths are one of 13 FHWA controlling criteria, it appears a design exception is required.

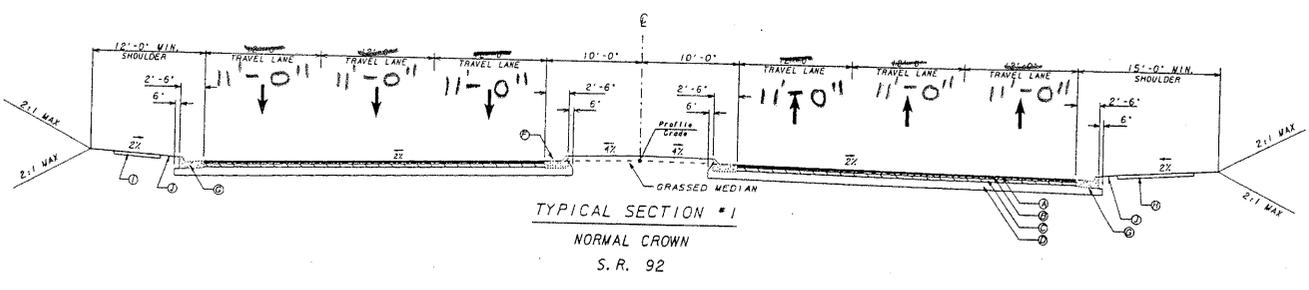
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 871,039	—	\$ 871,039
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 871,639	—	\$ 871,639

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)** ALTERNATIVE NO **TS-R-5**  
*Georgia Department of Transportation*

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH  SHEET NO **2 of 6**



ORIGINAL DESIGN



ALTERNATIVE DESIGN

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO  
TS-R-5

SHEET NO 3 of 6

## PCC / RCC UNIT PRICE BASIS

Concrete Pavement Section for SR92  
(PCC)

OMR computed a Life Cycle Cost Analysis  
and recommended P.C.C. Pavement.

Typical Section of 12 Inch PCC with  
base of 10 In. GAB

PCC

12 Inch : \$ 65 / S.Y. from a selected project bid  
tabulation conducted by the  
Engineering Services Estimators.

GAB Cost: 10" = 0.833'

$$\begin{matrix} \text{ton} \\ \uparrow \\ \text{wt'd value} \\ \text{from mean item summary} \end{matrix} \quad \frac{\$ 17.95}{\text{sf.}} \times 9 \text{ sf.} \times 0.833' \times \frac{0.75 \text{ T}}{\text{CF}} = \frac{\$ 10.10}{\text{S.Y.}}$$

PCC SECTION

$$\text{Total S.Y. Cost} = \frac{\$ 65}{\text{S.Y.}} + \frac{\$ 10.10}{\text{S.Y.}} = \frac{\$ 75.10}{\text{S.Y.}}$$

RCC

OMR recommended (RCC) Roller Compacted Concrete  
for Shoulder

with 10" GAB.

RCC shoulder = \$ 44 / S.Y. (RCC)

10" GAB = \$ 10.10 / S.Y. (GAB)

Total shoulder \$ 54.10 / S.Y. RCC Section

RCC Wtd Item  
Selected

CALCULATIONS

ALTERNATIVE NO  
TS-R-5

SHEET No 4 of 6

ITEM CODE	ITEM DESCRIPTION	QUANTITY	USE	UM	MEAN	WTD AVG
441-0206	PLAIN CONC DITCH PAVING, 6 IN	2000.00		2 SY	50.75	44.27
441-0300	CONC SPILLWAY, SPCL DES	7.00		4 EA	1986.13	2175.19
441-0301	CONC SPILLWAY, TP 1	399.00		33 EA	2248.99	2176.21
441-0302	CONC SPILLWAY, TP 2	31.00		7 EA	2096.03	2381.86
441-0303	CONC SPILLWAY, TP 3	312.00		29 EA	2348.80	2207.74
441-0304	CONC SPILLWAY, TP 4	27.00		7 EA	2365.69	2399.24
441-0600	CONC HEADWALLS	117.00		6 CY	895.16	858.87
441-0700	CONCRETE MEDIAN, VARB TK	80.00		1 SY	78.28	78.28
441-0740	CONCRETE MEDIAN, 4 IN	40186.00		26 SY	44.67	31.90
441-0748	CONCRETE MEDIAN, 6 IN	11424.00		19 SY	76.49	55.26
441-0754	CONCRETE MEDIAN, 7 1/2 IN	14559.00		10 SY	55.95	56.22
441-0762	CONCRETE MEDIAN, 9 1/2 IN	2700.00		1 SY	71.00	71.00
441-3999	CONCRETE V GUTTER	45838.00		18 LF	25.14	21.48
441-4000	CONC VALLEY GUTTER, SPCL DES	11341.00		2 SY	51.24	35.38
441-4020	CONC VALLEY GUTTER, 6 IN	5750.00		13 SY	42.77	42.54
441-4030	CONC VALLEY GUTTER, 8 IN	22319.00		27 SY	57.48	54.52
441-4050	CONC VALLEY GUTTER WITH CURB, 8 IN	549.00		3 SY	78.31	84.43
441-5001	CONCRETE HEADER CURB, 4 IN, TP 1	45.00		1 LF	17.50	17.50
441-5002	CONCRETE HEADER CURB, 6 IN, TP 2	28087.00		24 LF	22.42	21.48
441-5003	CONCRETE HEADER CURB, 8 IN, TP 3	1628.00		2 LF	21.00	21.59
441-5004	CONCRETE HEADER CURB, 10 IN, TP 4	244.00		3 LF	31.17	18.09
441-5007	CONCRETE HEADER CURB, 8 IN, TP 7	300.00		1 LF	26.26	26.26
441-5008	CONCRETE HEADER CURB, 6 IN, TP 7	2700.00		1 LF	13.90	13.90
441-5052	CONC DOWELED INTEGRAL CURB, TP 2, INCL DOWELS	3200.00		1 LF	27.10	27.10
441-5057	CONC DOWELED INTEGRAL CURB, TP 7, INCL DOWELS	2450.00		1 LF	10.25	10.25
441-6002	CONC CURB & GUTTER, 6 IN X 18 IN, TP 2	300.00		1 LF	14.30	14.30
441-6012	CONC CURB & GUTTER, 6 IN X 24 IN, TP 2	12810.00		8 LF	28.70	30.93
441-6022	CONC CURB & GUTTER, 6 IN X 30 IN, TP 2	130707.00		21 LF	21.01	19.98
441-6216	CONC CURB & GUTTER, 8 IN X 24 IN, TP 2	2378.00		3 LF	22.60	17.86
441-6221	CONC CURB & GUTTER, 8 IN X 30 IN, TP 1	9091.00		3 LF	20.64	16.62
441-6222	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	230102.00		59 LF	27.51	19.26
441-6720	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	12470.00		2 LF	21.41	15.55
441-6740	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	53702.00		11 LF	19.31	15.30
442-0100	ROLLER COMPACTED CONCRETE PAVEMENT	124803.00		1 SY	44.00	44.00
443-1000	ELASTOMERIC PROFILE BRIDGE JOINT SEALS, BR NO -	4.00		2 EA	15000.00	15000.00
444-1000	SAWED JOINTS IN EXIST PAVEMENTS - PCC	21604.00		24 LF	10.01	7.70
445-0500	WATERPROOFING PVMT JOINTS AND CRACKS -	41000.00		1 LF	1.00	1.00
446-1100	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	961591.00		61 LF	8.24	2.79
446-1200	PVMT REINF FABRIC FULL WIDTH, TYPE 2	8000.00		1 SY	2.30	2.30
446-2118	HIGH STRENGTH PVMT REINF FABRIC, 18 IN WIDTH	81576.00		10 LF	9.91	5.00
446-3500	HIGH STRENGTH PVMT REINF FABRIC -	229750.00		4 LF	7.45	4.41
447-1050	MODULAR EXPANSION JOINT, BR. NO -	1.00		1 EA	65000.00	65000.00
449-1000	BRIDGE DECK JOINT SEAL, BRIDGE NO. BENT NO.	1.00		1 EA	0.00	0.00
449-1605	LOW-DENSITY, X-LINKED, ETHYLENE VINYL ACETATE,	2026.00		22 LF	197.70	198.70
449-1620	LOW-DENSITY, CLOSED-CELL, X-LINKED, ETHYLENE VINYL ACETATE,	20393.00		361 LF	39.34	38.27
451-1100	PATCHING PCC PAVEMENT	5900.00		2 SF	129.40	128.99
452-1000	FULL DEPTH SLAB REPLACEMENT	800.00		1 CY	380.00	380.00
453-1000	PORTLAND CEMENT CONCRETE WHITETOPPING	2384.00		3 CY	654.71	643.62
455-1000	FILTER FABRIC FOR EMBANKMENT STABILIZATION	563205.00		13 SY	4.77	3.63
456-2012	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (CONTINUOUS)	347.00		19 GLM	2022.06	945.28
456-2015	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (SKIP)	306.89		38 GLM	1760.99	860.01
456-2025	INDENTATION CENTERLINE RUMBLE STRIPS-GROUND	2.00		1 GLM	1450.00	1450.00

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

TS-R-5

SHEET NO

5

of 6

From Plaza 92 Drive to Madeline Drive, the length of roadway is  $(552+50) - (438+00) = 11,450$  feet

One foot reduction in pavement width on all 3 lanes on both sides of the road implies a total savings of  $11,450 \times (3 \times 2) = 68,700$  sf or 7,633.3 SY.

Significant savings may not materialize from reductions in improvements, relocations & damages because only 3' of R/W will be reduced on each side. However, savings will result from not having to acquire a total of 6' of R/W.

Total cost of land acquired from all 3 phases  
= \$10,766,803

Total R/W acquired from all 3 phases  
= 3,072,052 sf

Average cost of land acquired =  $\frac{10,766,803}{3,072,052} = \$3.5/\text{sf}$

Total land saved =  $11,450 \times 6 = 68,700$  sf

Assume: no change to drainage costs



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-R-7**

DESCRIPTION: **USE RURAL SHOULDER IN LIEU OF URBAN SHOULDER**  
**FROM HAWTHORNE COMMUNITY CENTER TO**  
**MALONE ROAD**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The current design proposes outside urban shoulders (curb and gutter/storm drain system) the entire length of the SR 92 realignment in Douglas county.

**ALTERNATIVE:** (Sketch attached)

Use outside rural shoulders beginning just north of the Hawthorne Community Center to Malone Road, a distance of approximately 1,300 linear feet. Purchase an 800 linear ft. strip of additional right-of-way to accommodate the rural shoulder width requirement on the west side of the roadway. The location of the 800-ft. strip is on the west side of the roadway north of the commercial property acquisition.

**ADVANTAGES:**

- Reduces cost

**DISADVANTAGES:**

- Increases right-of-way for rural shoulder
- Provides rural shoulders in an area that may need urban shoulders as development increases in density.
- Increased right-of-way costs offsets construction cost savings

**DISCUSSION:**

The premise of this alternative is to match the widening project's rural section with the intent to reduce capital costs. There is excess right-of-way width along the whole east side and most of the converted portion of the west side (commercial properties) that facilitates the additional width needed to convert from urban to rural shoulder,

This alternative increases project costs, therefore it is not recommended. However, the VE team felt that the comparison exercise is of value to the designers.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 130,504	—	\$ 130,504
ALTERNATIVE	\$ 239,568	—	\$ 239,568
SAVINGS	\$ (109,064)	—	\$ (109,064)

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
 Georgia Department of Transportation

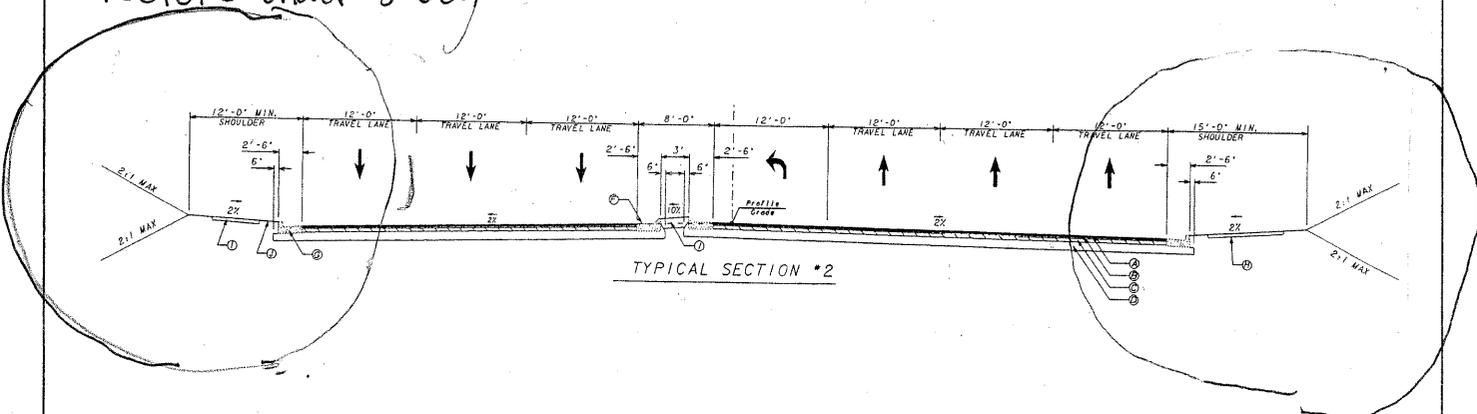
ALTERNATIVE NO  
**TS-R-7**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

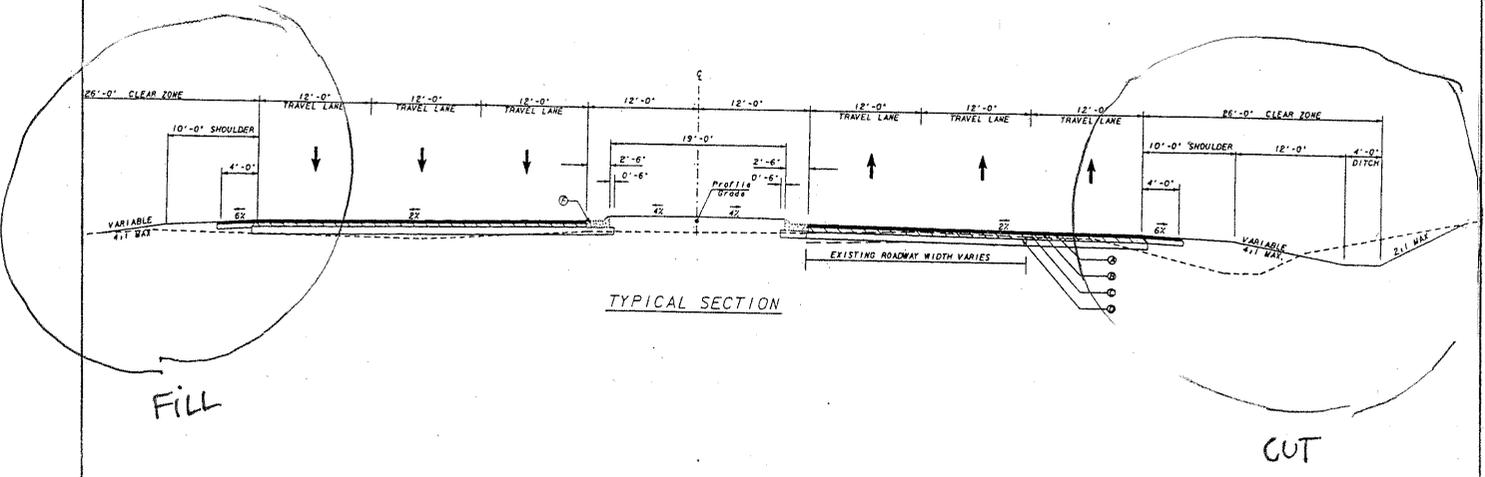
SHEET NO **2** of **5**

Original (URBAN SHLD):

Feature under study



Alternate (RURAL SHLD):



END PHASE 3  
END CONSTRUCTION

CURRENT DESIGN:  
URBAN SHLD

1300 LF  
RURAL SHLD

800 LF  
Add'l ROW take

ALPHA WAY

JOHN CLARK DRIVE

DAVIS DRIVE

MALONE ROAD

MALONE ROAD

SHELTERING  
MISC  
DAYCARE

COMMUNITY CENTER

MALONE STREET

AUTRY CIR

TETON TRL

END PROPOSED  
NOISE BARRIER 4

**ARON**  
ENGINEERING

Engineers  
Planners  
Surveyors

PARKWAY, BLDG. 400, SUITE 413  
ATLANTA, GA 30062  
TEL: (770) 971-0820  
FAX: (770) 971-0820

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

TS-R-7

SHEET NO

4 of 5

Original Costs: (urban shoulder)

- 1300 LF x 2 sides = 2600 LF of 8" x 30" curb & gutter
- estimate of 10 EA - Catch basins
- estimate of 1000' of Longitudinal \$ 400 L.F. of X-dens of pipe = 1500 L.F.
- SAY: 1000 L.F. of 18" storm drain pipe
- 500 L.F. of 24" storm drain pipe

Alternative (Rural shoulder)

more R/W required for ditch on west side of SR92

Rural shoulder vs urban shoulder

(36') - (15') = 21' of extra R/W req'd  
 26' CLEAR ZONE (AA) 10' cut/fill slope width for rural shoulder

\* 21' x 800' = 16,800 SF. = Additional R/W

• ditch protection: (incidental to R/W costs)

used \$5.75/SF for commercial R/W → from Project R/W cost estimate.

\* Amount of add'l right of way req'd = 36 - 15 = 21

\*\* 800 LF of right way required (south of Malone Road & on the west side of the road only)



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-1**

DESCRIPTION: **MODIFY HORIZONTAL ALIGNMENT AT NORTH END**  
**TIE-IN**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The current design calls for two horizontal curves between Malone Street and Malone Road, one right-handed and one left-handed, with very short distances in between. The curve is at  $R = 1500$  ft. The original profile has two vertical curves with a short vertical tangent in between. One commercial property will be affected.

**ALTERNATIVE:** (Sketch attached)

Eliminate the mainline S-curve with a single curve at  $R = 1,000$  ft. According to AASHTO Green Book (2004), the minimum radius curve required for the design speed of 45 MPH, for  $e = 4\%$  maximum, is 711 ft. The profile can be improved by combining two vertical curves into one at PVI 543+00, LVC = 1,600 ft. Revise Davis Street 90 degree bend further south.

**ADVANTAGES:**

- Reduces cost
- Eliminates S-curve
- Improves super elevation transition
- Reduces right-of-way take
- Saves commercial property on left side
- Improves operation
- Moves away from the community center and Davis Park

**DISADVANTAGES:**

- Realigns Davis Drive
- Skews intersection at Malone Street
- Requires checking for affected properties by realigning Davis Drive

**DISCUSSION:**

The original design causes one commercial displacement located halfway between Malone Street and Malone Road on west SR 92. This property can be eliminated from the right-of-way take by the alternative design. The alternative design tightens this horizontal curve, pulling away from the community center and Davis Park on the right-hand side. The intersection with Malone Street will be skewed, but the angle of the skew will be close to 80 degrees and it will be signalized. Davis Drive needs to be redesigned, which might cause one property displacement. The profile can be improved as shown on sheet 3 of this alternative, i.e., a combined curve that has a smoother operation.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,587,200	—	\$ 1,587,200
ALTERNATIVE	\$ 793,600	—	\$ 793,600
SAVINGS	\$ 793,600	—	\$ 793,600

ORIGINAL DESIGN  
Edge of Pavement

ALTERNATE DESIGN

END PHASE 3  
END CONSTRUCTION

ORIGINAL DESIGN  
Edge of Pavement

SHIELDED  
ARMS  
DAYCARE

ALICE N. HANCOCK  
COMMUNITY  
CENTER

END PROPOSED  
NOISE BARRIER 4

STREAM

MALONE STREET

TETON TRL

AUTRY CIR.

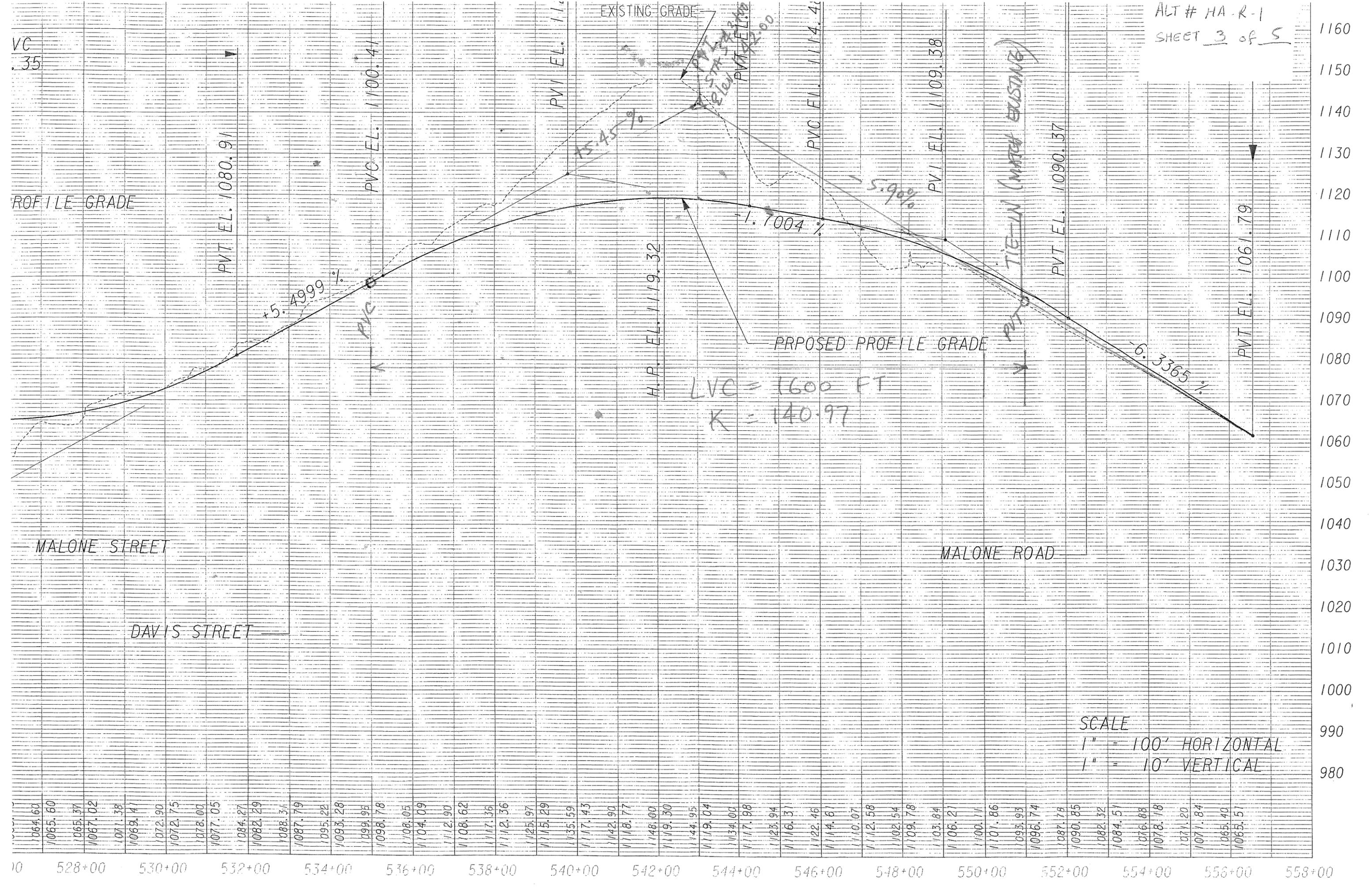
MALONE ROAD

MALONE ROAD

SR 92

RESIDENTIAL DISPLACEMENT  
COMMERCIAL DISPLACEMENT  
ENVIRONMENTAL CONSTRAINTS  
1" = 200'  
EXISTING TRAFFIC SIGNAL  
ALT. # HA-R-1  
TRAFFIC SIGNAL

**CROY**  
ENGINEERING  
Engineers  
Planners  
Surveyors  
200 NORTH COBB PARKWAY, BLDG. 400, SUITE 413  
MARIETTA, GA 30062  
PHONE: (770) 971-5407 FAX: (770) 971-0620



VC  
35

PROFILE GRADE

PVT EL. 1080.91

+5.4999%

PVC EL. 1100.41

PVI EL. 1119.32

+15.45%

H.P. EL. 1119.32

-1.7004%

PVC EL. 1114.42

PROPOSED PROFILE GRADE

PVI EL. 1109.38

+5.900%

TIE-IN (MATCH EXISTING)

PVT EL. 1090.37

-6.3365%

PVT EL. 1061.79

MALONE STREET

DAVIS STREET

MALONE ROAD

SCALE

1" = 100' HORIZONTAL  
1" = 10' VERTICAL

10 528+00 530+00 532+00 534+00 536+00 538+00 540+00 542+00 544+00 546+00 548+00 550+00 552+00 554+00 556+00 558+00

1160  
1150  
1140  
1130  
1120  
1110  
1100  
1090  
1080  
1070  
1060  
1050  
1040  
1030  
1020  
1010  
1000  
990  
980



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-1

SHEET NO

4 of 5

## Cost Assumptions:

The alternate alignment is more or less <sup>the</sup> same of length as the original design; therefore no change in construction costs.

The main difference is in the cost of right of way, reduced one commercial property from the required right of way.

→ Alternate Alignment would save 1 business displacement

→ Alternate Alignment would utilize existing R/W better.  $1000' \times \frac{40'}{2} = 20,000 SF$

The above savings are "Original" R/W costs.

## Additional Alternate R/W costs

→ two Residential displacements

R/W Costs: ESTIMATE SHOWS \$2,060,000 FOR 1 COMMERCIAL AND 13 RESIDENTIAL DISPLACEMENTS.

USE \$120,000 FOR RESIDENTIAL AND

\$500,000 FOR COMMERCIAL

$$13(120,000) + 500,000 = \$2,060,000 \checkmark$$

# COST WORKSHEET



PROJECT: SR 92 Realignment & Widening  
(Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO.: HA-R-1

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			Alt. PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
RW :							
1-business displacement	EA	1	\$500,000	\$500,000			
Land:	SF	20,000	\$5.75	\$115,000			
1-Comm Relocation	EA	1	\$25,000	\$25,000			
All RW unit costs are from the projects RW cost estimate.							
Additional RW impacts for Alt. Alignment							
2-Residential Displacements	EA				2	120,000	240,000
2-Residential Relocations	EA				2	\$40,000	\$80,000
RW Subtotal				640,000			320,000
Markup (%) at 148%				947,200			473,600
TOTAL				1,587,200			793,600

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING** ALTERNATIVE NO.: **HA-R-2**  
*Douglas and Paulding Counties*

DESCRIPTION: **CONSOLIDATE THE SR 92 REALIGNMENT BROKEN** SHEET NO.: **1 of 3**  
**BACK CURVE UNDER THE RAILROAD BRIDGE TO A**  
**SINGLE CURVE**

**ORIGINAL DESIGN:** (Sketch attached)

The proposed alignment at the railroad/US 78/Strickland bridges has a broken back curve to the right.

**ALTERNATIVE:** (Sketch attached)

Replace the broken back curve with a single curve.

**ADVANTAGES:**

- Improves geometrics
- Improves safety
- Retains right-of-way acquisition

**DISADVANTAGES:**

- Slightly increases skew at bridges

**DISCUSSION:**

The broken back curve under the railroad bridges can be replaced with a single curve. This will be safer and easier to drive through, and the alignment can be set so that it is in the same location on the north side of the bridges where the right-of-way is more critical. On the south side of the bridges, all of the properties along US 78 and adjacent to the project are being acquired, so the alignment can be shifted there if necessary.

As the alternative alignment is very near the original design alignment, no cost savings or additions are anticipated.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	<b>DESIGN SUGGESTION</b>		
SAVINGS			

END PH  
BEGIN P

ALTERNATIVE NO.  
HA-R-2  
ORIGINAL DESIGN  
SHEET 2 OF 3

BROWN STREET

ELLIS STREET

HAGGINS STREET

Hwy  
ROAD  
ST

PROPOSED  
BARRIER 2

END PI  
BEGIN

ALTERNATIVE NO.  
HA-R-2  
ALTERNATIVE DESIGN  
SHEET 3 OF 3

BROWN STREET

ELLIS STREET

ALT Q  
R ≈ 1500'

PACIFIC STREET

THY ROAD

PROPOSED  
BARRIER 2

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-3A**

DESCRIPTION: **RECONFIGURE OLD SR 92 AND REALIGNED SR 92 INTERSECTION**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The original design abandons or reconstructs approximately 1,000 ft. of existing SR 92.

**ALTERNATIVE:** (Sketch attached)

Adjust the location of the connection of old SR 92 to the proposed alignment to reduce the amount of reconstruction.

**ADVANTAGES:**

- Reduces cost
- Minimizes disruptions to existing roadway network
- Accelerates construction
- Reduces right-of-way impacts

**DISADVANTAGES:**

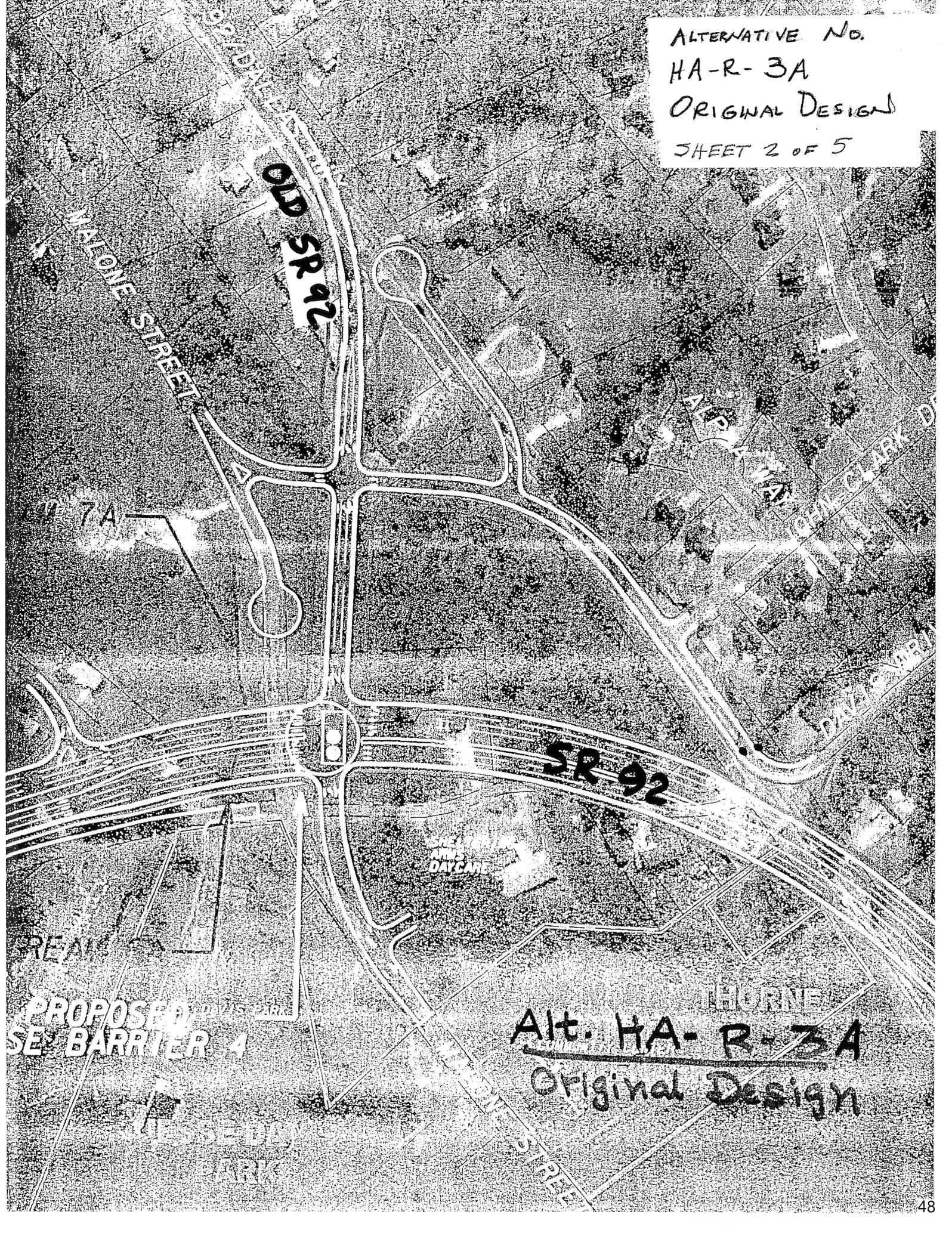
- Modifies NEPA footprint

**DISCUSSION:**

The original design abandons or reconstructs approximately 1,000 ft. of existing roadway where the new alignment ties into the existing roadway on the north end of the project. A slight adjustment of the Malone Street connector allows much of the existing SR 92 to be retained. The large residential parcel south of Malone Street/Davis Street has reduced right-of-way impacts.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 271,006	—	\$ 271,006
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 271,006	—	\$ 271,006

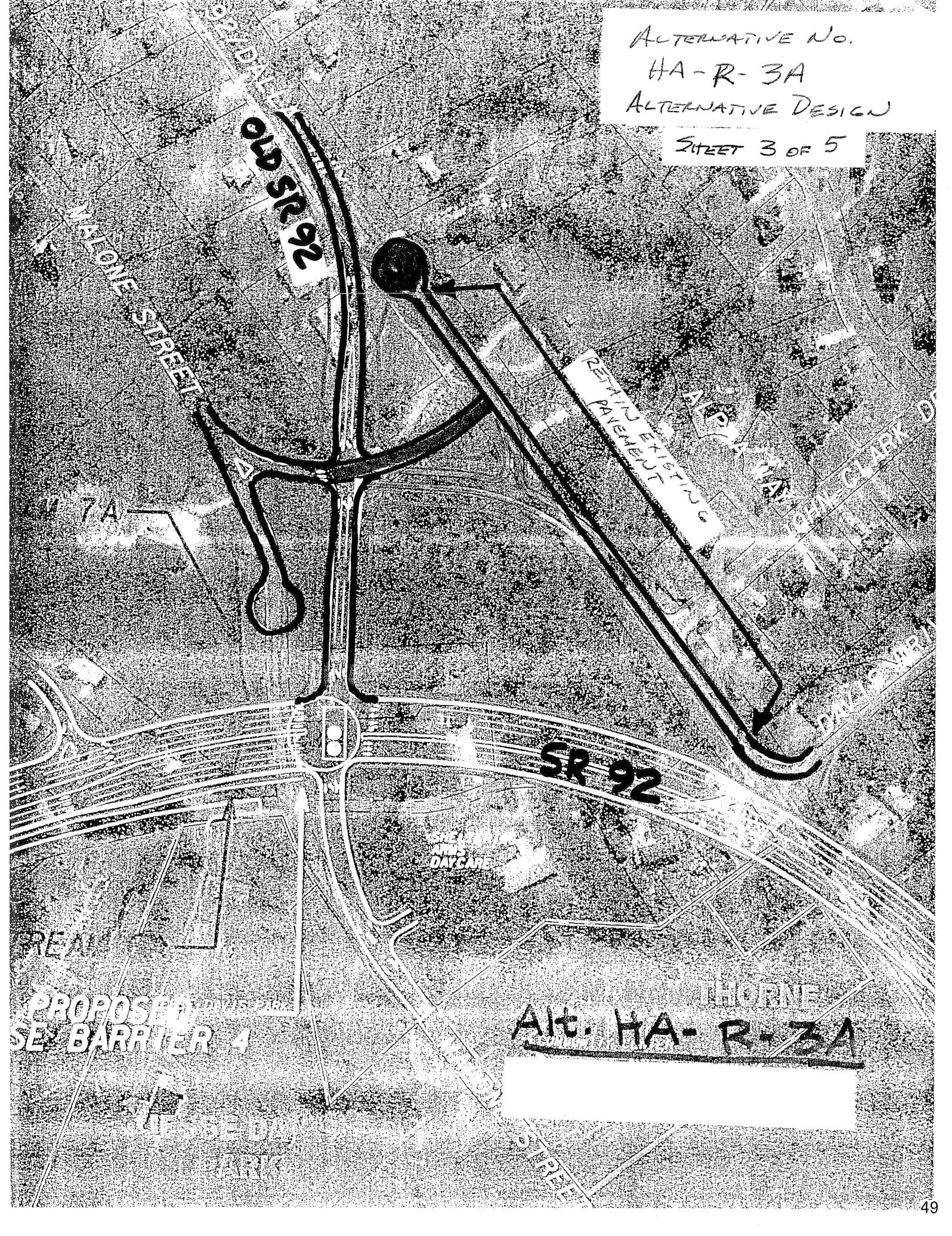
ALTERNATIVE No.  
HA-R-3A  
ORIGINAL DESIGN  
SHEET 2 OF 5



Alt. HA-R-3A  
Original Design

ALTERNATIVE NO.  
HA-R-3A  
ALTERNATIVE DESIGN

SHEET 3 OF 5



Alt. HA-R-3A



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-3A

SHEET NO 4 of 5

## CONSTRUCTION

THE ORIGINAL MALONE STREET CONNECTOR IS APPROXIMATELY 450 FEET LONG. A SLIGHT REALIGNMENT CAN REDUCE THE LENGTH TO 300 FEET. ALSO, APPROXIMATELY 1000' OF EXISTING SR 92 CAN BE RETAINED AS IS.

