



Widening of SR 107 From I-75 To SR 11/US129

Includes the Following Projects:

STP-0000-00(311), P.I. No. 0000311

STP-0000-00(314), P.I. No. 0000314

STP-0000-00(313), P.I. No. 0000313

Turner, Irwin, and Ben Hill Counties, GA

Value Engineering Study Report

August 2009

Designers

JACOBS

**McGee
Partners**



Value Engineering Consultant

Lewis & Zimmerman Associates





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

Ms. Lisa L. Myers
Transportation Engineer Assistant Administrator-VE Coordinator
GA DOT - Engineering Services
One Georgia Center – 5th Floor
600 West Peachtree Street
Atlanta, Georgia 30308

Re: Widening of SR 107 from I-75 to SR 11/US 129
Project No. STP-0000-00(311), P.I. No. 0000311
Project No. STP-0000-00(314), P.I. No. 0000314
Project No. STP-0000-00(313), P.I. No. 0000313
Value Engineering Study Report

Dear Ms. Myers:

Date:
August 21, 2009

Lewis & Zimmerman Associates is pleased to submit two hard copies and one electronic copy of the referenced value engineering study report documenting the study that took place August 10 - 13, 2009. The objective of the VE effort was to identify opportunities to reduce costs and enhance the value of the referenced projects.

Contact:
Stephen Havens

The VE workshop team developed 38 ideas that will yield a significant reduction in construction, materials, and recurring maintenance requirements and deliver the primary and secondary goals of each of the three projects studies. Of particular interest are alternatives to reduce lane width, reduce median width, and use Type A median openings.

Phone:
608-438-8227

Email:
shavens@lza.com

The team also suggested an alternative for each project which uses one mile of passing lanes in both directions in lieu of providing four-lanes for rural sections. This is based upon the low design year (2032) travel demand for the rural sections which are 3,700 vehicles per day (VPD) for P.I. No. 0000311, 3,400 VPD for P.I. No. 0000314, and 3,800 for P.I. No. 0000313 before transitioning to an urban section at mile marker 3.60 in Ben Hill County just west of Fitzgerald.

Our ref:
LZ083348.0000

We would like to thank design team members from Jacobs Engineering, McGee Partners, Inc., and Florence & Hutcherson for their assistance during the course of the VE team's work. Please do not hesitate to call if you or any reviewers have questions regarding the information presented in this report.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.
an ARCADIS company

Stephen G. Havens, PE, CVS
Senior Project Manager

Attachment

TABLE OF CONTENTS

SECTION ONE - EXECUTIVE SUMMARY

Introduction	1
Project Description	1
Concerns and Objectives	2
Results	3
Implementation	4
Summary of Potential Cost Savings	5

SECTION TWO - STUDY RESULTS

Introduction	11
Key Issues	12
Study Objectives	12
Results of the Study	13
Evaluation of Alternatives	14
Potential Cost Savings	15

SECTION THREE - PROJECT DESCRIPTION

180

SECTION FOUR - VALUE ANALYSIS AND CONCLUSIONS

Introduction	191
Preparation Effort	191
Value Engineering Workshop Effort	191
Post-Workshop Effort	195
Value Engineering Workshop Agenda	196
Value Engineering Workshop Participants	199
Economic Data	201
Cost Estimate Summary and Cost Model	202
Function Analysis	206
Creative Idea Listing and Evaluation of Ideas	210

EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the Widening of SR 107 From I-75 to SR 11/US 129 in Turner, Irwin and Ben Hill Counties. The following three projects comprise the total project segments:

<u>Location</u>	<u>Project No.</u>	<u>Design Team</u>
SR 107 from I-75 to CR 250	STP-0000-00(311), P.I. No. 0000311	Jacobs Engineering
SR 107 from CR 250 to CR 264	STP-0000-00(314), P.I. No. 0000314	McGee Partners, Inc.
SR 107 from CR 264 to SR 11//US 129	STP-0000-00(313), P.I. No. 0000313	Florence & Hutcheson

The VE workshop was conducted August 10 - 13, 2009, at GDOT's Atlanta Headquarters, One Georgia Center and followed the six-phase VE Job Plan:

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

PROJECT DESCRIPTION

Project STP-0000-00(311), P.I. No. 0000311 widens SR 107 from I-75 in the City of Ashburn to mile marker 7.90 at the SR 107/CR 250/Waterloo Highway intersection in Turner County and is approximately 7.9 miles in length. The project will begin from the I-75 ramps and widen SR 107 from three lanes to four lanes with a 24-ft raised median and rural shoulders that will transition to a four-lane rural section with a 44 ft grassed median near Thompson Road. The project will continue with a four-lane rural section with a 44 ft grassed median from Thompson Road to CR 250/Waterloo Highway. Proposed typical sections will include four 12-ft-wide travel lanes, 6 ft inside shoulders with 2 ft paved, and 10 ft outside shoulders with 6.5 ft paved. Left and right turn lanes are included where warranted. The typical right-of-way for the rural section is 200-ft-wide, and 120-ft-wide for the urban section. The proposed design speed for SR 107 will be 55 mph from I-75 to Thompson Road and 65 mph from Thompson Road to CR 250/Waterloo Highway.

Project STP-0000-00(314), P.I. No. 0000314 widens SR 107 beginning at mile marker 7.90 at the SR 107/CR 250/Waterloo Highway intersection in Turner County and ending at mile marker 4.84 at the SR 107/CR 264/Cleveland Road/Jeff Davis Road intersection in Irwin County. The project includes widening of the entire 7.1 miles of SR 107 to a four-lane roadway with a 44 ft depressed median. The proposed rural section will include four 12-ft-wide travel lanes, 6 ft inside shoulders with 2 ft paved, and 10 ft outside shoulders with 6.5 ft paved. Left and right turn lanes are included where warranted. The typical right-of-way for the rural section is 200-ft-wide. Two bridges along the project, one over Deep

Creek and the other over the Alapaha River, will be replaced with four bridges providing a separate bridge for each direction of travel. Additional median openings that are not adjacent to a roadway intersection will be provided where warranted. The proposed design speed for SR 107 will be 65 mph the entire length of the project.

Project STP-00-00(313), P.I. No. 0000313, is proposed to widen SR 107 beginning at mile marker 4.84 at the SR 107/CR 264/Cleveland Road/Jeff Davis Road intersection in Irwin County and ending approximately 1,600 ft east of the SR 107/SR 11/US 129 intersection at mile marker 5.90 in Ben Hill County. The project includes widening SR 107 to a four-lane road from CR 264/Cleveland Road/Jeff Davis Road to approximately 1,600 ft east of SR 11/US 129. The rural section will include two, 12-ft-wide travel lanes in each direction separated by a 44 ft depressed median, 6 ft inside shoulders with 2 ft paved, and 10 ft outside shoulders with 6.5 ft paved. Left and right turn lanes are included where warranted. The urban section will include two, 12-ft-wide travel lanes separated by a 24 ft raised median, and a 16 ft shoulder on each side with curb and gutter and a 5 ft sidewalk. The rural section will end at approximately mile marker 3.60 in Ben Hill County and transition for approximately 500 ft to the urban section. The typical right-of-way for the rural section is 200-ft-wide, and 120-ft-wide for the urban section. The intersection of SR 107/10 Mile Road (CR 245) and SR 107/Redwood Road (CR 106) will be removed and replaced with an approximately 2.75 degree curve that will provide a continuous travel way along SR 107. The length of the project is 10.45 miles including 80 percent rural section and 20 percent urban section. The design speed for SR 107 will vary between 55 mph to 65 mph in the rural section and 45 mph in the urban section.

Table 1 shows a summary of estimated costs by project.

Table 1: Summary of Estimated Costs by Project

Project No.	P.I. No.	Estimated Cost of Construction	Estimated Cost of Right-of-Way	Estimated Reimbursable Utilities	Estimated Total
STP-0000-00(311)	0000311	\$29,857,724	\$4,774,000	\$576,000	\$35,207,724
STP-0000-00(314)	0000314	\$31,959,543	\$6,187,900	\$569,400	\$38,716,843
STP-0000-00(313)	0000313	\$35,262,762	\$7,290,650	\$1,355,000	\$43,908,412

CONCERNS AND OBJECTIVES

Concerns

The following concerns were identified through information gathering and as a result of the design overview held on August 10, 2009:

- A 1998 study completed by the Office of Planning concluded that no improvements were required for SR 107 in Turner, Irwin, or Ben Hill Counties based upon existing or forecasted traffic and accident rates. Since SR 107 provides the most direct route from I-75 to the City of Fitzgerald, a secondary goal has been identified to improve capacity for the purpose of enhancing goods movement through the corridor to help promote economic development. The project team is seeking alternatives which would help reduce costs while continuing to deliver the secondary goal.
- Truck traffic along SR 107 currently averages 20% of all traffic and is projected to increase

- to 30% by the design year (2032).
- Historic Resource #1 near the intersection of SR 107 and Thompson Road in Turner County will require relocation as part of P.I. No. 0000311 to accommodate the proposed concept. The project team is very interested in seeking an alternative which would eliminate the need to relocate Historic Resource #1.
- The SR 107 corridor between Thompson Road and CR 250 within the project limits of P.I. No. 0000311 is heavily lined with agricultural fields. Vehicles including farm harvesting equipment, tandem trailer trucks carrying agricultural goods, trucks carrying wide loads, and timber trucks frequent this section of highway, especially during the early cultivation and harvesting seasons.

Objectives

The VE team was tasked with the following key objectives:

- Recommend cost reduction ideas
- Recommend ideas to add value by improving roadway design
- Recommend ideas to add value by reducing impacts to historic resources

To meet these objectives, the VE team focused on the key functions associated with the project, paying particular attention to roadway design, including additional lane requirements, median requirements, shoulder requirements, sidewalk requirements, turning lane requirements, median openings, and intersection alignments.

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of several VE alternatives and one design suggestion for consideration by the project teams. Table 2 provides a summary of the number of ideas developed for the three projects included in the study.

Table 2: Tabulation of Ideas Developed

Project Number	Number of VE Alternatives Developed	Number of Design Suggestions Developed
STP-0000-00(311)	12	1
STP-0000-00(314)	12	0
STP-0000-00(313)	13	0

The greatest opportunity for cost reduction and added value involves a choice between two mutually exclusive approaches identified during the function analysis phase of the workshop. Approach #1 suggests retention of the existing two-lane highway and construction of a one-mile intermittent passing lane in each direction of the existing rural sections within each of the three project segments in lieu of providing a new four-lane divided rural section with a 44 foot depressed grassed median. Approach #2 suggests combining several alternatives to achieve a more cost-effective roadway design that will provide an acceptable level of service for the rural section which has a very low traffic demand in the

design year (2032): 3,700 vehicles per day (VPD) for P.I. No. 0000311, 3400 VPD for P.I. No. 0000314, and 3650 for P.I. No. 0000313. Both Approach #1 and Approach #2 fully meet the project need and purpose which includes the primary goal of enhancing safety by correcting geometric deficiencies and sight distances and the secondary goal of enhancing goods movement through the corridor and promoting economic development.

Should GDOT select Approach #1 (detailed in Alt. No. T-2 for each of the project segments), the alternative design would include constructing three one-mile intermittent passing lanes in each direction of the existing rural section (one in each of each the project segments) resulting in approximately one passing lane for every seven miles of rural section. The passing lanes will enable slower moving vehicles to move to the right and allow faster moving vehicles to pass, which will enhance goods movement through the corridor given the high truck traffic of up to 30% by the design year (2032).

In addition, all interchange improvements identified in the original scope of work, correction of geometric and sight distance deficiencies in the current roadway alignment, realignment of the two-lane roadway at SR 107/SR 112 described in P.I. No. 0000311 and realignment of the two-lane roadway at SR 107/CR 106 described in P.I. No. 0000314 would be performed. Approach #1 will fully meet the primary and secondary goals of the project at a substantial cost reduction compared to the original design. If Approach #1 is adopted, consideration should be given to take advantage of the current low property costs purchase the additional right-of-way necessary for possible future expansion to a four-lane divided rural section as traffic demand grows beyond 2032.

Should GDOT decide not to select the intermittent passing lane option in favor of the original four-lane design, Approach #2 offers a combination of several alternatives (Alt. Nos. T-3, T-6, T-9, G-1, and G-2) which would reduce the rural section design width by 14 ft, change the median opening design to Type A, and modify the left-turn lane design to the minimum width required to fully meet the design year traffic demand requirements.

Several additional alternatives are available with either approach. They include maintaining all existing interchange alignments which meet the maximum skew angle requirement on very low traveled intersections (50 to 200 VPD in design year 2032) (Alt. Nos. G-8, G-10, G-11, G-12, and G-13); reducing urban section median widths (Alt. No. T-4) and shoulder widths (Alt. Nos. T-7 and T-10); and using 24-in-wide curb and gutter (Alt. No. T-8). Any combination of these alternatives can be implemented and deliver significant cost savings while fully meeting the primary and secondary goals of the project.

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

IMPLEMENTATION

This VE report is a formalization of the draft materials provided to GDOT and the design teams during the out-briefing discussion on August 13, 2009. The Summary of Potential Cost Savings worksheets outline all of the alternatives and the design suggestion developed by the VE team. Some of the alternatives are mutually exclusive or interrelated, so that addition of all project cost savings does not equal the potential total cost savings for the project. A full listing of all of the ideas considered by the VE team can be found on the Creative Idea Listing in Section Four of the report.

STUDY RESULTS

INTRODUCTION

The results are the major feature of this value engineering study since they portray the benefits that can be realized by GDOT and the users. The results will directly affect the project's design and require coordination between GDOT and the design teams to determine the disposition of each alternative.

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

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

The capital cost comparisons for each alternative use unit quantities from the cost summaries from each of the three projects provided by GDOT. If unit quantities were not available, GDOT databases were consulted. A composite markup of 10.0%, as described in Section Four of the report, was used to generate the 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 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 may include improve operations, reduce maintenance, improve constructability, improve safety, and reduce project risk. 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 value analysis process and facilitate referencing between the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of Potential Cost Savings table. The Alt. No. includes a prefix that refers to one of the major project elements:

PROJECT ELEMENT	PREFIX
Typical Sections	T
Bridge	B
Drainage	D
General	G

Summaries of the alternatives are provided on the Summary of Potential Cost Savings table. The table is divided into project segments and project elements in each segment for the reviewer's convenience and is used to divide the results section. The complete documentation of the developed alternatives and design suggestions follows the Summary of Potential Cost Savings tables.

KEY ISSUES

The project team summarized the following key issues during the design overview on August 10, 2009:

- A 1998 study completed by the Office of Planning concluded that no improvements were required for SR 107 in Turner, Irwin, or Ben Hill Counties based upon existing or forecasted traffic and accident rates. Since SR 107 provides the most direct route from I-75 to the City of Fitzgerald, a secondary goal has been identified to improve capacity for the purpose of enhancing goods movements through the corridor to help promote economic development. The project team is seeking alternatives which would help reduce costs while continuing to deliver the secondary goal.
- Truck traffic along SR 107 averages approximately 20 – 30% of all traffic.
- Historic Resource #1 near the intersection of SR 107 and Thompson Road in Turner County will require relocation as part of P.I. No. 0000311 to accommodate the proposed concept. The project team is very interested in seeking an alternative which would eliminate the need to relocate Historic Resource #1.
- The SR 107 corridor between Thompson Road and CR 250 within the project limits of P.I. No. 0000311 is heavily lined with agricultural fields. Vehicles including farm harvesting equipment, tandem trailer trucks carrying agricultural goods, trucks carrying wide loads, and timber trucks frequent this section of highway, especially during the early cultivation and harvesting seasons.

STUDY OBJECTIVES

The VE team was tasked with the following objectives:

- Recommend cost reduction ideas
- Recommend ideas to add value by improving roadway design
- Recommend ideas to add value by reducing impacts to historic resources

To meet these objectives, the VE team focused on the key elements of the project, paying particular attention to roadway design including additional lane requirements, median requirements, shoulder requirements, sidewalk requirements, turning lane requirements, median openings, and intersection alignments.

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of several VE alternatives and one design suggestion for consideration by the project team. The following Table 2 provides a summary of the number of ideas developed for the three projects included in the study.

TABLE 2: TABULATION OF IDEAS DEVELOPED

Project Number	Number of VE Alternatives Developed	Number of Design Suggestions Developed
STP-0000-00(311)	12	1
STP-0000-00(314)	12	0
STP-0000-00(313)	13	0

The greatest opportunity for cost reduction and added value involves a choice between two mutually exclusive approaches identified during the function analysis phase of the workshop. Approach #1 suggests retention of the existing two-lane highway and construction of a one-mile intermittent passing lane in each direction of the existing rural sections within each of the three project segments in lieu of providing a new four-lane divided rural section with a 44-foot depressed grassed median. Approach #2 suggests combining several alternatives to achieve a more cost-effective roadway design that will provide an acceptable level of service for the rural section which has a very low traffic demand in the design year (2032): 3,700 vehicles per day (VPD) for P.I. No. 0000311, 3400 VPD for P.I. No. 0000314, and 3650 for P.I. No. 0000313. Both Approach #1 and Approach #2 fully meet the project need and purpose which includes the primary goal of enhancing safety by correcting geometric deficiencies and sight distances and the secondary goal of enhancing goods movement through the corridor and promoting economic development.

Should GDOT select Approach #1 (detailed in Alt. No. T-2 for each of the project segments), the alternative design would include constructing three one-mile intermittent passing lane in each direction of the existing rural section (one in each of each the project segments) resulting in approximately one passing lane for every seven miles of rural section. The passing lanes will enable slower moving vehicles to move to the right and allow faster moving vehicles to pass, which will enhance goods movement through the corridor given the high truck traffic of up to 30% by the design year (2032).

In addition, all interchange improvements identified in the original scope of work, correction of geometric and sight distance deficiencies in the current roadway alignment, realignment of the two-lane roadway at SR 107/SR 112 described in P.I. No. 0000311 and realignment of the two-lane roadway at SR 107/CR 106 described in P.I. No. 0000314 would be performed. Approach #1 will

fully meet the primary and secondary goals of the project at a substantial cost reduction compared to the original design. If Approach #1 is adopted, consideration should be given to take advantage of the current low property costs purchase the additional right-of-way necessary for possible future expansion to a four-lane divided rural section as traffic demand grows beyond 2032.

Should GDOT decide not to select the intermittent passing lane option in favor of the original four-lane design, Approach #2 offers a combination of several alternatives (Alt. Nos. T-3, T-6, T-9, G-1, and G-2) which would reduce the rural section design width by 14 feet, change the median opening design to Type A, and modify the left turn lane design to the minimum width required to fully meet the design year traffic demand requirements.

Several additional alternatives are available with either approach. They include maintaining all existing interchange alignments which meet the maximum skew angle requirement on very low traveled intersections (50 to 200 VPD in design year 2032) (Alt. Nos. G-8, G-10, G-11, G-12, and G-13); reducing urban section median widths (Alt. No. T-4) and shoulder widths (Alt. Nos. T-7 and T-10); and using 24-in-wide curb and gutter (Alt. No. T-8). Any combination of these alternatives can be implemented and deliver significant cost savings while fully meeting the primary and secondary goals of the project.

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

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

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

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

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

VALUE ENGINEERING ALTERNATIVE



PROJECT:	WIDENING OF SR 107 FROM I-75 TO CR 250 <i>STP00-0000-00(311), P.I. No. 0000311</i> <i>Turner County, Georgia</i>	ALTERNATIVE NO.:	T-2
DESCRIPTION:	USE INTERMITTENT PASSING LANES IN LIEU OF A FOUR-LANE RURAL DIVIDED SECTION FROM I-75 TO CR 250	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The original design provides a four-lane divided section for SR 107 from the ramps on the east side of I-75 to CR 250.

ALTERNATIVE:

Retain the existing two-lane highway and provide one, one-mile passing lane in each direction between Sta. 300+00 and Sta. 400+00 for westbound traffic and between Sta. 300+00 and Sta. 400+00 for eastbound traffic. Realign SR 107 from Sta. 228+30 to Sta. 278+30; improve all intersections (see sheet 2 of 3); and reconstruct 34% of the existing two-lane rural section to correct geometric deficiencies.

ADVANTAGES:

- Reduces construction time
- Reduces construction requirements
- Reduces right-of-way requirements
- Reduces pavement maintenance

DISADVANTAGES:

- Does not provide four lanes of capacity as documented in the Need and Purpose statement.

DISCUSSION:

The Need and Purpose statement for this project states that no improvements are required in this corridor for future traffic or because of accidents. Additionally, design year traffic volumes range from 3,700 ADT at I-75 to 1,750 ADT at CR 250/Waterloo and Rebecca Highway. Providing intermittent passing lanes will allow traffic to pass slower vehicles safely without the expense of providing four lanes for the entire corridor. This alternative includes the realignment of SR 107 from Sta. 228+30 to Sta. 278+30 to correct the geometric deficiencies of the existing roadway and enhance safety.

It may be advantageous to purchase the right-of-way now for a future four-lane rural section as traffic demand increases, however additional right-of-way costs are not included in this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 34,251,411	—	\$ 34,251,411
ALTERNATIVE	\$ 9,935,018	—	\$ 9,935,018
SAVINGS	\$ 24,316,393	—	\$ 24,316,393

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

T-2

DESCRIPTION: **USE INTERMITTENT PASSING LANES IN LIEU OF A FOUR-LANE RURAL DIVIDED SECTION FROM I-75 TO CR 250**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design provides a four-lane divided section for SR 107 from the ramps on the east side of I-75 to CR 250.

ALTERNATIVE:

Retain the existing two-lane highway and provide one, one-mile passing lane in each direction between Sta. 300+00 and Sta. 400+00 for westbound traffic and between Sta. 300+00 and Sta. 400+00 for eastbound traffic. Realign SR 107 from Sta. 228+30 to Sta. 278+30; improve all intersections (see sheet 2 of 3); and reconstruct 34% of the existing two-lane rural section to correct geometric deficiencies.

ADVANTAGES:

- Reduces construction time
- Reduces construction requirements
- Reduces right-of-way requirements
- Reduces pavement maintenance

DISADVANTAGES:

- Does not provide four lanes of capacity as documented in the Need and Purpose statement.

DISCUSSION:

The Need and Purpose statement for this project states that no improvements are required in this corridor for future traffic or because of accidents. Additionally, design year traffic volumes range from 3,700 ADT at I-75 to 1,750 ADT at CR 250/Waterloo and Rebecca Highway. Providing intermittent passing lanes will allow traffic to pass slower vehicles safely without the expense of providing four lanes for the entire corridor. This alternative includes the realignment of SR 107 from Sta. 228+30 to Sta. 278+30 to correct the geometric deficiencies of the existing roadway and enhance safety.

It may be advantageous to purchase the right-of-way now for a future four-lane rural section as traffic demand increases, however additional right-of-way costs are not included in this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 34,251,411	—	\$ 34,251,411
ALTERNATIVE	\$ 9,935,018	—	\$ 9,935,018
SAVINGS	\$ 24,316,393	—	\$ 24,316,393

PROVIDE A ONE-MILE PASSING LANE
IN EACH DIRECTION

Carter Burgess
Atlanta, GA

GDOT
Georgia Department of Transportation

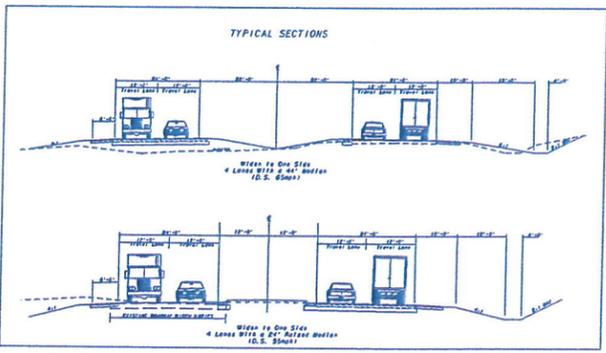
LEGEND

- ALTERNATIVES PROPOSED FOR FIGH
- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY AND PROPERTY LINE
- HISTORIC PROPERTY
- DISPLACEMENT
- STREAM
- WETLANDS
- LAKE
- MEDIAN

SCALE IN FEET
0 200 400 600



PUBLIC INFORMATION OPEN HOUSE
STP-0000-00(311)
P.I. 0000311
TURNER COUNTY
SR 107 FROM I-75 TO CR 250
MAY 15, 2007



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311) P.I. No. 0000311

ALTERNATIVE NO.: **T-2**

SHEET NO.: **3 of 4**

Alternative Design:

Use 800-foot tapers and a one-mile passing lane

Full-depth pavement: $2(0.5)(800)(12) + 5280(12) = 72,960$ SF X 2 passing lanes = 145,920 SF

Earthwork: Assume average depth of 5 feet over the area of the passing lane

$$\text{Volume} = 145920(5)/27 = 27,022 \text{ CY}$$

Right-of-way: Assume 40 feet over the total length of the passing lanes

$$\text{Area} = \{2(800) + 5280\}(40)(2)/43560 = 12.64 \text{ AC}$$

Drainage: Assume culvert extensions will be 20% of that for the original design and that every culvert on the project will be lengthened (conservative assumption)

$$\text{Concrete} = 0.20(1330) = 266 \text{ CY}$$

$$\text{Reinforcing steel} = 0.20(159805) = 31,961 \text{ LB}$$

Improvements to existing intersections:

Assume \$200,000 per small intersection including Thompson Road

Assume \$350,000 per intersection with Type B median, left and right turn lanes including Zorn Road, Live Oak Road, Beard Road/CR 137/Kedrick Road.