PAVEMENT AREA REDUCTION:

$$\text{MALONE ST. CONN. } A = (450 - 300)(24) / 9 = 400 \text{ SY}$$

$$\text{OLD SR 92 } A = (1000)(24) / 9 = 2667 \text{ SY}$$

RIGHT OF WAY (Δ Piece of large parcel, not occupied)

$$250' \times 300' \times \frac{1}{2} = 37,500 \text{ #}$$

# COST WORKSHEET



PROJECT:	SR 92 Realignment & Widening (Douglas & Paulding Counties) Georgia Department of Transportation	ALTERNATIVE NO.: HA-R-3A SHEET NO.: 5 of 5
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PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Cross-Rd Pav't	SY	400	20.08	8032	0	-	0
MAINLINE Pav't	SY	2667	75.10	200,292	0	-	0
SUBTOTAL				208,324			
CONSTR M/U	10%			20,832			
CONSTRUCTION				229,156			
<u>RIGHT OF WAY</u>							
RESIDENTIAL PARCELS	SF	37,500	\$ 0.45/SF	16,875			
MARK-UP	148%			24,975			
RIGHT OF WAY				41,850			
Subtotal							0
Markup (%) at <i>(INCLUDED)</i>							0
TOTAL				271,006			0

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-3B**

DESCRIPTION: **RECONFIGURE OLD SR 92 AND REALIGNED SR 92  
INTERSECTION AND MALONE STREET/DAVIS STREET  
INTERSECTION**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The original design abandons approximately 1,000 ft. of existing SR 92 and realigns Malone Street east of relocated SR 92 to line up with the old SR 92 intersection.

**ALTERNATIVE:** (Sketch attached)

Adjust the location of the connection of old SR 92 to the proposed alignment to reduce the amount of reconstruction on existing SR 92 and to intersect with the new alignment across from existing Malone Street.

**ADVANTAGES:**

- Reduces cost
- Minimizes disruptions to existing roadway network
- Accelerates construction
- Reduces right-of-way impacts
- Eliminates impacts to Sheltering Arms Daycare

**DISADVANTAGES:**

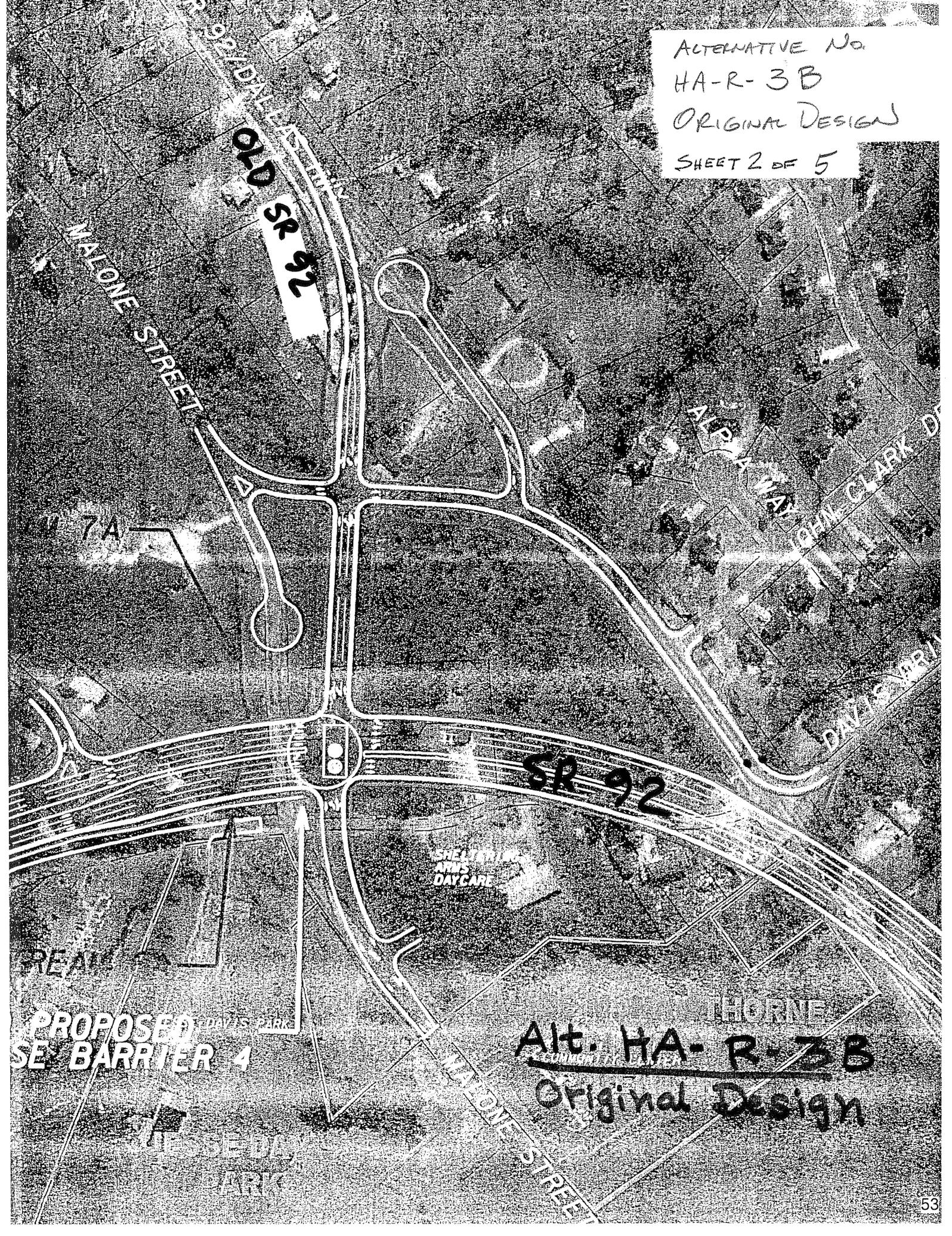
- Modifies NEPA footprint
- Increases skew angle at SR 92 realignment

**DISCUSSION:**

The original design abandons or reconstructs approximately 1,000 ft. of existing roadway where the new alignment ties into the existing roadway on the north end of the project. Approximately 500 ft. of Malone Street is realigned on the east side of the new alignment. A slight adjustment of the old SR 92 connector can place it opposite existing Malone Street. The impacts to the large residential parcel south of Malone Street/Davis Street and the Sheltering Arms Daycare commercial property are reduced.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 437,174	—	\$ 437,174
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 437,174	—	\$ 437,174

ALTERNATIVE No.  
HA-R-3B  
ORIGINAL DESIGN  
SHEET 2 OF 5



PROPOSED  
SE BARRIER 4

Alt. HA-R-3B  
Original Design

ALTERNATIVE NO.  
HA-R-3B  
ALTERNATIVE DESIGN  
SHEET No. 3 of 5

MALONE ST.

OLD SR-92

RETAINS EXIST  
PAVEMENT

SKEW =  
12° ±

DAVIS DRIVE

SR 92

CREATING  
AND  
DAYCARE

PROPOSED  
SE BARRIER 4

Alt. HA-R-3B

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-3B

SHEET NO 4

of 5

THE ORIGINAL MALONE STREET CONNECTOR IS APPROXIMATELY 450 FEET LONG. A SLIGHT REALIGNMENT CAN REDUCE THE LENGTH TO 300'. APPROXIMATELY 1000' OF EXISTING SR 92 CAN BE RETAINED AS IS. THE REALIGNMENT OF MALONE STREET EAST OF THE NEW SR 92 ALIGNMENT CAN BE REDUCED FROM ABOUT 500' TO 100'.

## PAVEMENT AREA REDUCTION:

$$\text{MALONE ST. CONNECTOR: } A = (450 - 300)(24)/9 = 400 \text{ SY}$$

$$\text{OLD SR 92 } A = 1000(24)/9 = 2667 \text{ SY}$$

$$\text{MALONE ST. EAST } A = (500 - 100)(24)/9 = 1067 \text{ SY}$$

## RIGHT OF WAY

SAME AS HA-R-3A :

37,500 \$ RESID.

SHELTER ARMS DAYCARE :  $\frac{1}{2}(250 \times 80) = 10,000$  \$ COMM.



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-5**

DESCRIPTION: **CONNECT HOSPITAL DRIVE ONLY TO SR 92 AND CUL-  
DE-SAC FAIRBURN ROAD**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The current design extends both Fairburn Road and Hospital Road to the SR 92 realigned highway, creating two closely spaced intersections along SR 92.

**ALTERNATIVE:** (Sketch attached)

Connect only Hospital Drive to SR 92 and create a cul-de-sac on Fairburn Road in lieu of the proposed connection to SR 92. Add lanes in both directions of Holiday Drive between SR 92/Fairburn Road. Extend the northbound SR 92 left turn at Hospital Drive as needed (no longer constrained by the Fairburn Road/SR 92 intersection). Relocate the access to the school opposite Hospital Drive.

**ADVANTAGES:**

- Reduces construction costs
- Reduces right-of-way costs
- Avoids commercial parcels
- Increases median opening spacing
- Improves access to Hospital Drive

**DISADVANTAGES:**

- Reduces quality of access for residents/business along Fairburn Road east of Hospital Drive

**DISCUSSION:**

Hospital Drive is favored in this alternative and SR 92 mainline operations are improved by consolidating the traffic intersections into a single intersection. The consolidated turning movements are not that much higher, i.e., SR 92 northbound left movements would increase from 1,800 to 1,900 vph. Should the school not be amenable to the suggested access relocation, another option would be to retain the access at the current design's location but with a right-in right-out configuration.

GDOT's guidelines specify 1,000-ft. median openings for this facility, whereas the current design achieves only 660 ft., requiring a design variance that would be eliminated in the alternative design.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,370,900	—	\$ 2,370,900
ALTERNATIVE	\$ 638,410	—	\$ 638,410
SAVINGS	\$ 1,732,490	—	\$ 1,732,490



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-5

ORIGINAL DESIGN

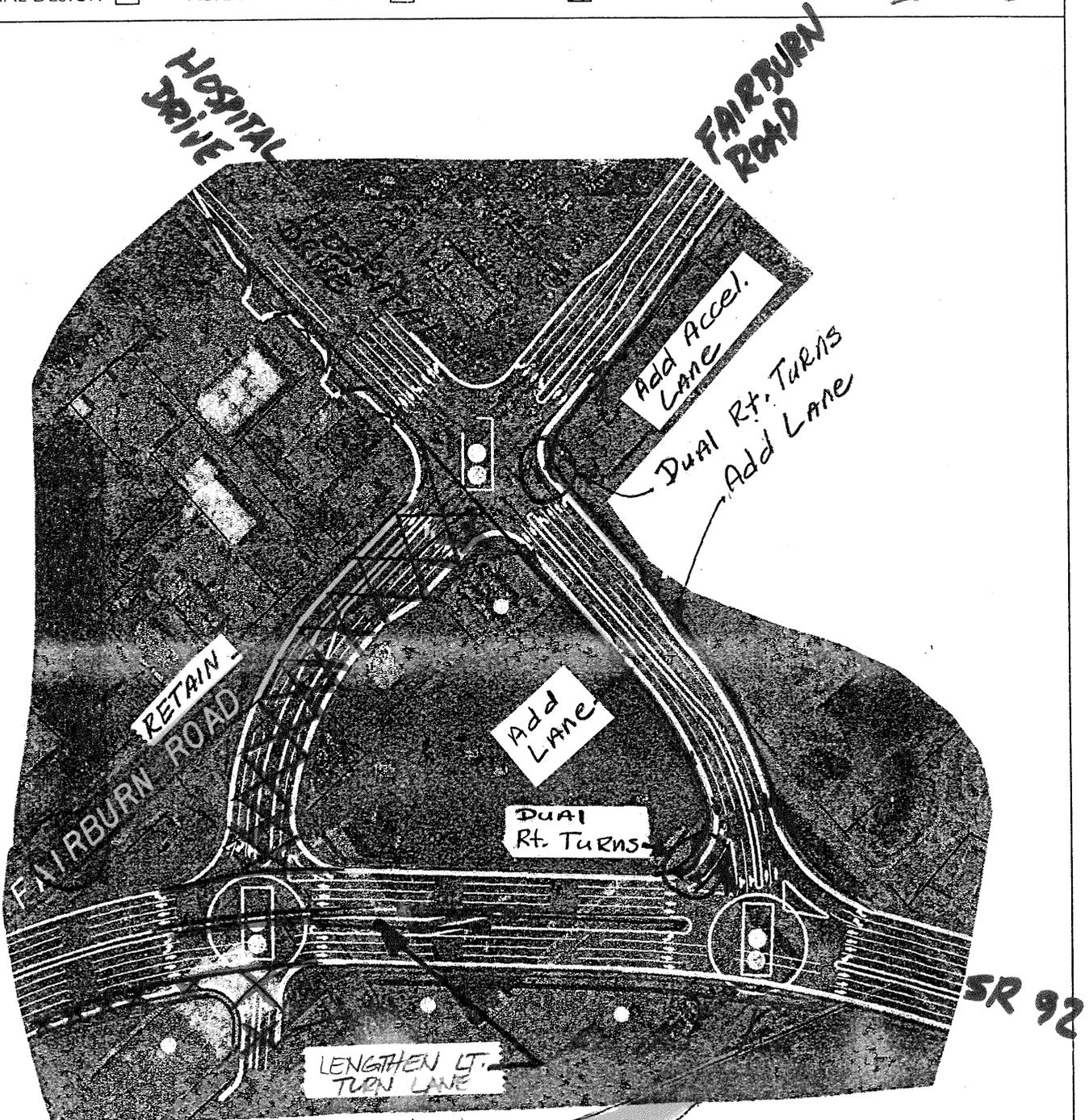
ALTERNATIVE DESIGN

BOTH

SHEET NO

2

of 5



The intent is to keep Exist. Fairburn Rd. As a "Drive" to Exist. Businesses.

Relocated Access Drive to school

# CALCULATIONS



9/17

PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-5

SHEET NO

3 of 5

Full Depth Asphalt Pavement Cost (\$/sy)  
OMR Recommended Pavement Section:

1.5" (165#/sy) (12.5mm Superpave)

2" (220#/sy) (19mm Superpave)

9" (990#/sy) (25mm Superpave)

GAB 12"

$$\frac{\$76.40^*}{\text{TN}} \times \frac{\text{TN}}{2000\text{lb}} \times \frac{165\text{lb}}{\text{sy}} = \$6.30/\text{sy} (12.5\text{mm})$$

$$\frac{\$84.73^*}{\text{TN}} \times \frac{\text{TN}}{2000\text{lb}} \times \frac{220\text{lb}}{\text{sy}} = \$9.32/\text{sy} (19\text{mm})$$

$$\frac{\$80.02^*}{\text{TN}} \times \frac{\text{TN}}{2000\text{lb}} \times \frac{990\text{lb}}{\text{sy}} = \$39.61/\text{sy} (25\text{mm})$$

$$\text{GAB (12")} = (\text{from Project Cost Est.}) = \$23.09/\text{sy}$$

$$\text{Total} = \underline{\$78.32/\text{s.y.}}$$

\*The Asphalt ton unit prices are from the project's cost estimate

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-5

SHEET NO

A of 5

Original Costs (which are eliminated)

The extension of Fairbuen Road = 600' +/-

$$\left[ (5 \text{ Lanes} \times 12') \times 600' \right] + \underset{\substack{\uparrow \\ \text{Turn Lane}}}{(250' \times 12')} / \underset{\substack{\uparrow \\ 3y}}{95F} = 4,333 \text{ sy}$$

• 4,333 sy @ \$ 78.02/sy (for full depth pavement)

• curb & gutter : (600' x 4" lines) = 2,400 L.F.

• UNCLASS EXCAV. (92' x 5' x 600') / 27cf/cy = 10,222 cy  
 $\uparrow$  width shld to shld

• eliminate signalized intersection @ \$100,000

R/W: displace 1 Business

$$\text{Land: } \left( \frac{300' \times 100'}{2} \right) + (200' \times 100') = 3,5,000 \text{ SF}$$

Additional Costs for Alternate:

• 2-Additional Lane full length Lanes (one in each direction)

$$(24' \times 600') / \underset{\substack{\uparrow \\ 3y}}{95F} = 1,600 \text{ s.y.}$$

• New School Access DR. (36' x 500') / 19 = 2,000'

• 1-Additional Rt.-turn Lane: (12' x 300') / 95F = 400 s.y.

$$\left( \begin{array}{l} \text{Additional} \\ \text{UNCLASS} \\ \text{incl. school DR.} \end{array} \right) = 4,800 \text{ cy} + 2,700 \text{ cy} = 7,500 \text{ cy.}$$

• Additional R/W (Land): [(12' x 600') + (12' x 600') + (12' x 300')] = 18,000 SF  
 Along Hospital extension

# COST WORKSHEET



PROJECT: **SR 92 Realignment & Widening**  
**(Douglas & Paulding Counties)**  
 Georgia Department of Transportation

ALTERNATIVE NO.: **HA-R-5**  
 SHEET NO.: **5** of **5**

PROJECT ITEM		ORIGINAL ESTIMATE			ALT. PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
<b>Full depth Pavement</b>							
Asph. Conc.	SY	4333	\$78.32	\$339,360			
8"x30" c&g	LF	2400	\$13.60	\$32,640			
unclass excau.	CY	10,222	\$4.50	\$46,000			
1-Signalization	LS	1	\$100,000	\$100,000			
<b>Additional R/W:</b>							
Business	EA	1	\$500,000	\$500,000			
Bus. Relocation	EA	1	\$25,000	\$25,000			
Bus. Land	SF	35,000	\$5.75	\$201,250			
<b>Additional Costs for Alternate</b>							
Asph. Conc.	SY				4000	\$78.32	\$313,280
unclass excau.	CY				7500	\$4.50	\$33,750
R/W (com Land)	SF				18,000	\$5.75	\$103,500
<b>CONST. Subtotal</b>				\$518,000			\$347,030
<b>10% Const. Markup</b>				\$51,800			\$34,700
<b>R/W Subtotal</b>				\$726,250			\$103,500
<b>10% R/W Markup at 148%</b>				\$1,074,850			\$153,180
<b>TOTAL</b>				\$2,370,900			\$638,410

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-9**

DESCRIPTION: **RECONSTRUCT COOPER STREET ONLY BETWEEN SR 92 AND DORSETT STREET**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The reconstruction of Cooper Street on the east side of SR 92 begins at SR 92 and extends approximately 230 ft. east of Dorsett Street.

**ALTERNATIVE:** (Sketch attached)

Reconstruct Cooper Street east of SR 92 only from SR 92 to Dorsett Street.

**ADVANTAGES:**

- Reduces cost
- Accelerates construction
- Minimizes disruptions to neighborhood

**DISADVANTAGES:**

- None apparent

**DISCUSSION:**

Cooper Street is being reconstructed between the new SR 92 alignment and Dorsett Street and continues for approximately 230 ft. east of Dorsett Street. The reconstruction east of Dorsett Street appears unnecessary. Also, the reconstruction requires one residential displacement which would not be necessary if the reconstruction ends at Dorsett Street.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 449,799	—	\$ 449,799
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 449,799	—	\$ 449,799

NOISE BARRIER 1

ALTERNATIVE No.  
HA-R-9  
SHEET 2 OF 5

(ALTERNATIVE  
END  
CONSTRUCTION)

END  
CONSTRUCTION  
(AS  
DESIGNED)

BEGIN PROPOSED  
NOISE BARRIER 2

END PROPOSED  
NOISE BARRIER 2

DORSETT

STREET

COOPER STREET

HILL STREET

CONNALLY DR.

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-9

SHEET NO

3

of

5

## RIGHT OF WAY

ALTERNATIVE RIGHT-OF-WAY WIDTH IS 70'. ASSUME  
AS DESIGNED R/W WIDTH = 50'

$$\text{ADDITIONAL R/W} = 230' (70 - 50) = \underline{4600 \text{ SF}}$$

## CONSTRUCTION

$$\text{CURB \& GUTTER: } L = 2(230) = 260 \text{ LF}$$

$$\text{SIDEWALK: } A = 5(2)(230)/9 = 256 \text{ SY}$$

$$\text{PAVEMENT: } A = [140(36) + 90(30)]/9 = 860 \text{ SY}$$

## RIGHT OF WAY

### UNIT COST FOR HOUSE:

R/W COST ESTIMATE INCLUDES

\$ 2,940,000 FOR 5 COMMERCIAL

AND 12 RESIDENTIAL UNITS.

\* → ASSUME \$125,000 FOR RESIDENTIAL

\* → AND \$288,000 FOR COMMERCIAL

$$\text{CHECK: } 12(125,000) + 5(288,000) = \underline{\$2,940,000} \checkmark$$



SUBJECT: ALTERNATIVE NO.
HA-R-9
JOB NO:

BY:	DATE:
CHKD:	DATE:

PAGE

SHEET  
4/5

## CROSS-ROAD PAVEMENT COST

### PAVEMENT SECTION:

8" GRADED AGGREGATE BASE

2" 19mm SUPERPAVE

1 1/2" 12.5mm SUPERPAVE

### TONS/SY:

$$\text{GAB} \quad (43)(9)(150)/2000 = 0.45$$

$$19 \text{ mm} \quad 2(110 \#/\text{in}/\text{sy})/2000 = 0.11$$

$$12.5 \text{ mm} \quad 1.5(110 \#/\text{in}/\text{sy})/2000 = 0.0825$$

### COST PER SY:

$$0.45(17.95) + 0.11(64.17) + 0.0825(59.97) \\ = \$20.08/\text{SY}$$

# COST WORKSHEET



PROJECT: **SR 92 Realignment & Widening**  
**(Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO.:  
**HA-R-9**  
 SHEET NO.: **5** of **5**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
RIGHT-OF-WAY	SF	4600	0.45	2,070	0	-	0
HOUSE	EA	1	125,000	125,000			
RELOCATION	EA	1	40,000	40,000	0	-	0
R/W SUBTOTAL				167,070			
R/W MARKUP (14.8%)				247,264			
R/W TOTAL				414,334			0
CONSTRUCTION							
CURB & GUTTER	LF	260	28.05	7,293	0	-	0
SIDEWALK	SY	256	37.81	9,679	0	-	0
PAVEMENT	SY	860	20.03	17,269	0	-	0
CONST. SUBTOTAL				32,241			
CONST. MARKUP (10%)				3,224			
CONST. TOTAL				35,465			
Subtotal				449,799			0
Markup (%) at INCLUDED				0			0
TOTAL				449,799			0

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-10**

DESCRIPTION: **REDUCE CROSS ROADS LANES NORTH OF COOPER STREET TO 11 FT.**

SHEET NO.: **1 of 6**

**ORIGINAL DESIGN:** (Sketch attached)

The present design proposes 12-ft.-wide lanes for the reconstructed length of cross roads that tie to SR 92.

**ALTERNATIVE:** (Sketch attached)

Reduce the cross roads lane width to 11 ft. beginning with Cooper Street and remaining at the cross roads north of Cooper Street.

**ADVANTAGES:**

- Reduces cost

**DISADVANTAGES:**

- May require a design variance

**DISCUSSION:**

It is assumed that most of the existing cross roads are 11 ft. wide or less. There would be little advantage to building the cross roads with 12-ft.-wide lanes if they must tie into 11-ft.-wide lanes. AASHTO guidelines for local streets support 11-ft.-wide lanes while GDOT guidelines (Table 6.1, "Design Guidelines for Local Roadway") call for 12-ft lane widths. The county guidelines for travel lanes are not known. A design variance may be required for this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 33,884	—	\$ 33,884
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 33,884	—	\$ 33,884



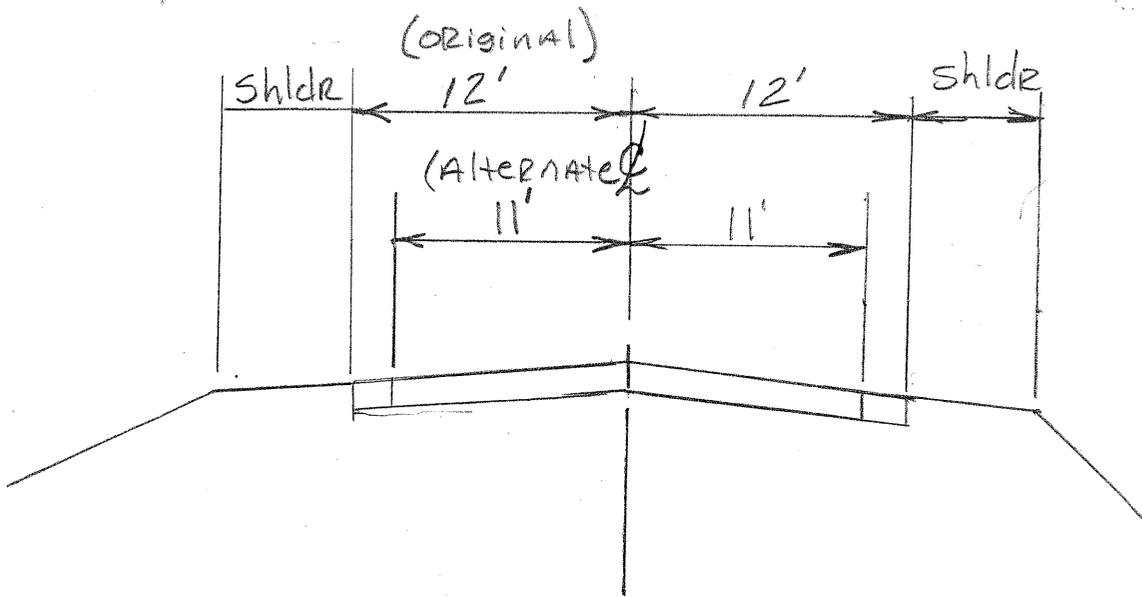
PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO  
**HA-R-10**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO **2** of **6**

### Typical Lane Proposed Lane Widths for Side-Streets



In commercial areas where there are midblock left turns, it may be advantageous to provide an additional continuous two-way, left-turn lane in the center of the roadway.

### Width of Traveled Way

Street lanes for moving traffic preferably should be at least 3.0 m [10 ft] wide. Where practical, they should be 3.3 m [11 ft] wide, and in industrial areas they should be 3.6 m [12 ft] wide. Where the available or attainable width of right-of-way imposes severe limitations, 2.7-m [9-ft] lanes can be used in residential areas, as can 3.3-m [11-ft] lanes in industrial areas. Added turning lanes where used at intersections should be at least 2.7 m [9 ft] wide, and desirably 3.0 to 3.6 m [10 to 12 ft] wide, depending on the percentage of trucks.

Where bicycle facilities are included as part of the design, refer to the AASHTO *Guide for the Development of Bicycle Facilities* (1).

### Parking Lanes

Where used in residential areas, a parallel parking lane a minimum of 2.1 m [7 ft] wide should be provided on one or both sides, as appropriate to the conditions of lot size and intensity of development. In commercial and industrial areas, parking lanes should be a minimum of 2.4 m [8 ft] wide and are usually provided on both sides.

Parking lane width determination in commercial and industrial areas should include consideration for use of the parking lane for moving traffic during peak periods that may occur where industries have high employment concentrations. Where curb and gutter sections are used, the gutter pan width should be considered as part of the parking lane width.

### Median

Medians provided on local urban streets primarily to enhance the environment and to act as buffer strips should be designed to minimize interference with access to the land abutting the roadway. A discussion of the various median types appears in Chapter 4.

Median openings should be situated only where there is adequate sight distance. The shape and length of the median openings depend on the width of median and the vehicle types to be accommodated. The desirable length of median openings, measured between the inner edge of the lane adjacent to the median and the centerline of the intersection roadway, should be great enough to provide for a 12-m [40-ft] turning control radius for left-turning P vehicles. The minimum length of median openings should be that of the width of the projected roadway of the intersecting cross street or driveway.

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-10

SHEET NO

4 of 6

Lengths of Reconstructed side Streets to be Reconstructed.

Cooper Street: (500' x 3 Lanes) = 1,500' Lanes  
 Ellis Street: (500' x 2 Ln.) + (200') = 1,200' Lanes  
 Relocated Brown St.: (700' + 200') x 2 Ln = 1,800' Lanes  
 Col Quit Street: (150' x 2 Ln) = 300' Lanes  
 Green Street: (150' x 2 Ln) = 300' Lanes  
 Cone Street: (150' x 2 Ln) = 300' Lanes  
 E. Malone Street: (500' x 2 Ln) = 1,000' Lanes  
 W. Malone Street: (1500' x 2 Ln) = 3,000' Lanes  
 SR 92 Dallas Hwy: (600' x 3 Ln) = 1,800' Lanes  
 Malone Road (300' x 3 Ln) = 900' Lanes  
 Autey Circle (200' x 2 Ln) = 400' Lanes  
 Old Dallas Hwy (150' x 2 Ln) = 300' Lanes

---

12,800 ft-Lane

$$12,800 \text{ ft-Lane} \times \frac{1'}{1 \text{ Lane}} = 12,800 \text{ SF}$$

↑  
(12'-11")

$$\frac{12,800 \text{ SF}}{9 \text{ SF/Sy}} = 1,422 \text{ sy of cross-street Pavement}$$

Cross-street Pavement section:

- 1 1/2" (12.5mm or 9.5mm)
- 2" (19mm)
- 8" GAB

see Calculations (\$20.08 sy) for Pavement



SUBJECT: ALTERNATIVE NO.
HA-2-10
JOB NO:

BY:	DATE:
CHKD:	DATE:

PAGE

SHEET  
5/6

## CROSS-ROAD PAVEMENT COST

### PAVEMENT SECTION:

8" GRADED AGGREGATE BASE

2" 19mm SUPERPAVE

1 1/2" 12.5mm SUPERPAVE

### TONS/SY:

$$\text{GAB} \quad (2.5)(9)(150)/2000 = 0.45$$

$$19 \text{ mm} \quad 2(110 \# / 10 / \text{SY}) / 2000 = 0.11$$

$$12.5 \text{ mm} \quad 1.5(110 \# / 10 / \text{SY}) / 2000 = 0.0825$$

### COST PER SY:

$$0.45(17.95) + 0.11(64.17) + 0.0825(59.97) \\ = \$20.08 / \text{SY}$$

Estimate of add. unclass. exca. =

$$1,422 \text{ SY} \times (.333/\text{yd}) = 474 \text{ cy} \approx \text{say } 500 \text{ cy}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-11**

DESCRIPTION: **ELIMINATE MEDIAN OPENING AT BROWN STREET  
AND MAKE BROWN STREET RIGHT-IN RIGHT-OUT  
ONLY**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The proposed intersection at Brown Street has a median opening and permits left turns into and out of Brown Street and U-turns northbound on SR 92.

**ALTERNATIVE:** (Sketch attached)

Omit the median opening and turn lanes on SR 92 and allow only right-in right-out movements at Brown Street.

**ADVANTAGES:**

- Reduces cost
- Improves safety
- Improves operations

**DISADVANTAGES:**

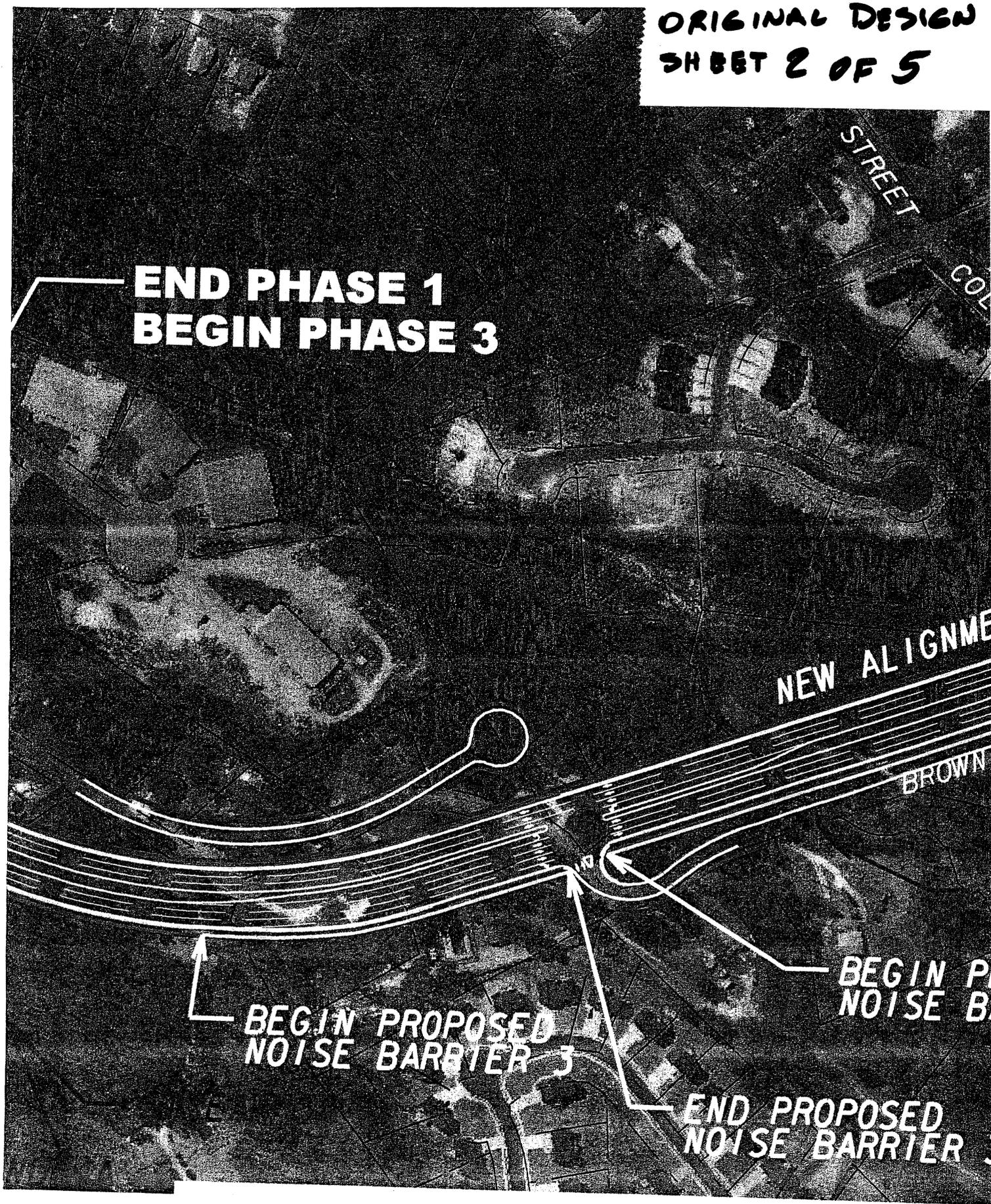
- Creates out-of-direction travel for Brown Street residents

**DISCUSSION:**

The current design allows left and right turns into and out of Brown Street. The Brown Street intersection is approximately midway between Ellis and Colquitt Streets and is not signalized. Eliminating left turns in or out of Brown Street could retain access for residents with highway safety improvements. Southbound traffic on SR 92 would continue to Ellis Street and make a U-turn to access Brown Street. Traffic leaving Brown Street and desiring to go south on SR 92 will go north to Brown Street and make a U-turn. Each of these will add about one-half mile to the trip.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 90,871	—	\$ 90,871
ALTERNATIVE	\$ 5,148	—	\$ 5,148
SAVINGS	\$ 85,723	—	\$ 85,723

ALTERNATIVE NO.  
HA-R-11  
ORIGINAL DESIGN  
SHEET 2 OF 5



**END PHASE 1  
BEGIN PHASE 3**

**NEW ALIGNMENT**

**BROWN**

**BEGIN PROPOSED  
NOISE BARRIER 3**

**BEGIN P  
NOISE B**

**END PROPOSED  
NOISE BARRIER 3**

ALTERNATIVE No.  
HA-R-11

ALTERNATIVE DESIGN  
SHEET. No. 3 OF 5

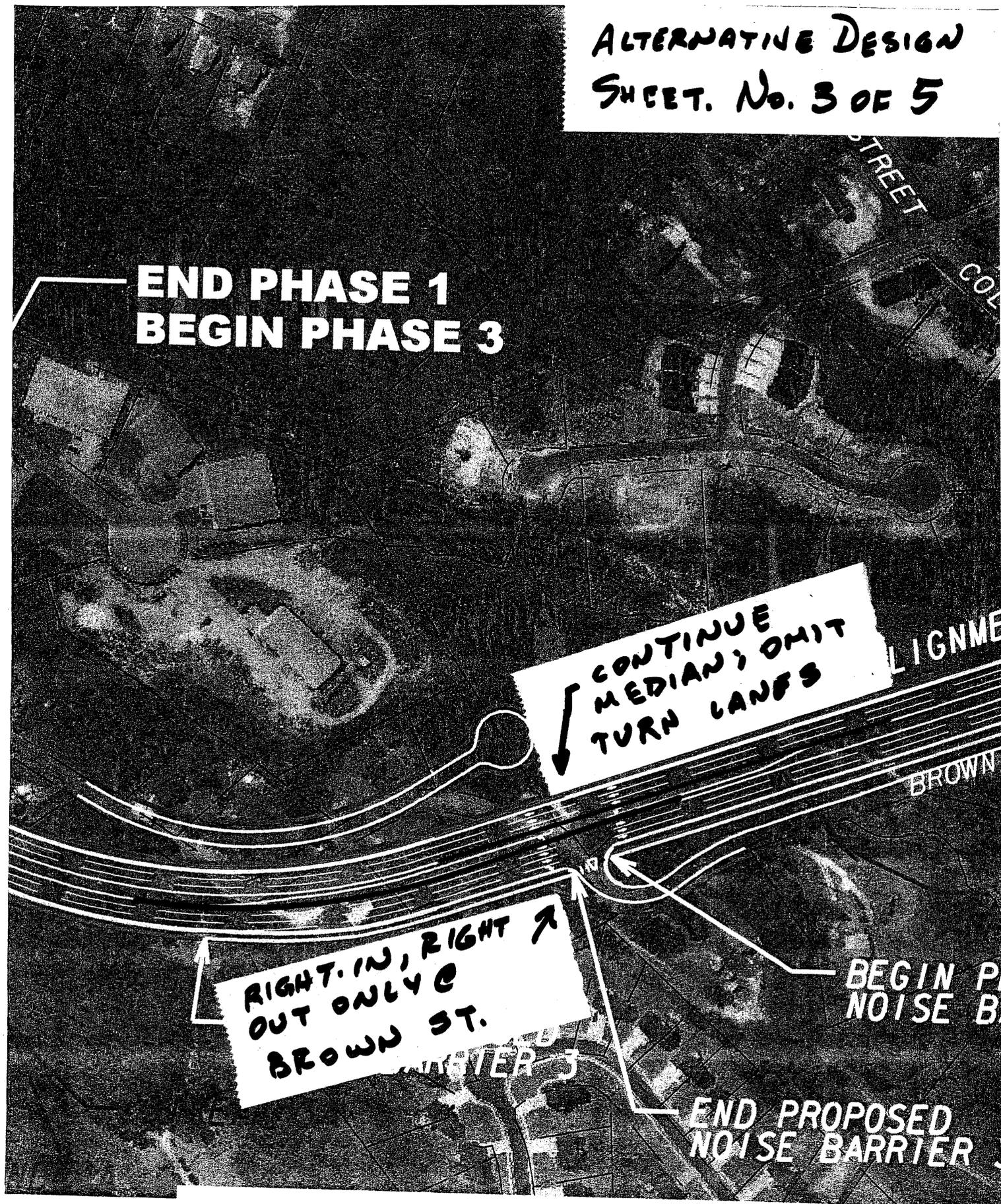
END PHASE 1  
BEGIN PHASE 3

CONTINUE  
MEDIAN; OMIT  
TURN LANES

RIGHT IN, RIGHT  
OUT ONLY @  
BROWN ST.