Assume \$500,000 per major intersection or realignment including I-75, SR 112, and CR 250/Waterloo & Rebecca Hwy.

Correction of Geometric Deficiencies:

Assume 50% of Roadway Subtotal to represent two lane complete reconstruction = $23,202,000/2 = 11,601,000$.

Assume 34% reconstruction of existing Roadway = $(11,601,000)(0.34) = \$3,944,340$

Include cost to realign SR 107 on new location for two-lane rural section from Sta. 228+30 to Sta. 278+30:

Roadway Pavement:

$$(26)(5000) = 130000 \text{ SF}$$

Earthwork:

$$(5)(64)(5000)/27 = 59,300 \text{ CY}$$

Drainage:

36" R.C.P.: 3 sites x 80 feet = 240 feet

Incidentals including Striping, etc. = \$20,000

Right-of-Way: = $(100)(5000)/43560 = 11.50 \text{ AC}$

COST WORKSHEET



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.: **T-2**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Full-depth Pavement	SF				275,920	5.10	1,407,192
Class A Concrete	CY				266	620.00	164,920
Reinforcing Steel	LB				32,000	1.00	32,000
Earthwork	CY				86,322	5.00	431,610
Drainage Piping:							
30-inch RCP	LF				75	60.00	4,500
36-inch RCP	LF				240	75.00	18,000
Incidentals, Striping, etc.	LS				1	20,000.00	20,000
Intersection Improvements:							
Small Intersection	EA				1	200,000.00	200,000
Intersection with Type B Median	EA				3	350,000.00	1,050,000
Major Intersection	EA				3	500,000.00	1,500,000
Correct Geometric Deficiencies	EA				1	3,944,340.00	3,944,340
Right-of-way	AC				23	5,000.00	115,000
Right-of-way markup @ 148%	LS				1	170,200.00	170,200
Total Project Cost minus Utilities	LS	1	34,251,411	34,251,411			
Subtotal (Less Right-of-Way)				34,251,411			8,772,562
Markup (%) at 10% minus R/W				Included			877,256
TOTAL (Incl. Right-of-Way)				34,251,411			9,935,018

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

T-3

DESCRIPTION: **USE A 32-FT-WIDE RURAL GRASSED MEDIAN IN LIEU OF
 A 44-FT-WIDE RURAL GRASSED MEDIAN**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (sketch attached)

The original design uses a 44-ft-wide depressed grassed median from Sta. 142+00 to Sta. 508+00.

ALTERNATIVE: (sketch attached)

Use a 32-ft-wide depressed grassed median from Sta. 142+00 to Sta. 508+00.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time
- Reduces environmental impacts
- Reduces right-of-way requirement

DISADVANTAGES:

- Less separation between opposing traffic

DISCUSSION:

The 32-ft-wide depressed median meets the required criteria for a high speed design (65 mph) facility. The narrower median will save right-of-way, pavement, drainage, and earthwork costs and has been implemented on other GDOT projects.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 633,902	—	\$ 633,902
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 633,902	—	\$ 633,902

PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
 STP00-0000-00(311), P.I. 0000311

ALTERNATIVE NO.:

T-3

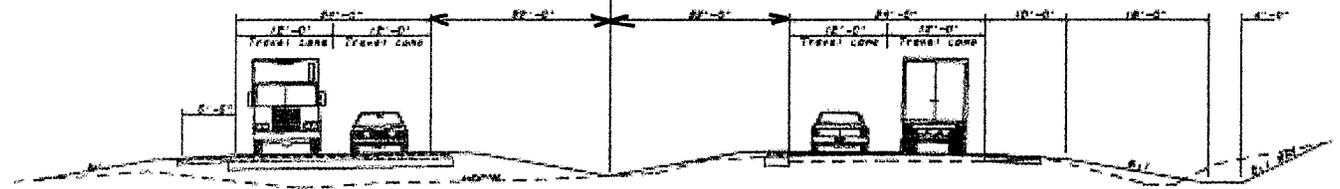
ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 2 of 6

Original

TYPICAL SECTIONS

22' 22'

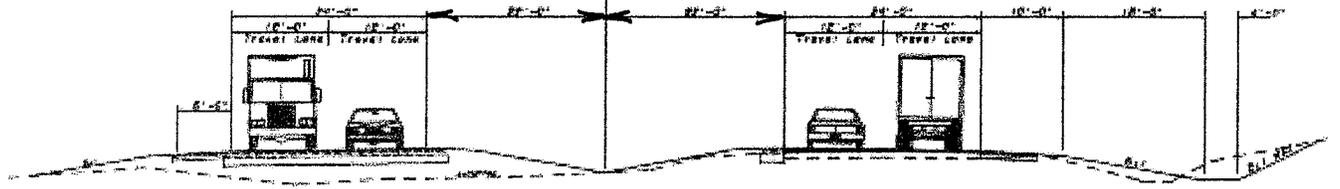


Widen To One Side
 4 Lanes With a 44' Median
 (D.S. 65mph)

Alternate

TYPICAL SECTIONS

16' 16'



Widen To One Side
 4 Lanes With a 44' Median
 (D.S. 65mph)

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

T3
SHEET NO.: *3* of *6*

** Pavement Unit Cost based on GDOT
Project Cost estimate*

STP-0000-00(311)Turner	SR 107	
Full Depth Pavement		
12.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$78/TN) =	\$0.72/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$85/TN) =	\$1.04/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$79/TN) =	\$1.93/SF
10" GAB	(10/12)(0.0735TN/CF)(\$23/TN) =	\$1.41/SF
Total		\$5.10/SF

CALCULATIONS



PROJECT: WIDENING OF SR 107 FROM I 75 TO CR 250
STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

T-3

SHEET NO.:

4 of 6

X-drain Pipe Length Saved:

$$18'' \text{ R.C.P. : } 6' \times 47(\text{x-drain-medium}) = 282 \text{ LF}$$

$$24'' \text{ R.C.P. : } 12' \times 9 (\text{x-drains}) = 108 \text{ LF}$$

$$30'' \text{ RCP : } 12' + 12' + 24' = 48 \text{ LF}$$

$$36'' \text{ RCP : } 12' \times 3 (\text{x-drains}) = 36 \text{ LF}$$

$$42'' \text{ RCP : } 12' \times 2 (\text{x-drains}) = 24 \text{ LF}$$

6'x7' Conc. Box Culvert @ 250+20 (Single)

$$\text{Class "A" Conc.} = 12' \times .88 \text{ cy/LF} = 10.6 \text{ cy}$$

$$\text{Reinf. Steel} = 12' \times 104 \text{ Lbs/LF} = 1,248 \text{ Lbs}$$

Double Conc. Box Culvert @ 295+00
5'x4'

$$\text{Class "A" Conc.} = 12' \times .944 \text{ cy/LF} = 11.3 \text{ cy}$$

$$\text{Reinf. Steel} = 12' \times 113.4 \text{ Lbs/LF} = 1,361 \text{ Lbs}$$

5'x4' Conc. Box Culvert @ 311+00

$$\text{Class "A" Conc.} = 12' \times .539 \text{ cy/LF} = 6.5 \text{ cy}$$

$$\text{Reinf. steel} = 12' \times 56.5 \text{ Lbs/LF} = 678 \text{ Lbs}$$

5'x3' Conc. Box Culvert @ 331+00

$$\text{Class "A" Conc.} = 12' \times .435 \text{ cy/LF} = 5.3 \text{ cy}$$

$$\text{Reinf. Steel} = 12' \times 51.7 \text{ Lbs/LF} = 620 \text{ Lbs}$$

5'x3' Conc. Box Culvert @ 351+00

$$\text{Class "A" Conc.} = 12' \times .435 \text{ cy/LF} = 5.3 \text{ cy}$$

$$\text{Reinf. Steel} = 12' \times 51.7 \text{ Lbs/LF} = 620 \text{ Lbs}$$



PROJECT:

WIDENING OF SR 107 FROM I 75 TO CR 250
STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

T-3

SHEET NO.:

5 of 6

Original Pavement saved through intersections:

Pavement

$$\rightarrow (12' \times 9 \text{ median Openings} \times 100' \text{ Avg. width}) = 10,800 \text{ sf}$$

→ Earth work (32' median savings)

$$\frac{(12' \times 4' \text{ Avg.} \times 34,000')}{27 \text{ cf/cy}} = 60,445 \text{ cy}$$

→ RLW saved: Use 10' savings in stead of 12' since RLW is usually set in even 5' or 10' increments

$$\frac{(10' \times 34,000')}{43,560 \text{ sf/ac}} = 7.80 \text{ ac}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

T-4

DESCRIPTION: **USE AN 18-FT-WIDE RAISED MEDIAN IN LIEU OF A 24-FT-WIDE RAISED MEDIAN IN URBAN SECTIONS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design calls for a 24-ft-wide raised median from Sta. 103+00 to Sta. 141+00.

ALTERNATIVE: (sketch attached)

Use an 18-ft-wide raised median from Sta. 103+00 to Sta. 141+00.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way requirement

DISADVANTAGES:

- Less distance between opposing traffic

DISCUSSION:

The 18-ft-wide median meets the AASHTO Greenbook Design Criteria. The AASHTO Greenbook Design Criteria also allows for a 6-ft nose (includes 2-ft buffer + 2-ft island + 2-ft buffer) for the median left turn lanes. 18-ft-wide medians would also save 6-ft of drainage piping on each cross drain.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 148,310	—	\$ 148,310
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 148,310	—	\$ 148,310

PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
STP00-0000-00(311), P.I. 0000311

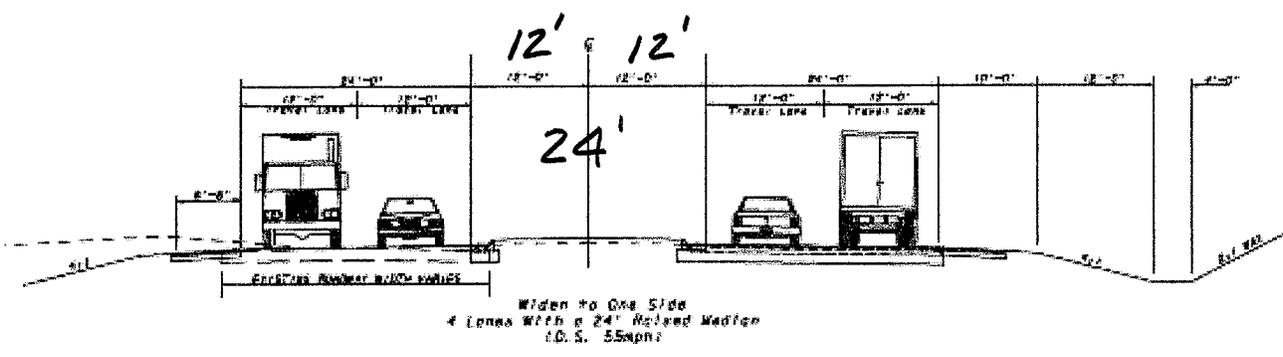
ALTERNATIVE NO.:

T-4

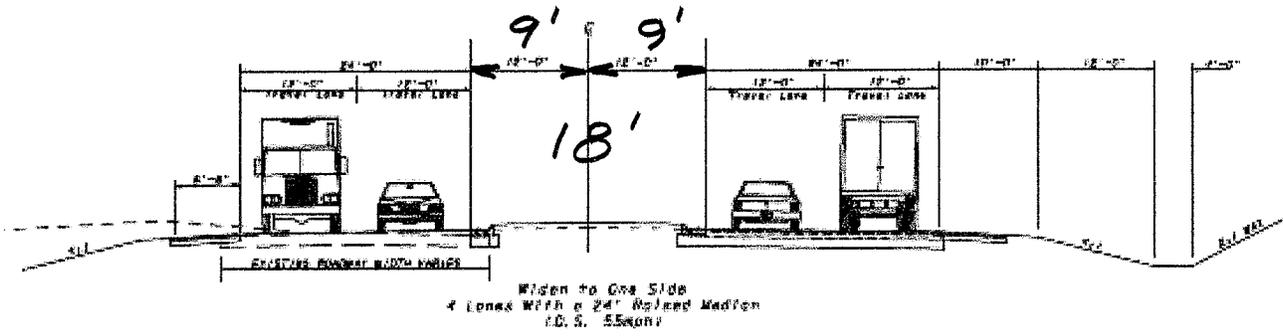
ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 2 of 4

Original



Alternate



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
 STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

T-4

SHEET NO.: 3 of 4

Earthwork Saved:

$$\frac{6' \times 3800' \times 4' \text{ Avg}}{27 \text{ cf/cy}} = 3,378 \text{ cy.}$$

$$\text{Clearing \& Grubbing} = \frac{6' \times 3800}{43,560 \text{ sf/ac}} = 0.53 \text{ ac}$$

STP-0000-00(311)Turner SR 107

Full Depth Pavement

12.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$78/TN) =	\$0.72/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$85/TN) =	\$1.04/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$79/TN) =	\$1.93/SF
10" GAB	(10/12)(0.0735TN/CF)(\$23/TN) =	\$1.41/SF

Total \$5.10/SF

$$\text{(Full Depth) Total} = \$5.10/\text{sf}$$

Pavement Saved: 6' x 110' x 2 intersections = 1,320 sf

$$\text{R/W Saved: } \frac{6' \times 3,800'}{43,560 \text{ sf/ac}} = 0.53 \text{ ac}$$

X-drain Pipe saved: 18" R.C.P. = 6 Lin. Ft.