BEGIN PHASE  
NOISE BARRIER

END PROPOSED  
NOISE BARRIER



# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-11

SHEET NO

4

of 5

ADDITIONAL CURB & GUTTER TO CLOSE MEDIAN:

$$2(90) = 180 \text{ LF}$$

DELETE LEFT TURN PAVEMENT

$$A = 12(500 + 325)/9 = 1100 \text{ SY}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **HA-R-13**

DESCRIPTION: **HAMMERHEAD BOTH ENDS OF BROWN STREET AND  
CONNECT IT TO SR 92 OPPOSITE COLQUITT STREET**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

The current design includes a hammerhead at the north end of Brown Street with its southern end connecting to SR 92. A median opening is provided on SR 92.

**ALTERNATIVE:** (Sketch attached)

Hammerhead the southern end of Brown Street as well as the northern end. Do not provide a full connection to SR 92. Instead, provide a right-turn lane and left-turn lane on SR 92, i.e., a continuous median. Provide a 24-ft. opening to Brown Street opposite Colquitt Street. Provide a right-turn lane from SR 92 to Brown Street at the suggested opening.

**ADVANTAGES:**

- Reduces cost
- Improves safety
- Improves operations

**DISADVANTAGES:**

- Creates out-of-direction travel for Brown Street residents

**DISCUSSION:**

There are only two parcels that use Brown Street, thus, the traffic entering SR 92 is negligible. A common intersection with Colquitt Street will be highly beneficial.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 188,590	—	\$ 188,590
ALTERNATIVE	\$ 3,320	—	\$ 3,320
SAVINGS	\$ 185,270	—	\$ 185,270

ALT. HAMMERHEAD

ALTERNATIVE

DESIGN

SHEET 2 OF 4

TREET

7A

ELSIE STREET

CONE STREET

GREEN STREET

COLOUETT STREET

COLOUETT STREET

PROVIDE

RIGHT

ELIMINATE LAND

CONTINUE ALIGNMENT SR 92

NEW MEDIAN

BROWN ST

HAMMERHEAD

BEGIN PROPOSED

END PROPOSED

HOUSE BARRIER

NEW CONNECTION

TO SR 92

(STOP CONNECTION)

ARK

See

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

HA-R-13

SHEET NO

3

of

4

THIS ALTERNATIVE REMOVES 2 LEFT TURN LANES FROM SR 92 AT THE INTERSECTION WITH BROWN STREET IN THE ORIGINAL DESIGN. LEFT TURN LANES ARE ALREADY PROPOSED AT THE INTERSECTION WITH CAWITT ST. ADDITIONAL PAVING IS SAVED AT THE SOUTH END OF BROWN STREET.

MAINLINE PAVEMENT (ELIMINATE LT TURN LANES)

$$A = 12(2)(300 + 450)/9 = 2000 \text{ SY}$$

$$\text{M/L TURN LANE ISLAND: } (300' \times 450') \times 3' \text{ WIDE} / 9 = 250 \text{ SY}$$

BROWN ST PAVEMENT (ELIMINATE SOUTH ACCESS POINT)

$$A = 24(250)/9 = 667 \text{ SY}$$

ADDITIONAL MEDIAN C & G

$$100 \text{ ft (median opening)} \times 2 = 200 \text{ LF}$$





# SUMMARY OF POTENTIAL COST SAVINGS

**SR 92 Realignment from Durelee Lane to Malone Road (P.I. No. 0006900, 0006901, 720970)**  
**SR 92 Widening from Malone Road to Nebo Road (P.I. No. 0007691)**  
*Georgia Department of Transportation*

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
<b>REALIGNMENT PROJECT (continued)</b>						
<b>RETAINING WALL - REALIGNMENT PROJECT</b>						
RW-R-2A	Eliminate the SR 92/railroad/US 78 grade separation retaining walls in the southwest quadrant	\$638,000	\$33,413	\$604,587		\$604,587
RW-R-2B	Eliminate the SR 92/railroad/US 78 grade separation retaining walls in the northeast quadrant	\$478,544	\$425,382	\$53,162		\$53,162
<b>BRIDGES - REALIGNMENT PROJECT</b>						
B-R-1	Use retaining walls in lieu of longer spans at the bridges	\$5,003,394	\$4,330,722	\$672,672		\$672,672
B-R-2	Build US 78 bridge for current requirements and widen in the future	\$2,129,490	\$1,012,770	\$1,116,720		\$1,116,720
<b>BRIDGE CONSTRUCTION - REALIGNMENT PROJECT</b>						
BC-R-3	Build US 78 permanently at current detour location	\$335,225	\$95,590	\$239,635		\$239,635
BC-R-5	Jack and bore twin precast boxes under the railroad			Design Suggestion		
<b>VERTICAL ALIGNMENT - REALIGNMENT PROJECT</b>						
V-A-R-1	Flatten the SR 92 mainline grades under the railroad			Design Suggestion		
V-A-R-2	Realign SR 92 to the US 78 ramp	\$4,059,380	\$4,492,790	(\$433,410)		(\$433,410)

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **RW-R-2A**

DESCRIPTION: **ELIMINATE THE SR 92/RAILROAD/US 78 GRADE SEPARATION RETAINING WALLS IN THE SOUTHWEST QUADRANT**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

Retaining walls are proposed at three of the four corners of the bridges at US 78 over SR 92.

**ALTERNATIVE:** (Sketch attached)

Eliminate the retaining wall at the southwest quadrant of the SR 92/railroad/US 78 grade separation and construct a slope.

**ADVANTAGES:**

- Reduces cost
- Accelerates construction
- Reduces wall maintenance

**DISADVANTAGES:**

- None apparent

**DISCUSSION:**

The property adjacent to the SR92 relocation in the southwest quadrant will be acquired. The retaining wall at this location should be omitted and a slope constructed. The walls in the northwest and northeast corners must remain since the properties there are not being acquired.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 638,000	—	\$ 638,000
ALTERNATIVE	\$ 33,413	—	\$ 33,413
SAVINGS	\$ 604,587	—	\$ 604,587

END PHASE  
BEGIN PHASE

ALT. NO.  
RW-R-2A  
SHT 2 OF 4

BRADY STREET

ELLIS STREET

NW WALL  
→

NE WALL

GRADE SEPARATION (BRIDGES)

COMMERCIAL DISPLACEMENT

SW WALL  
→

(to be eliminated in alternative design)  
use sideslopes within acquired parcel

PROPOSED CARRIER 2

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

RW-R-2A

SHEET NO

3 of 4

IF CONSTRUCTED, THE WALL WOULD HAVE TO BE A TIE-BACK WALL TO PROTECT THE BUILDING ON THE PROPERTY. USE \$90 PER SQ.FT. FOR TIE-BACK WALL.

TIE ELEVATION AT US78 IS APPROXIMATELY 1211.

THE ELEVATION ON SR92 IS APPROXIMATELY 1184.

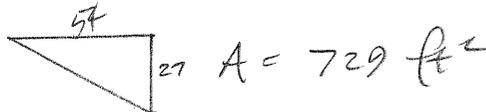
MAX WALL HEIGHT IS 27'. WALL BEGINS AT APPROXIMATELY 479+60 AND ENDS AT 484+60.

$$\begin{aligned} \text{WALL AREA} &= \left(\frac{2+27}{2}\right)(48460-47960) \\ &= 7250 \text{ SF} \end{aligned}$$

WITH NO WALL, EXCAVATION IS REQUIRED

AT 2:1

AT HIGHEST POINT



$$\text{VOLUME} = \frac{729}{2} (48460-47960) / 27$$

$$= 6750 \text{ CY}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **RW-R-2B**

DESCRIPTION: **ELIMINATE THE SR 92/RAILROAD/US 78 GRADE SEPARATION RETAINING WALL IN THE NORTHEAST QUADRANT**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

Retaining walls are proposed at three of the four corners of the bridges at US 78 over SR 92.

**ALTERNATIVE:** (Sketch attached)

Eliminate the retaining wall at the northeast quadrant of the SR 92/railroad/US 78 grade separation and construct a slope.

**ADVANTAGES:**

- Reduces cost
- Accelerates construction
- Reduces wall maintenance

**DISADVANTAGES:**

- Requires additional right-of-way
- Displaces property

**DISCUSSION:**

The property in the northeast quadrant of the bridges is outside of the East Strickland Street historic district. Although a displacement is required, purchasing the property and building a slope is less costly than the wall that would be required. Due to the proximity to new grade separation, the homeowner may prefer to be bought out.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 478,544	—	\$ 478,544
ALTERNATIVE	\$ 425,382	—	\$ 425,382
SAVINGS	\$ 53,162	—	\$ 53,162

END POINT  
BEGIN P

ALT. NO.  
RW-R-2B  
SHT 2 OF 4

BROWN STREET

ELLIS STREET

NW WALL  
→

NE WALL (Eliminate)  
w/ slopes  
& acquisition

GRADE SEPARATION  
(3 BRIDGES)

SW WALL  
→

ET  
ROAD  
HWY

PROPOSED  
BARRIER 2

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

RW - R - 2B

SHEET NO 3

of

4

IF CONSTRUCTED, THE WALL WOULD HAVE TO BE A TIE-BACK WALL TO PROTECT THE BUILDING ON THE PROPERTY. USE \$80 PER SQ. FOOT FOR TIE-BACK WALL.

THE ELEVATION AT US 78 IS APPROXIMATELY 1211. THE ELEVATION ON SR92 IS APPROXIMATELY 1181. THE MAXIMUM WALL HEIGHT IS 27'. THE WALL BEGINS AT 486+75 AND ENDS AT 490+50.

$$\text{Wall Area} = \left(\frac{2+27}{2}\right)(49050 - 48675) = 5438$$

WITH NO WALL, THE PARCEL MUST BE PURCHASED AND A 2:1 SLOPE EXCAVATED.

AT THE HIGHEST POINT, THE EXCAVATION END AREA IS

$$A = .5(27)(54) = 729$$

$$\text{VOLUME} = \frac{729}{2}(49050 - 48675) / 27 = 5063$$

$$\text{R/W PARCEL AREA} \approx 145(100) = 14500 \text{ SF}$$

USE \$125,000 FOR VALUE OF HOUSE. SEE ALTERNATIVE NO. HA-R-9.

# COST WORKSHEET



PROJECT: SR 92 Realignment & Widening  
(Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO.:

RW-R-ZB

SHEET NO.:

A of 4

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
TIE-BACK WALL	SF	5438	80-	435,040	0	-	0
EXCAVATION	CY	0	-	0	5063	4.50	22,784
CONST SUBTOTAL				435,040			22,784
CONST MARKUP @ 10%				43,504			2,278
CONST TOTAL				478,544			25,062
R/W	SF	0	-	0	14500	0.45	6,525
DISPLACEMENT	EA	0	-	0	1	40,000	40,000
HOUSE	EA	0	-	0	1	125,000	125,000
R/W SUBTOTAL				0			171,525
R/W MARKUP @ 14.8%				-			253,857
R/W TOTAL				0			
Subtotal				478,544			425,382
Markup (%) at INCLUDED				0			0
TOTAL				478,544			425,382

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **B-R-1**

DESCRIPTION: **USE RETAINING WALLS IN LIEU OF LONGER SPANS AT**  
**THE BRIDGES**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

The bridges are each 188 ft. long and consist of two spans.

**ALTERNATIVE:** (Sketch attached)

Use mechanically stabilized embankment retaining walls at the ends of the US 78 and East Strickland Street bridge and cast-in-place abutments at the railroad bridge. Shorten the bridges correspondingly.

**ADVANTAGES:**

- Reduces cost
- Accelerates bridge construction
- Reduces bridge maintenance

**DISADVANTAGES:**

- Requires more complex bridge construction at the walls
- Requires reconstruction of bridges if SR 92 is widened in the future

**DISCUSSION:**

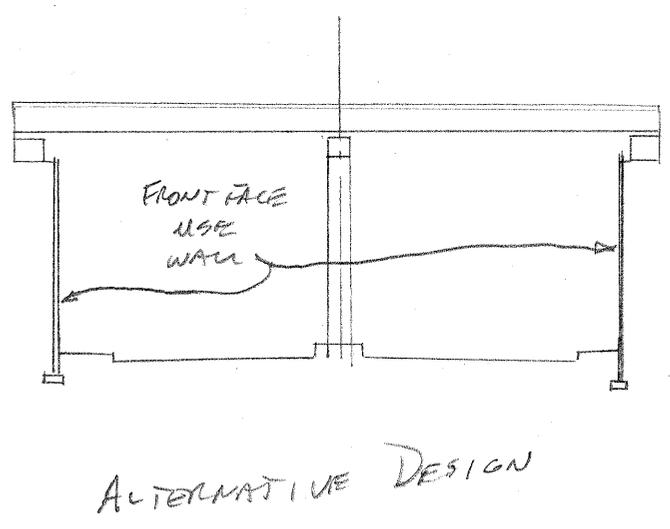
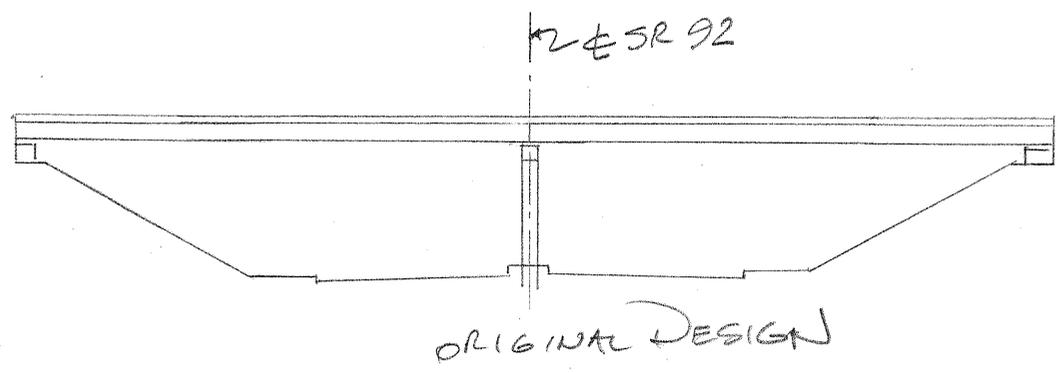
Shortening the bridges by using retaining walls removes the cost and construction time associated with longer spans.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 5,003,394	—	\$ 5,003,394
ALTERNATIVE	\$ 4,330,722	—	\$ 4,330,722
SAVINGS	\$ 672,672	—	\$ 672,672

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO  
*B-2-1*  
SHEET NO *2* of *4*

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH



# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

B-R-1

SHEET NO

3 of 4

ORIGINAL DESIGN BRIDGES ARE 188' LONG

BRIDGE LOCATION	OUT-TO-OUT WIDTH	AREA
US 78	$2(12) + 2(6 + 2 + 1.2083) = 114'-5"$	21510 SF
E. STRICKLAND	$2(12 + 2 + 6 + 1.2083) = 42'-5"$	7974 SF
RAILROAD	36'	6768 SF

ALTERNATIVE BRIDGE LENGTH:

USE 6' FROM FACE OF WALL TO BFPR,

PLACE WALL @ SHOULDER BREAK POINT

$$L = 2(6) + 12 + 3(12) + 20 + 3(12) + 15 = 131'$$

BRIDGE LOCATION	W	AREA
US 78	114'-5"	14989 SF
E. STRICKLAND	42'-5"	5557 SF
RAILROAD	36'	4716 SF

$$\text{ADDITIONAL PAVEMENT} = (24 + 96)(188 - 131) / 9 = 7605 \text{ Y}$$

WALL AREA: H = 20' UNDER BRIDGES

$$\text{RR BRIDGE } A = 2(36)(20) = 2160 \text{ SF}$$

HIGHWAY BRIDGES: WALL TURN BACK AT OUTS. EDGE

$$A = 2[(115 + 43)(20) + .5(60)(20)] = 7880 \text{ SF}$$

TURN BACK L ↑ & TURN BACK MAX. HT



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **B-R-2**

DESCRIPTION: **BUILD US 78 BRIDGE FOR CURRENT LANE REQUIREMENTS AND WIDEN IN THE FUTURE**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

The current design proposes to construct the US 78 bridge for the future condition which will comprise eight lanes with sidewalks.

**ALTERNATIVE:** (Sketch attached)

Construct the US 78 bridge to the current two lanes with one turning lane.

**ADVANTAGES:**

- Reduces cost
- Accelerates schedule
- Reduces bridge maintenance

**DISADVANTAGES:**

- Bridge construction prices will escalate

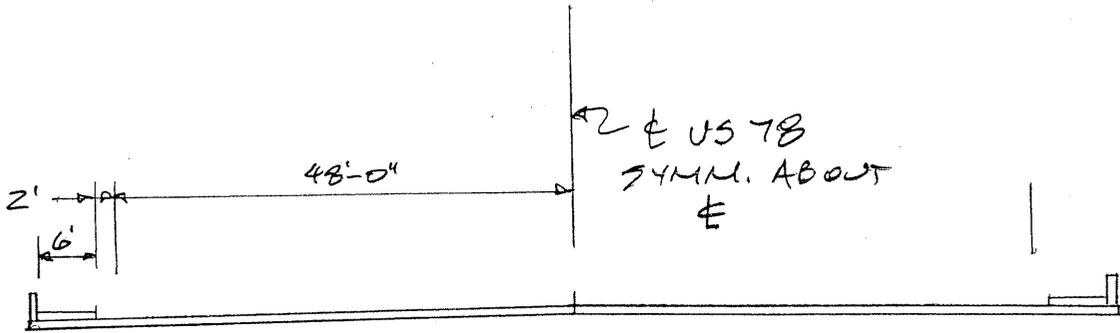
**DISCUSSION:**

Future plans for US 78 are to provide an eight-lane highway; the timing of this widening was unknown. Eliminating the future condition of US 78 from the current bridge design will reduce costs and eliminate the uncertainty of accommodating a future project in terms of exact lane configurations and positions.

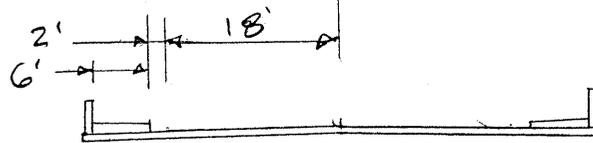
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,129,490	—	\$ 2,129,490
ALTERNATIVE	\$ 1,012,770	—	\$ 1,012,770
SAVINGS	\$ 1,116,720	—	\$ 1,116,720

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)** ALTERNATIVE NO **B-R-2**  
*Georgia Department of Transportation*

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH  SHEET NO **2** of **4**



ORIGINAL DESIGN



ALTERNATIVE DESIGN

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

B-R-2

SHEET NO

3

of

4

BRIDGE LENGTH = 188'

THE ORIGINAL DESIGN BRIDGE WIDTH IS:

8 LANES  $8(12) = 96$

2 GUTTERS  $2(2) = 4$

2 SIDEWALKS  $2(6) = 12$

2 PARAPETS  $2(1.2083) = 2'-5"$

TOTAL = 114'-5"

AREA =  $188(114.4167) = 21510$  SF

ALTERNATIVE DESIGN BRIDGE WIDTH IS:

2 LANES  $2(12) = 24$

1 TURNLANE  $= 12$

2 GUTTERS  $= 4$

2 SIDEWALKS  $= 12$

2 PARAPETS  $= 2'-5"$

TOTAL = 54'-5"

AREA =  $188(54.4167) = 10230$  SF



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **BRC-3**

DESCRIPTION: **BUILD US 78 PERMANENTLY AT CURRENT DETOUR LOCATION**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The current design has two stages for US 78: the first will shift it onto a new alignment and the second will shift it back to its existing alignment.

**ALTERNATIVE:** (Sketch attached)

Shift US 78 once by keeping it on the new alignment.

**ADVANTAGES:**

- Reduces cost
- Eliminates temporary paving
- Eliminates second stage

**DISADVANTAGES:**

- Requires shifted alignment to be designed for permanent design standards
- Impacts right-of-way
- Requires additional environmental clearance

**DISCUSSION:**

This alternative proposes to shift US 78 once to its permanent location. Stage 1 originally involves building the outside portion of the US 78 bridge, while US 78 would remain on the existing alignment. Stage 2 would involve shifting US 78 permanently to the portion of US 78 bridge built in Stage 1.

The shifted US 78 under this proposed design may require higher design standards than are proposed under the current design since the current detour is designed for temporary standards. This would require any future widening of US 78 to be to the north and away from the developed property.

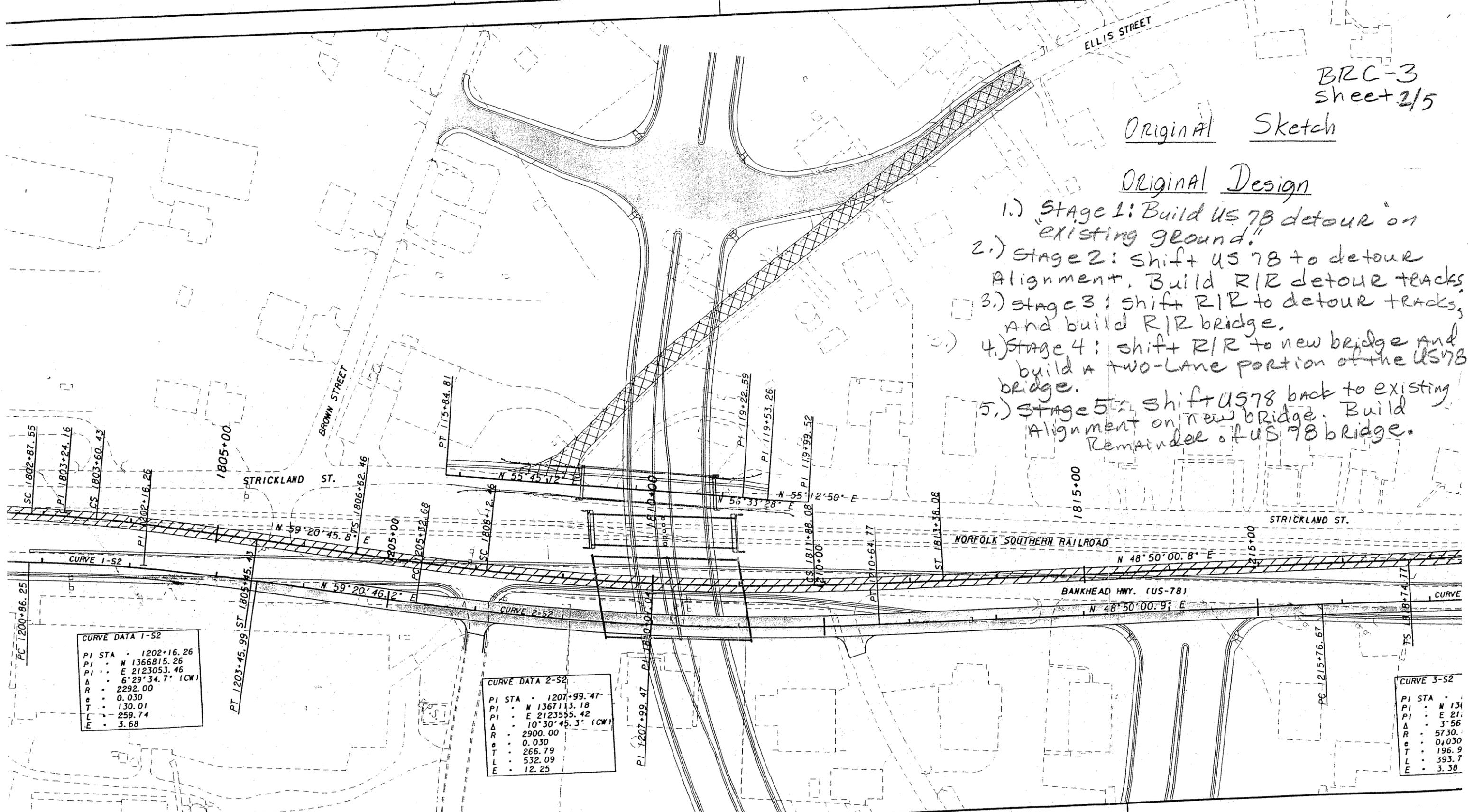
Existing US 78 pavement will have to be rebuilt in the area of the railroad detour tracks under the current design. Since under the proposed design the US 78 roadway would remain on the shifted detour alignment, the existing US 78 pavement removed for the railroad detour would not have to be rebuilt.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 335,225	—	\$ 335,225
ALTERNATIVE	\$ 95,590	—	\$ 95,590
SAVINGS	\$ 239,635	—	\$ 239,635

Original Sketch

Original Design

- 1.) Stage 1: Build US 78 detour on existing ground.
- 2.) Stage 2: Shift US 78 to detour Alignment, Build R/R detour tracks.
- 3.) Stage 3: Shift R/R to detour tracks, and build R/R bridge.
- 4.) Stage 4: Shift R/R to new bridge and build a two-lane portion of the US 78 bridge.
- 5.) Stage 5: Shift US 78 back to existing Alignment on new bridge. Build Remainder of US 78 bridge.



CURVE DATA 1-S2

PI STA	1202+16.26
PI	N 1366815.26
PI E	2123053.46
Δ	6° 29' 34.7" (CW)
R	2292.00
e	0.030
T	130.01
L	259.74
E	3.68

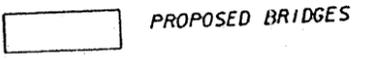
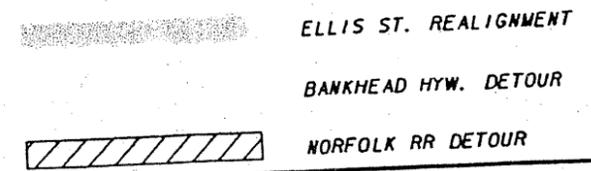
CURVE DATA 2-S2

PI STA	1207+99.47
PI	N 1367113.18
PI E	2123555.42
Δ	10° 30' 45.3" (CW)
R	2900.00
e	0.030
T	266.79
L	532.09
E	12.25

CURVE DATA 3-S2

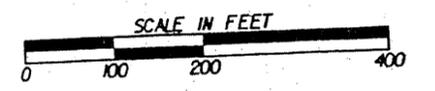
PI STA	1874+77.77
PI	N 1317113.18
PI E	2123555.42
Δ	10° 30' 45.3" (CW)
R	5730.00
e	0.030
T	196.9
L	393.7
E	3.38

DNS  
ED  
ONS



**CROY-MSE**

CROY-MSE, LLC.  
200 NORTH COBB PARKWAY  
BUILDING 400, SUITE 413  
MARIETTA, GA. 30062  
PHONE: (770) 971-5487 FAX: (770) 971-0620



Alternate Sketch

Alternate No. BRC-3  
sheet 3/5

Alternate Design

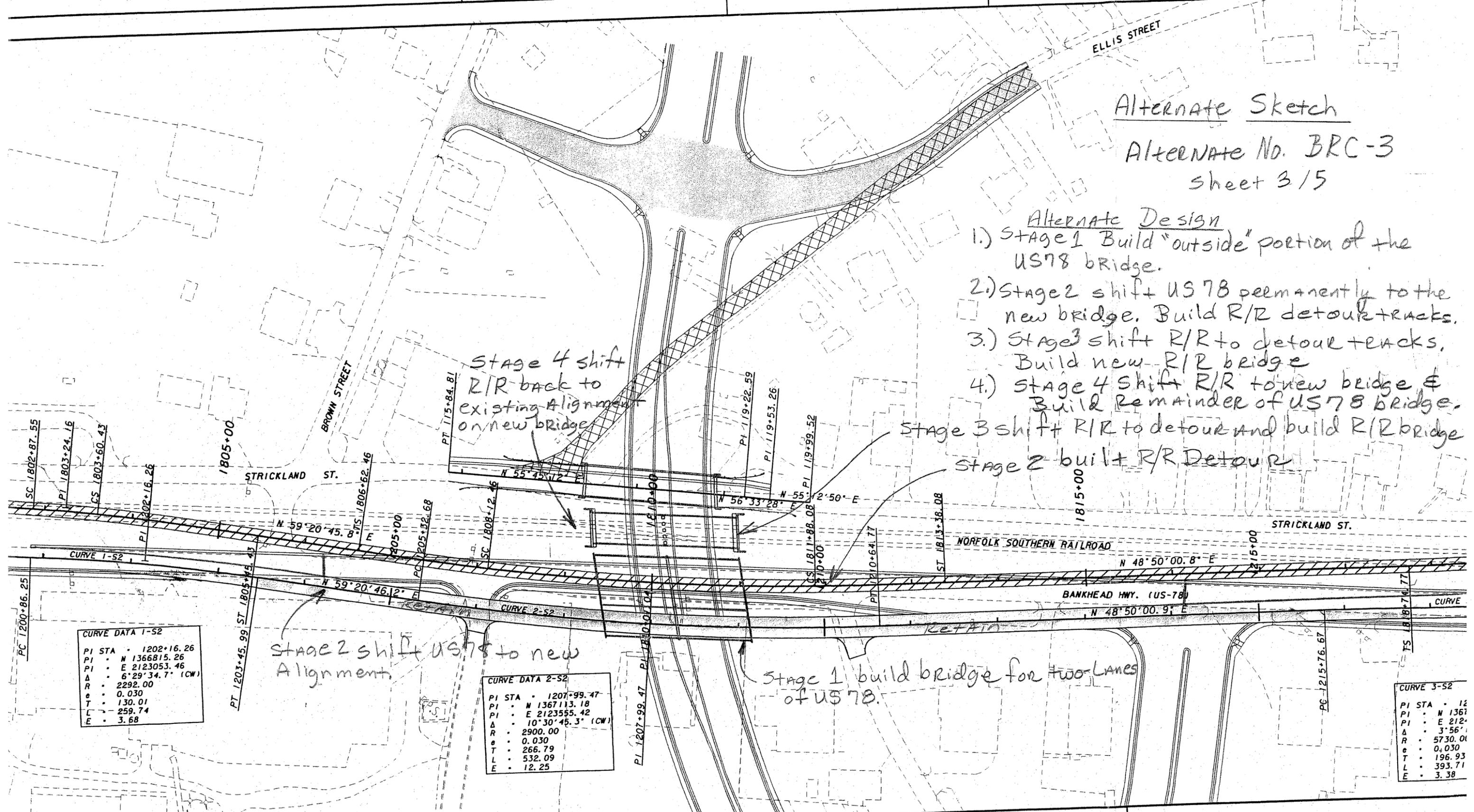
- 1.) Stage 1 Build "outside" portion of the US78 bridge.
- 2.) Stage 2 shift US 78 permanently to the new bridge. Build R/R detour tracks.
- 3.) Stage 3 shift R/R to detour tracks. Build new R/R bridge
- 4.) Stage 4 shift R/R to new bridge & Build Remainder of US78 bridge.

Stage 3 shift R/R to detour and build R/R bridge  
Stage 2 built R/R Detour

Stage 4 shift R/R back to existing Alignment on new bridge

Stage 2 shift US78 to new Alignment

Stage 1 build bridge for two lanes of US78.



CURVE DATA 1-S2

PI STA	1202+16.26
PI	N 1366815.26
PI	E 2123053.46
Δ	6°29'34.7" (CW)
R	2292.00
e	0.030
T	130.01
L	259.74
E	3.68

CURVE DATA 2-S2

PI STA	1207+99.47
PI	N 1367113.18
PI	E 2123555.42
Δ	10°30'45.3" (CW)
R	2900.00
e	0.030
T	266.79
L	532.09
E	12.25

CURVE 3-S2

PI STA	12
PI	N 1367
PI	E 212
Δ	3°56'
R	5730.00
e	0.030
T	196.93
L	393.71
E	3.38

ELLIS ST. REALIGNMENT

BANKHEAD HYW. DETOUR

NORFOLK RR DETOUR

PROPOSED BRIDGES

**CROY-MSE**

CROY-MSE, LLC.  
200 NORTH COBB PARKWAY  
BUILDING 400, SUITE 413  
MARIETTA, GA. 30062  
PHONE: (770) 971-5407 FAX: (770) 971-0620

SCALE IN FEET

0 50 100 200

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

BRC-3

SHEET NO

4 of 5

Pavement length of US 78 detour: 1,250'

Pavement Area of Detour (US 78):

$$\frac{(1250' \times 24')}{9 \text{ sf/sy}} = \frac{3,000 \text{ S.F.}}{9 \text{ sf/sy}} = 3,333 \text{ sy}$$

Area of existing US 78 to be rebuilt where the R/R detour will be located.

$$\frac{(1200' \times 24')}{9 \text{ sf/sy}} = 3,200 \text{ s.y.}$$

Assume the detour would require approximately 4 inches of additional asphalt pavement to be retained as permanent pavement (conservative estimate)

$$4'' = 440 \text{ lb/sy (25mm Asphalt)}$$

$$\frac{\$80.02}{\text{TN}} \times \frac{\text{TN}}{2000 \text{ lb}} \times \frac{440 \text{ lb}}{\text{sy}} = \$17.60/\text{sy (for 4'')}$$

It is assumed that the approximate same length of curb & gutter would be required for the shifted (detour) US 78, and the reconstructed portion of US 78.

# COST WORKSHEET



PROJECT: SR 92 Realignment & Widening  
(Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO.: BRC-3

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			A/H, <del>PROPOSED</del> ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
SAVE Rebuilding EXIST. US 78							
Pavement	SY	3200	\$78.32	\$250,630			
Grading:	CY	6000	\$4.50	\$27,000			
Restriping	LS	LS	\$5,000	\$5,000			
Reconstruct Drainage:							
Reconst. C.B.	EA	4	\$1850	\$7400			
18" pipe	LF	400	\$36.80	\$14,720			
Additional Thickness to build detour Pavement to Permanent stds. 4" of 25mm AC.		SY			3333	\$17.60	\$58,660
Additional drainage Catch Basins	EA				4	\$2460	\$9840
18" pipe	LF				500	\$36.80	\$18,400
CONSTR Subtotal				\$304,750			\$86,900
Markup (%) at 10%				\$30,475			\$8,690
TOTAL				\$335,225			\$95,590

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **BRC-5**

DESCRIPTION: **JACK AND BORE TWIN PRECAST BOXES UNDER RAILROAD**

SHEET NO.: **1 of 2**

**ORIGINAL DESIGN:** (Sketch attached)

Detours are created for SR 78 and the railroad while a cut and cover construction method will be employed to construct new SR 92.

**ALTERNATIVE:** (Sketch attached)

Jack and bore two precast boxes roughly 200 ft. long underneath SR 78, the railroad and Strickland Street. The top slab can transition to the ground another 100 ft. on either side of the tunnel. These approaches to the tunnel can be cut and cover since no traffic movements is affected.