24" R.C.P. = 2 x 6' = 12 Lin. Ft.

48" R.C.P. = 6 Lin. Ft.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

T-6

DESCRIPTION: **USE 4-FOOT PAVED SHOULDERS IN LIEU OF 6'-6" PAVED SHOULDERS**

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (sketch attached)

The original design calls for 6 ft 6 in of pavement on the outside shoulders.

ALTERNATIVE: (sketch attached)

Use 4 ft of pavement on the shoulder.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time

DISADVANTAGES:

- Reduces paved area for pulling off the road

DISCUSSION:

Before consideration was given to bicycles, outside shoulders typically had 4 ft of pavement. Since there is not a bicycle route at this location, there is no reason to provide 6 ft 6 in of pavement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 741,609	—	\$ 741,609
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 741,609	—	\$ 741,609

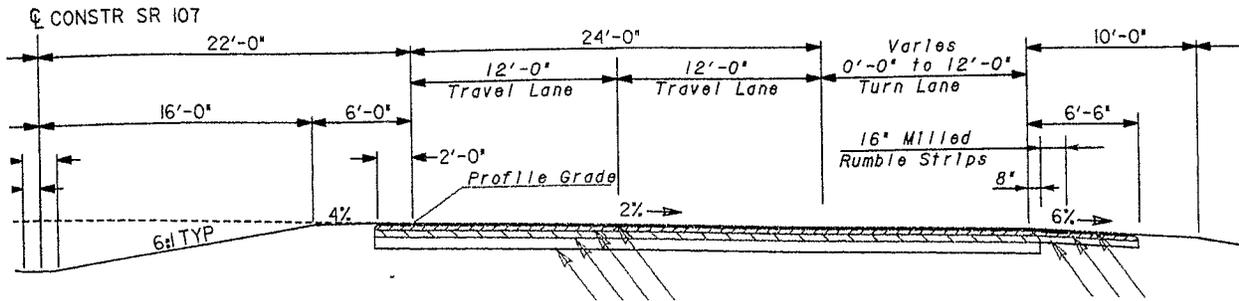
PROJECT: **WIDENING OF SR 107 FROM L 75 TO CR 250**
 STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

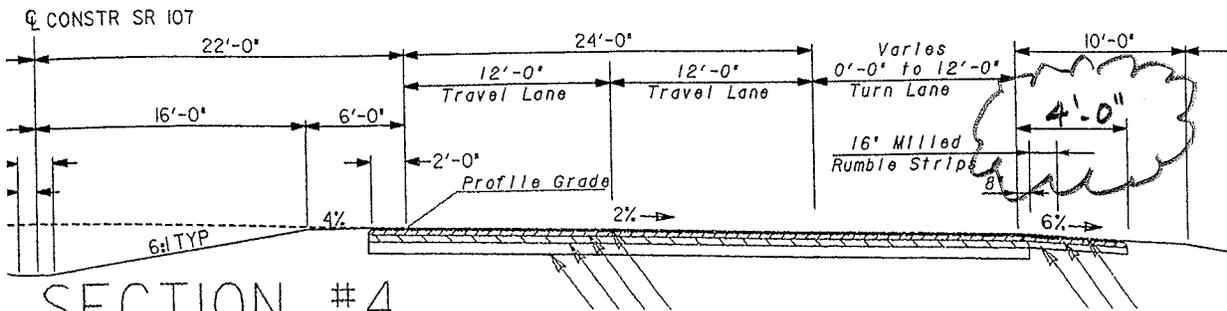
T-6

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 2 of 4



ORIGINAL DESIGN



SECTION #4

ALTERNATIVE DESIGN

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311) P.I. No. 0000311

ALTERNATIVE NO.: **T-6**

SHEET NO.: **3 of 4**

Shoulder pavement area = $(51000-10140)(2)(6.5-4) = 204,300$ SF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

T-8

DESCRIPTION: **USE 24-IN-WIDE CURB AND GUTTER IN LIEU OF 30-IN-WIDE CURB AND GUTTER**

SHEET NO.: 1 of 2

ORIGINAL DESIGN:

The original design includes 30-in-wide curb and gutter throughout the project.

ALTERNATIVE:

Use 24-in-wide curb and gutter throughout the project.

ADVANTAGES:

- Reduces material cost

DISADVANTAGES:

- Increases gutter spread which may result in increased drainage cost

DISCUSSION:

The savings from 24-in-wide curb and gutter do not include the right-of-way savings resulting from 6 in less width on both sides of the road. The median width would remain 24-ft-wide.

The potential right-of-way savings might get offset by a possible increase in the cost of additional catch basin that could be required due to increased gutter spread.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 137,280	—	\$ 137,280
ALTERNATIVE	\$ 115,830	—	\$ 115,830
SAVINGS	\$ 21,450	—	\$ 21,450

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

T-9

DESCRIPTION: **USE 11-FT-WIDE IN LIEU OF 12-FT-WIDE INSIDE LANES**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design includes 12-ft-wide lanes throughout the project.

ALTERNATIVE: (sketch attached)

Use 11-ft-wide inside lanes throughout the project. Maintain 12-ft-wide outside lanes to accommodate truck traffic.

ADVANTAGES:

- Reduces pavement requirement
- Reduces right-of-way requirement

DISADVANTAGES:

- Narrower inside lanes

DISCUSSION:

Downtown Atlanta has 11-ft-wide lanes on its freeways without any significant problems. Design year traffic volumes along SR 107 from I-75 to CR 250 range from 3,700 ADT at I-75 to 1,750 ADT at CR 250. Constructing 11-ft-wide inside lanes on SR 107 from I-75 to CR 250 will save material and construction cost without sacrificing the quality of traffic movement. Keeping 12-ft-wide outside lanes will provide enhanced goods movement for 30 percent truck traffic traveling through the corridor.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 11,040,480	—	\$ 11,040,480
ALTERNATIVE	\$ 10,580,460	—	\$ 10,580,460
SAVINGS	\$ 460,020	—	\$ 460,020

PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
 STP00-0000-00(311), P.I. 0000311

ALTERNATIVE NO.:

T-9

ORIGINAL DESIGN

ALTERNATIVE DESIGN

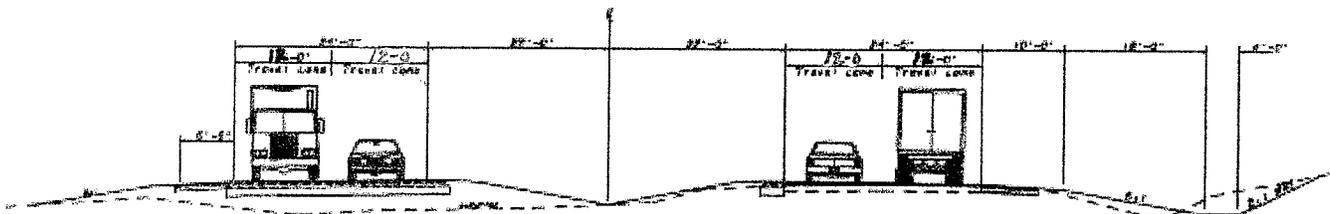
BOTH

SHEET NO.:

2 of 4

Original

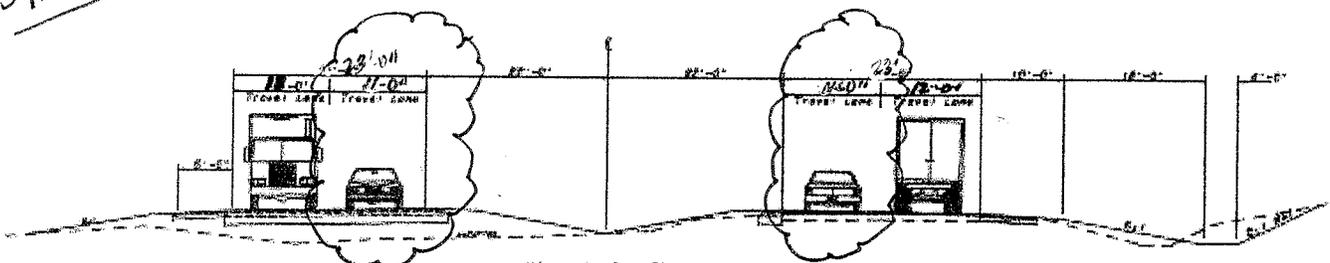
TYPICAL SECTIONS



Widen To One Side
 4 Lanes With a 44' Median
 (D.S. 65mph)

Alternate

TYPICAL SECTIONS



Widen To One Side
 4 Lanes With a 44' Median
 (D.S. 65mph)

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
 STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.: T-9

SHEET NO.: 3 of 4

SL107/ STP-0000-00(311) / Turner Co.
 Full Depth Pavement

$$(13.5mm) 165 \frac{lb}{sf} \times \frac{T}{2000\#} \times \frac{SY}{95\%} \times \frac{\$78}{TN} = \$0.72/sf$$

$$(19mm) 220 \frac{lb}{sf} \times \frac{T}{2000\#} \times \frac{SY}{95\%} \times \frac{\$85}{TN} = \$1.04/sf$$

$$(25mm) 440 \frac{lb}{sf} \times \frac{T}{2000\#} \times \frac{SY}{95\%} \times \frac{\$79}{TN} = \$1.93/sf$$

$$(10" GAB) .833' \times \frac{0.735T}{cf} \times \frac{\$23}{TN} = \$1.41/sf$$

(Full Depth) Total = \$5.10/sf

Begin Sta. 180+00
 End Sta. 510+000

 41,000 LF

Travel-Way

$$(41,000)(48') = 1,968,000 sf$$

$$\frac{1,968,000}{9} \approx 218,667 sy$$

Less 1-ft on inside Lane

$$(41,000)(246') = 1,008,600 sf$$

$$\frac{1,008,600}{9} \approx 209,556 sy$$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	WIDENING OF SR 107 FROM I-75 TO CR 250 <i>STP00-0000-00(311), P.I. No. 0000311</i> <i>Turner County, Georgia</i>	ALTERNATIVE NO.:	T-11
DESCRIPTION:	EXTEND THE EXISTING THREE-LANE SECTION AT I-75 TO JUST EAST OF THOMPSON ROAD	SHEET NO.:	1 of 1

ORIGINAL DESIGN:

The original design provides a four-lane section with raised median to Station 141+47, approximately 750 ft east of Thompson Road. This section is 92 ft wide from shoulder point to shoulder point.

ALTERNATIVE

Extend the existing three-lane section at I-75 to Station 141+47. This section would be 56 ft wide from shoulder point to shoulder point.

ADVANTAGES:

- Less impact to historic resources at Thompson Road
- Reduces construction requirements

DISADVANTAGES:

- Does not provide four lanes of capacity as documented in the Need and Purpose statement
- May still require extensive drainage work since the site drainage and roadway drainage may be tied together in the existing condition

DISCUSSION:

The four-lane section with a 24 ft median was used in lieu of a four-lane rural section to avoid the historic resource at Thompson Road. A historic house will have to be moved to avoid the roadway in the original design. By extending the three-lane section, the house would not have to be moved, and the impact on the historic resource would be reduced. It may be necessary to re-evaluate the boundary of the historic resource; however, the alternative design will have less impact than the original design.