**ADVANTAGES:**

- Eliminates road and rail traffic detour
- Minimizes accidents
- Accelerates construction

**DISADVANTAGES:**

- Requires approval by railroad
- Specifically designed jacking pits (original ground slopes down) would be very wide
- Requires special attention to the jacking pits (original ground slopes down) nearby

**DISCUSSION:**

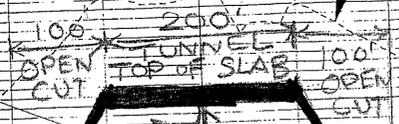
The cost to detour and retrack the railway tracks was not provided, hence this alternative is presented as a design suggestion. The cost of the grade separation bridges, SR 78 detour and the railroad detour and retracking would need to offset the jack and bore operation.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	<b>DESIGN SUGGESTION</b>		
SAVINGS			

$K = 136.16$

PVI EL. 1202.60

EXISTING GRADE



PVC EL. 1153.66

PVT EL. 1174.31

REALIGNED  
TOP OF PAVEMENT  
SR 92

H.P. EL. 1184.68

6:7.498%

BANKHEAD HIGHWAY  
(US 78, SR 5, SR 8)

NORFOLK SOUTHERN RAILWAY

EAST STRICTLAND STREET

Alt. # BRC-5  
Sheet 2 of 2

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **VA-R-1**

DESCRIPTION: **FLATTEN SR 92 MAINLINE GRADES UNDER RAILROAD**

SHEET NO.: **1 of 2**

**ORIGINAL DESIGN:** (Sketch attached)

The original design shows 6.75% grades for a crest curve before the US 92/railroad and roadway grade separation.

**ALTERNATIVE:** (Sketch attached)

Flatten the grade to 5.0% at the south side of the bridges to improve the tie to the existing Cooper Street and also to improve the ramp from SR 92 to US 78.

**ADVANTAGES:**

- Improves truck operations (especially start up at Cooper Street intersection)
- Flattens grades for the ramp between SR 92 and US 78
- Slightly increases clearance under bridges

**DISADVANTAGES:**

- May impact balanced earthwork expected out of current design

**DISCUSSION:**

Two intersections, one at Cooper Street and one at the ramp, are located 600 ft. apart which is substandard according to design guidelines. This alternative would reduce the grades at the south side of the grade separation. The new profile is about two ft. higher at Cooper Street and lower at the ramp that helps both Cooper Street tie in and ramp profile. Construction cost may not have much difference other than earthwork. Bridges get more vertical clearance also.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	<b>DESIGN SUGGESTION</b>		
SAVINGS			



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **VA-R-2**

DESCRIPTION: **REALIGN SR 92 TO US 78 RAMP**

SHEET NO.: **1 of 7**

**ORIGINAL DESIGN:** (Sketch attached)

The current design calls for an SR 92/US 78 ramp halfway between the Cooper Street/SR 92 intersection and the SR 92/US 78/railroad/Strickland Street grade separation.

**ALTERNATIVE:** (Sketch attached)

Move the SR 92/US 78 ramp south to Cooper Street and provide access to the portion of Dorsett Street north of Cooper Street via a short connecting road that would operate with right-in right-out access from SR 92. Connect Dorsett Street to the portion of Cooper Street east of Dorsett Street. Cul-de-sac Dorsett Street just north where the alternative ramp crosses it.

**ADVANTAGES:**

- Eliminates one intersection
- Eliminates non-standard median openings
- Improves SR 92 operations

**DISADVANTAGES:**

- Limits access to this portion of Dorsett Street to US 78/Connally and US 92/Durelee Lane
- Extends ramp and places it at approximately the same grade
- Impacts five properties
- Increases right-of-way costs
- Increases construction costs
- Impacts the Dorsett Street neighborhood (north of proposed ramp)

**DISCUSSION:**

This alternative was proposed with the intent to reduce the grades of the ramp and eliminate closely spaced intersections between Cooper Street and the US 78 ramp. It is presented as a VE exercise that supports the current design.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,050,380	—	\$ 4,050,380
ALTERNATIVE	\$ 4,492,790	—	\$ 4,492,790
SAVINGS	\$ (442,410)	—	\$ (442,410)

END PROPOSED  
NOISE BARRIER 1

STREAM 2A

Handwritten notes in a cloud shape: "Add High-Density Residential" and "Remove existing parking" with arrows pointing to specific areas on the map.

Eliminated Ramp

BEGIN PROPOSED  
NOISE BARRIER 2

END PROPOSED  
NOISE BARRIER 2

BEGIN  
NOISE BARRIER 3

WETLAND 4A

Handwritten notes: "The exit will be at Connally Drive of US-78 and Durbin at SR 92" and "Alternative Design" with arrows pointing to the proposed barrier area.

EAST STRICKLAND HISTORIC DISTRICT

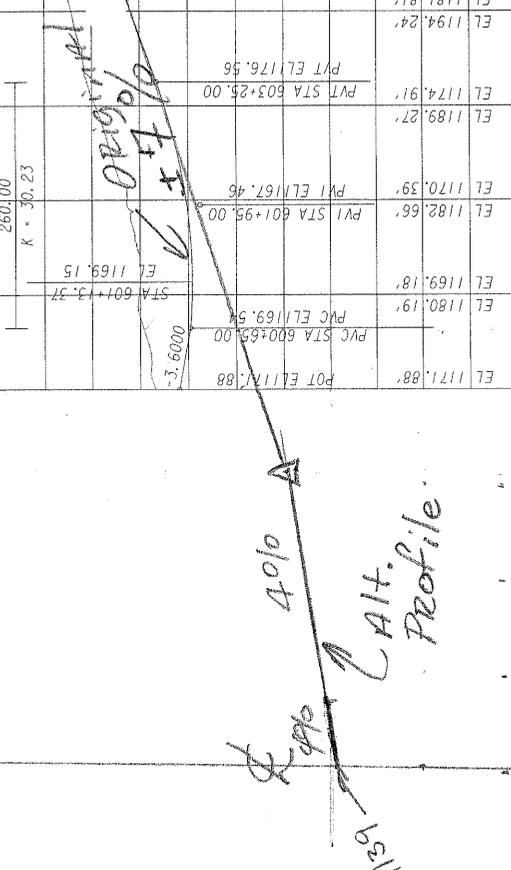


# ALTERNATIVE RAMP PROFILE

SHEET NO. 2 of 7

ALTERNATIVE RAMP PROFILE  
SHEET NO. 3 of 7

STATION	ELEVATION	DESCRIPTION
600+00	1171.88	POT EL 1171.88
600+50	1180.19	PVC STA 600+50.00
601+00	1180.19	PVC EL 1180.19
601+13.37	1169.15	STA 601+13.37
601+95.00	1182.66	PVI STA 601+95.00
602+00	1170.59	PVI EL 1170.59
603+25.00	1174.91	PVT STA 603+25.00
604+00	1194.24	PVT EL 1194.24
605+00	1197.28	EL 1197.28
605+55.00	1188.81	PVC EL 1188.81
606+00	1198.24	EL 1198.24
606+29.00	1194.49	PVI EL 1194.49
606+55.00	1198.11	PVI STA 606+55.00
607+00	1197.66	EL 1197.66
607+16.10	1198.11	POT STA 607+16.10
608+00	1200.00	POT EL 1198.00 + 2.00



Basically the same profile curve for both alignments.

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE: RAMP PLAN AND PROFILE  
DRAWING NO. SR 92 REALIGNMENT

REVISION DATES

NOT TO SCALE

# CALCULATIONS



PROJECT SR 92 Realignment & Widening (Douglas & Paulding Counties) ALTERNATIVE NO VA-R-2  
 Georgia Department of Transportation

## PCC / RCC UNIT PRICE BASIS

SHEET NO 4 of 7

Concrete Pavement Section for SR92  
 (PCC)

OMR computed a Life Cycle Cost Analysis  
 and recommended P.C.C. Pavement.

Typical Section of 12 Inch PCC with  
 base of 10 In. GAB

PCC

12 Inch : \$ 65 / s.y. from a selected project bid  
 tabulation concurred by the  
 Engineering Services Estimators.

GAB Cost: 10" = 0.833'

$$\begin{matrix} \text{\$ 17.95} \\ \text{ton} \end{matrix} \times 9 \text{ sf.} \times 0.833' \times 0.75 \frac{\text{T}}{\text{CF}} = \begin{matrix} \text{\$ 10.10} \\ \text{s.y.} \end{matrix}$$

wtd value from mean item summary

$$\text{Total S.Y. Cost} = \begin{matrix} \text{PCC} \\ \text{\$ 65 / s.y.} \end{matrix} + \begin{matrix} \text{GAB} \\ \text{\$ 10.10 / s.y.} \end{matrix} = \begin{matrix} \text{PCC SECTION} \\ \text{\$ 75.10 / s.y.} \end{matrix}$$

RCC

OMR recommended (RCC) Rolled Computed Concrete  
 for Shoulder

with 10" GAB.

RCC shoulder = \$ 44 / s.y. (RCC)

10" GAB = \$ 10.10 / s.y. (GAB)

Total shoulder \$ 54.10 / s.y. RCC Section

RCC Wtd Item  
 Selected

CALCULATIONS  
 ALTERNATIVE NO VA-R-2  
 SHEET No 5 of 7

ITEM CODE	ITEM DESCRIPTION	QUANTITY	USE	UM	MEAN	WTD AVG
441-0206	PLAIN CONC DITCH PAVING, 6 IN	2000.00	2	SY	50.75	44.27
441-0300	CONC SPILLWAY, SPCL DES	7.00	4	EA	1986.13	2175.19
441-0301	CONC SPILLWAY, TP 1	399.00	33	EA	2248.99	2176.21
441-0302	CONC SPILLWAY, TP 2	31.00	7	EA	2096.03	2381.86
441-0303	CONC SPILLWAY, TP 3	312.00	29	EA	2348.80	2207.74
441-0304	CONC SPILLWAY, TP 4	27.00	7	EA	2365.69	2399.24
441-0600	CONC HEADWALLS	117.00	6	CY	895.16	858.87
441-0700	CONCRETE MEDIAN, VARB TK	80.00	1	SY	78.28	78.28
441-0740	CONCRETE MEDIAN, 4 IN	40186.00	26	SY	44.67	31.90
441-0748	CONCRETE MEDIAN, 6 IN	11424.00	19	SY	76.49	55.26
441-0754	CONCRETE MEDIAN, 7 1/2 IN	14559.00	10	SY	55.95	56.22
441-0762	CONCRETE MEDIAN, 9 1/2 IN	2700.00	1	SY	71.00	71.00
441-3999	CONCRETE V GUTTER	45838.00	18	LF	25.14	21.48
441-4000	CONC VALLEY GUTTER, SPCL DES	11341.00	2	SY	51.24	35.38
441-4020	CONC VALLEY GUTTER, 6 IN	5750.00	13	SY	42.77	42.54
441-4030	CONC VALLEY GUTTER, 8 IN	22319.00	27	SY	57.48	54.52
441-4050	CONC VALLEY GUTTER WITH CURB, 8 IN	549.00	3	SY	78.31	84.43
441-5001	CONCRETE HEADER CURB, 4 IN, TP 1	45.00	1	LF	17.50	17.50
441-5002	CONCRETE HEADER CURB, 6 IN, TP 2	28087.00	24	LF	22.42	21.48
441-5003	CONCRETE HEADER CURB, 8 IN, TP 3	1628.00	2	LF	21.00	21.59
441-5004	CONCRETE HEADER CURB, 10 IN, TP 4	244.00	3	LF	31.17	18.09
441-5007	CONCRETE HEADER CURB, 8 IN, TP 7	300.00	1	LF	26.26	26.26
441-5008	CONCRETE HEADER CURB, 6 IN, TP 7	2700.00	1	LF	13.90	13.90
441-5052	CONC DOWELED INTEGRAL CURB, TP 2, INCL DOWELS	3200.00	1	LF	27.10	27.10
441-5057	CONC DOWELED INTEGRAL CURB, TP 7, INCL DOWELS	2450.00	1	LF	10.25	10.25
441-6002	CONC CURB & GUTTER, 6 IN X 18 IN, TP 2	300.00	1	LF	14.30	14.30
441-6012	CONC CURB & GUTTER, 6 IN X 24 IN, TP 2	12810.00	8	LF	28.70	30.93
441-6022	CONC CURB & GUTTER, 6 IN X 30 IN, TP 2	130707.00	21	LF	21.01	19.98
441-6216	CONC CURB & GUTTER, 8 IN X 24 IN, TP 2	2378.00	3	LF	22.60	17.86
441-6221	CONC CURB & GUTTER, 8 IN X 30 IN, TP 1	9091.00	3	LF	20.64	16.62
441-6222	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	230102.00	59	LF	27.51	19.26
441-6720	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	12470.00	2	LF	21.41	15.55
441-6740	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	53702.00	11	LF	19.31	15.30
442-0100	ROLLER COMPACTED CONCRETE PAVEMENT	124803.00	1	SY	44.00	44.00
443-1000	ELASTOMERIC PROFILE BRIDGE JOINT SEALS, BR NO -	4.00	2	EA	15000.00	15000.00
444-1000	SAVED JOINTS IN EXIST PAVEMENTS - PCC	21604.00	24	LF	10.01	7.70
445-0500	WATERPROOFING PVMT JOINTS AND CRACKS -	41000.00	1	LF	1.00	1.00
446-1100	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	961591.00	61	LF	8.24	2.79
446-1200	PVMT REINF FABRIC FULL WIDTH, TYPE 2	8000.00	1	SY	2.30	2.30
446-2118	HIGH STRENGTH PVMT REINF FABRIC, 18 IN WIDTH	81576.00	10	LF	9.91	5.00
446-3500	HIGH STRENGTH PVMT REINF FABRIC -	229750.00	4	LF	7.45	4.41
447-1050	MODULAR EXPANSION JOINT, BR. NO -	1.00	1	EA	65000.00	65000.00
449-1000	BRIDGE DECK JOINT SEAL, BRIDGE NO. BENT NO.	1.00	1	EA	0.00	0.00
449-1605	LOW-DENSITY, CLOSED CELL, X-LINKED, ETHYLENE VINYL ACETATE,	2026.00	22	LF	197.70	198.70
449-1620	LOW-DENSITY, CLOSED-CELL, X-LINKED, ETHYLENE VINYL ACETATE,	20393.00	361	LF	39.34	38.27
451-1100	PATCHING PCC PAVEMENT	5900.00	2	SF	129.40	128.99
452-1000	FULL DEPTH SLAB REPLACEMENT	800.00	1	CY	380.00	380.00
453-1000	PORTLAND CEMENT CONCRETE WHITETOPPING	2384.00	3	CY	654.71	643.62
455-1000	FILTER FABRIC FOR EMBANKMENT STABILIZATION	563205.00	13	SY	4.77	3.63
456-2012	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (CONTINUOUS)	347.00	19	GLM	2022.06	945.28
456-2015	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (SKIP)	306.89	38	GLM	1760.99	860.01
456-2025	INDENTATION CENTERLINE RUMBLE STRIPS-GROUND	2.00	1	GLM	1450.00	1450.00

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO VA-R-2

SHEET NO

6 of 7

$$\text{Original Save} \rightarrow \text{Pavement} = \frac{6 \text{ lanes} \times 12' \times 650'}{9} = \underline{5200 \text{ SY}}$$

Save  $\rightarrow$  8' median - 650' long

Save  $\rightarrow$  curb & gutter (median + sides) =  $650 \times 4 = 2600 \text{ LF}$

Save R/W displacements - 3 Residential + 2 commercial  
(this is based on visual observation & from maps)

Save - 1 signalized intersection

## Alternate

$$\text{Pavement} = \frac{6 \text{ lanes} \times 12' \times 1100'}{9} = 8800 \text{ SY}$$

$$\text{C \& G (median + sides)} = 1100 \times 4 = 4400$$

Required R/W displacements, 5 properties

# COST WORKSHEET



PROJECT: **SR 92 Realignment & Widening**  
**(Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO.: *VA-R-2*

SHEET NO.: *7* of *7*

PROJECT ITEM		ORIGINAL ESTIMATE			ALT. PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
<i>Original → Signalized Intersect</i>	<i>each</i>	<i>1</i>	<i>100,000</i>	<i>100,000</i>			
<i>Pavement</i>	<i>SY</i>	<i>5200</i>	<i>75.10</i>	<i>390,520</i>			
<i>curb &amp; Gutter</i>	<i>LF</i>	<i>2600</i>	<i>13.60</i>	<i>35,360</i>			
<i>R/W 2 Residential prop</i>	<i>EA</i>	<i>3</i>	<i>200,000</i>	<i>600,000</i>			
<i>2 Commercial</i>	<i>EA</i>	<i>2</i>	<i>400,000</i>	<i>800,000</i>			
<i>Alternative Design</i>							
<i>Pavement</i>	<i>SY</i>	<i>8800</i>	<i>75.10</i>	<i>660,880</i>	<i>8800</i>	<i>75.10</i>	<i>660,880</i>
<i>C&amp;G</i>	<i>LF</i>				<i>4400</i>	<i>13.60</i>	<i>59,840</i>
<i>R/W</i>							
<i>Residential/Comm prop.</i>	<i>EA</i>				<i>5</i>	<i>300,000</i>	<i>1,500,000</i>
<i>Const. Subtotal</i>				<i>\$ 525,800</i>	<i>Const. Subtotal</i>		<i>\$ 720,720</i>
<i>Const. Markup 10%</i>				<i>\$ 52,580</i>	<i>Const. Markup 10%</i>		<i>\$ 72,070</i>
<i>Const. Subtotal</i>				<i>\$ 578,380</i>	<i>Const. Subtotal</i>		<i>\$ 792,790</i>
<i>R/W Subtotal</i>				<i>\$ 1,400,000</i>	<i>R/W Subtotal</i>		<i>1,500,000</i>
<i>R/W Markup 145%</i>				<i>\$ 2,012,000</i>	<i>R/W Markup 145%</i>		<i>2,200,000</i>
				<i>\$ 3,412,000</i>	<i>R/W Subtotal</i>		<i>3,700,000</i>
<b>Subtotal</b>				<i>\$ 3,412,000</i>			<i>\$ 3,700,000</i>
<b>Markup (%) at</b>				<i>\$ 72,580</i>			<i>\$ 72,580</i>
<b>TOTAL</b>				<i>\$ 4,050,380</i>			<i>\$ 4,492,790</i>



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-W-1**

DESCRIPTION: **REDUCE MEDIAN WIDTH FROM 24 FT. TO 20 FT.**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

A 24-ft.-wide median is provided throughout the widening project from Malone Road to Nebo Road.

**ALTERNATIVE:** (Sketch attached)

Reduce the median width to 20 ft. All other elements of the project would remain unchanged except for a reduction in right-of-way at 12-ft. left-turn lanes. The raised island median would be 8 ft. including gutter pans.

**ADVANTAGES:**

- Reduces right-of-way acquisition costs
- Reduces landscape costs

**DISADVANTAGES:**

- Reduces landscaped area slightly
- Offsets opposing left-turn lanes by 4 ft.

**DISCUSSION:**

This rural arterial is expected to become an urban arterial within a few years of its construction due to the high growth in this area. AASHTO guidelines allow a minimum of 18-ft. median for urban arterial. Construction of a 20-ft. median will satisfy this requirement. GDOT guidelines state that a 24-ft. raised median with 4 ft. from the edge of the travel way to the face of the curb (2 ft. of paved shoulders) for >45 MPH design speeds will be required.

A design variance for this alternative will be required.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,161,136	—	\$ 3,161,136
ALTERNATIVE	\$ 2,881,274	—	\$ 2,881,274
SAVINGS	\$ 279,862	—	\$ 279,862



PROJECT

**SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
 Georgia Department of Transportation

ALTERNATIVE NO

**TS-W-1**

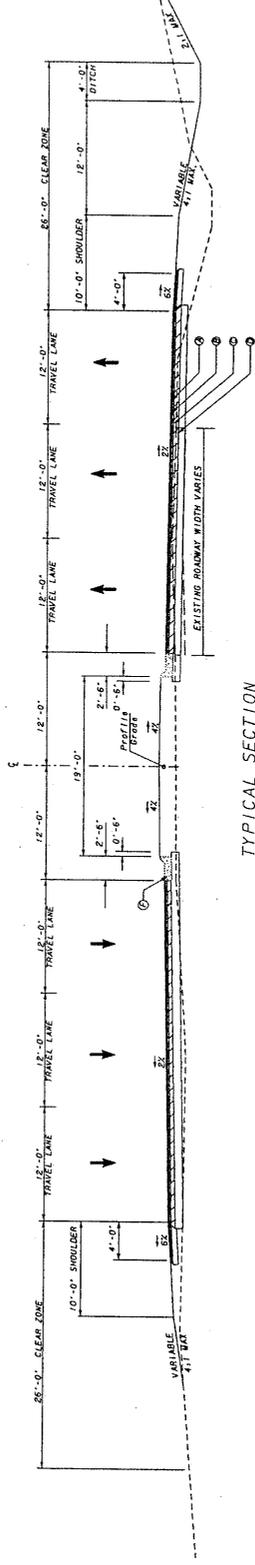
ORIGINAL DESIGN

ALTERNATIVE DESIGN

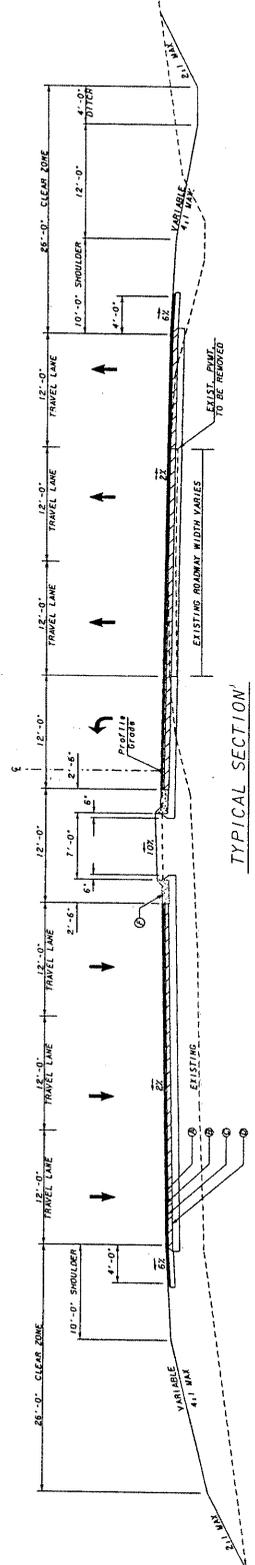
BOTH

SHEET NO

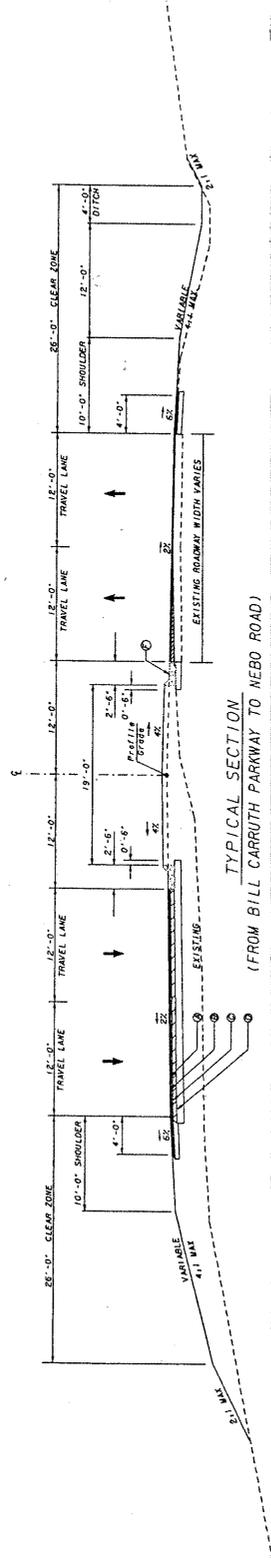
**2 of 5**



**TYPICAL SECTION**  
 (FROM MALONE ROAD TO BILL CARRUTH PARKWAY)



**TYPICAL SECTION**  
 WITH LEFT TURN LANE  
 (AS REQUIRED)

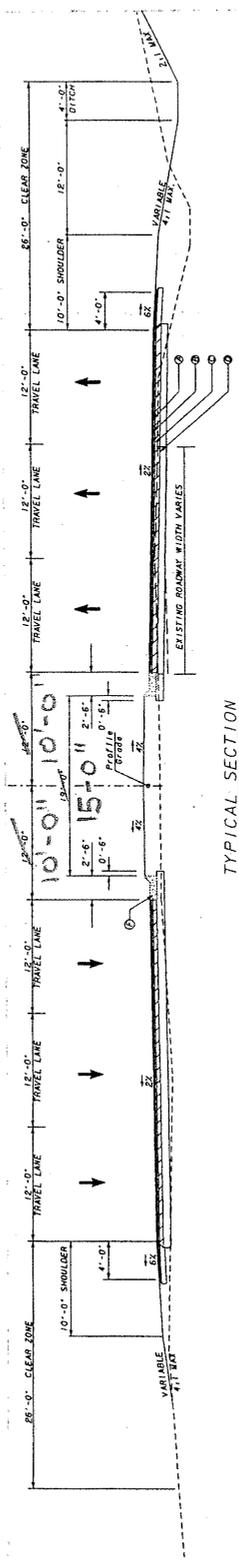


**TYPICAL SECTION**  
 (FROM BILL CARRUTH PARKWAY TO NEBO ROAD)

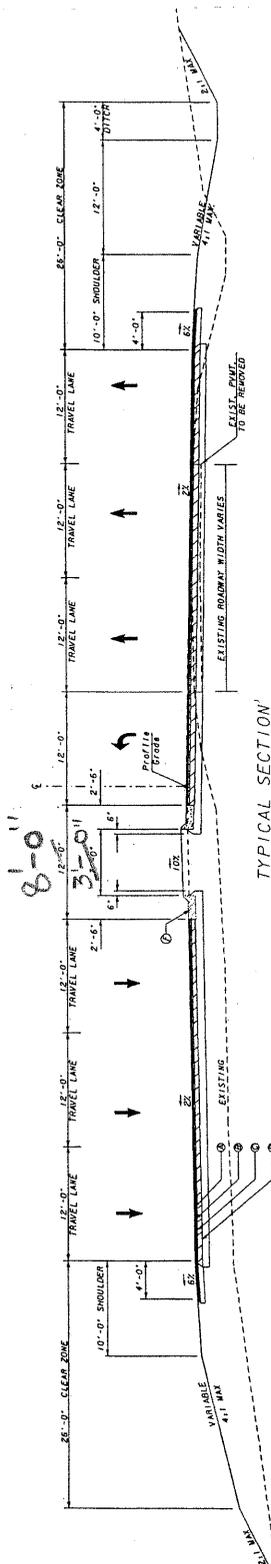
- REQUIRED PAVEMENT
- (A) ASPHALTIC CONCRETE 12.5mm SUPERPAVE
  - (B) ASPHALTIC CONCRETE 19mm SUPERPAVE
  - (C) ASPHALTIC CONCRETE 25mm SUPERPAVE
  - (D) GRADED AGGREGATE BASE, 10"
  - (E) 8" X 30" CONC. CURB & GUTTER, GA. 51

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)** ALTERNATIVE NO **TS-W-1**  
 Georgia Department of Transportation

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH  SHEET NO **3 of 5**

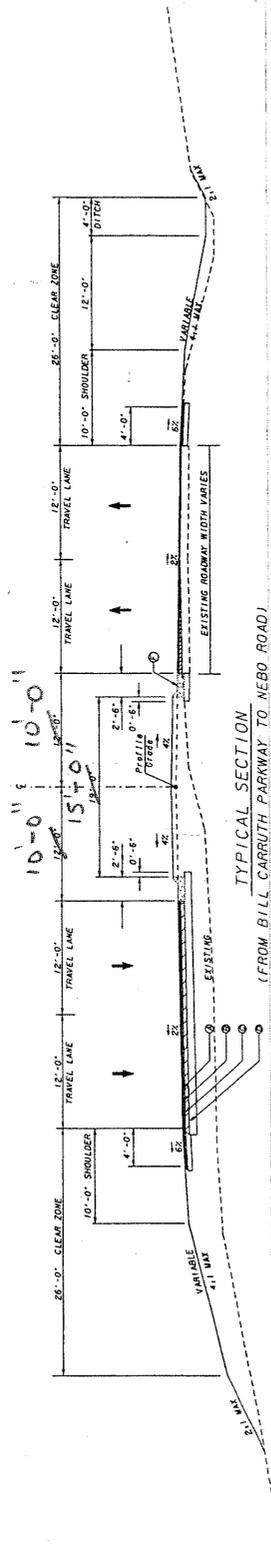


TYPICAL SECTION  
 (FROM MALONE ROAD TO BILL CARRUTH PARKWAY)



TYPICAL SECTION'  
 WITH LEFT TURN LANE  
 (AS REQUIRED)

- REQUIRED PAVEMENT
- (A) ASPHALTIC CONCRETE 12.5mm SUPERPAVE
  - (B) ASPHALTIC CONCRETE 19mm SUPERPAVE
  - (C) ASPHALTIC CONCRETE 25mm SUPERPAVE
  - (D) GRADED AGGREGATE BASE, 10"
  - (E) 8" X 30" CONC. CURB & GUTTER, GA. STL



TYPICAL SECTION  
 (FROM BILL CARRUTH PARKWAY TO NEMO ROAD)

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO  
TS-W-1

SHEET NO

4 of 5

Since <sup>only</sup> 2' reduction in R/W will occur on each side of the road, savings will not materialize from reductions in Improvements, Relocation & Damages. Savings will occur only from the reduction in the land area that will need to be acquired.

Total area of land to be acquired per original design  
= 188,362 + 782,232 + 695,047 = 1,665,641 sf

Total cost for this acquisition = \$1,238,059

∴ Cost per sf of land to be acquired =  $\frac{1,238,059}{1,665,641} = \$0.74$   
(Average) for the widening portion of the project

The total length of the widening project from Malone Road to Nebo Road is 6.8 miles or 35,904 ft.  
Thus, the total R/W saved = 35,904 × 4 = 143,616 sf.

For 24' wide median, landscaping system costs \$82,500. ∴ For 20' wide median, it would cost

$$\frac{82,500 \times 20}{24} = \$68,750$$

# COST WORKSHEET



PROJECT: **SR 92 Realignment & Widening**  
**(Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO.: **TS-W-1**

SHEET NO.: **5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
R/W to be acquired	SF	1,665,641	0.7433	1,238,059	1,522,025	0.7433	1,131,310
148% mark-up				1,832,327			1,674,339
Sub-total:				3,070,386			2,805,649
landscaping	LS			82,500			68,750
10% mark-up				8,250			6,875
Sub-total:				90,750			75,625
Subtotal				3,161,136			2,881,274
Markup (%) at <i>Included</i>				—			—
TOTAL				3,161,136			2,881,274

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-W-3**

DESCRIPTION: **USE 6 IN. X 24 IN. MEDIAN SIDE CURB AND GUTTER IN LIEU OF 8 IN. X 30 IN. MEDIAN SIDE CURB AND GUTTER**

SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:** (Sketch attached)

The current design calls for Type 7, 8 in. x 30 in. curb and gutter on both sides of the median throughout the widening portion of the project from Malone Road to Nebo Road.

**ALTERNATIVE:** (Sketch attached)

Use Type 7, 6 in. x 24 in. curb and gutter on both sides of the median.

**ADVANTAGES:**

- Reduces right-of-way
- Reduces cost

**DISADVANTAGES:**

- Reduces 6 in. of gutter spread on one side of the median where super-elevation occurs

**DISCUSSION:**

Although the gutter width is reduced by 6 in. on both sides of the median, it would have no effect on gutter spread because a majority of the widening project is on tangent where the crown is in the median and the pavement slopes away from the median.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 236,149	—	\$ 236,149
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 236,149	—	\$ 236,149

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

TS-W-3

SHEET NO

2 of 3

Total length of widening from Toladone Road to Nebo Road is 6.8 miles or 35,904 feet.

$$\begin{aligned} \text{The area of R/W saved} &= 35,904 \times (0.5 + 0.5) \\ &= 35,904 \text{ sf} \end{aligned}$$

Average cost of R/W on the widening portion of the project for Alternative TS-W-1 is \$0.74/sf

$$\text{Total length of curb \& gutter: } 35,904 \times 2 = 71,808'$$

Deducting length of <sup>street</sup> intersection openings,

Net length of curb & gutter is 71,000 feet.

Costs for C & G are taken from Means Summary.

Type 7 + 8" x 30" C & G : \$13.64/ft

Type 7 : 6" x 24" C & G : \$11.46/ft

Cost difference : \$2.18/ft



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-W-5**

DESCRIPTION: **OVERLAY EXISTING SR 92 PAVEMENT AND WIDEN**

SHEET NO.: **1 of 8**

**ORIGINAL DESIGN:** (Sketch attached)

The current design specifies removal of the existing asphalt concrete pavement (two lanes) and the placement of all new PCC pavement for the widening project from the southern terminus to Bill Carruth Parkway. The new roadbed will be six lanes with 6.5-ft. outside shoulders. The proposed roadbed will generally follow the current profile grades and widen to either the east or west by holding a given edge of travel way. The widening will switch from one side to the other to limit right of acquisition to one side and favor the side that has less development.

**ALTERNATIVE:** (Sketch attached)

Retain the existing asphalt pavement and overlay the existing roadbed. Widen the two-lane roadbed to a three-lane section by adding a 12-ft.-wide full asphalt concrete pavement section to the inside. Construct the opposite roadbed with a full depth asphalt concrete pavement section. Add 6.5-ft.-wide asphalt concrete shoulders to the outside of both roadbeds.

Where the widening transitions from one side to the other, construct both roadbeds (northbound and southbound) with full depth asphalt concrete pavement.

**ADVANTAGES:**

- Eliminates “throw away” service life of existing pavement
- Reduces cost
- Eases stage construction of intersections
- Asphalt concrete construction requires less time

**DISADVANTAGES:**

- Reduces leeway to modify roadway grades (if needed)
- Reduces pavement service life (concrete pavement service life versus asphalt concrete)
- Requires additional traffic management (especially for the “third” inside lane adjacent to the existing lanes)
- Delays schedule

**DISCUSSION:**

This alternative trades service life for cost savings.

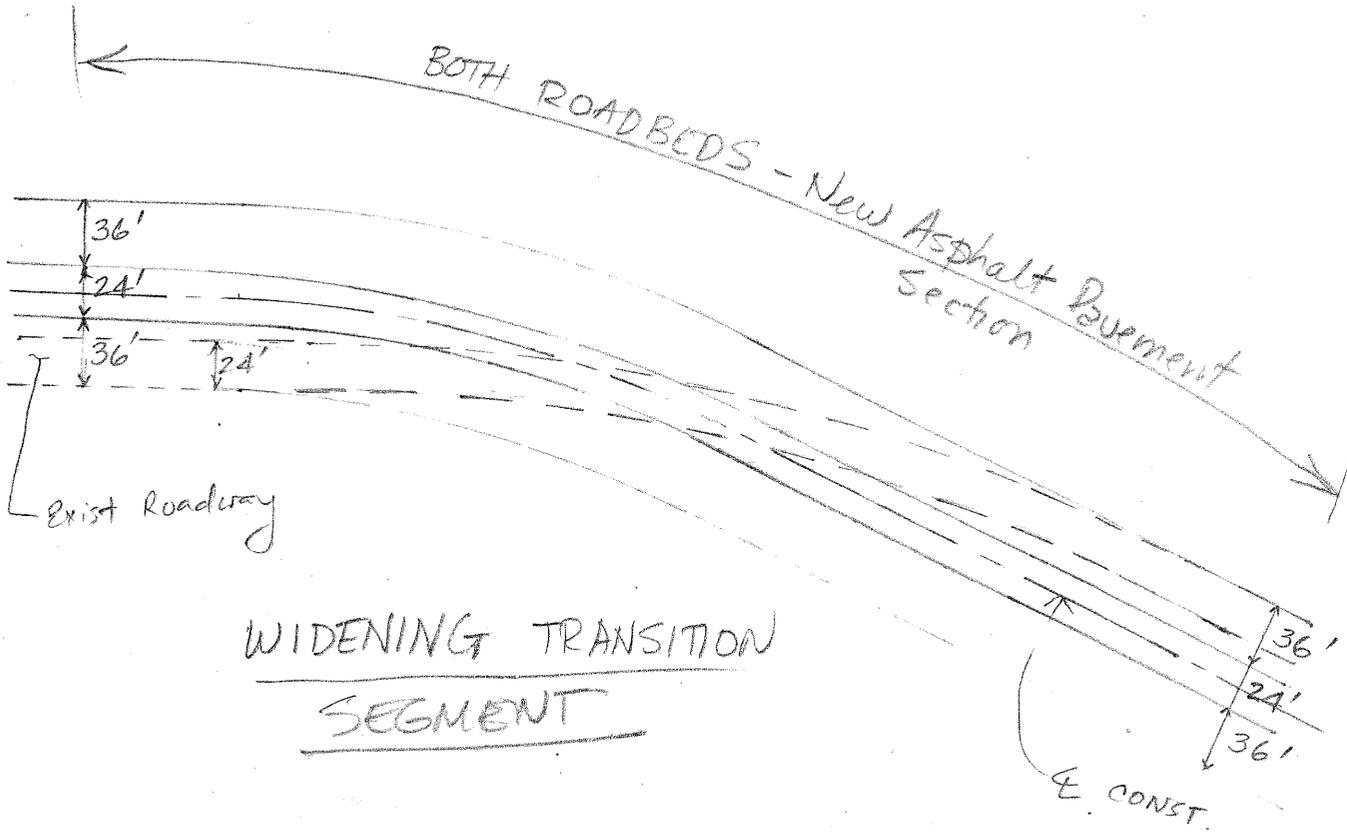
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 27,220,051	—	\$ 27,220,051
ALTERNATIVE	\$ 21,805,506	—	\$ 21,805,506
SAVINGS	\$ 5,414,545	—	\$ 5,414,545





PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)** ALTERNATIVE NO *TS-W-5*  
*Georgia Department of Transportation*

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH  SHEET NO *3 of 8*



# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO TS-U-5

SHEET NO

4 of 8

## ASPHALT (ALTERNATIVE DESIGN)

$$\begin{aligned} \text{TOTAL LENGTH OF PROJECT} &= 6.5 \text{ miles} \\ &= 34320 \text{ LF} \end{aligned}$$

$$\text{UN-USABLE PAVEMENT} = 4 \times 1000 \text{ LF} = 4000 \text{ LF}$$

$$\begin{aligned} \text{Replaced w/ New Asph. section} &= 4000 \text{ LF} \times 2 \text{ Lanes} \times 12' \\ &= 96,000 \text{ SF} = 10,667 \text{ SY} \end{aligned}$$

$$\begin{aligned} \text{USABLE EXISTING PAVEMENT} &= (34320 - 4000) \text{ LF} \times 24 \text{ LF wide} \\ \text{(Overlay section)} &= 727680 \text{ S.F.} \\ \text{2-LANES} &= 80853 \text{ SY.} \leftarrow \end{aligned}$$

$$\begin{aligned} \text{New Asph. conc. section} &= 34320 \text{ LF} \times 4 \text{ lanes} \times 12' \\ \text{(COMPOSITE SIDE)} &= 1641360 \text{ SF} \end{aligned}$$

$$\Rightarrow \text{All New Asph. Conc section} = 183,040 \text{ SY} + 10,667 \text{ SY} = 193,707 \text{ SY.}$$

$$\Rightarrow \text{Shoulders (both sides)} = 76267 \text{ SY} \leftarrow$$

## ORIGINAL DESIGN

$$\begin{aligned} \text{Original Design PCC section} &= 34320 \text{ LF} \times 6 \text{ lanes} \times 12' \\ &= 2471040 \text{ SF} \\ &= 274560 \text{ SY} \end{aligned}$$

$$\begin{aligned} \text{Shoulders (both sides)} &= 2 \times 10 \times 34320 \\ &= 76267 \text{ SY} \end{aligned}$$

$$\begin{aligned} \text{Asphalt Leveling: (Overlay Area)} &= 80,853 \text{ S.Y.} \times 33.3\% \approx 27,000 \text{ S.Y.} \end{aligned}$$

$$\begin{aligned} \text{Average thickness: } 1.5'' &= 165 \text{ Lb/SY} \\ \# 85/\text{TN} \times \frac{\text{TN}}{2000 \text{ Lb}} \times \frac{165 \text{ Lb}}{\text{SY}} &= \$7.00/\text{SY} \end{aligned}$$

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

TS-W-5

SHEET NO

5 of 8

Full Depth Asphalt Pavement Cost (\$/sy)  
OMR Recommended Pavement Section:

1.5" (165#/sy) (12.5mm Superpave)

2" (220#/sy) (19mm Superpave)

9" (990#/sy) (25mm Superpave)

GAB 12"

$$\frac{\$76.40^*}{\text{TN}} \times \frac{\text{TN}}{2000\text{lb}} \times \frac{165\text{lb}}{\text{sy}} = \$6.30/\text{sy} (12.5\text{mm})$$

$$\frac{\$84.73^*}{\text{TN}} \times \frac{\text{TN}}{2000\text{lb}} \times \frac{220\text{lb}}{\text{sy}} = \$9.32/\text{sy} (19\text{mm})$$

$$\frac{\$80.02^*}{\text{TN}} \times \frac{\text{TN}}{2000\text{lb}} \times \frac{990\text{lb}}{\text{sy}} = \$39.61/\text{sy} (25\text{mm})$$

$$\text{GAB (12")} = (\text{from Project Cost Est.}) = \$23.09/\text{sy}$$

$$\text{Total} = \$78.32/\text{s.y.}$$

\*The Asphalt ton unit prices are from the project's cost estimate

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO TS-W-5

## PCC / RCC UNIT PRICE BASIS

SHEET NO

6 of 8

Concrete Pavement Section for SR92  
(PCC)

OMR computed a Life Cycle Cost Analysis and recommended P.C.C. Pavement.

Typical Section of 12 Inch PCC with base of 10 In. GAB

PCC

12 Inch : \$ 65 / S.Y. from a selected project bid tabulation concurred by the Engineering Services Estimators.

GAB Cost: 10" = 0.833'

$$\frac{\$ 17.95}{\text{ton}} \times 9 \text{ sf.} \times 0.833' \times 0.075 \frac{\text{T}}{\text{CF}} = \frac{\$ 10.10}{\text{S.Y.}}$$

wt'd value from mean item summary

$$\text{Total S.Y. Cost} = \frac{\$ 65}{\text{S.Y.}} + \frac{\$ 10.10}{\text{S.Y.}} = \frac{\$ 75.10}{\text{S.Y.}}$$

PCC SECTION  
↓  
GAB

RCC

OMR recommended (RCC) Rolled Computed Concrete for Shoulder

with 10" GAB.

RCC shoulder = \$ 44 / S.Y. (RCC)

10" GAB = \$ 10.10 / S.Y. (GAB)

Total shoulder \$ 54.10 / S.Y. RCC Section

ITEM MEAN SUMMARY FOR 01/2007 TO 12/2007  
FOR SPEC YEAR 2001 CONTRACTS - (ENGLISH)

RCC Wtd Item  
Selected

CALCULATIONS  
ALTERNATIVE NO TS-W-5  
SHEET No 7 of 8

ITEM CODE	ITEM DESCRIPTION	QUANTITY	USE	UM	MEAN	WTD AVG
441-0206	PLAIN CONC DITCH PAVING, 6 IN	2000.00	2	SY	50.75	44.27
441-0300	CONC SPILLWAY, SPCL DES	7.00	4	EA	1986.13	2175.19
441-0301	CONC SPILLWAY, TP 1	399.00	33	EA	2248.99	2176.21
441-0302	CONC SPILLWAY, TP 2	31.00	7	EA	2096.03	2381.86
441-0303	CONC SPILLWAY, TP 3	312.00	29	EA	2348.80	2207.74
441-0304	CONC SPILLWAY, TP 4	27.00	7	EA	2365.69	2399.24
441-0600	CONC HEADWALLS	117.00	6	CY	895.16	858.87
441-0700	CONCRETE MEDIAN, VARB TK	80.00	1	SY	78.28	78.28
441-0740	CONCRETE MEDIAN, 4 IN	40186.00	26	SY	44.67	31.90
441-0748	CONCRETE MEDIAN, 6 IN	11424.00	19	SY	76.49	55.26
441-0754	CONCRETE MEDIAN, 7 1/2 IN	14559.00	10	SY	55.95	56.22
441-0762	CONCRETE MEDIAN, 9 1/2 IN	2700.00	1	SY	71.00	71.00
441-3999	CONCRETE V GUTTER	45838.00	18	LF	25.14	21.48
441-4000	CONC VALLEY GUTTER, SPCL DES	11341.00	2	SY	51.24	35.38
441-4020	CONC VALLEY GUTTER, 6 IN	5750.00	13	SY	42.77	42.54
441-4030	CONC VALLEY GUTTER, 8 IN	22319.00	27	SY	57.48	54.52
441-4050	CONC VALLEY GUTTER WITH CURB, 8 IN	549.00	3	SY	78.31	84.43
441-5001	CONCRETE HEADER CURB, 4 IN, TP 1	45.00	1	LF	17.50	17.50
441-5002	CONCRETE HEADER CURB, 6 IN, TP 2	28087.00	24	LF	22.42	21.48
441-5003	CONCRETE HEADER CURB, 8 IN, TP 3	1628.00	2	LF	21.00	21.59
441-5004	CONCRETE HEADER CURB, 10 IN, TP 4	244.00	3	LF	31.17	18.09
441-5007	CONCRETE HEADER CURB, 8 IN, TP 7	300.00	1	LF	26.26	26.26
441-5008	CONCRETE HEADER CURB, 6 IN, TP 7	2700.00	1	LF	13.90	13.90
441-5052	CONC DOWELED INTEGRAL CURB, TP 2, INCL DOWELS	3200.00	1	LF	27.10	27.10
441-5057	CONC DOWELED INTEGRAL CURB, TP 7, INCL DOWELS	2450.00	1	LF	10.25	10.25
441-6002	CONC CURB & GUTTER, 6 IN X 18 IN, TP 2	300.00	1	LF	14.30	14.30
441-6012	CONC CURB & GUTTER, 6 IN X 24 IN, TP 2	12810.00	8	LF	28.70	30.93
441-6022	CONC CURB & GUTTER, 6 IN X 30 IN, TP 2	130707.00	21	LF	21.01	19.98
441-6216	CONC CURB & GUTTER, 8 IN X 24 IN, TP 2	2378.00	3	LF	22.60	17.86
441-6221	CONC CURB & GUTTER, 8 IN X 30 IN, TP 1	9091.00	3	LF	20.64	16.62
441-6222	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	230102.00	59	LF	27.51	19.26
441-6720	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	12470.00	2	LF	21.41	15.55
441-6740	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	53702.00	11	LF	19.31	15.30
442-0100	ROLLER COMPACTED CONCRETE PAVEMENT	124803.00	1	SY	44.00	44.00
443-1000	ELASTOMERIC PROFILE BRIDGE JOINT SEALS, BR NO -	4.00	2	EA	15000.00	15000.00
444-1000	SAWED JOINTS IN EXIST PAVEMENTS - PCC	21604.00	24	LF	10.01	7.70
445-0500	WATERPROOFING PVMT JOINTS AND CRACKS -	41000.00	1	LF	1.00	1.00
446-1100	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	961591.00	61	LF	8.24	2.79
446-1200	PVMT REINF FABRIC FULL WIDTH, TYPE 2	8000.00	1	SY	2.30	2.30
446-2118	HIGH STRENGTH PVMT REINF FABRIC, 18 IN WIDTH	81576.00	10	LF	9.91	5.00
446-3500	HIGH STRENGTH PVMT REINF FABRIC -	229750.00	4	LF	7.45	4.41
447-1050	MODULAR EXPANSION JOINT, BR. NO -	1.00	1	EA	65000.00	65000.00
449-1000	BRIDGE DECK JOINT SEAL, BRIDGE NO. BENT NO.	1.00	1	EA	0.00	0.00
449-1605	LOW-DENSITY, CLOSED CELL, X-LINKED, ETHYLENE VINYL ACETATE,	2026.00	22	LF	197.70	198.70
449-1620	LOW-DENSITY, CLOSED-CELL, X-LINKED, ETHYLENE VINYL ACETATE,	20393.00	361	LF	39.34	38.27
451-1100	PATCHING PCC PAVEMENT	5900.00	2	SF	129.40	128.99
452-1000	FULL DEPTH SLAB REPLACEMENT	800.00	1	CY	380.00	380.00
453-1000	PORTLAND CEMENT CONCRETE WHITETOPPING	2384.00	3	CY	654.71	643.62
455-1000	FILTER FABRIC FOR EMBANKMENT STABILIZATION	563205.00	13	SY	4.77	3.63
456-2012	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (CONTINUOUS)	347.00	19	GLM	2022.06	945.28
456-2015	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (SKIP)	306.89	38	GLM	1760.99	860.01
456-2025	INDENTATION CENTERLINE RUMBLE STRIPS-GROUND	2.00	1	GLM	1450.00	1450.00

# COST WORKSHEET



PROJECT: **SR 92 Realignment & Widening**  
**(Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO.: **TS-W-5**

SHEET NO.: **8 of 8**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
<i>Original</i>							
Full depth PCC	SY	274560	75.10	20,619,456	215,000	75.10	16,147,500
Shoulders	SY	76267	54.10	4,126,045	76,267	54.10	4,126,045
<i>Alternate</i>							
Full depth Asph. Conc	SY	193,909	78.32	15,171,132	193,909	78.32	15,171,132
Overlay Existing <small>prime</small>	SY	80,853	6.30	509,374	80,853	6.30	509,374
Shoulders	SY	76,267	51.84	3,953,681	76,267	51.84	3,953,681
AC Leveling	SY	27,000	7.00	189,000	27,000	7.00	189,000
<b>Subtotal</b>				<b>24,745,501</b>			
<b>Markup (%) at 10%</b>				<b>2,474,550</b>			
<b>TOTAL</b>				<b>27,220,051</b>			
					<b>19,823,187</b>		
					<b>1,982,319</b>		
					<b>21,805,506</b>		

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-W-7**

DESCRIPTION: **BUILD A FOUR-LANE DIVIDED HIGHWAY NOW AND  
WIDEN TO SIX LANES IN THE FUTURE**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The current SR 92 widening project calls for completely new PCC concrete lanes and RCC outside shoulders from Malone Road to the Bill Carruth Parkway for a total of 6.5 miles. The proposed highway will provide six 12-ft.-wide lanes and 6'-6" outside shoulders. According to the traffic analysis, the need for six lanes from Malone Road to the Bill Carruth Parkway is to accommodate design year 2035. From Bill Carruth Parkway to Nebo Road lanes are specified for design year 2035.

**ALTERNATIVE:** (Sketch attached)

Provide a four-lane roadway for the opening year 2015 from Malone Road to the Bill Carruth Parkway. Build the additional two outside lanes within this section at a later date as dictated by traffic needs. Purchase the right-of-way for the full six-lane facility.

**ADVANTAGES:**

- Reduces cost
- Accelerates construction

**DISADVANTAGES:**

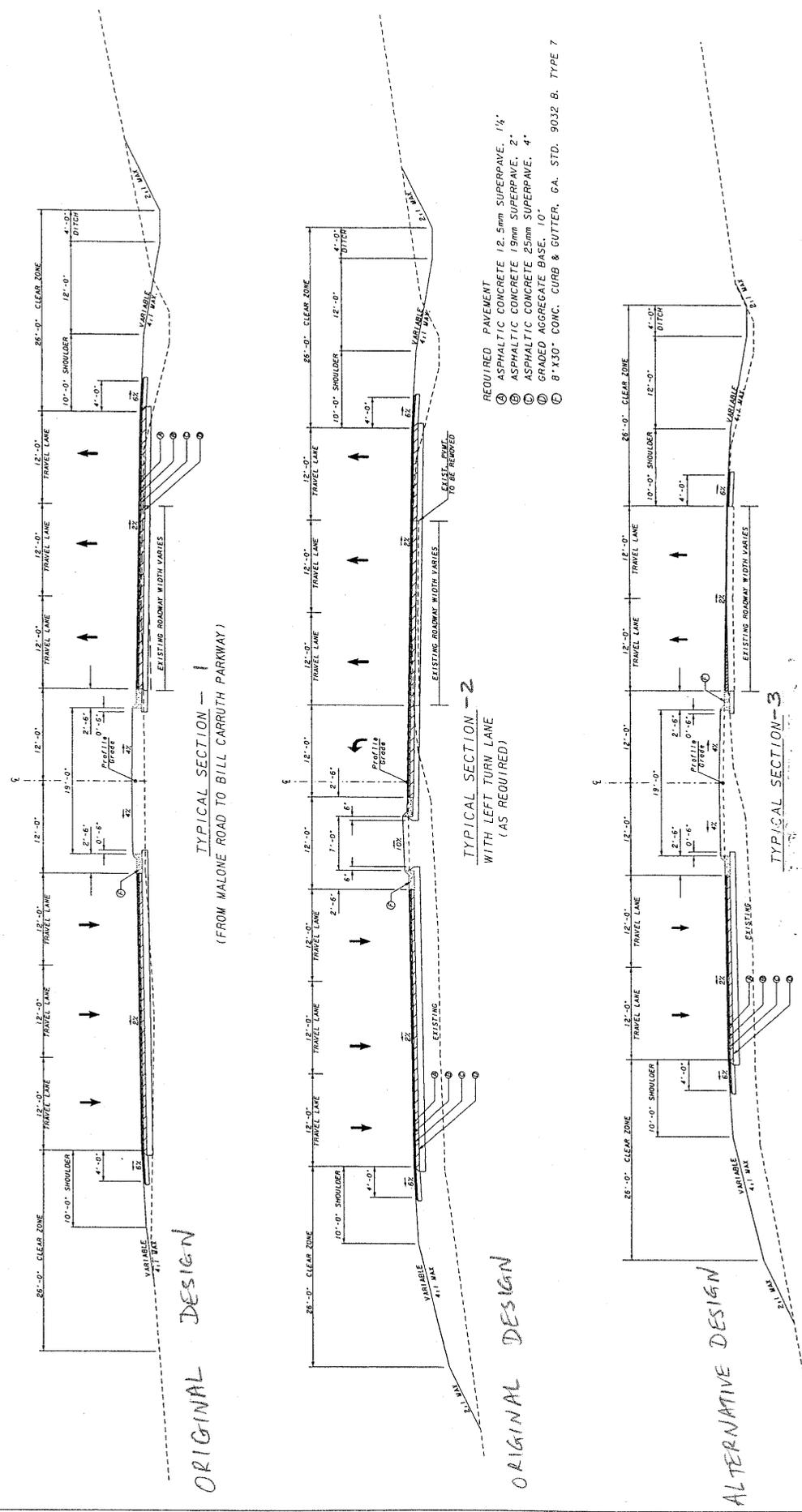
- Relies on future traffic management to determine when six-lane widening would occur

**DISCUSSION:**

This alternative should be entertained if cost reductions are needed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 7,560,467	—	\$ 7,560,467
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 7,560,467	—	\$ 7,560,467

1/17/2008 USR/RS/114	2/11/07 PM PWS	1/05/08 SR92 PH/1/1/08/DESIGN/CONCEPT/CONCEPT COPY OF PWS/101.089	COUNTY PAULDING	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
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ORIGINAL DESIGN

ORIGINAL DESIGN

ALTERNATIVE DESIGN

<p>Engineers Planners Surveyors</p> <p><b>CROY ENGINEERING</b></p> <p>500 NORTH COLUMBIA PARKWAY, BLDG. 400, SUITE 413 MARIETTA, GA. 30067 PHONE: (770) 971-6407 FAX: (770) 971-0820</p>	<p>NOT TO SCALE</p>	<p>STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: URBAN DESIGN TYPICAL SECTIONS</p>	<p>SR 92 WIDENING PAULDING COUNTY</p>
	<p>REVISION DATES</p>	<p>DATE</p>	<p>BY</p>

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO TS-W-7

SHEET NO

3 of 5

Project Length from Malone Road to Bill Carruth Pkwy = 6.5 miles.

$$\begin{aligned} \text{Pavement area} &= 2 \times 12' \text{ lanes} \times 6.5 \text{ miles} \times 5280 \frac{\text{ft}}{\text{mile}} \\ &= 823680 \text{ SF} \\ &= 91520 \text{ SY} \end{aligned}$$

# CALCULATIONS



PROJECT SR 92 Realignment & Widening (Douglas & Paulding Counties) ALTERNATIVE NO TS-10-7  
 Georgia Department of Transportation

## PCC/RCC UNIT PRICE BASIS

SHEET NO 4 of 5

Concrete Pavement Section for SR92  
 (PCC)

OMR computed & Life Cycle Cost Analysis  
 and recommended P.C.C. Pavement.  
 Typical Section of 12 Inch PCC with  
 base of 10 In. GAB

PCC

12 Inch : \$ 65 / S.Y. from a selected project bid  
 tabulation concurred by the  
 Engineering Services Estimators.

GAB Cost: 10" = 0.833'

$$\frac{\$ 17.95}{\text{ton}} \times 9 \text{ sf.} \times 0.833' \times 0.75 \frac{\text{CF}}{\text{S.Y.}} = \frac{\$ 10.10}{\text{S.Y.}}$$

*(wtd value from mean item summary)* PCC GAB PCC SECTION

$$\text{Total S.Y. Cost} = \frac{\$ 65}{\text{S.Y.}} + \frac{\$ 10.10}{\text{S.Y.}} = \frac{\$ 75.10}{\text{S.Y.}}$$

RCC

OMR recommended (RCC) Roller Compacted Concrete  
 for Shoulder

with 10" GAB. *(wtd value from mean item summary)*  
 RCC shoulder = \$ 44 / S.Y. (RCC)

10" GAB = \$ 10.10 / S.Y. (GAB)

$$\text{Total shoulder} = \frac{\$ 54.10}{\text{S.Y.}} \text{ RCC Section}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-W-10**

DESCRIPTION: **REDUCE THROUGH LANES FROM 12 FT. WIDE TO 11 FT. WIDE**

SHEET NO.: **1 of 7**

**ORIGINAL DESIGN:** (Sketch attached)

All six lanes are 12 ft. wide from the beginning of the widening project at Malone Road to the Bill Carruth Parkway (35,544 ft.).

**ALTERNATIVE:** (Sketch attached)

Reduce all six lanes to 11 ft. wide but keep turn lanes at 12 ft. wide.

**ADVANTAGES:**

- Reduces construction cost
- Reduces right-of-way cost
- Reduces impervious surfacing

**DISADVANTAGES:**

- Requires a design exception
- Perceived loss of safety
- Eliminates one-ft. gutter spread for outside lanes
- Eliminates one-ft. gutter spread for inside lanes on the high side of the super-elevation

**DISCUSSION:**

This alternative would save six feet of pavement and right-of-way along the length of the project for a total of 213,264 SF. The inside lanes have two ft. of additional room owing to the gutter width while the outside lanes have 6.5 ft. of shoulder for vehicles to maneuver. The middle lane should have the most constrained situation for this alternative.

The gutter spread issues for the inside lanes will only occur where the alignment curves. Since the majority of the widening project is on tangent, the inside lane's loss of gutter spread is not a significant concern.

The design concept report classifies this road as an urban minor arterial. AASHTO guidelines state that 11-ft. lanes are allowable, but that 12-ft. lanes are most desirable and should be used on high speed, free flowing principal arterials. GDOT guidelines specify 12-ft. lanes. As lane widths are one of 13 FHWA controlling criteria, it appears a design exception is required.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,348,908	—	\$ 2,348,908
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 2,348,908	—	\$ 2,348,908



Georgia Department of Transportation

Table 6.3. GDOT Design Standards for Arterial Roadways

Item No.	Item	Rural				Urban(1)	
		Two-Lane		Four-Lane			
1	Design Speed (mph)(2)	50	60	60	70	40	50
2	Level of Service	B	B	B	B	C(3)	C(3)
3	Number of Travel Lanes	2	2	4	4	2 min-4 typ.	2 min-4 typ.
4	Width of Travel Lanes	12-ft.	12-ft.	12-ft.	12-ft.	12-ft.	12-ft.
5	Overall Width of Shoulders						
	Outside	10-ft.	10-ft.	10-ft.	10-ft.	n/a	n/a
	Median(4)	n/a	n/a	6-ft.	6-ft.	6-ft.	6-ft.
6	Width of Paved Shoulders						
	Outside	6.5-ft.	6.5-ft.	6.5-ft.	6.5-ft.	n/a	n/a
	Median(4)	n/a	n/a		2-ft.	2-ft.	2-ft.
7	Width of Median (ft)						
	Depressed	n/a	n/a	32-44-ft.	32-44-ft.	n/a	n/a
	Raised	n/a	n/a	20-24-ft.	20-24-ft.	Turn Lane (5)	Turn Lane(5) Plus 8-12-ft.
	Flush	n/a	n/a	14-ft.	14-ft.	14-ft.	14-ft.
8	Sidewalks						
	Width of Sidewalk	n/a	n/a	n/a	n/a	5-ft.	5-ft.
	Sidewalk Offset from Curb	n/a	n/a	n/a	n/a	6-ft.	6-ft.
9	Width of Bike Lane(6)	n/a	n/a	n/a	n/a	4-ft.	4-ft.
10	Fore Slope - Ratio	4:1	4:1	4:1	4:1	2:1 max.	4:1
11	Back Slope - Ratio	2:1 max.	2:1 max.				
12	Pavement Cross Slope	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.
13	Stopping Sight Distance(7)	425-ft.	570-ft.	570-ft.	730-ft.	305-ft.	425-ft.
14	Maximum Superelevation	0.06-ft./ft.	0.06-ft./ft.	0.06-ft./ft.	0.08-ft./ft.	0.04-ft./ft.	0.06-ft./ft.
15	Minimum Radius						
	Without Superelevation (+ .02)(8)	5,700-ft.	8,060-ft.	8,060-ft.	10,700-ft.	3,220-ft.	5,700-ft.
	Without Superelevation (- .02)(8)	7,870-ft.	11,100-ft.	11,100-ft.	14,500-ft.	4,770-ft.	7,870-ft.
16	Min. Radius (With Superelev.)	833-ft.	1,330-ft.	1,330-ft.	1,810-ft.	533-ft.	833-ft.
17	Maximum Grade (%)						
	Level	4%	3%	3%	3%	7%	6%
	Rolling	5%	4%	4%	4%	8%	7%
	Mountainous	7%	6%	6%	5%	10%	9%
18	Minimum Vertical Clearance (ft)	16.75-17.5	16.75-	16.75-17.5	16.75-17.5	14.5	14.5



PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
 Georgia Department of Transportation

ALTERNATIVE NO

**TS-W-10**

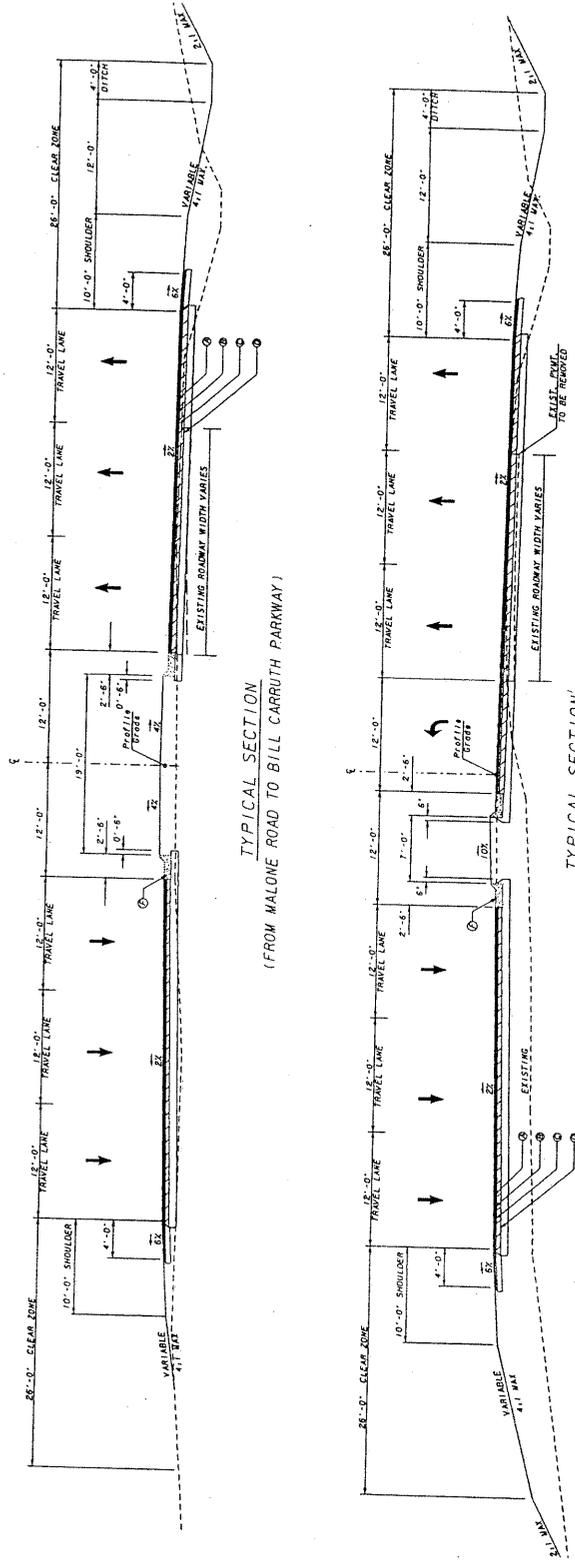
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO

**3 of 7**



- REQUIRED PAVEMENT
- Ⓐ ASPHALTIC CONCRETE 12.5mm SUPERP
  - Ⓑ ASPHALTIC CONCRETE 19mm SUPERP
  - Ⓒ ASPHALTIC CONCRETE 25mm SUPERP
  - Ⓓ GRADED AGGREGATE BASE, 10"
  - Ⓔ 8" X 30" CONC. CURB & GUTTER, GA.

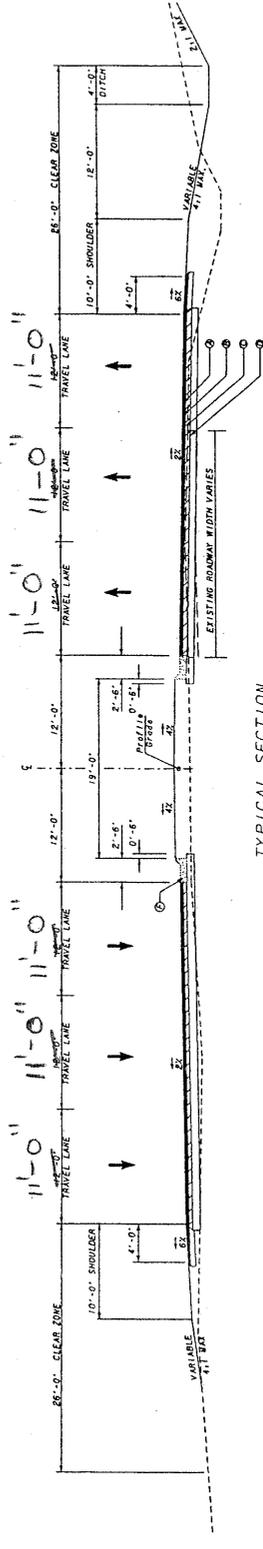


PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
 Georgia Department of Transportation

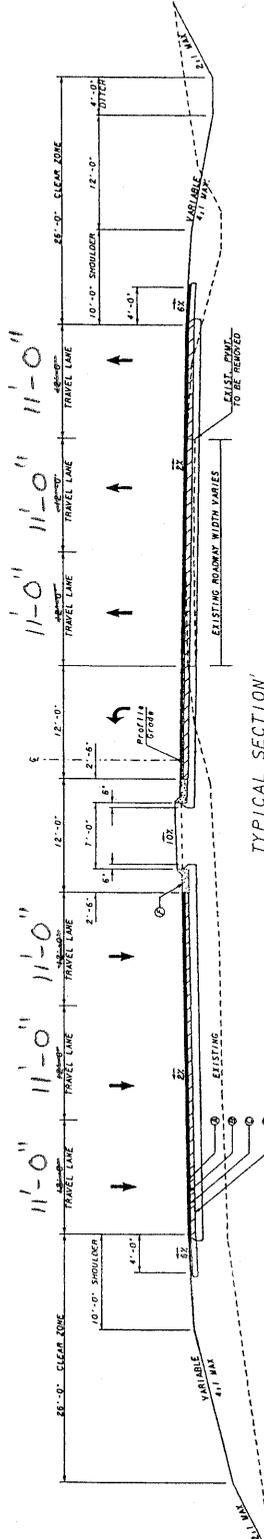
ALTERNATIVE NO  
**TS-W-10**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO **4** of **7**



TYPICAL SECTION  
 (FROM MALONE ROAD TO BILL CARRUTH PARKWAY)



TYPICAL SECTION  
 WITH LEFT TURN LANE  
 (AS REQUIRED)

- REQUIRED PAVEMENT
- Ⓐ ASPHALTIC CONCRETE 12.5mm SUPERR
  - Ⓑ ASPHALTIC CONCRETE 19mm SUPERRAP
  - Ⓒ ASPHALTIC CONCRETE 25mm SUPERRAP
  - Ⓓ GRADED AGGREGATE BASE, 10"
  - Ⓔ 8"X30" CONC. CURB & GUTTER, GA.

# CALCULATIONS



PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)** ALTERNATIVE NO  
 Georgia Department of Transportation

## PCC/RCC UNIT PRICE BASIS

SHEET NO 5 of 7

Concrete Pavement Section for SR92  
 (PCC)

OMR computed a Life Cycle Cost Analysis and recommended P.C.C. Pavement.

Typical Section of 12 Inch PCC with base of 10 In. GAB

PCC

12 Inch : \$ 65 / S.Y. from a selected project bid tabulation concurred by the Engineering Services Estimators.

GAB Cost: 10" = 0.833'

$$\frac{\$ 17.95}{\text{ton}} \times 9 \text{ sf.} \times 0.833' \times 0.075 \frac{\text{T}}{\text{CF}} = \frac{\$ 10.10}{\text{S.Y.}}$$

Wtd value from mean item summary

$$\text{Total S.Y. Cost} = \frac{\$ 65}{\text{S.Y.}} \left( \frac{\text{PCC}}{\text{GAB}} \right) + \frac{\$ 10.10}{\text{S.Y.}} \left( \frac{\text{GAB}}{\text{PCC SECTION}} \right) = \frac{\$ 75.10}{\text{S.Y.}}$$

RCC

OMR recommended (RCC) Rolled Computed Concrete for Shoulder

with 10" GAB.

RCC shoulder = \$ 44 / S.Y. (RCC)

10" GAB = \$ 10.10 / S.Y. (GAB)

Total shoulder \$ 54.10 / S.Y. RCC Section

RCC Wtd Item  
Selected

ALTERNATIVE NO TS-W-10

SHEET No 6 of 7

CALCULATIONS

ITEM CODE	ITEM DESCRIPTION	QUANTITY	USE	UM	MEAN	WTD AVG
441-0206	PLAIN CONC DITCH PAVING, 6 IN	2000.00	2	SY	50.75	44.27
441-0300	CONC SPILLWAY, SPCL DES	7.00	4	EA	1986.13	2175.19
441-0301	CONC SPILLWAY, TP 1	399.00	33	EA	2248.99	2176.21
441-0302	CONC SPILLWAY, TP 2	31.00	7	EA	2096.03	2381.86
441-0303	CONC SPILLWAY, TP 3	312.00	29	EA	2348.80	2207.74
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441-0600	CONC HEADWALLS	117.00	6	CY	895.16	858.87
441-0700	CONCRETE MEDIAN, VARB TK	80.00	1	SY	78.28	78.28
441-0740	CONCRETE MEDIAN, 4 IN	40186.00	26	SY	44.67	31.90
441-0748	CONCRETE MEDIAN, 6 IN	11424.00	19	SY	76.49	55.26
441-0754	CONCRETE MEDIAN, 7 1/2 IN	14559.00	10	SY	55.95	56.22
441-0762	CONCRETE MEDIAN, 9 1/2 IN	2700.00	1	SY	71.00	71.00
441-3999	CONCRETE V GUTTER	45838.00	18	LF	25.14	21.48
441-4000	CONC VALLEY GUTTER, SPCL DES	11341.00	2	SY	51.24	35.38
441-4020	CONC VALLEY GUTTER, 6 IN	5750.00	13	SY	42.77	42.54
441-4030	CONC VALLEY GUTTER, 8 IN	22319.00	27	SY	57.48	54.52
441-4050	CONC VALLEY GUTTER WITH CURB, 8 IN	549.00	3	SY	78.31	84.43
441-5001	CONCRETE HEADER CURB, 4 IN, TP 1	45.00	1	LF	17.50	17.50
441-5002	CONCRETE HEADER CURB, 6 IN, TP 2	28087.00	24	LF	22.42	21.48
441-5003	CONCRETE HEADER CURB, 8 IN, TP 3	1628.00	2	LF	21.00	21.59
441-5004	CONCRETE HEADER CURB, 10 IN, TP 4	244.00	3	LF	31.17	18.09
441-5007	CONCRETE HEADER CURB, 8 IN, TP 7	300.00	1	LF	26.26	26.26
441-5008	CONCRETE HEADER CURB, 6 IN, TP 7	2700.00	1	LF	13.90	13.90
441-5052	CONC DOWELED INTEGRAL CURB, TP 2, INCL DOWELS	3200.00	1	LF	27.10	27.10
441-5057	CONC DOWELED INTEGRAL CURB, TP 7, INCL DOWELS	2450.00	1	LF	10.25	10.25
441-6002	CONC CURB & GUTTER, 6 IN X 18 IN, TP 2	300.00	1	LF	14.30	14.30
441-6012	CONC CURB & GUTTER, 6 IN X 24 IN, TP 2	12810.00	8	LF	28.70	30.93
441-6022	CONC CURB & GUTTER, 6 IN X 30 IN, TP 2	130707.00	21	LF	21.01	19.98
441-6216	CONC CURB & GUTTER, 8 IN X 24 IN, TP 2	2378.00	3	LF	22.60	17.86
441-6221	CONC CURB & GUTTER, 8 IN X 30 IN, TP 1	9091.00	3	LF	20.64	16.62
441-6222	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	230102.00	59	LF	27.51	19.26
441-6720	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	12470.00	2	LF	21.41	15.55
441-6740	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	53702.00	11	LF	19.31	15.30
442-0100	ROLLER COMPACTED CONCRETE PAVEMENT	124803.00	1	SY	44.00	44.00
443-1000	ELASTOMERIC PROFILE BRIDGE JOINT SEALS, BR NO -	4.00	2	EA	15000.00	15000.00
444-1000	SAWED JOINTS IN EXIST PAVEMENTS - PCC	21604.00	24	LF	10.01	7.70
445-0500	WATERPROOFING PVMT JOINTS AND CRACKS -	41000.00	1	LF	1.00	1.00
446-1100	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	961591.00	61	LF	8.24	2.79
446-1200	PVMT REINF FABRIC FULL WIDTH, TYPE 2	8000.00	1	SY	2.30	2.30
446-2118	HIGH STRENGTH PVMT REINF FABRIC, 18 IN WIDTH	81576.00	10	LF	9.91	5.00
446-3500	HIGH STRENGTH PVMT REINF FABRIC -	229750.00	4	LF	7.45	4.41
447-1050	MODULAR EXPANSION JOINT, BR. NO -	1.00	1	EA	65000.00	65000.00
449-1000	BRIDGE DECK JOINT SEAL, BRIDGE NO. BENT NO.	1.00	1	EA	0.00	0.00
449-1605	LOW-DENSITY, CLOSED CELL, X-LINKED, ETHYLENE VINYL ACETATE,	2026.00	22	LF	197.70	198.70
449-1620	LOW-DENSITY, CLOSED-CELL, X-LINKED, ETHYLENE VINYL ACETATE,	20393.00	361	LF	39.34	38.27
451-1100	PATCHING PCC PAVEMENT	5900.00	2	SF	129.40	128.99
452-1000	FULL DEPTH SLAB REPLACEMENT	800.00	1	CY	380.00	380.00
453-1000	PORTLAND CEMENT CONCRETE WHITETOPPING	2384.00	3	CY	654.71	643.62
455-1000	FILTER FABRIC FOR EMBANKMENT STABILIZATION	563205.00	13	SY	4.77	3.63
456-2012	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (CONTINUOUS)	347.00	19	GLM	2022.06	945.28
456-2015	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (SKIP)	306.89	38	GLM	1760.99	860.01
456-2025	INDENTATION CENTERLINE RUMBLE STRIPS-GROUND	2.00	1	GLM	1450.00	1450.00



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **TS-W-12**

DESCRIPTION: **REDUCE INSIDE LINES FROM 12 FT. WIDE TO 11 FT. WIDE**

SHEET NO.: **1 of 7**

**ORIGINAL DESIGN:** (Sketch attached)

All lanes are 12 ft. wide from the beginning of the widening project at Malone Road to the Bill Carruth Parkway (35,544 ft.).