The secondary goal for this project of providing a four-lane facility would have to be omitted for this segment of the project. The design year ADT of 3,700 does not justify a four-lane typical section on this project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

G-1

DESCRIPTION: **SHORTEN THE LEFT TURN LANES TO THE MINIMUM ALLOWABLE DECELERATION LENGTH**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design uses the maximum “x” length of 450 ft for storage and deceleration for left-turn lanes per GA. Construction Detail M-3.

ALTERNATIVE: (sketch attached)

Use the minimum “x” length of 300 ft for storage and deceleration for left-turn lanes per GA. Construction Detail M-3.

ADVANTAGES:

- Reduces pavement requirements

DISADVANTAGES:

- None identified

DISCUSSION:

300 ft of length is adequate for left-turn lanes given the low design year traffic volumes along SR 107 from I-75 to CR 250 which range from 3,700 ADT at I-75 to 1,750 ADT at CR 250.

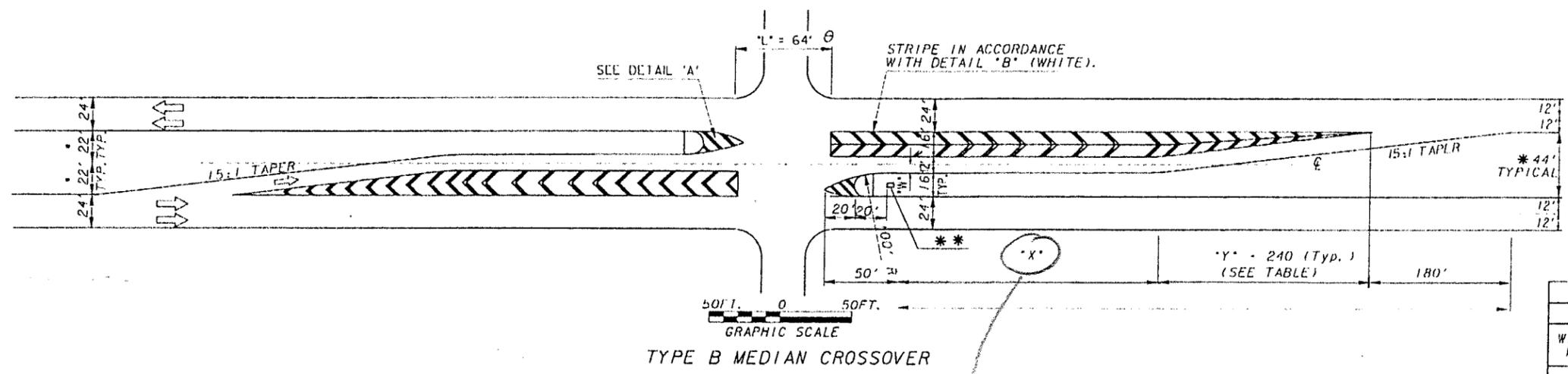
The right-turn lanes were not shortened since they already meet the minimum deceleration length for 65 mph design speed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 219,912	—	\$ 219,912
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 219,912	—	\$ 219,912

2/4
Alt. G-1

Project:
STP-0000-00(311)

Sketch
Alt. G-1
2/4



Δ 'X' DIMENSION IS FOR DECELERATION ONLY, DOES NOT ACCOUNT FOR ANY STORAGE NEEDED. MIN. VALUES FOR 'X' ARE ONLY TO BE USED WHERE SPACING BETWEEN MEDIAN OPENINGS DOES NOT ALLOW FOR THE MORE DESIRABLE LENGTH.

WIDTH OF MEDIAN	TYPE B MEDIAN CROSSOVERS				Y	W	
	DECELERATION LENGTH - Δ (FT.)			Y			W
	DESIGN SPEED ↓						
	45 MPH	55 MPH	65 MPH				
32	350(200MIN)	450(350MIN)	650(450MIN)	60	4		
44	150(150MIN)	300(150MIN)	450(300MIN)	240	16		
64	N/A	150(150MIN)	300(150MIN)	390	26		

X = 450' for "Original"
X = 300' for "Alternate Design"

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
 STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

G-1

SHEET NO.: 3 of 4

Median Openings Left Turn Lengths
 Saved:

use 300' min (Storage/Decel) Length

400' (current design) for 7 of the
 intersections (median openings).

$$28' \times (400' - 300') \times 2 \text{ Left-Turns} \times 7 \text{ intersections} =$$

$$= 39,200 \text{ sf}$$

STP-0000-00(311)Turner	SR 107	
Full Depth Pavement		
12.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$78/TN) =	\$0.72/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$85/TN) =	\$1.04/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$79/TN) =	\$1.93/SF
10" GAB	(10/12)(0.0735TN/CF)(\$23/TN) =	\$1.41/SF
Total		\$5.10/SF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

G-2

DESCRIPTION: **USE TYPE A MEDIAN OPENINGS IN LIEU OF TYPE B**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design calls for Type B median openings throughout the project.

ALTERNATIVE:

Use Type A median openings throughout the project.

ADVANTAGES:

- Reduces pavement requirement
- Reduces long-term pavement maintenance

DISADVANTAGES:

- None identified

DISCUSSION:

A total of ten median openings are placed throughout the length of the project. Type B median openings are used but Type A median openings are adequate based upon the design year traffic volumes which range from 3,700 ADT at I-75 to 1,750 ADT at CR 250.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,000,263	—	\$ 1,000,263
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 1,000,263	—	\$ 1,000,263

CALCULATIONS



PROJECT:

WIDENING OF SR 107 FROM I 75 TO CR 250
STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.: 6-2

Use Type A Median Openings ILO Type B

SHEET NO.: 3 of 4

Pow't needed for Type B: $450' \times 28' = 18900 \text{ SF}$

$$(420' \times 28') \div 2 = 5880 \text{ SF}$$

$$(50' \times 34') \div 2 = 850 \text{ SF}$$

25,630 SF

Type A: $525' \times 12' = 6300 \text{ SF}$

$$(180' \times 12') \div 2 = 1080 \text{ SF}$$

$$(42' \times 20') \div 2 = 420 \text{ SF}$$

7800 SF

Type A sawes 17,830 SF $\therefore 17,830 \text{ SF} \times \$5.10/\text{SF} = \$90,933 \text{ opening}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:
G-3

DESCRIPTION: **ELIMINATE THE FIRETOWER ROAD CONNECTOR AT
 STA. 226+63 BY REUSING THE EXISTING INTERSECTION
 AT JEANNETTE ROAD**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design provides a connector road from Firetower Road to SR 107 at Rick Road (SR 107 Station 226+63).

ALTERNATIVE: (sketch attached)

Omit the connector at Sta. 226+63 by making minor improvements to the existing intersection at Jeanette Road.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time
- Less right-of-way required

DISADVANTAGES:

- Slightly longer travel to SR 107 for some residents
- Longer distance to median opening for some residents
- A minor amount of additional earthwork and pavement requirements may be needed to match profiles between the new westbound SR 107/SR 112 roadway and Jeanette Road/Firetower Road

DISCUSSION:

The original design provides a new connector road approximately 300 ft long to connect Firetower Road to SR 107 at Rick Road. Minor improvements can be made at the existing intersection at Jeanette Road to provide access at the current location. The median opening would be moved back to the intersection at Jeanette Road, resulting in a longer drive for some residents on the south side of SR 107 to get to a median opening.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 66,980	—	\$ 66,980
ALTERNATIVE	\$ 9,416	—	\$ 9,416
SAVINGS	\$ 57,564	—	\$ 57,564

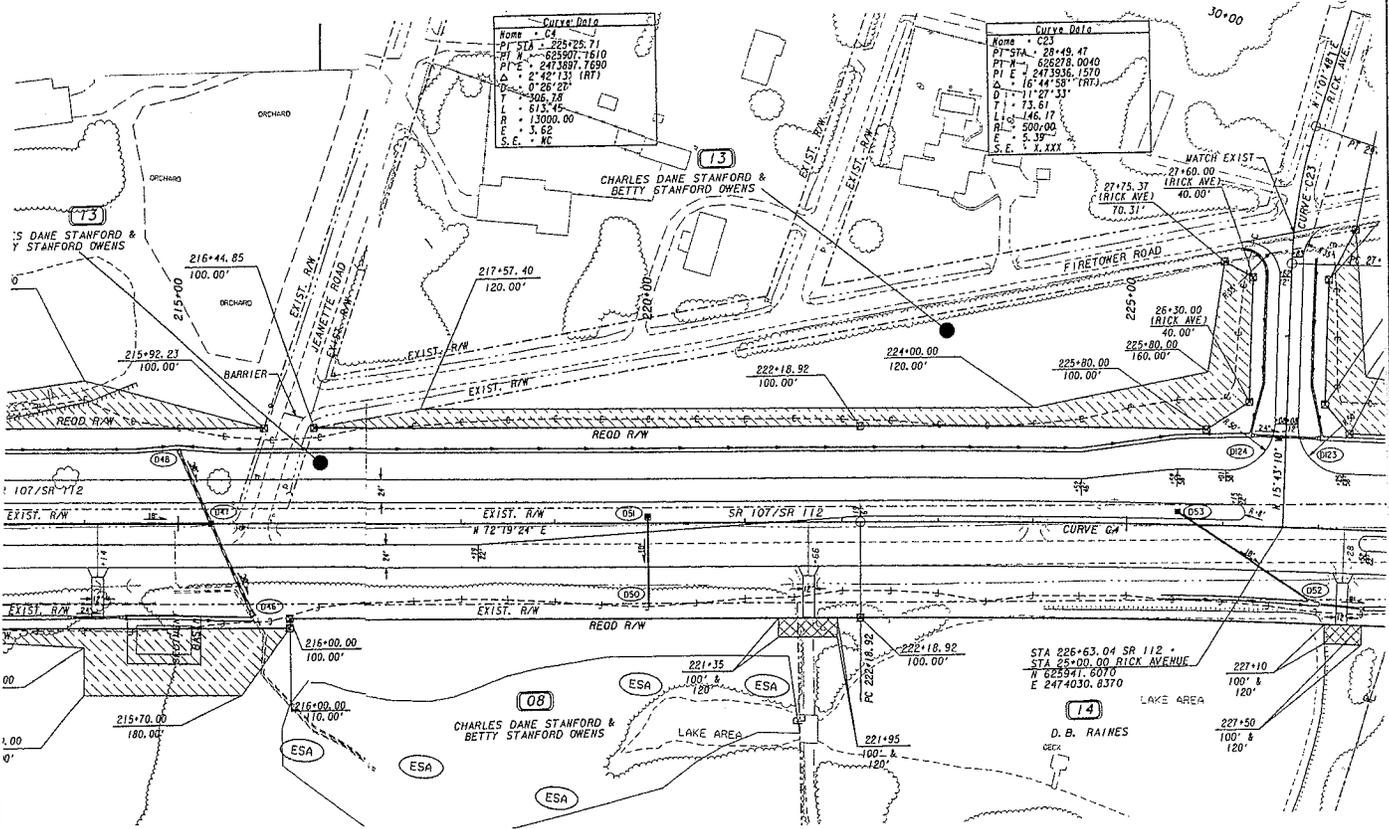
PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
 STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

9-3

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 5**



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311) P.I. No. 0000311

ALTERNATIVE NO.: **G-3**

SHEET NO.: **4 of 5**

Original design:

Full depth pavement: $250(28) = 7,000$ SF

Right-of-way: $250(80) = 20,000$ SF/ $43,260 = 0.46$ AC

Unclassified excavation

Station	End area	Volume
26+00	610	1009
26+50	480	889
27+00	480	793
27+50	376	436
28+00	95	
Total		3,127 CY

Clearing & grubbing 0.46 AC

Alternative Design:

Full depth pavement: $50(28) = 1,400$ SF

Right-of-way: $80(50) = 4,000$ SF/ $43,260 = 0.09$ AC

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:

G-5

DESCRIPTION: **BLOCK GEOGHAGEN ROAD (CR 41) JUST TO THE NORTH
 OF PROPOSED SR 107**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

Geoghagen Road is connected to the widened SR 107 by a new intersection as well as to SR 112.