**ALTERNATIVE:** (Sketch attached)

Reduce the inside lanes next to the median to 11 ft. wide and leave all other lanes at 12 ft. wide.

**ADVANTAGES:**

- Reduces cost
- Reduces impervious surfacing
- Reduces right-of-way

**DISADVANTAGES:**

- Requires a design exception
- Perceived loss of safety
- Eliminates one-ft. gutter spread loss for inside lanes on the high side of the super-elevation

**DISCUSSION:**

This alternative would save two feet of pavement and right-of-way along the length of the project for a total of 71,088 SF. As trucks favor the outer lanes, the lane width reduction impact is not as critical on the inside lane. The gutter spread issues for the inside lanes will only occur where the alignment curves. Since the majority of the widening project is on tangent, the inside lane's loss of gutter spread is not a significant concern.

The design concept report classifies this road as an urban minor arterial. AASHTO guidelines state that 11-ft. lanes are allowable, but that 12-ft. lanes are most desirable and should be used on high speed, free flowing principal arterials. GDOT guidelines specify 12-ft. lanes. As lane widths are one of 13 FHWA controlling criteria, it appears a design exception is required.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 782,969	—	\$ 782,969
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 782,969	—	\$ 782,969



Georgia Department of Transportation

Table 6.3. GDOT Design Standards for Arterial Roadways

Item No.	Item	Rural				Urban(1)	
		Two-Lane		Four-Lane			
1	Design Speed (mph)(2)	50	60	60	70	40	50
2	Level of Service	B	B	B	B	C(3)	C(3)
3	Number of Travel Lanes	2	2	4	4	2 min-4 typ.	2 min-4 typ.
4	Width of Travel Lanes	12-ft.	12-ft.	12-ft.	12-ft.	12-ft.	12-ft.
5	Overall Width of Shoulders						
	Outside	10-ft.	10-ft.	10-ft.	10-ft.	n/a	n/a
	Median(4)	n/a	n/a	6-ft.	6-ft.	6-ft.	6-ft.
6	Width of Paved Shoulders						
	Outside	6.5-ft.	6.5-ft.	6.5-ft.	6.5-ft.	n/a	n/a
	Median(4)	n/a	n/a		2-ft.	2-ft.	2-ft.
7	Width of Median (ft)						
	Depressed	n/a	n/a	32-44-ft.	32-44-ft.	n/a	n/a
	Raised	n/a	n/a	20-24-ft.	20-24-ft.	Turn Lane (5)	Turn Lane(5) Plus 8-12-ft.
	Flush	n/a	n/a	14-ft.	14-ft.	14-ft.	14-ft.
8	Sidewalks						
	Width of Sidewalk	n/a	n/a	n/a	n/a	5-ft.	5-ft.
	Sidewalk Offset from Curb	n/a	n/a	n/a	n/a	6-ft.	6-ft.
9	Width of Bike Lane(6)	n/a	n/a	n/a	n/a	4-ft.	4-ft.
10	Fore Slope - Ratio	4:1	4:1	4:1	4:1	2:1 max.	4:1
11	Back Slope - Ratio	2:1 max.	2:1 max.				
12	Pavement Cross Slope	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.	0.02-ft./ft.
13	Stopping Sight Distance(7)	425-ft.	570-ft.	570-ft.	730-ft.	305-ft.	425-ft.
14	Maximum Superelevation	0.06-ft./ft.	0.06-ft./ft.	0.06-ft./ft.	0.08-ft./ft.	0.04-ft./ft.	0.06-ft./ft.
15	Minimum Radius						
	Without Superelevation (+ .02)(8)	5,700-ft.	8,060-ft.	8,060-ft.	10,700-ft.	3,220-ft.	5,700-ft.
	Without Superelevation (- .02)(8)	7,870-ft.	11,100-ft.	11,100-ft.	14,500-ft.	4,770-ft.	7,870-ft.
16	Min. Radius (With Superelev.)	833-ft.	1,330-ft.	1,330-ft.	1,810-ft.	533-ft.	833-ft.
17	Maximum Grade (%)						
	Level	4%	3%	3%	3%	7%	6%
	Rolling	5%	4%	4%	4%	8%	7%
	Mountainous	7%	6%	6%	5%	10%	9%
18	Minimum Vertical Clearance (ft)	16.75-17.5	16.75-	16.75-17.5	16.75-17.5	14.5	14.5



PROJECT

**SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
 Georgia Department of Transportation

ALTERNATIVE NO

TS-W-12

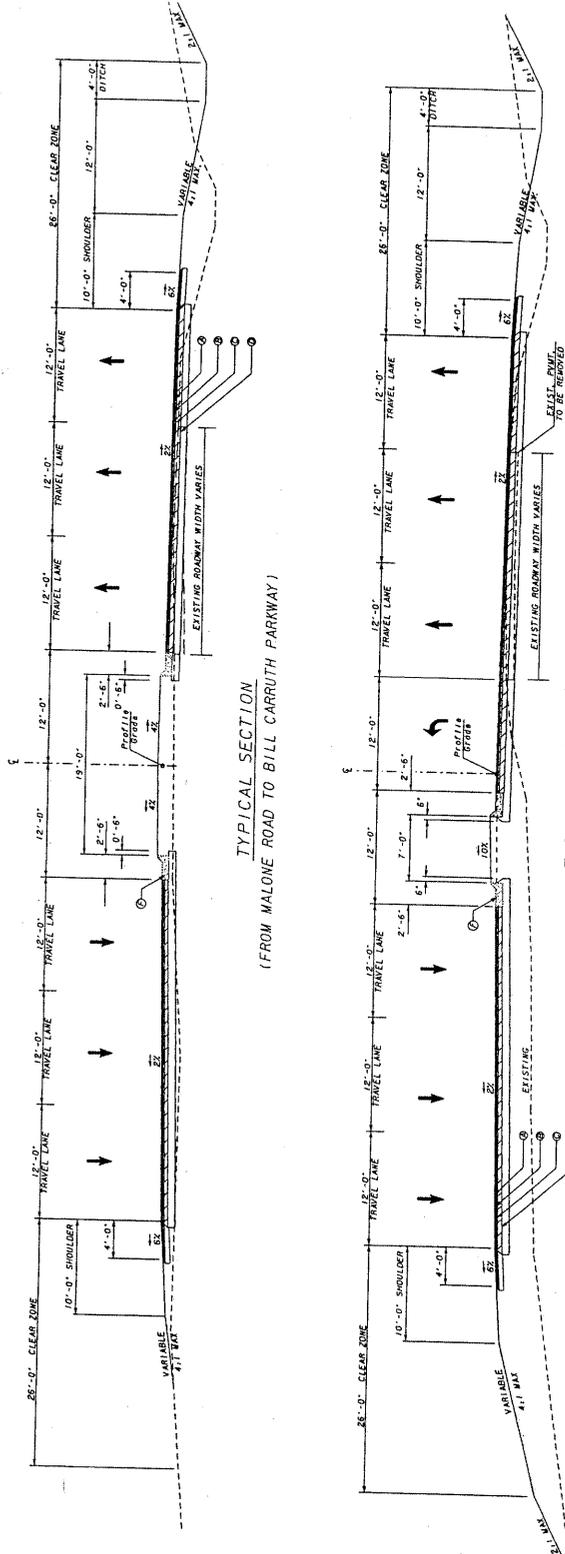
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO

3 of 7



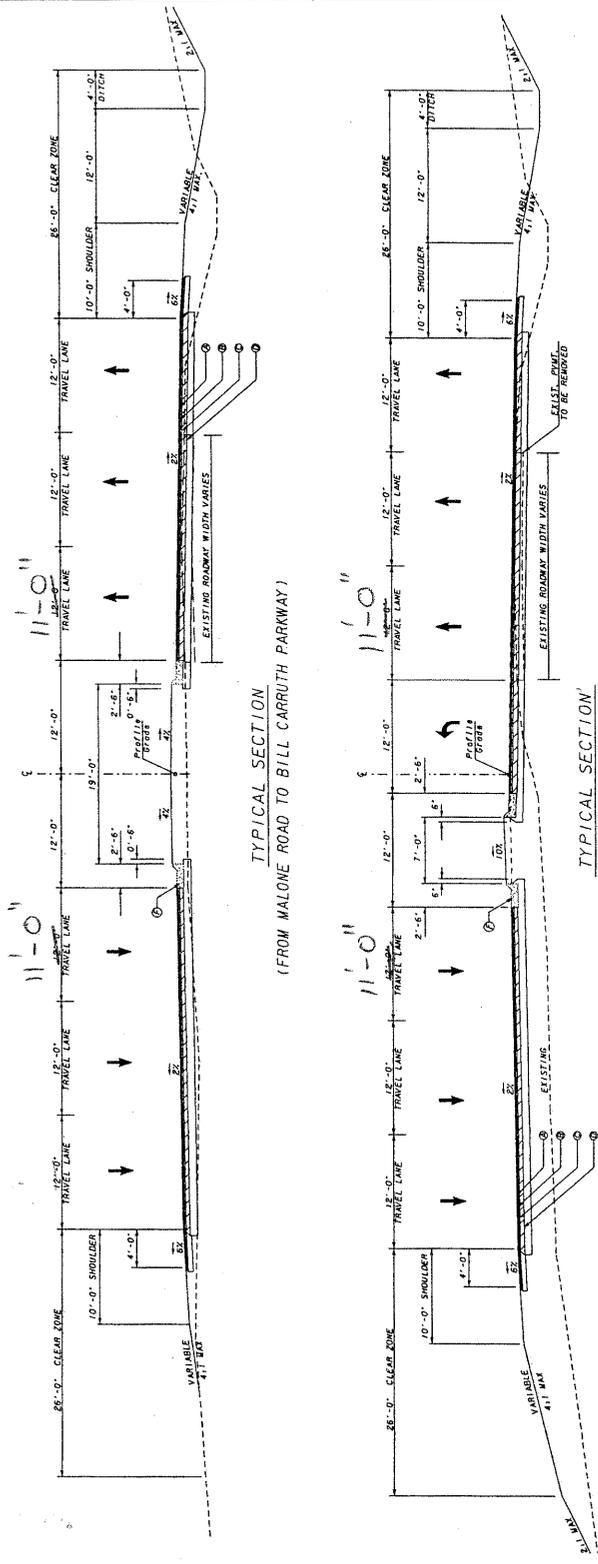
- REQUIRED PAVEMENT
- ① ASPHALTIC CONCRETE 12.5mm SUPERP
  - ② ASPHALTIC CONCRETE 19mm SUPERP
  - ③ ASPHALTIC CONCRETE 25mm SUPERP
  - ④ GRADED AGGREGATE BASE, 10"
  - ⑤ 8" X 30" CONC. CURB & GUTTER, GA.

PROJECT **SR 92 Realignment & Widening (Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO  
**TS-W-12**

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

SHEET NO **4 of 7**



- REQUIRED PAVEMENT
- Ⓐ ASPHALTIC CONCRETE 12.5mm SUPERP
  - Ⓑ ASPHALTIC CONCRETE 19mm SUPERPAV
  - Ⓒ ASPHALTIC CONCRETE 25mm SUPERPAV
  - Ⓓ GRADED AGGREGATE BASE, 10"
  - Ⓔ 8"X30" CONC. CURB & GUTTER, GA.

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

TS-W-12

## PCC/RCC UNIT PRICE BASIS

SHEET NO

5 of 7

Concrete Pavement Section for SR92  
(PCC)

OMR computed a Life Cycle Cost Analysis  
and recommended P.C.C. Pavement.

Typical Section of 12 Inch PCC with  
base of 10 In. GAB

PCC

12 Inch : \$ 65 / S.Y. from a selected project bid  
tabulation concurred by the  
Engineering Services Estimators.

GAB Cost: 10" = 0.833'

$$\frac{\$ 17.95}{\text{ton}} \times 9 \text{ sf.} \times 0.83' \times \frac{0.75 \text{ T}}{\text{CF}} = \frac{\$ 10.10}{\text{S.Y.}}$$

wtd value from mean item summary

$$\text{Total S.Y. Cost} = \frac{\$ 65}{\text{S.Y.}} + \frac{\$ 10.10}{\text{S.Y.}} = \frac{\$ 75.10}{\text{S.Y.}}$$

PCC SECTION  
↓  
GAB

RCC

OMR recommended (RCC) Rolled Computed Concrete  
for Shoulder

with 10" GAB. wtd value from mean item summary

RCC shoulder = \$ 44 / S.Y. (RCC)

10" GAB = \$ 10.10 / S.Y. (GAB)

Total shoulder \$ 54.10 / S.Y. RCC Section

RCC Wtd Item  
Selected

ALTERNATIVE NO TS-W-12  
SHEET NO 6 of 7

ITEM CODE	ITEM DESCRIPTION	QUANTITY	USE	UM	MEAN	WTD AVG
441-0206	PLAIN CONC DITCH PAVING, 6 IN	2000.00	2	SY	50.75	44.27
441-0300	CONC SPILLWAY, SPCL DES	7.00	4	EA	1986.13	2175.19
441-0301	CONC SPILLWAY, TP 1	399.00	33	EA	2248.99	2176.21
441-0302	CONC SPILLWAY, TP 2	31.00	7	EA	2096.03	2381.86
441-0303	CONC SPILLWAY, TP 3	312.00	29	EA	2348.80	2207.74
441-0304	CONC SPILLWAY, TP 4	27.00	7	EA	2365.69	2399.24
441-0600	CONC HEADWALLS	117.00	6	CY	895.16	858.87
441-0700	CONCRETE MEDIAN, VARB TK	80.00	1	SY	78.28	78.28
441-0740	CONCRETE MEDIAN, 4 IN	40186.00	26	SY	44.67	31.90
441-0748	CONCRETE MEDIAN, 6 IN	11424.00	19	SY	76.49	55.26
441-0754	CONCRETE MEDIAN, 7 1/2 IN	14559.00	10	SY	55.95	56.22
441-0762	CONCRETE MEDIAN, 9 1/2 IN	2700.00	1	SY	71.00	71.00
441-3999	CONCRETE V GUTTER	45838.00	18	LF	25.14	21.48
441-4000	CONC VALLEY GUTTER, SPCL DES	11341.00	2	SY	51.24	35.38
441-4020	CONC VALLEY GUTTER, 6 IN	5750.00	13	SY	42.77	42.54
441-4030	CONC VALLEY GUTTER, 8 IN	22319.00	27	SY	57.48	54.52
441-4050	CONC VALLEY GUTTER WITH CURB, 8 IN	549.00	3	SY	78.31	84.43
441-5001	CONCRETE HEADER CURB, 4 IN, TP 1	45.00	1	LF	17.50	17.50
441-5002	CONCRETE HEADER CURB, 6 IN, TP 2	28087.00	24	LF	22.42	21.48
441-5003	CONCRETE HEADER CURB, 8 IN, TP 3	1628.00	2	LF	21.00	21.59
441-5004	CONCRETE HEADER CURB, 10 IN, TP 4	244.00	3	LF	31.17	18.09
441-5007	CONCRETE HEADER CURB, 8 IN, TP 7	300.00	1	LF	26.26	26.26
441-5008	CONCRETE HEADER CURB, 6 IN, TP 7	2700.00	1	LF	13.90	13.90
441-5052	CONC DOWELED INTEGRAL CURB, TP 2, INCL DOWELS	3200.00	1	LF	27.10	27.10
441-5057	CONC DOWELED INTEGRAL CURB, TP 7, INCL DOWELS	2450.00	1	LF	10.25	10.25
441-6002	CONC CURB & GUTTER, 6 IN X 18 IN, TP 2	300.00	1	LF	14.30	14.30
441-6012	CONC CURB & GUTTER, 6 IN X 24 IN, TP 2	12810.00	8	LF	28.70	30.93
441-6022	CONC CURB & GUTTER, 6 IN X 30 IN, TP 2	130707.00	21	LF	21.01	19.98
441-6216	CONC CURB & GUTTER, 8 IN X 24 IN, TP 2	2378.00	3	LF	22.60	17.86
441-6221	CONC CURB & GUTTER, 8 IN X 30 IN, TP 1	9091.00	3	LF	20.64	16.62
441-6222	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	230102.00	59	LF	27.51	19.26
441-6720	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	12470.00	2	LF	21.41	15.55
441-6740	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	53702.00	11	LF	19.31	15.30
442-0100	ROLLER COMPACTED CONCRETE PAVEMENT	124803.00	1	SY	44.00	44.00
443-1000	ELASTOMERIC PROFILE BRIDGE JOINT SEALS, BR NO -	4.00	2	EA	15000.00	15000.00
444-1000	SAWED JOINTS IN EXIST PAVEMENTS - PCC	21604.00	24	LF	10.01	7.70
445-0500	WATERPROOFING PVMT JOINTS AND CRACKS -	41000.00	1	LF	1.00	1.00
446-1100	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	961591.00	61	LF	8.24	2.79
446-1200	PVMT REINF FABRIC FULL WIDTH, TYPE 2	8000.00	1	SY	2.30	2.30
446-2118	HIGH STRENGTH PVMT REINF FABRIC, 18 IN WIDTH	81576.00	10	LF	9.91	5.00
446-3500	HIGH STRENGTH PVMT REINF FABRIC -	229750.00	4	LF	7.45	4.41
447-1050	MODULAR EXPANSION JOINT, BR. NO -	1.00	1	EA	65000.00	65000.00
449-1000	BRIDGE DECK JOINT SEAL, BRIDGE NO. BENT NO.	1.00	1	EA	0.00	0.00
449-1605	LOW-DENSITY, CLOSED CELL, X-LINKED, ETHYLENE VINYL ACETATE,	2026.00	22	LF	197.70	198.70
449-1620	LOW-DENSITY, CLOSED-CELL, X-LINKED, ETHYLENE VINYL ACETATE,	20393.00	361	LF	39.34	38.27
451-1100	PATCHING PCC PAVEMENT	5900.00	2	SF	129.40	128.99
452-1000	FULL DEPTH SLAB REPLACEMENT	800.00	1	CY	380.00	380.00
453-1000	PORTLAND CEMENT CONCRETE WHITETOPPING	2384.00	3	CY	654.71	643.62
455-1000	FILTER FABRIC FOR EMBANKMENT STABILIZATION	563205.00	13	SY	4.77	3.63
456-2012	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (CONTINUOUS)	347.00	19	GLM	2022.06	945.28
456-2015	INDENTATION RUMBLE STRIPS - GROUND-IN-PLACE (SKIP)	306.89	38	GLM	1760.99	860.01
456-2025	INDENTATION CENTERLINE RUMBLE STRIPS-GROUND	2.00	1	GLM	1450.00	1450.00

# COST WORKSHEET



PROJECT: **SR 92 Realignment & Widening**  
**(Douglas & Paulding Counties)**  
*Georgia Department of Transportation*

ALTERNATIVE NO.: **TS-W-12**

SHEET NO.: **7 of 7**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
R/W Savings (see TS-W-1 for Unit Cost Data)	SF	71,088	0.74	52,605			
148% mark-up				77,855			
Sub-total:				130,460			
P.C.C. Roadway	SY	7898.6	75.10	593,190			
10% mark-up				59,319			
Sub-total:				652,509			
Subtotal				782,969			
Markup (%) at				—			
TOTAL				782,969			

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 92 REALIGNMENT AND WIDENING**  
*Douglas and Paulding Counties*

ALTERNATIVE NO.: **B-W-3**

DESCRIPTION: **RETAIN EXISTING BRIDGE OVER LICK LOG CREEK  
AND WIDEN FOR NEW TYPICAL SECTION**

SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:**

The existing bridge will be removed and a new bridge will be constructed over the entire section.

**ALTERNATIVE:**

Retain and widen existing Lick Log Creek bridge.

**ADVANTAGES:**

- Reduces cost
- Accelerates schedule
- Minimizes use of existing service life

**DISADVANTAGES:**

- Increases maintenance (older bridge)

**DISCUSSION:**

The existing bridge at Lick Log Creek was built in 1996 and has a sufficient rating of 87.57. The roadway is in a curve to the left and the widening is on the right, which is on the high side of super-elevation. Extending the bridge on the high side will not reduce the hydraulic area of opening. The hydraulic section of the GDOT office of Bridge Design reports that the hydraulic study for this bridge was done using the current regression equations so hydraulically the bridge should be adequate. Because the bridge is in super-elevation, no correction of existing crown is necessary.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,492,325	—	\$ 2,492,325
ALTERNATIVE	\$ 2,079,688	—	\$ 2,079,688
SAVINGS	\$ 412,637	—	\$ 412,637

# CALCULATIONS



PROJECT

SR 92 Realignment & Widening (Douglas & Paulding Counties)  
Georgia Department of Transportation

ALTERNATIVE NO

B-W-3

SHEET NO 2 of 3

EXISTING BRIDGE WIDTH IS 44' GUTTER-TO-GUTTER.  
OUT-TO-OUT WIDTH = 47'-3". ASSUME 42' + 1'-7 1/2"  
(TOTAL = 43'-7 1/2") CAN BE RETAINED.

FINAL BRIDGE WIDTH:

$$W = 24 + 6(12) + 2(10) + 2(1.625) = 119'-3" \text{ OUT-TO-OUT}$$

$$\text{SO BRIDGE WIDENING WIDTH} = 119.25 - 43.625 \\ = 75'-7 1/2"$$

$$\text{BRIDGE LENGTH} = 200'$$

$$\text{WIDENING AREA} = 200(75.625) = 15,125 \text{ SF}$$

ACCORDING TO BULINGALSBIE OF GDOT OFFICE OF  
BRIDGE DESIGN, USE \$125/SF FOR BRIDGE WIDENING,  
INCLUDING REMOVAL.

AS-DESIGNED BRIDGE AREA IS 18000 SF IN THE  
ESTIMATE. THIS CONVERTS TO A BRIDGE LENGTH  
OF 151'. THE EXISTING BRIDGE LENGTH IS 200', WHICH  
IS SET BY HYDRAULICS. THEREFORE, CALCULATE

AS-DESIGNED BRIDGE WIDTH AND USE \$95/SF (CURRENT  
VALUE)

$$\text{BRIDGE AREA} = 200(119.25) = 23850 \text{ SF}$$



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## PROJECT DESCRIPTION

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Two main segments of roadway were studied in the VE workshop. The SR 92 realignment comprises the southernmost portion in Douglas County, and the SR 92 widening comprises the northernmost portion in Douglas and Paulding Counties.

### SR 92 Realignment

The realignment of SR 92 involves a new six-lane divided highway from Durelee Lane to Malone Road in Douglas County. It will divert heavy truck and automobile traffic from the downtown portion of Douglasville to the new highway. The preferred alignment avoids historical, 4F and community resources and intersects and connects ten cross roads. A grade separation between SR 92 and US 78, the Norfolk Southern Railroad and East Strickland Street will be constructed to eliminate the existing at-grade crossing. The typical section includes a 20-ft. raised median and 12-ft. urban shoulders with a multi-use path on one side and a sidewalk on the other side.

The pavement section will be Portland cement concrete (PCC). Please note that the cost estimate information shown in Table 1 reflects asphalt pavement and should be updated for PCC pavement.

	South Section	Middle Section	North Section	All 3 Sections
Construction	\$ 10,196,925	\$ 9,809,621	\$ 12,901,858	\$ 32,908,404
Right of Way	\$ 15,667,600	\$ 9,737,500	\$ 9,004,500	\$ 34,409,600
Reimbursable Utilities	\$ -	\$ 3,100,000	\$ 100,000	\$ 3,200,000
Total Project Costs	\$ 25,477,221	\$ 23,034,425	\$ 22,006,358	\$ 70,518,004

### SR 92 Widening

The widening of SR 92 involves widening the existing roadway to six lanes from Malone Road to Nebo Road in Douglas and Paulding Counties. The project will also provide a variable width median. The existing roadway is variable, with two to three travel lanes and approximately 8-ft. shoulders, 2-ft. paved. Right- and left-turn lanes are provided as needed.

From Malone Road to Bill Carruth Parkway, the primary typical section would consist of six travel lanes, three in each direction, with a 24-ft. raised median and 10-ft. outside shoulders, 6.5-ft. paved. From Bill Carruth Parkway to Nebo Road, the primary typical section would consist of four travel lanes, two in each direction, with a 24-ft. raised median and 10-ft. outside shoulders, 4-ft. paved.

The existing right-of-way on SR 92 is about 100 ft. Approximately 60 ft. of additional right-of-way would be required. The existing asphalt pavement will be replaced with PCC.

The combined construction and right-of-way costs for the widening project are \$ 52.3 million, comprising \$42 million for construction, \$9.2 million for right of way, and \$1.1 million for reimbursable utilities. Please note that the cost estimate information shown in Table 1 reflects asphalt pavement and should be updated for PCC pavement.

The attached information describes each project in more detail.

# **SR-92 REALIGNMENT PROJECT**

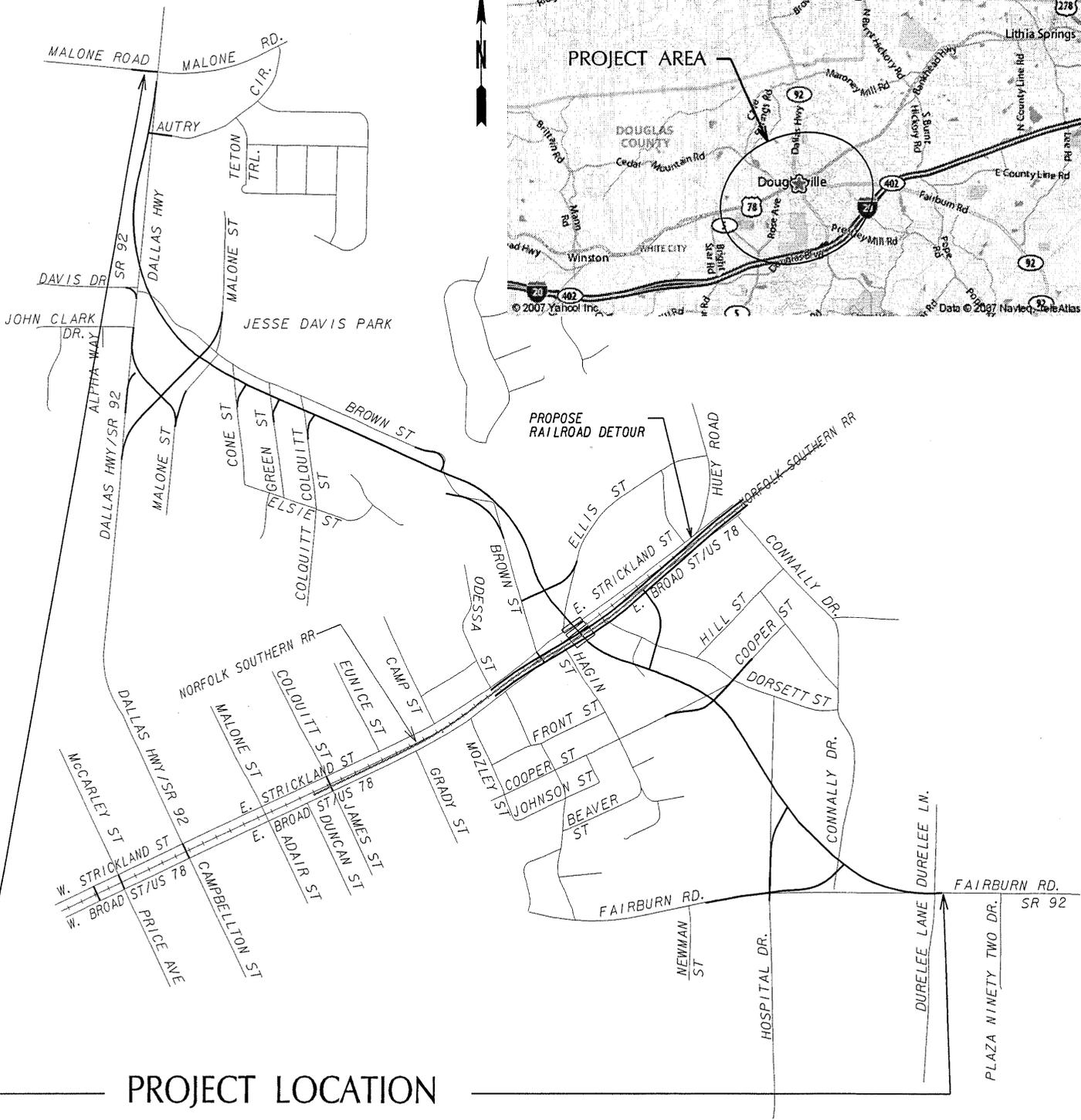
Project Number: CSSTP-0006-00(900), CSSTP-0006-00-(901), STP-186-1(11)

County: Douglas

P. I. Number: 0006900, 0006901, 720970

Federal Route Number: N/A

State Route Number: SR 92



PROJECT LOCATION

SR 92 - DOUGLASVILLE  
LOCATION MAP

## **Need and Purpose:**

### A. Background

SR 92 between US 78 and I-20 is also known as Fairburn Road. SR 92 between US 78 and Malone Road is also known as Dallas Highway. US 78 in Douglasville is also SR 5 and SR 8 and is sometimes referred to as Bankhead Highway. US 78 east of downtown Douglasville (Campbellton Street) is signed as East Broad Street. US 78 west of downtown Douglasville (Campbellton Street) is signed as West Broad Street.

In the project area, SR 92 is classified as an urban minor arterial; however, it provides a major north/south corridor through downtown Douglasville and between Douglas and Paulding Counties. The SR 92 corridor is a major north-south corridor connection from northern Douglas and Paulding Counties to I-20, which provides a direct link to I-285 less than ten miles east of the Douglas/Fulton County line. The SR 92 corridor provides a vital link for commuters using I-20, as well as connectivity between residential neighborhoods and the Arbor Place Mall area. In addition, SR 92 provides a heavily used north/south corridor between I-20 and US 78. SR 92/Fairburn Road crosses I-20 to US 78/East Broad Street, then follows US 78/East Broad Street easterly until the Mozley Street intersection, crosses the Norfolk Southern railroad at Mozley Street, then follows East Strickland Street westerly until intersecting with Campbellton Street. SR 92/Dallas Highway then extends northerly to Malone Road.

With the increasing population growth in Douglas and Paulding Counties over the last few decades, SR 92 has become a major transportation corridor for vehicles traveling between the two counties, especially to gain access to I-20. The SR 92 corridor is the only direct corridor between Hiram and Douglasville and one of only three travel corridors between Paulding County and I-20. This corridor no longer has sufficient capacity to meet the present vehicle travel demands and, without additional capacity, the corridor will experience increasingly longer and unacceptable delays. Although minor corridor improvements would provide some benefits, none would sufficiently increase the corridor capacity and reduce travel delays. These improvements, primarily of the Transportation Systems Management/ Transportation Demand Management type, include such features as turn lanes, signal modifications and Intelligent Transportation Systems, transit and ridesharing programs, flexible work hours, telecommuting, bicycle/pedestrian improvements, and other measures that would make a system function more efficiently and/or reduce the demands on a system by offering alternative modes of travel. However, none of these improvements would significantly add capacity or reduce travel delays without also adding vehicle travel lanes to the system.

All existing railroad crossings in the vicinity of SR 92 and the City of Douglasville are at-grade. The Norfolk Southern railroad is a heavily used train corridor that runs just north of and parallel to US 78. This train corridor is the most direct railroad line from Atlanta, Georgia, to Birmingham, Alabama. The track carries an average of 11 heavy freight trains per day with an operating density of 60 to 70 million gross ton-miles per mile. The system also accommodates Amtrak passenger service. Including both freight and Amtrak trains, between 8 and 12 trains run daily along these tracks. Train speeds in the downtown area can reach up to 60 miles per hour.

As the SR 92 corridor passes through the downtown Douglasville area, it takes a circuitous route to allow appropriate clearance for truck traffic crossing the railroad tracks. Many automobiles traveling along this route use the more direct travel path westerly along US 78/East Broad Street to Campbellton Street, contributing to traffic congestion in downtown Douglasville. Also, existing SR 92 shares the roadway through downtown Douglasville with a portion of US 78/East Broad Street. The primary road through downtown Douglasville is US 78. The US 78 corridor

is a major east/west corridor in Douglas County, which provides an east-west corridor alternative to I-20. In addition to accommodating this east/west movement, US 78/East Broad Street must accommodate the traffic from the major north/south movement associated with SR 92, as well as the traffic associated with downtown Douglasville.

Existing pedestrian facilities to and from major destinations in the City of Douglasville are minimal. The primary area where pedestrian activity occurs is in downtown Douglasville where an adequate sidewalk network connects the downtown commercial area, government offices, and a few residential pockets. The existing SR 92 corridor in the project area includes sporadic areas of existing sidewalks that do not meet existing American's with Disability Act (ADA) standards.

The projects are identified in the ARC's Mobility 2030 RTP as ARC numbers DO-282C, DO-282B, and DO-282A. Project DO-282C is identified as, "Dorsett Street (SR 92 Realignment) from Bankhead Highway to Hospital Drive." Project DO-282B is identified as, "US 78/SR 92 and R/R Grade Separation from Brown Street to Dorsett Street." Project DO-282A is identified as, "SR 92 Realignment from SR 92 (North of City) to US 78/SR 5/SR 8 – Bankhead Hwy." All three sections are identified in the plan as capacity type projects to allow for better freight movement into and out of Douglas County, east Paulding County and south Cobb County. All three units are also identified in the ARC's current FY 2006-2011 Transportation Improvement Plan (TIP) and in the ARC's Draft 2008-2013 TIP, under the same numbers as those in the RTP.

The Douglasville Livable Centers Initiative (LCI) Study Report (May 2001) proposes to divert traffic from the downtown area to make it more livable. The realignment of SR 92 is recommended in the LCI plan and is considered essential for the success of a more livable downtown. This goal would also be reached by building more pedestrian sidewalks and bicycle paths that link other areas of the city to the downtown area. The proposed projects are also identified in the City of Douglasville 1994 Comprehensive Plan and is consistent with the plan's goals, policies and statements identified in the plan.

#### B. Proposed Improvements

The proposed projects would improve the level of service and safety along the SR 92 corridor and alleviate congestion in the downtown area of the City of Douglasville. These projects are also needed to accommodate both current and future growth in Douglas and Paulding Counties and allow for better freight movement into and out of Douglas County, east Paulding County and south Cobb County. The proposed projects, in conjunction with other projects in the Georgia Department of Transportation (GDOT) Construction Work Program and the Atlanta Regional Commission's (ARC's) Mobility 2030 Regional Transportation Plan (RTP), would provide a continuous multi-lane north-south corridor from I-20 to SR 120, two significant east-west corridors in the region.

#### C. Logical Termini

For purposes of logical termini, the environmental document includes the widening and realignment of SR 92 from Malone Road in Douglas County to Nebo Road in the City of Hiram, Paulding County, identified in the RTP as Project PA-092A. Consequently, the logical southern terminus for the widening and realignment of SR 92 in Douglas and Paulding Counties would be just south of Durelee Lane, City of Douglasville, Douglas County and the logical northern terminus would be Nebo Road in the City of Hiram, Paulding County. The proposed termini are considered logical because they provide connections to sections of SR 92 with the same number of lanes to those proposed. In addition to the logical project termination points, a logical location for transitioning from a 6-lane divided section to a 4-lane divided section has been determined at

Bill Carruth Parkway. The southern terminus just south of Durelee Lane and the northern terminus at Nebo Road both are located at the termini of other programmed GDOT projects along the SR 92 corridor.