ALTERNATIVE: (sketch attached)

Omit the access to SR 107 from Geoghagen Road on the north side of SR 107.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way cost
- Fewer intersections on SR 107

DISADVANTAGES:

- Slight inconvenience to residents

DISCUSSION:

The design year ADT on Geoghagen Road is 100. Geoghagen Road will connect to SR 112 on the north side of SR 107 after construction is complete. There will not be a median opening at Geoghagen Road on SR 107. The residence nearest to SR 107 will continue to have access to SR 107 via a driveway. There is no reason to maintain direct access to SR 107 from Geoghagen Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 25,298	—	\$ 25,298
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 25,298	—	\$ 25,298



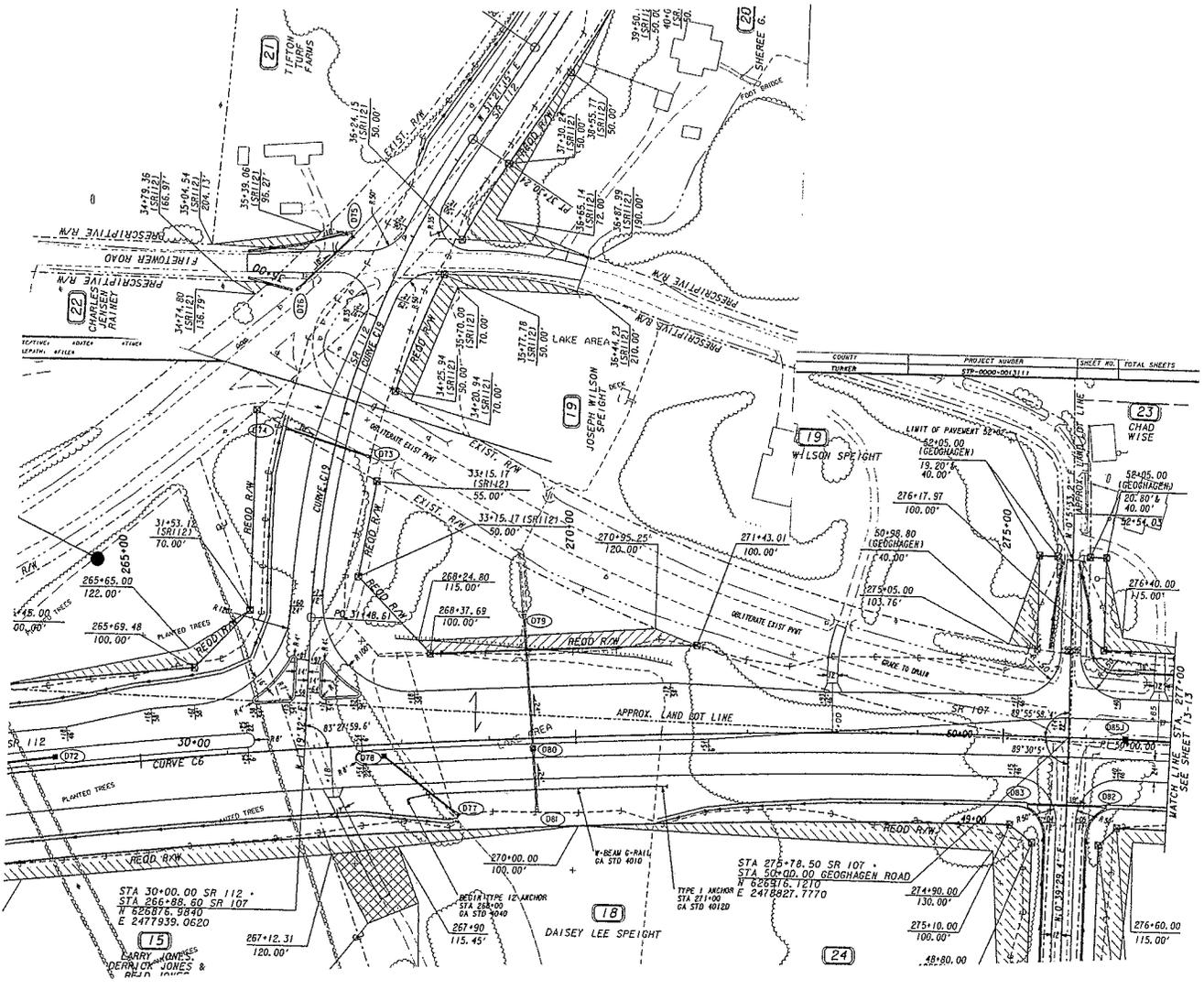
PROJECT: **WIDENING OF SR 107 FROM E. 75 TO CR 250**
 STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

G-5

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 5**



SKETCH



PROJECT: **WIDENING OF SR 107 FROM I 75 TO CR 250**
STP00-0000-00(311) P.I. Number 0000311

ALTERNATIVE NO.:

G-5

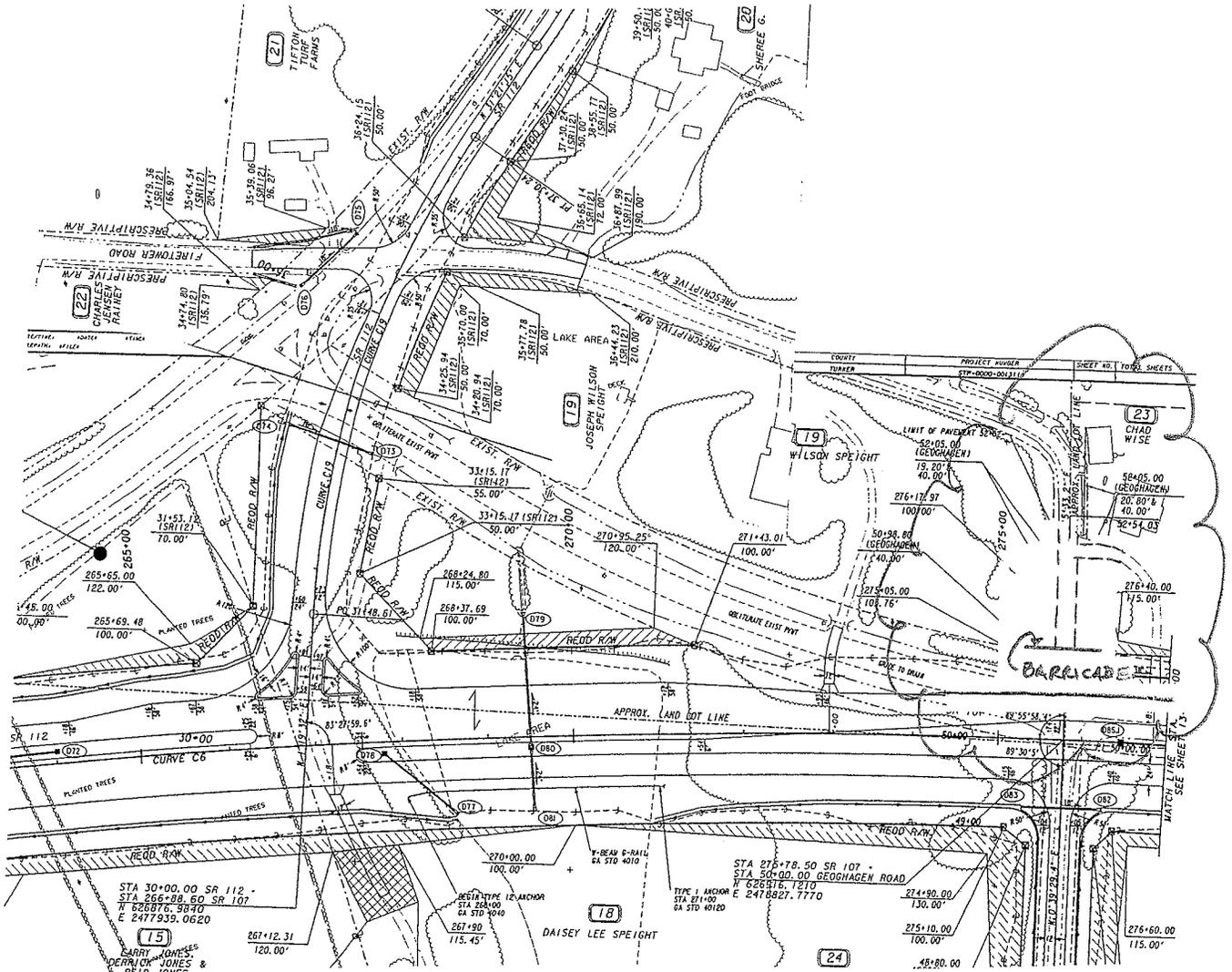
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.:

3 of 5



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311) P.I. No. 0000311

ALTERNATIVE NO.: **G-5**

SHEET NO.: **4 of 5**

Original design:

Full-depth pavement: $28(150) = 4200$ SF

Right-of-way $110(40)/43560 = 0.10$ AC

VALUE ENGINEERING ALTERNATIVE



PROJECT: WIDENING OF SR 107 FROM I-75 TO CR 250 <i>STP00-0000-00(311), P.I. No. 0000311</i> <i>Turner County, Georgia</i>	ALTERNATIVE NO.: G-8
DESCRIPTION: MINIMIZE IMPROVEMENTS TO LIVE OAK ROAD AND RELOCATE MEDIAN OPENING TO ALIGN WITH LIVE OAK ROAD IN ITS NEW LOCATION	SHEET NO.: 1 of 5

ORIGINAL DESIGN: (sketch attached)

The relocation of Live Oak Road is approximately 600 ft long. A median opening is placed to align with the relocated Live Oak Road.

ALTERNATIVE: (sketch attached)

Construct a minimally improved intersection at Live Oak Road and SR 107. Move the median opening to coincide with the new live Oak Road intersection.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time
- Less right-of-way to acquire
- Driveway on north side of SR 107 can be aligned with new median opening location

DISADVANTAGES:

- None identified

DISCUSSION:

The design year ADT on Live Oak Road is 200. Minimal improvement of its intersection with SR 107 will provide a safe intersection.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 115,279	—	\$ 115,279
ALTERNATIVE	\$ 25,162	—	\$ 25,162
SAVINGS	\$ 90,117	—	\$ 90,117

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311) P.I. No. 0000311

ALTERNATIVE NO.: **G-8**

SHEET NO.: **4 of 5**

Original Design:

Full depth pavement: $600(28) = 16,800$ SF

Right-of-way: $[340(80) + 260(50)]/43560 = 0.92$ AC

Clearing and Grubbing = 0.92 AC

Alternative Design:

Full depth pavement: $150(28) = 4,200$ SF

Right-of-way = $80(40)/43560 = 0.07$ AC

Clearing and grubbing = 0.07 AC

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311), P.I. No. 0000311
Turner County, Georgia

ALTERNATIVE NO.:
G-14

DESCRIPTION: **ELIMINATE MEDIAN OPENINGS AT STA. 304+70 AND STA. 334+00 AND REPLACE WITH A SINGLE MEDIAN OPENING AT STA. 319+35**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

Median openings are spaced at less than the maximum spacing of one mile.

ALTERNATIVE:

Eliminate the median openings at Stations 304+70 and 334+00 and replace them with an opening at Station 319+35.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time
- Fewer traffic conflict points

DISADVANTAGES:

- Reduces access to U-turns

DISCUSSION:

Median openings should be spaced at a maximum of one mile. At this location, the distances between openings are 2,892 ft, 2,930 ft, and 3,630 ft. There are no roads or driveways at Sta. 304+70 or Sta. 334+00. Providing an opening at Station 319+35 spaces the openings at 4,357 ft and 5,095 ft, which are less than the maximum. Sight distances are adequate to support this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 216,322	—	\$ 216,322
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 216,322	—	\$ 216,322

CALCULATIONS

PROJECT: **WIDENING OF SR 107 FROM I-75 TO CR 250**
STP00-0000-00(311) P.I. No. 0000311

ALTERNATIVE NO.: **G-14**

SHEET NO.: **2 of 3**

$$\text{Pavement area} = 2(.5)(28)(420) + 2(400)(28) + 100(44) = 38,560 \text{ SF}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-1

DESCRIPTION: **USE A THREE-LANE RURAL SECTION IN LIEU OF A FOUR-LANE URBAN DIVIDED SECTION**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design calls for a four-lane urban section including curb and gutter and sidewalks from Sta. 490+69 to Sta. 620+45.

ALTERNATIVE: (sketch attached)

Use a three-lane rural section with a center turn lane and open ditch from Sta. 490+69 to Sta. 620+45.

ADVANTAGES:

- Reduces pavement requirements
- Reduces right-of-way requirements
- Reduces earthwork requirements

DISADVANTAGES:

- Slight increase in travel time when compared with a 4-lane urban section

DISCUSSION:

A three-lane rural section with a center turn lane will correct geometric deficiencies and promote economic development at a significantly reduced cost. Design year traffic volumes along SR 107 range from 3,650 ADT at Sta. 490 to 10,950 ADT at SR 11/US 129.