#### D. Projects in the Area

<b>Project Number</b>	<b>Description</b>
DO-AR-208 A, B (P.I. No. 712930)	SR 92 at I-20 Interchange-Capacity Improvement (under construction)
PA-092A (P.I. No. 0007961)	SR 92 (Hiram Douglasville Highway): Segment 1 - from Between Brown and Malone Streets to Nebo Road - Roadway Capacity
AR-H-201 (P.I. No. 0003165)	I-20 West HOV Lanes from SR 6 to Bright Star Road - HOV Lanes
DO-009 (P.I. No. 0004425)	Durelee Lane Extension from current end of Durelee Lane to Dorris Road - Roadway Capacity
DO-029A (P.I. No. 721590)	US 78/Bankhead Highway from SR 92 to South Sweetwater Road - Roadway Capacity
DO-280 (P.I. No. 0006724)	SR 92/Dallas Highway at Malone Road -Roadway Operational Upgrades
DO-281 (P.I. No. 0000333)	Thompson Street Realignment at SR 92 -Roadway Operational Upgrades

#### E. Existing and Proposed Traffic

A capacity analysis within the project area was performed for the existing 2006 and future 2035 build and no-build traffic conditions to determine the impact of the project. The analysis took into account anticipated developments. Using procedures based on the Highway Capacity Manual, this analysis determines the operating level-of-service (LOS) for roadway sections and intersections. Level of service (LOS) is a qualitative system of measurement that measures the effect of speed and travel time, traffic interruptions or restrictions, freedom to maneuver, safety, driving comfort and convenience, and economy. Traffic speed is the major factor used in identifying the LOS. The ratio of service volume to capacity is a second accompanying factor. Six LOS are defined for each type of facility for which analysis procedures are available. The LOS are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. A LOS A describes an operating condition of free flow with low volumes and high speed. A LOS B describes an operating condition of stable flow with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and driving lane. A LOS C describes an operating condition still in the range of stable flow; however, speed and maneuverability are more closely controlled by the higher volume of traffic. A LOS D describes an operating condition of high density and is approaching unstable flow. Tolerable operating speeds are maintained though considerably affected by changes in operating conditions. A LOS E describes an operating condition at or near the capacity level with unstable flow and short stoppages. Driver frustration is generally high. A LOS F describes an operating condition of forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount of traffic that can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop and go waves and are extremely unstable.

The results of the year 2006 existing roadway capacity analysis indicates that the existing SR 92/Fairburn Road corridor, north of I-20, currently carries 33,552 vehicles per day (VPD) and is projected to carry as many as 46,510 VPD by the year 2035. Trucks account for approximately 10% of the traffic. The capacity analysis indicates that the existing SR 92/Fairburn Road from Durelee Lane to US 78/East Broad Street currently operates at a LOS C during the AM peak hours and a LOS D during the PM peak hours. However, it is anticipated that this same section of roadway would function at a LOS F during both peak hour periods by the year 2035, under the no-build condition.

The capacity analysis indicates that the existing SR 92/Dallas Highway from US 78/East Broad Street to Malone Road currently operates at a LOS B during both peak hour periods. However, it is also anticipated that this same section of roadway would function at a LOS F during both peak hour periods by the year 2035, under the no-build condition. Additional existing and proposed traffic information is included in Table 1: Traffic Analysis below.

Table 1: Traffic Analysis

Road Name:	Current Year: (2006) VPD	Design Year: (2035) VPD
SR 92/Fairburn Road south of Durelee Lane	28,620	51,790
SR 92/Fairburn Road north of Durelee Lane	26,960	**
SR 92 Realignment north of Durelee Lane	*	47,960
SR 92/Fairburn Road south of US 78/East Broad Street	17,990	**
SR 92 Realignment south of US 78/East Broad Street Ramp	*	40,940
SR 92/Dallas Highway north of US 78/East Broad Street	13,680	**
SR 92 Realignment north of US 78/East Broad Street Ramp	*	38,440
SR 92/Dallas Highway south of Malone Road	19,680	**
SR 92 Realignment south of Malone Road	*	47,850
SR 92/Dallas Highway north of Malone Road	15,940	**
SR 92 Dallas Highway north of Malone Road	*	47,430

\*Doesn't occur under existing conditions

\*\*Won't occur under proposed project conditions due to realignment

Future traffic volumes were estimated through an analysis of traffic counts, existing turning movement counts, and traffic projections from the ARC travel demand mode. The traffic analysis indicates a need for 6 through lanes from Durelee Lane to Malone Road to accommodate design year 2035 daily traffic volumes which are projected to be greater than 40,000 vehicles per day. The roadway capacity was examined under the build condition at key intersections and, according to the analysis, a LOS D or better is anticipated. This LOS is considered acceptable for most drivers in urban and suburban areas.

In addition to traffic flow benefits, a grade separation is needed between SR 92 and the heavily traveled Norfolk Southern railroad to limit vehicle and train interaction. Currently, all railroad crossings in the vicinity of SR 92 and the City of Douglasville are at-grade. The only existing railroad crossing in downtown Douglasville that is adequate for trucks is located at Mozley Street. Trucks often attempt to use the other crossings and get caught physically on the tracks, contributing to the congestion problem. Furthermore, trucks that utilize the Mozley Street crossing are required to make several turns in the downtown area to utilize the existing SR 92 corridor, further exacerbating the congestion problem.

#### F. Crash Information

Accident data of the project area for the most recent consecutive three-year period for which data is available (2004 through 2006) was compiled and a comparison was conducted, which compares the automobile crash rates per 100 million vehicle miles traveled (100MVMT) in the project area with statewide comparisons for similar type roadways. The statewide average for urban minor arterials, based on 2005 data, is 534 crashes per 100MVMT. SR 92/Fairburn Road between US 78/East Broad Street and I-20 has a history of crash experience that is more than twice the statewide average rate for an urban minor arterial. US 78/ Broad Street between Rose Avenue and Connelly Drive has a history of crash experience that is almost twice the statewide

average rate for an urban minor arterial. SR 92/Fairburn Road between US 78/Broad Street and Brownsville Road has a crash experience that lower than the statewide average. This information is detailed in Table 2 below. The accident/injury/fatality rate is detailed in Table 3.

Table 2: Automobile Crash Rates on SR 92

Crash Analysis Section	Year	Number of Accidents	Crash Rate (100MVMT)
<b><i>SR 92 from I-20 to US 78 (Broad Street)</i></b>			
	2004	226	1224
	2005	190	1173
	2006	153	1026
<b><i>US 78 (Broad Street) from Rose Avenue to Connelly Drive</i></b>			
	2004	109	1181
	2005	79	942
	2006	83	929
<b><i>SR 92 from US 78 (Broad Street) to Brownsville Road</i></b>			
	2004	127	332
	2005	99	273
	2006	82	217

Table 3: Accident/Injury/Fatality Rates on SR 92

Crash Analysis Section	Year	Number of Accidents	Number of Injuries	Number of Fatalities
<b><i>SR 92 from I-20 to US 78 (Broad Street)</i></b>				
	2004	226	126	0
	2005	190	43	0
	2006	153	39	0
<b><i>US 78 (Broad Street) from Rose Avenue to Connelly Drive</i></b>				
	2004	109	49	0
	2005	79	18	0
	2006	83	15	0
<b><i>SR 92 from US 78 (Broad Street) to Brownsville Road</i></b>				
	2004	127	164	0
	2005	99	31	1
	2006	82	29	0

Areas where a majority of the accidents occur along the proposed projects corridor include the intersection of SR 92 with Fairburn Road, Durelee Lane, Hospital Drive, Newman Street, Lincoln Street, Thompson Street, East Strickland Street and Brownsville Road. A majority of accidents along US 78/Bankhead Highway within the proposed projects corridor occur at the intersections with Campbellton Street, McCarley Street, Mozley Street, and Brown Street.

In addition to the crash experience occurring along the SR 92 corridor, existing roadway geometric constraints contribute to the potential for crashes at the SR 92/Dallas Highway railroad crossing. The crossing experiences an abrupt drop in elevation (approximately 5 feet) from this railroad crossing to the edge of the intersection with US 78, located 50 feet to the south. This elevation change makes the SR 92/Dallas Highway railroad crossing unsuitable for the crossing of trucks that may become physically caught on the railroad tracks.

The SR 92 corridor and surrounding crossings have a history of railroad crossing accidents. From 2001 through 2005, eight railroad crossing crashes involving trains occurred at the five at-grade crossings in the downtown area of Douglasville. Five of the eight crashes occurred at the SR 92/Dallas Highway railroad crossing and the remaining three occurred at the Brown Street railroad crossing. Please see Table 4 below for detailed railroad crossing crash data.

Table 4: Railroad Crossing Crash History

Railroad Crossing	Year Accident Occurred	Vehicle Driver Injured	Type of Accident
Rose Avenue	96	No	Car Stalled on Crossing
McCarley Street	97	Yes	Car Trapped on Crossing
	97	No	Car Trapped on Crossing
	99	No	Car Moving over Crossing
SR 92/Dallas Highway	77	No	Car Stalled on Crossing
	81	Yes	Car Stopped on Crossing
	82	No	Car Stopped on Crossing
	84	No	Car Stopped on Crossing
	89	No	Car Stopped on Crossing
	92	No	Car Stalled on Crossing
	94	No	Car Stopped on Crossing
	94	No	Car Stopped on Crossing
	95	Yes	Car Stopped on Crossing
	97	No	Car Moving over Crossing
	01	No	Car Moving over Crossing
	01	No	Car Stopped on Crossing
	01	No	Car Stalled on Crossing
	01	No	Car Stopped on Crossing
	03	No	Car Stopped on Crossing
Mozley Street	79	Yes	Car Moving over Crossing
	83	No	Car Stopped on Crossing
	83	No	Car Stopped on Crossing
	86	No	Car Stalled on Crossing
	90	No	Car Moving over Crossing
	90	No	Car Moving over Crossing
	94	No	Car Stopped on Crossing
Brown Street	85	Yes	Car Stalled on Crossing
	86	No	Car Moving over Crossing
	87	No	Car Moving over Crossing
	89	Killed	Car Moving over Crossing
	93	No	Car Stalled on Crossing
	01	No	Car Stopped on Crossing
	01	No	Car Stalled on Crossing
	05	No	Car Stalled on Crossing

G. Need and Purpose Statement

The proposed projects are greatly needed to improve the level of service along the SR 92 corridor and alleviate congestion in the downtown area of the City of Douglasville. Furthermore, the additional capacity provided by the proposed projects are needed to provide an acceptable LOS (LOS D or better) along SR 92/Fairburn Road south of US 78/East Broad Street. This LOS is considered to be acceptable for most drivers in urban and suburban areas.

An additional benefit of these projects is improved motorist safety that would be provided by the construction of the proposed grade-separated structure at the Norfolk Southern Railroad. It is anticipated that most vehicle and truck through traffic (65% of all traffic traveling on SR 92) would utilize the proposed grade-separated railroad crossing. The grade-separated crossing would also provide an opportunity for emergency vehicles to cross the tracks, even when a train is on the tracks.

In addition to the provision of a grade-separated crossing in Douglasville, the proposed project would close the existing at-grade crossings in the downtown area at Brown Street, Mozley Street

and SR 92/Dallas Highway. These closures would reduce crash exposure between the trains and the automobiles and trucks. In addition to the railroad crossing closures indicated above, the proposed projects would relocate the existing at-grade crossing at McCarley Street to provide a safer at-grade crossing. The upgraded crossing would include a reduced grade differentiation between McCarley Street and US 78/West Broad Street and improve the signing, marking and signal timing at the crossing.

The addition of a raised median would also improve safety along the project corridor. According to studies conducted by the GDOT Office of Planning, the provision of raised medians on roadways would provide greater vehicle safety by reducing turning conflicts and crashes by up to 55%. The addition of a raised median would allow for left turn lanes to separate left-turning vehicles from through traffic, reducing the likelihood of rear-end collisions and providing a buffer that would significantly reduce the likelihood of head-on collisions.

Pedestrian safety would also be improved along the SR 92 corridor with the addition of sidewalks to both sides of the proposed projects, the addition of signalized intersections for pedestrian crossings, and the provision of a median to provide a mid-way pedestrian refuge. The proposed projects would provide approximately 2.3 miles of sidewalks on each side of the SR 92 corridor that would connect to the existing sidewalk systems in downtown Douglasville, along Hospital Drive, at the two schools in the project area and at Jessie Davis Park. Also, the proposed projects would provide a grade-separated railroad crossing for pedestrians. Separating the grades between pedestrians and the railroad would reduce possibilities of pedestrian accidents involving the railroad along the corridor.

#### **DESCRIPTION:**

The proposed projects consist of the widening and realignment of SR 92 in Douglasville from just south of the existing intersection of SR 92/Fairburn Road and Durelee Lane to just north of the existing intersection of SR 92/Dallas Highway and Malone Road. The proposed projects would include a grade separation of SR 92 Realignment and US 78/East Broad Street, the Norfolk Southern railroad, and East Strickland Street. The proposed projects would also include the relocation of the existing at-grade railroad crossing at McCarley Street and the closing of three existing at-grade crossings in Downtown Douglasville. The total length of the three projects would be approximately 2.3 miles.

The proposed typical cross-section would consist of six 12-foot travel lanes, three in each direction, with a 20-foot raised median and 12-foot shoulders consisting of curb, gutter, and a 5-foot sidewalk on the west side of the road and 15-foot shoulders consisting of curb, gutter, and an 8-foot multi-use trail on the east side. Double 12-foot, left turn lanes would be provided at Hospital Drive. Single 12-foot right and left turn lanes would be provided elsewhere as needed.

The proposed projects would widen SR 92/Fairburn Road until reaching a point just north of Durelee Lane. The proposed projects would then curve easterly on new location creating a new intersection with the existing SR 92/Fairburn Road, then intersecting Hospital Drive approximately 1,200 feet east of the existing intersection of SR 92/Fairburn Road and Hospital Drive. The proposed projects would continue northerly just west of and roughly parallel to Dorsett Street, until reaching US 78/East Broad Street. The proposed projects would then underpass US 78/East Broad Street, the Norfolk Southern railroad and East Strickland Street, near the existing intersection of US 78/East Broad Street and Dorsett Street. The underpass structure at US 78/East Broad Street would be constructed large enough to accommodate the future widening of US 78/East Broad Street to eight lanes. A ramp would be provided from the

proposed SR 92 Realignment to US 78/East Broad Street and right and left turn lanes would be added to US 78/East Broad Street at the ramp. The alignment would continue northwesterly just west of and roughly parallel to Brown Street. Just north of Malone Street, the alignment would curve northeasterly and tie into existing SR 92/Dallas Highway at the existing intersection of SR 92/Dallas Highway and Malone Road.

The proposed projects would realign and modify existing cross streets as follows:

- Realign SR 92/Fairburn Road to intersect perpendicular with the proposed SR 92 Realignment.
- Realign Hospital Drive to intersect perpendicular with the proposed SR 92 Realignment.
- Realign Cooper Street, Ellis Street, Colquitt Street, Green Street, Cone Street, Brown Street, Malone Street, and SR 92/Dallas Highway to intersect perpendicular with the proposed SR 92 Realignment.
- Widen all intersecting cross-streets in the immediate vicinity of the intersections to include 12-foot lanes, with 12-foot shoulders, curb and gutter, and a 5-foot sidewalk on at least one side of the roadway, and right and left turn lanes as needed.
- Cul-de-sac Dorsett Street at one location; 1) just south of the proposed connector between US 78/Bankhead Hwy and SR 92/Fairburn Road.
- Cul-de-sac Brown Street approximately 1,000 feet north of East Strickland Street.

There are no existing major structures along the proposed corridor since the alignment is primarily on new location. The proposed projects would include grade-separated structures at US 78/East Broad Street, at the Norfolk Southern railroad and at East Strickland Street by providing underpass bridges at these locations. The proposed US 78/East Broad Street bridge would be approximately 98 feet by 188 feet; the Norfolk Southern railroad bridge would be approximately 36 feet by 188 feet; and, the East Strickland Street bridge would be approximately 36 feet by 188 feet. Culverts would be constructed to accommodate the proposed typical cross sections at three stream crossings.

The proposed projects would relocate the existing at-grade railroad crossing at McCarley Street. The at-grade crossing would be relocated approximately 100 feet west of its existing location to minimize the “hump” at the crossing, and the signing, marking and signal timing at the crossing would be improved. The proposed projects would also close the existing at-grade railroad crossings at SR 92/Dallas Highway, Brown Street, and Mozley Street. The existing at-grade crossing at Rose Avenue would not be closed or modified as part of the proposed projects.

**Non-attainment area:** Yes (X) No ( )

The proposed concept matches the projects as planned in the conforming plans model description which are identified in the FY 2007-2012 TIP as DO-282A, DO-282B, and DO-282C.

- DO-282A SR92 Realignment: Phase I Overpass. The service type programmed is Roadway Capacity with 0 existing lanes and 6 planned. The proposed open to traffic year in the plan is 2011. The project length is 0.24 miles.
- DO-282B SR 92 Realignment: Phase II. The service type programmed is Roadway Capacity with 0 existing lanes and 6 planned. The proposed open to traffic year in the plan is 2011. The project length is 0.78 miles.
- DO-282C SR 92 Realignment: Phase III. The service type programmed is Roadway Capacity with 2 existing lanes and 6 planned. The proposed open to traffic year in the plan is 2014. The project length is 1.28 miles.

**PDP Classification:** Major (X) Minor ( )

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

**Functional Classification:**

Urban Minor Arterial	Urban Collector Street	Urban Local Street
SR 92	Durelee Lane	Cooper Street
US 78	Hospital Drive	East Strickland Street
Campelton Street	Malone Road	West Strickland Street
		Ellis Street
		Brown Street
		Colquitt Street
		Green Street
		Cone Street
		Malone Street
		Dorsett Street

**U. S. Route Number(s):** US 78 (SR 5, SR 8, East Broad Street, West Broad Street)

**State Route Number(s):** SR 92 (Fairburn Road, Dallas Highway), SR 5 (East Broad Street, West Broad Street), SR 8 (East Broad Street, West Broad Street)

**Traffic (AADT):**

Road Name	Current Year (2006) VPD	Design Year (2035) VPD
SR 92/Fairburn Road south of Durelee Lane	28,620	51,790
SR 92/Fairburn Road north of Durelee Lane	26,960	**
SR 92 Realignment north of Durelee Lane	*	47,960
SR 92/Fairburn Road south of US 78/East Broad Street	17,990	**
SR 92 Realignment south of US 78/East Broad Street Ramp	*	40,940
SR 92/Dallas Highway north of US 78/East Broad Street	13,680	**
SR 92 Realignment north of US 78/East Broad Street Ramp	*	38,440
SR 92/Dallas Highway south of Malone Road	19,680	**
SR 92 Realignment south of Malone Road	*	47,850
SR 92/Dallas Highway north of Malone Road	15,940	**
SR 92 Dallas Highway north of Malone Road	*	47,430

\*Doesn't occur under existing conditions

\*\*Won't occur under proposed project conditions due to realignment

**Existing design features:**

- **Typical Section:** SR 92 corridor varies with 5-lane, 4-lane and 2-lane sections.
- **Posted speed:**

Posted speed	25 mph	30 mph	35 mph	45 mph	Not Posted
Mainline					

SR 92/Fairburn Road			X		
SR 92/Dallas Highway				X	X
<b>Cross Street</b>					
Durelee Lane		X			
Hospital Drive				X	
Cooper Street		X			
US 78/East Broad Street at SR 92 realignment				X	
US 78/West Broad Street at McCauley Street			X		
East Strickland Street at SR 92 at Realignment		X			
West Strickland Street at McCauley			X		
Ellis Street		X			
Brown Street	X				
Colquitt Street					X
Green Street					X
Cone Street					X
Malone Street			X		
Malone Road			X		
Campbellton Street					

- **Maximum degree of curvature:**

Maximum degree of curvature	0°	3°	4°	8°	17°	76°
<b>Mainline</b>						
SR 92	X					
<b>Cross Street</b>						
Durelee Lane	X					
Hospital Drive	X					
Cooper Street	X					
US 78/East Broad Street at SR 92 realignment			X			
US 78/West Board Street at McCauley Street	X					
East Strickland Street at SR 92 at Realignment		X				
West Strickland Street at McCauley	X					
Ellis Street				X		
Brown Street						X
Colquitt Street	X					
Green Street	X					
Cone Street			X			
Malone Street					X	
Malone Road		X				
Campbellton Street	X					

- **Maximum grade:**

Maximum Grade	1%	2%	3%	4%	5%	6%	7%	8%	10%	12%	13%	0 to 12%
<b>Mainline</b>												

SR 92									X			
<b>Cross Street</b>												
Durelee Lane	X											
Hospital Drive		X										
Cooper Street							X					
US 78/East Broad Street at SR 92 realignment			X									
US 78/West Board Street at McCauley Street				X								
East Strickland Street at SR 92 at Realignment			X									
West Strickland Street at McCauley				X								
Ellis Street						X						
Brown Street							X					
Colquitt Street							X					
Green Street								X				
Cone Street									X			
Malone Street				X								
Malone Road					X							
Campbellton Street			X									
Driveways												X

- **Width of right of way:**

Width of Right of Way	30 Feet	40 Feet	45-50 Feet	50 Feet	60 Feet	90-100 Feet	100 Feet	125 Feet
<b>Mainline</b>								
SR 92						X		
<b>Cross Street</b>								
Durelee Lane				X				
Hospital Drive								X
Cooper Street				X				
US 78/East Broad Street at SR 92 realignment					X			
US 78/West Board Street at McCauley Street					X			
East Strickland Street at SR 92 at Realignment					X			
West Strickland Street at McCauley					X			
Ellis Street		X						
Brown Street			X					
Colquitt Street					X			
Green Street	X							
Cone Street	X							
Malone Street					X			
Malone Road							X	
Campbellton Street					X			

- **Major structures:** None
- **Major interchanges or intersections along the project:**

Road Name	Interchange	Intersection
SR 92/Fairburn Road at Durelee Lane		X

SR 92/Fairburn Road at Hospital Drive		X
SR 92/Fairburn Road at US 78/East Broad Street		X
SR 92/Fairburn Road at Mozley Street		X
SR 92 at East Strickland Street		X
SR 92/Dallas Highway at Campbellton Road		X

- **Existing length of roadway segment and beginning mile log:** The existing length of roadway segment is 3.15 miles. The beginning mile log is 9.87.

**Proposed Design Features:**

- **Proposed typical section(s):** SR 92 Realignment consists of six 12-foot lanes with a 20-foot raised median, and 12-foot shoulders with curb and gutter and 5-foot sidewalks on west sides and 15-foot shoulders consisting of curb, gutter, and an 8-foot multiuse trail on the east side. Left turn only lanes will be added within the width of the median where required. Right turn only lanes will be added where required.
- **Proposed Design Speed Mainline and Side road:** SR 92: 45 mph Bankhead: 45 mph
- **Proposed Maximum grade Mainline:** 7% **Maximum grade allowable:** 7%.
- **Proposed Maximum grade Side Street:** 10% **Maximum grade allowable:** 12%.
- **Proposed Maximum grade driveway:** Commercial 11%, Residential 15%
- **Proposed Minimum radius Mainline:** 750 **Minimum radius allowable:** 711
- **Proposed Minimum radius side street:** (table) **Minimum radius allowable:** (table)

Road Names Side Roads	Proposed Minimum Radius Side Road:	Minimum Radius Allowable:
Hospital Drive	463	711
Cooper Street	310	250
US 78/East Broad Street	300	711
Ellis Street	300	250
Brown Street	100	154
Malone Street	500	250

- **Right of way**
  - **Width:** SR 92 Realignment - varies 122 ft to 158 ft
  - **Easements:** Temporary ( ), Permanent ( X ), Utility ( ), Other ( ).
  - **Type of access control:** Full ( ), Partial ( X ), By Permit ( X ), Other ( ).
  - **Number of parcels:** 134 **Number of displacements:**
    - **Business:** 23
    - **Residences:** 61
    - **Mobile homes:** 0
    - **Other:** 0
- **Major Structures:**
  - **Bridges:** (See also Attachment 2: Typical Sections).  
Three bridges will be constructed over SR 92 Realignment: the US 78/East Broad Street bridge, the Norfolk Southern railroad bridge, and East Strickland Street bridge. Underpass lighting will be provided. The US 78/East Broad Street bridge will be a two-span structure approximately 188 feet in length. The US 78/East Broad Street bridge will be built to accommodate 4 twelve-foot lanes (two in each direction) with an eastbound 12' left turn lane, a 12' eastbound right turn lane, with six foot sidewalks and barrier walls for future use. The US 78/East Broad Street bridge will be striped for 3 twelve-foot lanes, one westbound and two eastbound. The Norfolk Southern railroad bridge will include one mainline

track, one side track, and one crossover track and will be a two-span structure approximately 188 feet in length. The East Strickland Street Bridge will be a two-span structure approximately 188 feet in length with 2 twelve-foot lanes (one in each direction) with barrier walls and a sidewalk on the left (north) side.

- **Retaining walls:** A retaining wall will be constructed along the west side of SR 92 Realignment just south of the US 78/East Broad Street bridge to avoid impact to property. A retaining wall will be constructed along the west side of SR 92 Realignment just north of the East Strickland Street Bridge to avoid impact to property. A retaining wall will be constructed along the east side of SR 92 Realignment just north of the East Strickland Street Bridge to avoid impact to a 4(f) property.
- **Other Structures:** A noise barrier wall will be constructed on the left (west) side of the SR 92 Realignment between Hospital Drive and Cooper Street. A noise barrier wall will be constructed on the east side of the SR 92 Realignment between Cooper Street and the US 78/East Broad Street ramp. A noise barrier wall will be constructed on the east side of the SR 92 Realignment between Brown Street and Malone Street.

- **Major intersections and interchanges:**

Road Name	Interchange	Intersection
SR 92/Fairburn Road at Durelee Lane		X
SR 92 Realignment at SR 92/Fairburn Road		X
SR 92 Realignment at Hospital Drive		X
SR 92 Realignment at Cooper Street		X
SR 92 Realignment at US 78/East Broad Street Ramp		
US 78/East Broad Street Ramp at US 78/East Broad Street		
SR 92 Realignment at SR 92/Dallas Highway/Malone Street		X
SR 92 Realignment at Malone Road		X

- **Traffic control during construction:** Hospital Drive will be closed at the SR 92 Realignment. Cooper Street will be closed at the SR 92 Realignment with traffic detoured to US 78/East Broad Street. East Strickland Street will be closed at the bridge construction site with traffic detoured to Brown Street and Ellis Street. Brown Street at-grade crossing of the Norfolk Southern railroad will be closed and detoured to Mozley Street (and closed permanently at completion of the project). Colquitt Street, Green Street, Cone Street, and Malone Street will be closed at the SR 92 Realignment with traffic detoured to SR 92/Dallas Highway.

- **Design Exceptions to controlling criteria anticipated:**

	UNDETERMINED	YES	NO
HORIZONTAL ALIGNMENT:	( )	( )	( X )
ROADWAY WIDTH:	( )	( )	( X )
SHOULDER WIDTH:	( )	( )	( X )
VERTICAL GRADES:	( )	( )	( X )
CROSS SLOPES:	( )	( )	( X )
STOPPING SIGHT DISTANCE:	( )	( )	( X )
SUPERELEVATION RATES:	( )	( )	( X )
HORIZONTAL CLEARANCE:	( )	( )	( X )
SPEED DESIGN:	( )	( )	( X )
VERTICAL CLEARANCE:	( )	( )	( X )
BRIDGE WIDTH:	( )	( )	( X )
BRIDGE STRUCTURAL CAPACITY:	( )	( )	( X )

- **Design Variances:** A design variance to minimum intersection spacing of 1,000 ft will be required on SR 92 for the following intersections: SR 92/Fairburn Rd., SR 92/Hospital

Dr., and SR 92/Cooper St. A design variance for minimum radius allowable for various design speeds on the following intersections: SR 92/Hospital Dr., SR92/US78/East Broad St., and SR 92/Brown St.

- **Environmental concerns:** Two historic districts and a railroad eligible for inclusion in the National Register of Historic Places, low income and minority neighborhoods, public controversy of railroad crossing closures, two schools, a park, noise impacts, large number of anticipated displacements, two churches, and five stream crossings.
- **Are Time Savings Procedures appropriate?** Yes ( ), No ( X ),
- **Level of environmental analysis:**
  - Categorical exclusion ( ),
  - Environmental Assessment/Finding of No Significant Impact (FONSI) (X), or
  - Environmental Impact Statement (EIS) ( ).
  
- **Utility involvements:** Atlanta Gas Light, BellSouth Telecommunication, Douglas County Water & Sewer Authority, MCI Communications, Georgia Power Transmission, Georgia Power Company (2), Douglas County DOT, Austell Gas System, Comcast Communication, Greystone Power Corporation, Quest, Verizon

**Project responsibilities:**

- Design: GDOT
- Right of Way Acquisition: GDOT
- Relocation of Utilities: GDOT
- Letting to contract: GDOT
- Supervision of construction: GDOT
- Providing material pits: Contractor
- Providing detours: GDOT, Norfolk Southern Corporation

**“SR-92 WIDENING PROJECT”**

Project Number: CSSTP-0007-00(691)

Counties: Douglas and Paulding

P. I. Number: 0007691

Federal Route Number: N/A

State Route Number: SR92

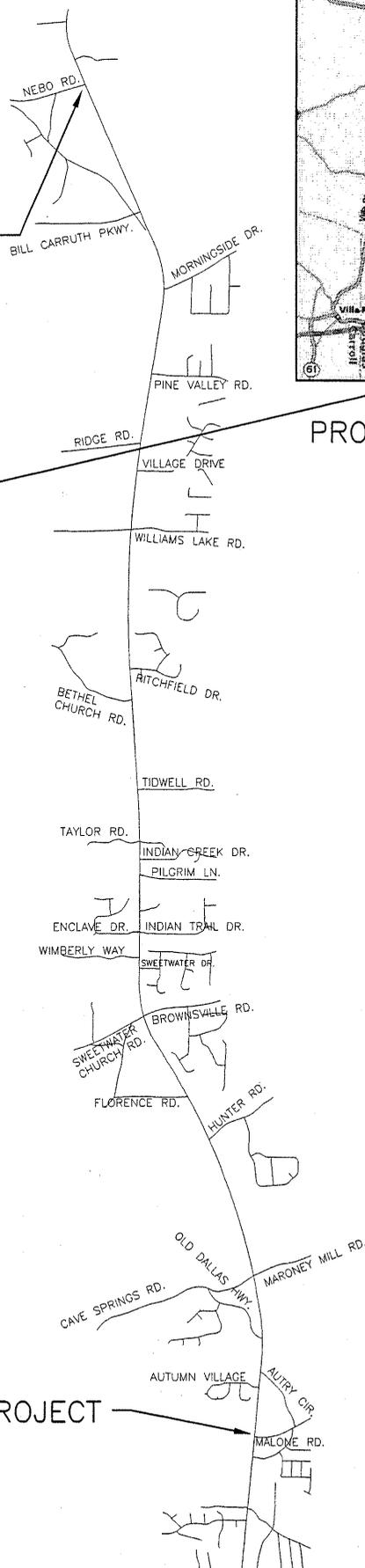
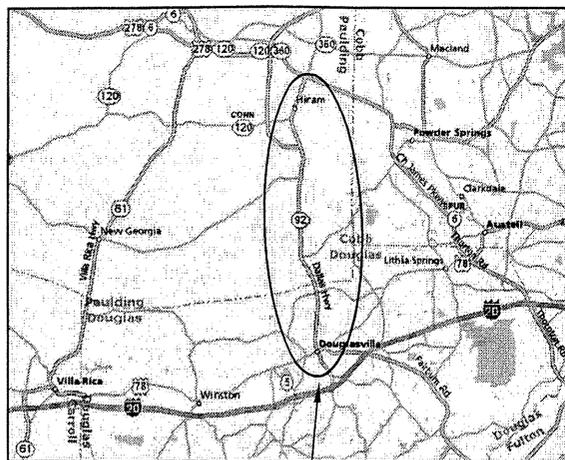
Project Concept Report Page 2  
 Project Number: CSSTP-0007-00(691)  
 P.I. Number 0007691  
 Counties: Doulgas and Paulding



END PROJECT

PROJECT AREA

COLONIAL PIPELINE  
 (APPROX. LOCATION)



**S.R. 92 - PAULDING COUNTY  
 LOCATION MAP**

## **NEED AND PURPOSE:**

### **A. Background**

With the increasing population growth in Douglas and Paulding Counties over the last few decades, SR 92/Dallas Highway has become a major transportation corridor for vehicles traveling between the two counties, especially to gain access to I-20. The SR 92/Dallas Highway corridor is the only direct corridor between Hiram and Douglasville and one of only three travel corridors between Paulding County and I-20. This corridor no longer has sufficient capacity to meet the present vehicle travel demands and, without additional capacity, the corridor will experience increasingly longer and unacceptable delays. Although a number of types of minor corridor improvements would provide some benefits, none would sufficiently increase the corridor capacity and reduce travel delays. These improvements, primarily of the Transportation Systems Management/ Transportation Demand Management type, include such features as turn lanes, signal modifications and Intelligent Transportation Systems, transit and ridesharing programs, flexible work hours, telecommuting, bicycle/pedestrian improvements, and other measures that make a system function more efficiently and/or reduce the demands on a system by offering alternative modes of travel. However, none of these improvements would significantly add capacity or reduce travel delays without also adding vehicle travel lanes to the system.

The proposed project is consistent with the Mobility 2030 Regional Transportation Plan, the Atlanta Regional Commission's (ARC's) current FY 2006-2011 Transportation Improvement Plan (TIP), and the draft FY 2008-2013 TIP. The project is identified as project number PA-092A in all three plans.

### **B. Proposed Improvements**

The proposed project would widen existing SR 92/Dallas Highway from Malone Road in Douglas County, to Nebo Road in Paulding County. The proposed project would provide a continuous multi-lane corridor from the City of Douglasville to the City of Hiram. Furthermore, the proposed project, in conjunction with other projects in the Georgia Department of Transportation (GDOT) Construction Work Program and the ARC's Transportation Improvement Plan, would provide a continuous multi-lane north-south corridor from I-20 to SR 120 in eastern Paulding County.

### **C. Logical Termini**

For purposes of logical termini, the environmental document includes the widening and realignment of SR 92 in Douglas County from Malone Road to just south of Durelee Lane, identified as Projects DO-282A, DO-282B and DO-282C in the TIP. Consequently, the logical southern terminus for the widening and realignment of SR 92 in Douglas and Paulding Counties would be just south of Durelee Lane, City of Douglasville, Douglas County and the logical northern terminus would be Nebo Road in the City of Hiram, Paulding County. The proposed termini are considered logical because they provide connections to sections of SR 92 with the same number of lanes to those proposed. In addition to the logical project termination points, a logical location for transitioning from a 4-lane divided section to a 6-lane divided section has been determined to be at Bill Carruth Parkway. Both the southern terminus just south of Durelee Lane and the northern terminus at Nebo Road are located at the termini of other programmed GDOT projects along the SR 92 corridor.

## D. Projects in the Area

Project Number	Description
DO-282A (P.I. No. 0006900)	SR 92 Realignment: Phase I-Overpass at US 78 and NS Rail Line
DO-282B (P.I. No. 000690100)	SR 92 Realignment: Phase II from SR 92 south of Hospital Drive to US 78 - Roadway Capacity
DO-282C (P.I. No. 720970)	SR 92 Realignment: Phase III from US 78 to SR 92
AR-610 (P.I. No. 0007924)	Park and Ride Facilities for Xpress Bus Service in the vicinity of the City of Hiram -Transit Facilities
PA-015 (P.I. No. 000163)	West Hiram Parkway from SR 92 near intersection of Panter School Road to intersection of US 278 and SR 120 widening and new alignment - Roadway Capacity
PA-016 (P.I. No. 0004688)	East Hiram Parkway from intersection of SR 92 and SR 120 Connector to US 278 between Metromont Road and Poplar Springs Road -Roadway Capacity
PA-027 (P.I. No. 632921)	SR 92 at Southern Rail Line in downtown Hiram - Bridge Upgrade
PA-038 (P.I. No. 0006930)	Ridge Road from SR 92 to SR 61 - Roadway Capacity
PA-092B1 (P.I. No. 621720):	SR 92 (Hiram Douglasville Highway): Segment 2 from Nebo Road to SR 120 - Roadway Capacity
PA-092B2 P.I. No. 621022	SR 92 (Hiram Acworth Highway) at Silver Comet Trail / SCL Rail Line - Bridge Capacity

## E. Existing and Proposed Traffic

A capacity analysis within the project area was performed for the existing 2006 and future 2035 build and no-build traffic conditions to determine the impact of the project. The analysis took into account anticipated developments and known Developments of Regional Impacts (DRIs) in the general project area. Using procedures based on the Highway Capacity Manual, this analysis determines the operating level-of-service (LOS) for roadway sections and intersections. Level of service is a qualitative system of measurement that measures the effect of speed and travel time, traffic interruptions or restrictions, freedom to maneuver, safety, driving comfort and convenience, and economy. Traffic speed is the major factor used in identifying the LOS. The ratio of service volume to capacity is a second accompanying factor. Six LOS are defined for each type of facility for which analysis procedures are available. The LOS are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. A LOS A describes an operating condition of free flow with low volumes and high speed. A LOS B describes an operating condition of stable flow with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and driving lane. A LOS C describes an operating condition still in the range of stable flow; however, speed and maneuverability are more closely controlled by the higher volume of traffic. A LOS D describes an operating condition of high density and is approaching unstable flow. Tolerable operating speeds are maintained though considerably affected by changes in operating conditions. A LOS E describes an operating condition at or near the capacity level with unstable flow and short stoppages. Driver frustration is generally high. A LOS F describes an operating condition of forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount of traffic that can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop and go waves and are extremely unstable. For intersections, the LOS is determined based on intersection delay for each approach.