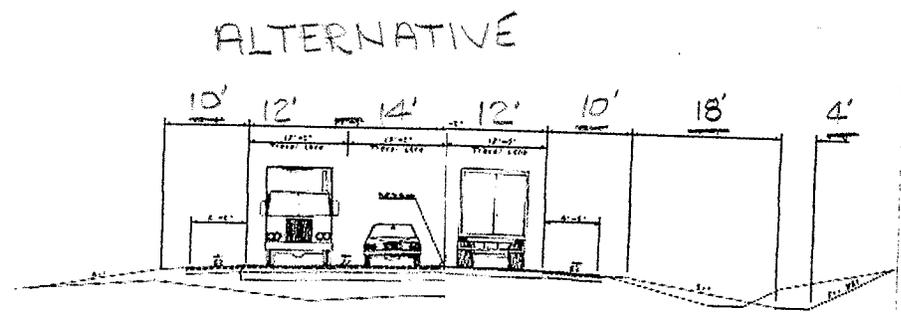
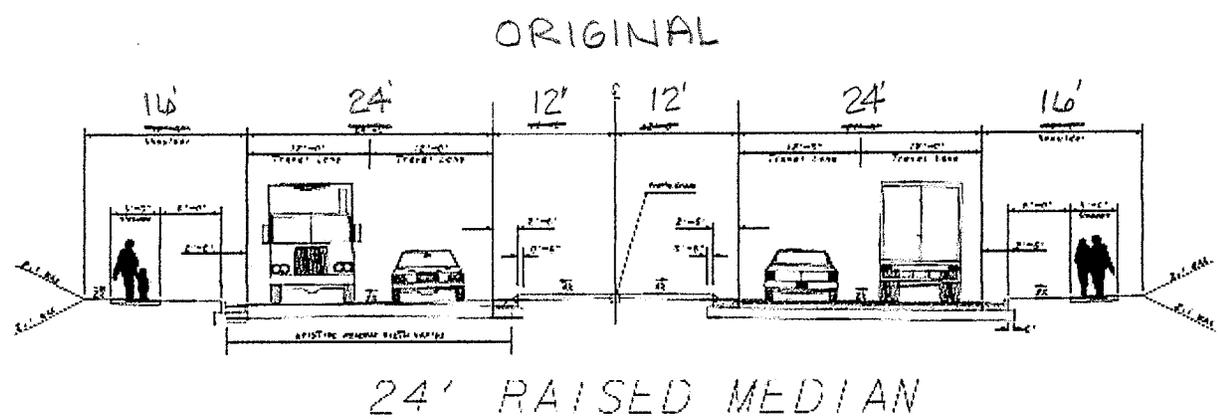
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,679,076	—	\$ 4,679,076
ALTERNATIVE	\$ 619,846	—	\$ 619,846
SAVINGS	\$ 4,059,230	—	\$ 4,059,230

PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
 STP00-0000-00(313), P.I. 0000313

ALTERNATIVE NO.: **T-1**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 4**



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
 STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.: T-1

Use a 3-lane Rural Section ILO 4-lane Urban Section

SHEET NO.: 3 of 4

Length of Curb + Gutter Section is 12,945 LF

$$\text{Curb + Gutter: } 4 \times 12,945' = 51,780 \text{ LF} + 11 \times 25 \text{ LF (Side Rds)} = 52,055 \text{ LF}$$

$$\text{Sidewalk: } 12,945' \times 2 = 25,890 \text{ LF} - 11 \times 24' \text{ (Side roads)} =$$

$$25,626 \text{ LF} \times 5' = 128,130 \text{ SF} \div 9 = \underline{14,237.59}$$

30.7

$$\text{Median Paving: } 12,945 \text{ LF} - 6 \times 50' \text{ (Median Opening)} = 12,645 \text{ LF}$$

$$12,645 \text{ LF} \times 19' \div 9 = \underline{26,695.59}$$

Inlets - 94 Each

$$\text{Drainage Pipes: } 18'' = \underline{10,150 \text{ LF}}$$

$$36'' = \underline{2,130 \text{ LF}}$$

$$\text{Add'l Pavement: } 12,945 \text{ LF} - 300 \text{ LF (Median Openings)} =$$

$$12,645 \text{ LF} \times 14' = \underline{177,030 \text{ SF}}$$

$$\text{Add'l Shoulder: } 12,945 \text{ LF} \times 2 = 25,890 \text{ LF} - 11 \times 30' \text{ (Side Rds)} = 25,560 \text{ LF}$$

$$25,560 \text{ LF} \times 6.5' = \underline{166,140 \text{ SF}}$$

$$\text{Add'l Grassing: } 25,560 \text{ LF} \times 38.5' = 984,060 \text{ SF} \div 43,560 \text{ SF/Ac} = \underline{22.6 \text{ Ac}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-2

DESCRIPTION: **USE INTERMITTENT PASSING LANES IN LIEU OF A FOUR-LANE RURAL DIVIDED SECTION**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design provides a four-lane divided rural section SR 107 from Sta. 131+00 to Sta. 490+69 and a four-lane divided urban section from Sta. 490+69 to Sta. 620+45.

ALTERNATIVE:

Retain the existing two-lane highway in the rural area from Sta. 131+00 to Sta. 490+69, and provide a one-mile passing lane in each direction between Sta. 150+00 and Sta. 250+00 in lieu of building a four-lane rural divided section. Realign the two-lane section of SR 107 on a new location from Sta. 332+15 to Sta. 382+77. Improve all intersections from Sta. 131+00 to Sta. 490+69 (see sheet 2 of 3).

ADVANTAGES:

- Reduces construction time
- Reduces construction cost
- Reduces right-of-way requirements

DISADVANTAGES:

- Does not provide four lanes of capacity as documented in the Need and Purpose statement

DISCUSSION:

The Need and Purpose statement for this project states that no improvements are required in this corridor for future traffic or because of accidents. Additionally, design year traffic volumes range from 1,875 ADT at CR 264 to 3,650 ADT at Sta. 490, which do not require a four-lane facility. Providing additional one-mile passing lanes will allow traffic to pass slower vehicles safely without the expense of providing four lanes for the entire corridor.

It may be advantageous to purchase the right-of-way now for a future four-lane rural section as traffic demand increases, however additional right-of-way cost is not included in this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 18,082,449	—	\$ 18,082,449
ALTERNATIVE	\$ 5,340,543	—	\$ 5,340,543
SAVINGS	\$ 12,741,906	—	\$ 12,741,906

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 149**
STP00-0000-00(313) P.I. No. 0000313

ALTERNATIVE NO.: T-2

SHEET NO.: 3 of 4

Original Design:

\$2,203,000 = typical section cost per mile of rural widening

Miles of Rural Widening = $((49069-13100)-(38277-33215))/5280 = 5.85$ miles

\$3,699,000 = typical section cost per mile of rural new location

Miles of rural new location = $(38277-33215)/5280 = 0.96$ miles

Alternative Design

Use 800-foot tapers and a one-mile passing lane

Full-depth pavement: $2(0.5)(800)(12) + 5280(12) = 72,960$ SF X 2 passing lanes = 145,920 SF

Earthwork: Assume average depth of 5 feet over the area of the passing lane

Volume = $145920(5)/27 = 27,022$ CY

Right-of-way: Assume 40 feet over the total length of the passing lanes

Area = $\{2(800) + 5280\}(40)(2)/43560 = 12.64$ AC

Drainage: Assume culvert extensions will be 20% of that for the original design and that every culvert on the project will be lengthened (conservative assumption)

Concrete = $0.20(1330) = 266$ CY

Reinforcing steel = $0.20(159805) = 31,961$ LB

Include Cost to Realign SR 107 on new location for two lanes only from Sta. 332+15 to Sta. 382+77:

Roadway Pavement:

$(26)(5062) = 131,6112$ SF

Earthwork:

Volume = $(5)(64)(5062)/27 = 60,930$ CY

Drainage: Assume 36" RCP: 3 sites times 80 feet = 240 FT

Incidentals including striping, etc. = \$20,000

Right of way: Assume 100 feet wide x 5000 linear feet of realignment

Area = $(100)(5000)/435560 = 11.50$ AC

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-3

DESCRIPTION: **USE A 32-FT-WIDE RURAL GRASSED MEDIAN IN LIEU OF
 A 44-FT-WIDE RURAL GRASSED MEDIAN**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design uses a 44-ft-wide depressed grassed median.

ALTERNATIVE: (sketch attached)

Use a 32-ft-wide depressed grassed median from Sta. 131+00 to Sta. 486+00.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time
- Reduces environmental impacts
- Reduces right-of-way requirement

DISADVANTAGES:

- Less separation between opposing traffic

DISCUSSION:

The 32-ft-wide depressed median meets the required criteria for a high speed design (65 mph) facility. The narrower median will save right-of-way, pavement, and earthwork costs and has been implemented on other GDOT projects.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 615,328	—	\$ 615,328
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 615,328	—	\$ 615,328

SKETCH



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. Number 0000313

ALTERNATIVE NO.:

T-3

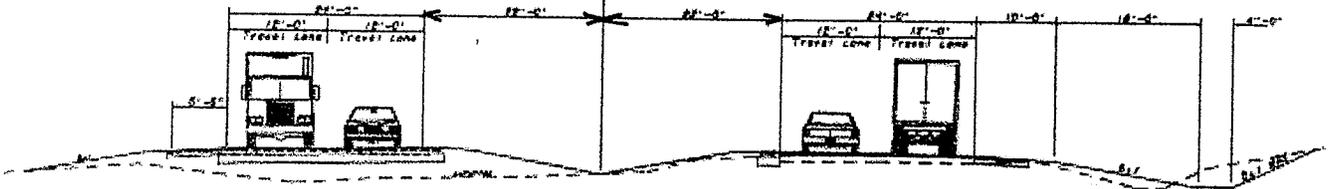
ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 2 of 5

Original

TYPICAL SECTIONS

22' 22'

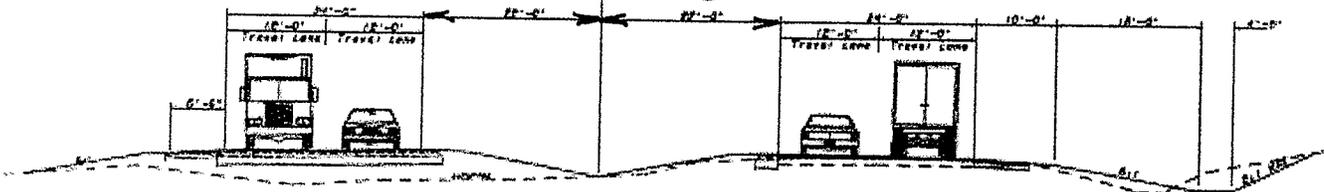


Widen To One Side
4 Lanes With a 44' Median
I.D.S. Eschepi

Alternate

TYPICAL SECTIONS

16' 16'



Widen To One Side
4 Lanes With a 44' Median
I.D.S. Eschepi

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
 STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.:

T-3

SHEET NO.:

3 of 5

STP-0000-00(313) Irwin-Ben Hill SR 107 Rural Section

Full Depth Pavement

9.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$85/TN) =	\$0.78/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$76/TN) =	\$0.93/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$73/TN) =	\$1.78/SF
10" GAB	(10/12)(0.0735TN/CF)(\$26/TN) =	\$1.59/SF

Total \$5.08/SF

→ Pavement Saved: $(12' \times 100' \text{ Avg.} \times 9 \text{ intersections}) = 10,800 \text{ sf}$

→ Earthwork = $\frac{(35,500' \times 4 \text{ Avg.} \times 12')}{27 \text{ cf/cy}} = 63,111 \text{ cy}$

RIW Saved: Reduce by 10' even increment,
 $\frac{10' \times 35,500'}{43,560 \text{ sf/ac}} = 0.15 \text{ ac}$

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.:

T-3

SHEET NO.: 4 of 5

X-dRAIN Pipe Saved: (12')

18" R.C.P. : 26 x 6' = 156 L.F.

24" R.C.P. : = 36 L.F.

30" R.C.P. : = 18 L.F.

36" R.C.P. : 7 x 12' = 84 L.F.

48" R.C.P. : = 24 L.F.