The results of the year 2006 existing roadway capacity analysis indicates that the existing roadway sections for this segment of the SR 92 corridor experience LOS D or better conditions for both AM and PM peak hours in both directions. However, the results of the year 2035 no-

build roadway capacity analysis indicates that LOS F conditions are anticipated for roadway segments from Malone Road to Brownsville Road and LOS D or better conditions from Brownsville Road to Nebo Road. The LOS reflects the relatively large spacing between signalized intersections in that area. However, as indicated in the intersection analysis for this section, LOS F conditions are anticipated for most intersections under the no-build condition. Another reason for the LOS D conditions in the Paulding County portion of SR 92 is the difference in traffic volumes assumed under the build and no-build conditions since it is anticipated that project implementation would draw traffic from other corridors. Also, the programmed projects at both termini of this project will direct more traffic to this corridor.

Future traffic volumes were estimated through an analysis of traffic counts, existing turning movement counts, and traffic projections from the ARC travel demand mode. The traffic analysis indicates a need for 6 through lanes from Malone Road to Bill Carruth Parkway to accommodate design year 2035 daily traffic volumes which are projected to be greater than 40,000 vehicles per day. The traffic analysis further indicates a need for 4 through lanes from Bill Carruth Parkway to Nebo Road to accommodate design year 2035 daily traffic volumes of 28,000 vehicles per day.

The roadway capacity was examined for SR 92 segments under the build condition. Both 4-lane and 6-lane build conditions were analyzed at key intersections. The 4-lane divided cross section results were LOS E to LOS F operations in all sections south of Bill Carruth Parkway during the critical PM peak hour. North of Bill Carruth Parkway, the SR 92 traffic volumes are reduced significantly due to travel via Bill Carruth Parkway; therefore, a 4-lane divided roadway cross section results in LOS D or better conditions north of Bill Carruth Parkway.

**F. Crash Information**

The existing facility does not provide a median or pedestrian facility along this section of SR 92/Dallas Highway. The accident data for the three most recent consecutive years of data available along existing SR 92/Dallas Highway (2004 through 2006), indicate that the accident rate along this section of roadway is lower than the statewide average for similar type roadways. The statewide average for urban minor arterials is 534 crashes per 100 million vehicle miles traveled (MVMT). This information is detailed in Table 1 below. The accident/injury/fatality rate is detailed in Table 2.

Table 1: Automobile Crash Rates on SR 92

Crash Analysis Section	Year	Number of Accidents	Crash Rate (100MVMT)
<i>SR 92 from Nebo Road to Brownsville Road</i>			
	2004	86	270
	2005	95	326
	2006	99	329

Table 2: Accident/Injury/Fatality Rates

Crash Analysis Section	Year	Number of Accidents	Number of Injuries	Number of Fatalities
<i>SR 92 from Nebo Road to Brownsville Road</i>				
	2004	86	72	0
	2005	95	36	0
	2006	99	44	1

G. Need and Purpose Statement

The primary purpose of the project is to improve north-south mobility between Douglas and Paulding Counties and between the Cities of Hiram and Douglasville, as well as to alleviate congestion and improve safety on the SR 92 corridor. Existing and future traffic projections along the SR 92 corridor, between Hiram and Douglasville, show increased levels of traffic congestion. The proposed project would improve the level of service on this heavily traveled corridor.

The proposed project would also improve safety on the SR 92 corridor. The addition of a raised median on SR 92/Dallas Highway from Malone Road to Nebo Road would improve safety along that section of road. According to studies conducted by the GDOT Office of Planning, the provision of raised medians on roadways would provide greater vehicle safety by reducing turning conflicts and crashes by up to 55%. The addition of a raised median would allow for left turn lanes to separate left-turning vehicles from through traffic and would significantly reduce the likelihood of a head-on collision. Pedestrian safety would also be improved along SR 92/Dallas Highway with the addition of sidewalks to both sides of the proposed roadway throughout the project corridor, the addition of signalized intersections for pedestrian crossings, and the provision of a median to provide a mid-way pedestrian refuge.

**DESCRIPTION OF THE PROPOSED PROJECT:**

The proposed project would widen existing SR92 from Malone Road, Douglas County, to Nebo Road, Paulding County. The proposed project would widen the existing roadway to provide additional travel lanes and a variable width median. The existing roadway is variable with 2 to 3 travel lanes with approximately 8-foot shoulders, 2-foot paved. Right and left turn lanes are provided as needed. From Malone Road to Bill Carruth Parkway, the primary typical section would consist of six travel lanes, three in each direction, with a 24-foot raised median and 10-foot outside shoulders, 4-foot paved. From Bill Carruth Parkway to Nebo Road, the primary typical section would consist of four travel lanes, two in each direction, with a 24-foot raised median with 10-foot outside shoulders, 4-foot paved. The existing right-of-way on SR 92 is approximately 100 feet. Approximately 60 feet of additional right-of-way would be required for a total right-of-way width of approximately 160 feet.

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

The proposed concept matches the project as planned in the conforming plans model description. The proposed project is identified in the FY 2007-2012 TIP as project PA-092A, SR 92 (Hiram Douglasville Highway): Segment 1. The service type programmed is Roadway Capacity with 2 existing and 6 planned. The proposed open to traffic years in the plan is 2020.

**PDP Classification:** Major  X  Minor

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

**Functional Classification:**

Urban Minor Arterial	Urban Collector Street	Urban Local Street
SR 92	Malone Road	Cave Springs Road
Brownsville Road	Sweetwater Church Road	Maroney Mill Road

Ridge Road	Nebo Road	Tidwell Road
Bill Carruth Parkway		Bethel Church Road
		Pine Valley Road

U. S. Route Number(s): None

State Route Number(s): 92

Traffic (AADT):

Road Name	Current Year: (2006) VPD		Design Year: (2035) VPD	
	South	North	South	North
Malone Road	19,680	18,940	47,850	47,430
Bill Carruth Parkway	26,570	19,560	44,970	28,620
Nebo Road	19,560	25,200	28,620	32,800

Existing design features:

- **Typical Section:** SR 92 typical section varies from 2 to 3 travel lanes with approximate 8-foot shoulder, with 2-foot being paved.
- **Posted speed**

Posted speed	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph
<b>Mainline</b>							
SR 92							X
<b>Cross Street</b>							
Malone Road			X				
Cave Springs Road			X				
Maroney Mill Road			X				
Sweetwater Church Road				X			
Brownsville Road			X				
Bethel Church Road			X				
Williams Lake Road (west of SR 92)				X			
Williams Lake Road (east of SR 92)	X						
Ridge Road					X		
Pine Valley Road				X			
Morningside Drive			X				
Bill Carruth Parkway					X		
Nebo Road						X	

- **Maximum degree of curvature:**

Maximum degree of curvature	0°	2°	3°	4°	7°	8°	10°	13°	14°	17°
<b>Mainline</b>										
SR 92		X								
<b>Cross Street</b>										
Malone Road			X							
Cave Springs Road									X	
Maroney Mill Road						X				
Sweetwater Church Road	X									
Brownsville Road			X							
Bethel Church Road										X
Williams Lake Road								X		
Ridge Road	X									
Pine Valley Road	X									
Morningside Drive							X			
Bill Carruth Parkway			X							
Nebo Road				X						

- **Maximum grade:**

Maximum grade	0.5%	2%	3%	4%	4.5%	5%	7%	8%	12%	0 to 12%
<b>Mainline</b>										
SR 92							X			
<b>Cross Street</b>										
Malone Road				X						
Cave Springs Road						X				
Maroney Mill Road						X				
Sweetwater Church Road			X							
Brownsville Road			X							
Bethel Church Road									X	
Williams Lake Road		X								
Ridge Road	X									
Pine Valley Road					X					
Morningside Drive								X		
Bill Carruth Parkway				X						
Nebo Road	X									
Driveways										X

- **Width of right of way:**

Width of right of way	50	60	80	100	300
<b>Mainline</b>					
SR 92				X	
<b>Cross Street</b>					
Malone Road				X	
Cave Springs Road		X			
Maroney Mill Road	X				
Sweetwater Church Road			X		
Brownsville Road			X		
<b>Width of right of way Continued</b>	<b>50</b>	<b>60</b>	<b>80</b>	<b>100</b>	<b>300</b>
Bethel Church Road		X			
Williams Lake Road		X			

Ridge Road			X		
Pine Valley Road		X			
Morningside Drive	X				
Bill Carruth Parkway					X
Nebo Road			X		

- **Major structures:**

Structure ID	Bridge	Length	Width	Sufficiency Rating
223-0035-0	Gothards Creek	120	47.2	93.22
223-0036-0	Sweetwater Creek	280	47.2	93.22
223-0009-0	Sweetwater Creek Tributary	38	5 x 5	81.87
223-0042-0	Lick Log Creek	200	47.2	87.57

- **Major interchanges or intersections along the project:**

Road Name	Interchanges	Intersections
SR 92 at Malone Road		X
SR 92 at Cave Springs Road/Maroney Mill Road		X
SR 92 at Sweetwater Church Road/Brownsville Road		X
SR 92 at Williams Lake Road		X
SR 92 at Ridge Road		X
SR 92 at Pine Valley Road		X
SR 92 at Bill Carruth Parkway		X
SR 92 at Nebo Road		X

- **Existing length of roadway segment and the beginning mile logs for each county segment:** The existing length of roadway segment is 6.8 miles. The beginning mile log is 13.02 (Douglas County).

**Proposed Design Features:**

- **Proposed typical sections:** SR 92 Typical Section from Malone Road to Bill Carruth Parkway consists of six 12-foot lanes with a 24-foot raised median, with 4-foot paved outside shoulder on both sides. SR 92 Typical Section from Bill Carruth Parkway to Nebo Road consists of four 12 foot lanes with a 24 foot raised median, with 4-foot paved outside shoulder on both side. Left turn only lanes will be added within the width of the median where required. Right turn only lanes will be added within the shoulder where required.
- **Proposed Design Speed:** SR 92 55 mph
- **Proposed Maximum grade Mainline:** 7%      **Maximum grade allowable:** 7%.
- **Proposed Maximum grade Side Street:** 12%      **Maximum grade allowable:** 12%.
- **Proposed Maximum grade driveway:** 12%
- **Proposed Maximum degree of curve:** 2°      **Maximum degree allowable:** 4° 48'
- **Right of way**
  - **Width:** SR 92 - 160 ft
  - **Easements:** Temporary ( ), Permanent ( X ), Utility ( ), Other ( ).
  - **Type of access control:** Full ( ), Partial ( ), By Permit ( X ), Other ( ).
  - **Number of parcels:** 108      **Number of displacements:**
    - **Business:** 9
    - **Residences:** 9
    - **Mobile homes:** 0
    - **Other:** 0

- **Major structures:**

- **Bridges:** (See Attachment 2: Bridge Plans & Typical Sections).  
Three existing bridges, Gothards Creek, Sweetwater Creek, Lick Log Creek, will be replaced with three new bridges to accommodate additional southbound (westbound) lanes and shoulders. Three new bridges, Gothards Creek, Sweetwater Creek, Lick Log Creek, will be constructed to accommodate additional northbound (eastbound) lanes.
- **Retaining walls:** None anticipated
- **Culverts:** One existing 5'x 5' culvert at Sweetwater Creek Tributary will be lengthened to include the widening.

- **Major intersections and interchanges:**

Road Name	Interchanges	Intersections
SR 92 at Malone Road		X
SR 92 at Cave Springs Road/Maroney Mill Road		X
SR 92 at Sweetwater Church Road/Brownsville Road		X
SR 92 at Bethel Church Road		X
SR 92 at Williams Lake Road		X
SR 92 at Ridge Road		X
SR 92 at Pine Valley Road		X
SR 92 at Morningside Drive		X
SR 92 at Bill Carruth Parkway		X
SR 92 at Nebo Road		X

- **Traffic control during construction:** Traffic to be maintained on-site during construction. Construction of SR 92 will incorporate construction staging to allow continuous movement.

- **Design Exceptions to controlling criteria anticipated:**

	<u>UNDETERMINED</u>	<u>YES</u>	<u>NO</u>
HORIZONTAL ALIGNMENT:	( )	( )	(X)
ROADWAY WIDTH:	( )	( )	(X)
SHOULDER WIDTH:	( )	( )	(X)
VERTICAL GRADES:	( )	( )	(X)
CROSS SLOPES:	( )	( )	(X)
STOPPING SIGHT DISTANCE:	( )	( )	(X)
SUPERELEVATION RATES:	( )	( )	(X)
HORIZONTAL CLEARANCE:	( )	( )	(X)
SPEED DESIGN:	( )	( )	(X)
VERTICAL CLEARANCE:	( )	( )	(X)
BRIDGE WIDTH:	( )	( )	(X)
BRIDGE STRUCTURAL CAPACITY:	( )	( )	(X)

- **Design Variances:** None anticipated
- **Environmental concerns:** Two historic resources eligible for inclusion in the National Register of Historic Places, two cemeteries, three churches, seven Underground Storage Tanks (UST's), one potential hazardous waste site, ten wetlands, twelve streams, longitudinal encroachment into the vegetative buffer of five streams.
- **Level of environmental analysis:**
  - Are Time Savings Procedures appropriate? Yes ( ), No (X),
  - Categorical exclusion ( ),

- Environmental Assessment/Finding of No Significant Impact (FONSI) ( X ), or
  - Environmental Impact Statement (EIS) ( ).
- **Utility involvements:**

	<b>Paulding County:</b>	<b>Douglas County:</b>
GDOT	X	
Atlanta Gas Light	X	X
Atlanta (Transmission)	X	
Austell Gas System		X
AT & T	X	
AT & T		X
Colonial Pipeline Company	X	
Comcast Cable	X	
Comcast Communication		X
Douglas County DOT		X
Douglas County Water & Sewer Authority		X
MCI Communications		X
Georgia Power (Distribution)	X	
Georgia Power Transmission	X	X
Georgia Power Company (2)		X
Greystone Power	X	
Greystone Power Corporation		X
Paulding County Water	X	
Verizon		X
Quest		X
Paulding County Dept. of Transportation	X	

**Project responsibilities:**

- Design: GDOT
- Right of Way Acquisition: GDOT
- Relocation of Utilities: GDOT, Utility Companies
- Letting to contract: GDOT
- Supervision of construction: GDOT
- Providing material pits: GDOT
- Providing detours: GDOT

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## VALUE ANALYSIS AND CONCLUSIONS

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### INTRODUCTION

This section describes the procedures used during the value engineering study on the SR 92 Realignment and Widening projects.

A systematic approach was used in the VE study, which is divided into three parts: Preparation Effort, Workshop Effort, and Post-Workshop Effort. A task flow diagram outlining each of the procedures included in the VE study is attached for reference.

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

- VE study agenda
- VE workshop participants
- Cost model
- Function analysis
- Creative ideas and evaluations

### PREPARATION EFFORT

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

- Project Concept Report, SR 92 Widening project (concept level plans and cost estimate included), not dated, prepared by GDOT
- Revised Project Concept Report, SR 92 Realignment project (concept level plans and cost estimate included), not dated, prepared by GDOT
- Current Project Roll Plots, prepared by Croy Engineering
- Current railroad detour plans, prepared by Croy Engineering
- Preliminary Right-of-Way Cost Estimate for Realignment and Widening projects, dated May 2, 2008, prepared by GDOT
- Pavement Life Cycle Analysis and Pavement Type Recommendation Report, dated May 1, 2008 prepared by GDOT
- Revised Hydraulic and Hydrological Study, dated January 6, 1994, prepared by GDOT



# Value Engineering Study Task Flow Diagram

## Preparation Effort

**Coordinate Project**

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

**Prepare for Workshop**

- Collect Project Data
- Distribute Data to Team Members
- Verify Cost Data
- Team Members Become Familiar with Project

**Construct Cost Models**

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

**LCC Model**

- Process Areas
- Staffing
- Chemicals
- Energy
- User Impact

## Workshop Effort

**Information Phase**

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

**Function Identification and Analysis Phase**

- Analyze Project Costs and Energy Usage
- Perform Function Analysis and FAST Diagram
- Identify High Cost and Energy Areas
- Calculate Cost/Worth Ratios
- Identify Paradigms
- List Ideas Generated During Function Analysis

**Creative Phase**

- Introduction by VETL
- Creative Idea Listing:
  - Quantity of Ideas
  - Association of Ideas
- Brainstorming
- Creative Thinking:
  - Group & Individual
- Use Checklist for Ideas

**Evaluation Phase**

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

**Development Phase**

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

**Presentation Phase**

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

## Post-Workshop Effort

**VE Study Report**

- Prepare Preliminary VE Report
- Designer Prepares Responses to VE Report
- Owner Evaluates Recommendations

**Implementation Phase**

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

**Final Acceptance**

- Redesign by Designer

Information relating to the project's purpose and need, owner concerns, project stakeholder concerns, design criteria, project constraints, funding sources and availability, regulatory agency approval requirements, and the project's schedule and costs are very important as they provide the VE team with insight as to how the project has progressed to its current state.

Project cost data provided by the designers was used by the VE team as the basis for a comparative analysis with other similar projects. To prepare for this exercise, the VE team leader used the cost estimate prepared by the designers to develop cost models for the project. The models (described in the Cost Model section of this report) were used to distribute the total project cost among the various elements or functions comprising the project. The VE team used this data to identify the high cost elements or functions that drive the project and the elements or functions providing little or no value so that the team could effectively use its time and focus on reducing or eliminating the impact of those elements.

## **VALUE ENGINEERING WORKSHOP EFFORT**

The VE workshop effort consisted of a 5-day workshop beginning with an orientation/kickoff meeting May 5, 2008 and concluding with the final VE presentation on May 9, 2008. During the workshop, the VE Job Plan was followed in compliance with GDOT and SAVE International guidelines for VE studies. The job plan guided the search for alternatives to mitigate or eliminate high cost drivers, support functions providing little or no value, and potential project risk elements. Alternatives to specifically address the owner's project concerns and enhance value by improving operations, reducing maintenance requirements, enhancing constructibility, and providing missing or less than optimum functionality were also entertained. The Job Plan includes six phases:

- Information Gathering Phase including site visit
- Function Identification and Analysis Phase
- Creative Idea Generation Phase
- Evaluation of Creative Ideas Phase
- Alternative Development Phase
- Presentation Phase

### **Information Gathering Phase**

At the beginning of the study, the decisions that have influenced the project's design and proposed construction methods had to be reviewed and understood. For this reason, GDOT and the design team sent information (described above) to the VE team prior to the study and, following a short orientation session, the workshop was kicked off with a presentation of the project to the team. The presentation highlighted the information provided in the written documentation and expanded on that information to include a history of the project's development and any underlying influences that caused the design to develop to its current state. During this presentation, VE team members were given the opportunity to ask questions and obtain clarifications of the information provided.

## Function Identification and Analysis Phase

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

Function is defined as the intended use of a physical or process element. In the VE process, the team attempted to identify functions in the simplest manner using active verb/measurable noun word combinations. Sometimes modifying adjectives were used with the noun to clarify the definition. To accomplish this, the team first looked at the project in its entirety and randomly listed its functions which were recorded on Random Function Analysis Worksheets (provided in the Function Identification and Analysis section). Then the individual function(s) were identified for the major components of the project depicted on the cost model(s).

After identifying the functions, the team classified the functions according to the following:

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

Higher order and basic functions provide value while secondary functions tend to reduce value. Thus, the team works in future phases to reduce the impact of secondary functions and enhance project value.

To further clarify the impact of the various functions, the team assigned costs to provide the functions or group of functions provided by a specific project element using the cost estimate and cost model(s). Where possible they seek to benchmark the costs for providing functions, i.e., finding the lowest cost, or worth, to perform the function, using published data from other sources or team knowledge obtained from working on other similar projects to establish cost goals and then comparing them to the current costs. By identifying the cost and worth of a function or group of functions, cost/worth ratios were calculated. Cost/worth ratios greater than 1 indicated that less than optimum value was being provided. Those project functions or elements with high cost/worth ratios became prime targets for value improvement.

As well as looking at areas with high cost/worth ratios, the team used the cost model(s) to seek out the areas where most of the project funds are being applied. Because of the absolute magnitude of these high cost elements or functions, they too became initial targets for value enhancement.

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

### **Creative Idea Generation Phase**

This VE study phase involved the creation and listing of ideas. Starting with the functions or project elements with high cost/worth ratios, a high absolute cost compared to other elements in the project, and secondary functions providing little or no value, the VE team generated as many ideas as possible to provide the necessary functions at a lower total life cycle cost, or to improve the quality of the project. Ideas for improving operation and maintenance, reducing project risk, and simplifying constructibility were also encouraged. At this stage of the process the VE team was looking for a large quantity of ideas and free association of ideas. Creative Idea Listing worksheets were generated and organized by the function or project element being addressed.

GDOT and the design team may wish to review these creative lists since they may contain ideas that were not pursued by the VE but can be further evaluated for potential use in the design.

### **Evaluation/Judgment Phase**

Since the goal of the Creative Idea Generation phase was to conceive as many creative ideas as possible without regard for technical merit or applicability to respond to the project goals, this phase of the workshop focused on identifying those ideas that respond to the project value objectives and are worthy of additional research and development before being presented to the owner. The selection process consisted of evaluating the ideas originated during the Creative Idea Generation phase based on the project value objectives identified through conversations at the Designer's Briefing.

Based on the team's understanding of the owner's value objectives, each idea was compared with the present design concept and the advantages and disadvantages of each idea were discussed (and recorded on the Creative Idea Listings). How well an idea met the design criteria was also reviewed. Based on the results of these reviews, the VE team rated the idea by consensus using a scale of 1 to 3, with 3 indicating an idea with the greatest potential to be technically sound and provide cost savings or improvements in other areas of the project, 2 indicating an idea that provides moderate value improvement and 1 indicating an idea with a major technical flaw that does not respond to project requirements. Generally, ideas rated 2 and 3 are continued in the next phase and presented during the presentation phase.

The team also used the designation DS to indicate a Design Suggestion, which is an idea that may not have specific quantifiable cost savings, but may reduce project risk, improve constructibility, help to minimize claims, enhance operability, ease maintenance, reduce schedule time or enhance project value in other ways. Design suggestions could also increase a project's cost but provide value in areas not currently addressed. These are also developed in the next phase of the VE process.

## **Development Phase**

In this phase, each highly-rated idea was expanded into a workable solution designated as a Value Engineering Alternative. The development consists of describing the current design and the alternative solution, preparing a life cycle cost comparison where applicable, describing the advantages and disadvantages of the proposed alternative solution, and a writing a brief narrative to compare the original design to the proposed change and provide a rationale for implementing the idea into the design. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The Value Engineering Alternatives are included in the Study Results section. Design suggestions include the same information as the alternatives except that no cost analysis is performed. They too are included in the Study Results section.

## **Presentation Phase**

The last phase of the workshop was to summarize the results of the study and prepare Draft Summary of VE Alternatives worksheets to handout at the presentation and to present the key alternatives and design suggestions to GDOT and the design teams. The purpose of the presentation meeting was to provide the attendees with an overview of the suggestions for value enhancement resulting from the VE study, and afford them the opportunity to ask questions to clarify specific aspects of the alternatives presented. Procedures for implementing the results of the study were discussed and arrangements were made for the reviewers of the VE report to contact the VE team in order to obtain further clarifications, if necessary. Draft copies of the Summary of VE Alternatives worksheets were given the owner and design team to facilitate a timely review and speedy implementation of the selected ideas.

## **POST STUDY PROCEDURES**

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

Upon completing their reviews, the owner and designer will meet and, by consensus, select those Value Engineering Alternatives and Design Suggestions that provide good value to incorporate into the project.



Construction Phasing  
Overview of the Current Project Cost Estimate  
Design Team fields VE Team questions

11:30 am – 12:00 pm                      **Identification of Major Project Risks, Project Constraints & Key Issues**                      **(VE Team)**

VE team assesses the project risks, project constraints and the key project issues based on the Designer's presentation and document review.

12:30 pm - 1:00 pm                      **Lunch**

1:00 pm – 1:30 pm                      **Cost Model**                      **(VE Team)**

VE team develops cost histogram from the project estimate.

1:30 pm – 2:30 pm                      **Functional Analysis**                      **(VE Team)**

Identify basic and secondary functions  
Analyze cost model(s) and worth assignments

2:30 pm – 5:00 pm                      **Creative Phase**                      **(VE Team)**

Brainstorm to generate ideas through free association. Defer judgment.

5:00 pm                      **Daily Wrap-up Session**                      **(VE Team)**

**Tuesday, May 6, 2008**

8:00 am – 12:00 pm                      **Creative Phase (cont.)**                      **(VE Team)**

The VE team continues brainstorming session; consider a variety of brainstorming techniques. Defer judgment.

1200 pm – 1:00 pm                      **Lunch**

1:00 pm – 5:00 pm                      **Evaluation Phase**                      **(VE Team)**

Establish the criteria for evaluation and rate each idea on a scale of 1 to 5, identifying the "best" ideas for development.

**Wednesday, May 7 & Thursday, May 8, 2008**

8:00 am – 5:00 pm

**Development Phase (continued)**

**(VE Team)**

Assign team members to carryout the highly ranked ideas from the evaluation phase.

The VE team develops creative ideas into value engineering alternatives with sketches, calculations and written justifications. Initial and life-cycle cost estimates comparing baseline and proposed designs will be prepared.

**Friday, May 9, 2008**

8:00 am – 9: 00 am

**Development Phase (continued)**

**(VE Team)**

9:00 am – 10:00 am

**Presentation Phase**

**(All Participants)**

The VE team presents the value engineering alternatives to the Designers and GDOT representatives. A draft copy of the *Summary of Potential Cost Savings* will be distributed.

## VALUE ENGINEERING WORKSHOP PARTICIPANTS

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The VE team was organized to provide specific expertise in the project elements involved with the SR 92 project. Team members consisted of a multidisciplinary group with professional highway design, structures and construction experience and a working knowledge of VE procedures. The VE team comprised the following:

<b><u>Participant</u></b>	<b><u>Specialization</u></b>	<b><u>Affiliation</u></b>
Joe Leoni, PE	Highway Design	ARCADIS U.S., Inc.
John Tiernan, PE	Structural Design	ARCADIS U.S., Inc
Paresh Parikh, PE	Constructability	Delon Hampton
Geeta Bhatt, PE	Highway Design	HNTB Corporation
George Hunter, PE, CVS, PMP	VE Team Leader	Lewis & Zimmerman Associates

### DESIGNER'S PRESENTATION

An overview of the project was presented on May 5, 2008 by representatives from GDOT and the design teams. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE study, was to bring the VE team up-to-speed regarding the overall project specifics. Additionally, the meeting afforded the owner and design staff the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention. An attendance list for the meeting is attached.

#### *Site Visit*

A site visit was completed on the first day of the VE workshop.

### VALUE ENGINEERING TEAM'S PRESENTATION

A VE presentation was conducted on May 9, 2008 at GDOT offices in Atlanta. Copies of the Draft Summary of VE Alternatives were provided to the attendees. An attendance list for the meeting entitled is attached.

VE STUDY SIGN-IN SHEET

Project No.: CSSTP-0007-00(691) County: Douglas Paulding PI No.: 0007691/720970 Date: 5/5-9/08  
 STP00-0186-01(011) CSSTP-0006-00(900)(901) 0006900/0006901

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✓ STANLEY MACK	00354596	TRAFFIC OPS		

## COST MODEL

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The attached Pareto Charts, or cost histograms, display the major construction elements identified in the designer's cost estimate for each project in descending order of magnitude and identify the high cost areas in both projects, providing the VE team with a focus for its work during the study.

### Realignment

The following breakdown identifies the south, middle and north sections of the realignment project costs by construction and right-of-way components:

<b>Realignment Project by Section</b>				
	South Section	Middle Section	North Section	All 3 Sections
Construction	\$ 10,196,925	\$ 9,809,621	\$ 12,901,858	\$ 32,908,404
Right of Way	\$ 15,667,600	\$ 9,737,500	\$ 9,004,500	\$ 34,409,600
Reimbursable Utilities	\$ -	\$ 3,100,000	\$ 100,000	\$ 3,200,000
Total Project Costs	\$ 25,477,221	\$ 23,034,425	\$ 22,006,358	\$ 70,518,004

The combined construction and right-of-way costs are \$70.6 million.

Approximately 26% of the construction items represent about 80% of the project costs. They are:

- Right-of-Way \$34,409,600
- Base and Paving \$12,000,258
- Earthwork \$ 4,917,000
- Bridges \$ 4,754,873

### Widening

The combined construction and right-of-way costs are \$52.3 million, segregated into \$42.0 million for construction, \$9.2 million for right-of-way and \$1.1 million for reimbursable utilities.

Approximately 25% of the construction items represent about 80% of the project costs. They are:

- Base & Paving \$15,192,111
- Bridges \$12,418,604
- Right of Way \$9,196,000
- Unclassified Excavation \$5,500,000

The construction costs include an E&C mark-up of 10%.

The raw unit prices for right-of-way for the projects are as follows:

- Commercial Land: \$5.75 per square foot/ relocation \$25,000 per property
- Residential Land: \$0.45 per square foot/ relocation \$40,000 per property
- Agricultural Land: \$0.18 per square foot

The bases of the improvement and damages costs are not detailed.

# COST HISTOGRAM

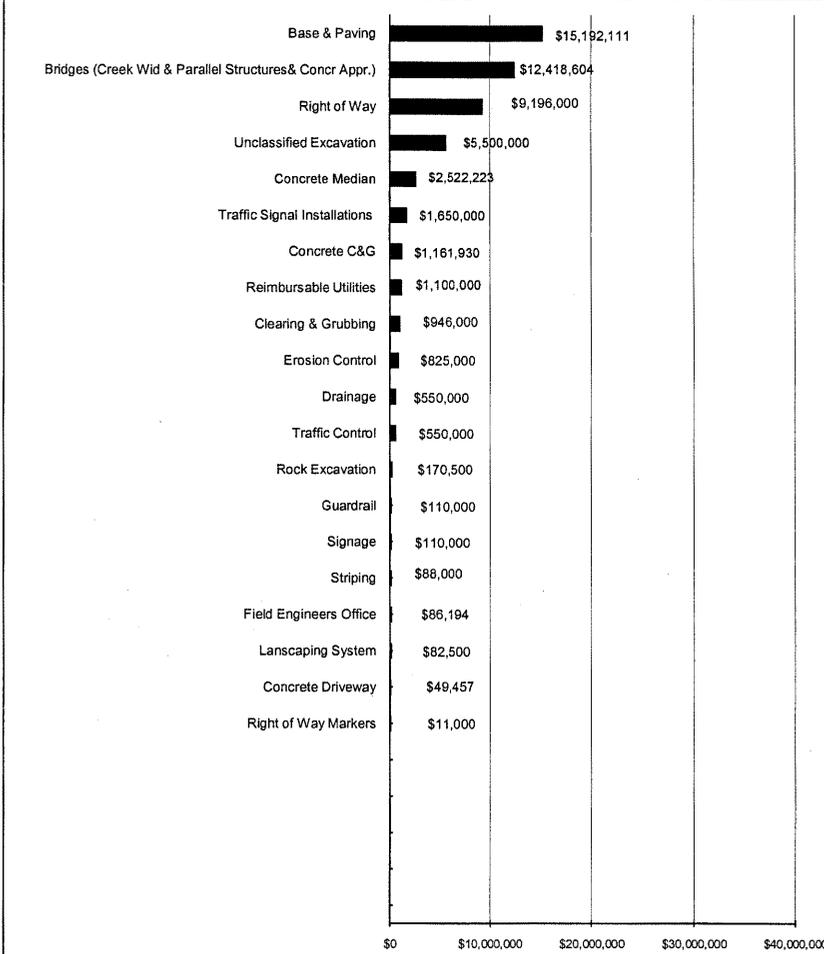


PROJECT: SR 92 Widening (P.I. No. 0007691)

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Base & Paving	\$15,192,111	29.0%	29.0%
Bridges (Creek Wid & Parallel Structures& Concr Appr.)	\$12,418,604	23.7%	52.8%
Right of Way	\$9,196,000	17.6%	70.3%
Unclassified Excavation	\$5,500,000	10.5%	80.9%
Concrete Median	\$2,522,223	4.8%	85.7%
Traffic Signal Installations	\$1,650,000	3.2%	88.8%
Concrete C&G	\$1,161,930	2.2%	91.1%
Reimbursable Utilities	\$1,100,000	2.1%	93.2%
Clearing & Grubbing	\$946,000	1.8%	95.0%
Erosion Control	\$825,000	1.6%	96.5%
Drainage	\$550,000	1.1%	97.6%
Traffic Control	\$550,000	1.1%	98.6%
Rock Excavation	\$170,500	0.3%	99.0%
Guardrail	\$110,000	0.2%	99.2%
Signage	\$110,000	0.2%	99.4%
Striping	\$88,000	0.2%	99.6%
Field Engineers Office	\$86,194	0.2%	99.7%
Lanscaping System	\$82,500	0.2%	99.9%
Concrete Driveway	\$49,457	0.1%	100.0%
Right of Way Markers	\$11,000	0.0%	100.0%
		0.0%	100.0%
		0.0%	100.0%
		0.0%	100.0%
		0.0%	100.0%
		0.0%	100.0%

25 % of items

**TOTAL \$ 52,319,519**      **Comp Mark-up: Not Appl.**



Costs in graph include all mark-ups



## FUNCTION ANALYSIS

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

The result of the function analysis exercise identified the basic functions of the SR 92 projects as follows:

- Improve LOS
- Improve Douglasville Automobile and Truck Traffic Patterns
- Reduce Douglasville Pedestrian Traffic
- Reduce Railroad/Highway Conflicts
- Reduce Highway/Highway Conflicts
- Reduce Motorist Delays

The lane additions in both projects and the grade separation in the realignment project were key project elements contributing towards the provision of the basic functions.





## CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

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During the Creative phase, numerous ideas were generated for this project using conventional brainstorming techniques as recorded on the following pages. For the convenience of tracking an idea through the VE process, the ideas were grouped into the following design categories and numbered according to the order in which they were conceived. The following letter prefixes were used to identify the design categories.

<b>Design Category</b>	<b>Prefix</b>	<b>No. of Ideas</b>
<b>Realignment Project</b>		
Typical Sections	TS-R	12
Horizontal Alignment	HA-R	13
Retaining Walls	RW-R	3
Bridges	BR-R	4
Vertical Alignment	VA-R	2
Bridge Construction	BC-R	5
<b>Widening Project</b>		
Typical Sections	TS-W	11
Bridge	BR-W	4
Horizontal Alignment	HA-W	1
	<b>Subtotal:</b>	<b>55</b>

The ideas were ranked on a qualitative scale of 1-3 on how well the VE team believed the idea met the project purpose and need criteria. To assist the team in evaluating the creative ideas, the advantages and disadvantages of each new idea compared to the existing design solution were discussed based on the responses of owner during the project briefings identified the following as below:

- Project Duration
- Level of Service
- Capital Costs
- Environmental Acceptability
- Community Impacts
- Right-of-Way Impacts

After discussing each idea, the team evaluated the ideas by consensus. This produced 28 ideas evaluated *as 2 or 3* to carry forward and research and develop into formal Value Engineering Alternatives. When this was not the case, an idea may have been combined with another related idea or discarded, as a result of the additional research that indicated the concept as not being cost-effective or technically feasible. The reader is encouraged to review the Creative Idea Listing and Evaluation worksheets since they may suggest additional ideas that can be applied to the design.



# CREATIVE IDEA LISTING



NO.	IDEA DESCRIPTION	RATING
<div style="display: flex; justify-content: space-between;"> <span>PROJECT: <b>SR 92 REALIGNMENT AND WIDENING</b> <i>Douglas and Paulding Counties</i></span> <span>SHEET NO.: <b>2 of 3</b></span> </div>		
<b>RETAINING WALL – REALIGNMENT</b>		
RW-R-1	Use mechanically stabilized embankment walls in lieu of retaining walls	1
RW-R-2	Reduce retaining wall; use excel land	2
RW-R-3	Top down construction where advantageous	ABD
<b>BRIDGES - REALIGNMENT</b>		
B-R-1	Use retaining walls in lieu of longer spans at bridge	2
B-R-2	Build SR 78 bridge for current lane requirements and widen in the future	2
B-R-3	Tunnel under existing railroad and highways	See BRC-1
B-R-4	Detour railroad north in lieu of south	2
<b>BRIDGE REALIGNMENT - CONSTRUCTION</b>		
BRC-1	Build low elevation tunnel (connect US 78 and SR 92)	1
BRC-2	Only build railroad; transport US 78 traffic on railroad cars	1
BRC-3	Build US 78 permanently at detour location	2
BRC-4	Build high elevation tunnel; build jack and bore tunnel	2
BRC-5	Jack and bore twin precast boxes	DS
<b>VERTICAL ALIGNMENT – REALIGNMENT</b>		
VA-R-1	Flatten SR 92 mainline grades under railroad	DS
VA-R-2	Realign SR 92 to US 78 ramp	2
<b>TYPICAL SECTION – WIDENING</b>		
TS-W-1	Reduce median width to 20 ft.	2
TS-W-2	Use 4-ft. paved shoulder in lieu of 6.5 ft.	1
TS-W-3	Use 6 in. x 24 in. median side curb and gutter	2
TS-W-4	Use asphalt on one side, concrete on other	1
TS-W-5	Overlay existing SR 92 pavement and widen	3
Rating:    1 = Not to be Developed;                      2 = Varying Degree of Development Potential;                      3 = Most Likely to be Developed; DS = Design Suggestion;                              ABD = Already Being Done;    N/A = Not Applicable		