Double 10'x10' conc. Box Culvert.

$$12' \times 4.238 \text{ cy/LF} = 51 \text{ cy}$$

$$12' \times 516 \text{ Lbs/LF} = 6,192 \text{ Lbs}$$

COST WORKSHEET

PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.: **T-3**

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
Full Depth Pavement	SF	10,800	5.08	54,864			
Earthwork	CY	63,111	5.00	315,555			
Clearing and Grubbing	AC	8.15	5,000.00	40,750			
Cross-Drains Pipe:							
18 inch RCP	LF	156	37.00	5,772			
24 inch RCP	LF	36	41.00	1,476			
30 inch RCP	LF	18	47.00	846			
36 inch RCP	LF	84	62.00	5,208			
48 inch RCP	LF	24	110.00	2,640			
Double 10-in by 10-in Culvert:							
Class "A" Concrete	CY	51	620.00	31,620			
Bar Steel	LB	6,192	1.00	6,192			
Right-of-Way	AC	8.15	5,000.00	40,750			
Right-of-Way Markup (155%)	LS	1	63,162.50	63,163			
Subtotal (Less Right-of-Way)				464,923			
Markup (%) at 10.0%				46,492			
TOTAL (Incl. Right-of-Way)				615,328			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-4

DESCRIPTION: **USE AN 18-FT-WIDE RAISED MEDIAN IN LIEU OF A 24-FT-WIDE RAISED MEDIAN IN URBAN SECTIONS**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design calls for a 24-ft-wide raised median from Sta. 490+00 to Sta. 612+50.

ALTERNATIVE: (sketch attached)

Use an 18-ft-wide raised median from Sta. 490+00 to Sta. 612+50.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way requirement

DISADVANTAGES:

- Less distance between opposing traffic

DISCUSSION:

The 18-ft-wide median meets the AASHTO Greenbook Design Criteria. The AASHTO Greenbook Design Criteria also allows for a 6-ft nose (includes 2-ft buffer + 2-ft island + 2-ft buffer) for the median left turn lanes. 18-ft-wide medians would also save 6 ft of drainage piping on each cross drain.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 160,657	—	\$ 160,657
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 160,657	—	\$ 160,657

PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
 STP00-0000-00(313), P.I. 0000313

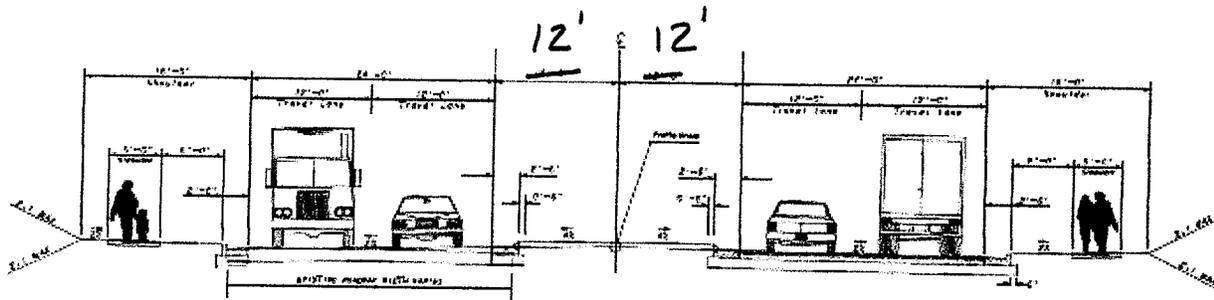
ALTERNATIVE NO.:

T-4

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

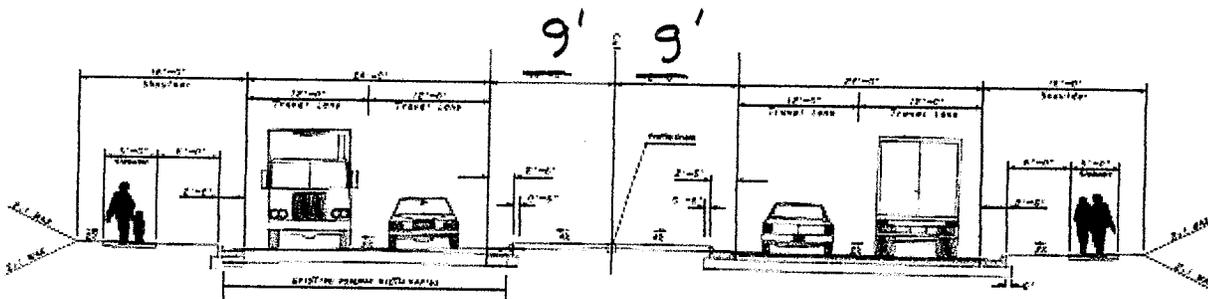
SHEET NO.: 2 of 5

Original



24' RAISED MEDIAN

Alternate



18' RAISED MEDIAN

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.:

SHEET NO.:

T-4
3 of 5

STP-0000-00(313) Irwin-Ben Hill	SR 107 Rural Section
Full Depth Pavement	
9.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$85/TN) = \$0.78/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$76/TN) = \$0.93/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$73/TN) = \$1.78/SF
10" GAB	(10/12)(0.0735TN/CF)(\$26/TN) = \$1.59/SF
Total	\$5.08/SF

CALCULATIONS



PROJECT: WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.:

T-4

SHEET NO.: 4 of 5

Pavement Saved:

$$(6' \times 110' \times 11 \text{ intersections}) = 7,260 \text{ sf}$$

$$\text{Earth Work } \frac{(6' \times 4' \times 12,250)}{27 \text{ cf/cy}} = 10,889 \text{ cy}$$

$$\text{R/W Saved } \frac{(6' \times 12,250)}{43,560 \text{ sf/AC}} = 1.69 \text{ AC}$$

$$\text{Clear. \& Grubbing} = 1.69 \text{ AC}$$

$$18" \text{ R.C.P. Saved: } 21 (\text{x-drains}) \times 6' = 121 \text{ Lin.ft.}$$

$$24" \text{ R.C.P. Saved: } 3 (\text{x-drains}) \times 6' = 18 \text{ Lin.ft.}$$

$$30" \text{ R.C.P. Saved: } 3 (\text{x-drains}) \times 6' = 18 \text{ Lin.ft.}$$

$$36" \text{ R.C.P. Saved: } 3 (\text{x-drains}) \times 6' = 18 \text{ Lin.ft.}$$

$$42" \text{ R.C.P. Saved} = 6' \text{ Lin.ft.}$$

$$48" \text{ R.C.P. Saved } 2 \times 6' = 12' \text{ Lin.ft.}$$

Triple 10' x 8' culvert - SAVE 6 Lin.ft.

$$\text{Class "A" Conc. } (6' \times 3.836 \text{ cy/LF}) = 23 \text{ cy.}$$

$$\text{Reinf. steel } (6' \times 426.4 \text{ Lbs/L.F.}) = 2,559 \text{ Lbs}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-5

DESCRIPTION: **USE 12-FT-WIDE URBAN SHOULDERS IN LIEU OF 16-FT-WIDE URBAN SHOULDERS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design calls for 16-ft-wide urban shoulders from Sta. 490+69 to Sta. 620+45.

ALTERNATIVE: (sketch attached)

Use 12-ft-wide urban shoulders from Sta. 490+69 to Sta. 620+45.

ADVANTAGES:

- Reduces excavation costs
- Reduces grassing requirements
- Reduces right-of-way requirements

DISADVANTAGES:

- None identified

DISCUSSION:

Reducing the urban shoulders from 16-ft-wide to 12-ft-wide will reduce excavation costs, grassing requirements and right-of-way requirements with no significant reduction in functionality.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 93,571	—	\$ 93,571
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 93,571	—	\$ 93,571



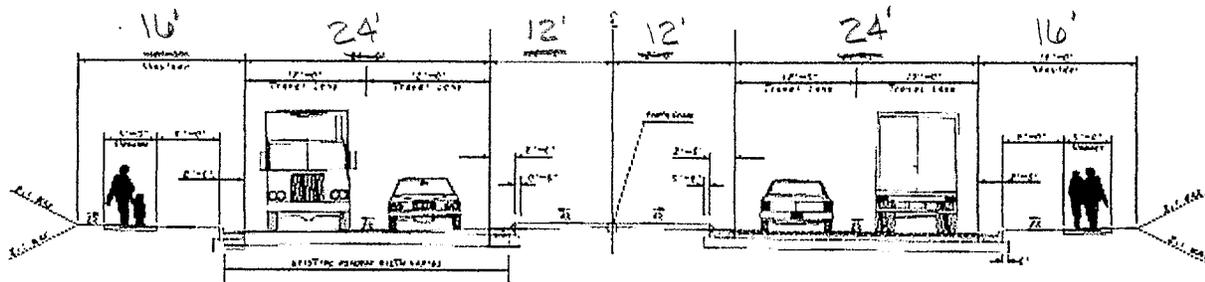
PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 149**
STP00-0000-00(313), P.I. 0000313

ALTERNATIVE NO.: T-5

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

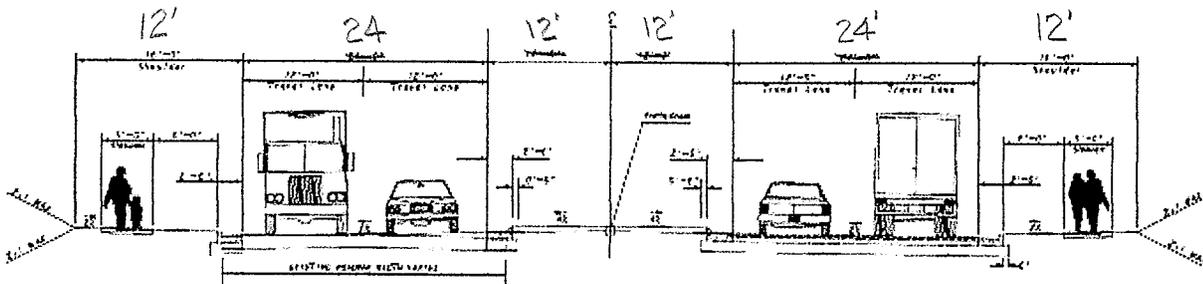
SHEET NO.: 2 of 4

ORIGINAL



24' RAISED MEDIAN

PROPOSED



24' RAISED MEDIAN

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.: T-5

Use 12'-wide Urban Shoulders ILO 16'-wide Shoulders

SHEET NO.: 3 of 4

Length of Curb + Gutter Section is 12,945 LF

$$R/W: 12,945 \text{ LF} \times 8' = 103,560 \text{ SF} \div 43,560 \text{ SF/Ac} = \underline{2.4 \text{ Ac}}$$

$$\text{Grassing: } 12,945 \text{ LF} - 11 \times 30' (\text{Side Roads}) = 12,615' \times 8' \div 43,560 = \underline{2.3 \text{ Ac}}$$

$$\text{Borrow: } 12,615 \text{ LF} \times 10' \times 2' = 252,300 \text{ CF} \times 2 \text{ sides} = 504,600 \text{ CF}$$

$$504,600 \text{ CF} \div 27 \text{ CF/CY} = 18,690 \text{ CY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-6

DESCRIPTION: **USE 4 FT PAVED SHOULDERS IN LIEU OF 6 FT 6 IN PAVED SHOULDERS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design calls for 6 ft, 6-in-wide pavement on the outside shoulders from Sta. 130+80 to Sta. 490+69.

ALTERNATIVE: (sketch attached)

Use 4-ft-wide pavement on the outside shoulders from Sta. 130+80 to Sta. 490+69.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time

DISADVANTAGES:

- Reduces paved area for pulling off the road

DISCUSSION:

Before consideration was given to bicycles, outside shoulders typically had 4 ft of pavement. Since there is not a bicycle route at this location, there is no reason to provide 6 ft 6 in of pavement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 653,201	—	\$ 653,201
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 653,201	—	\$ 653,201

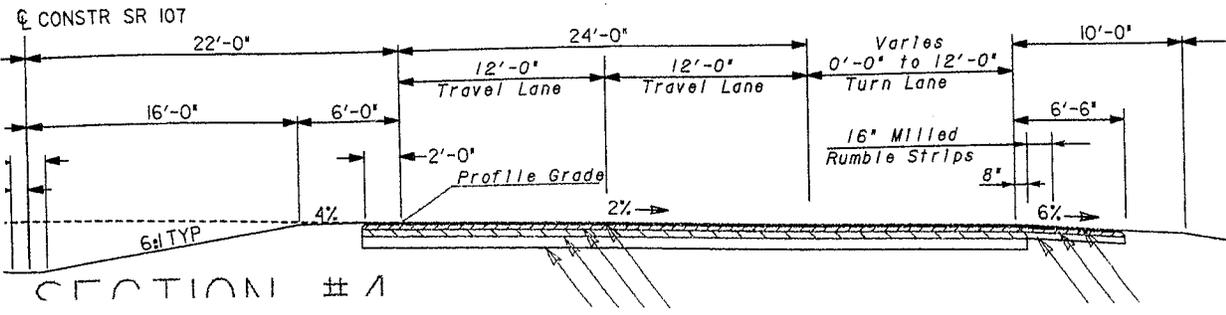
PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. Number 0000313

ALTERNATIVE NO.:

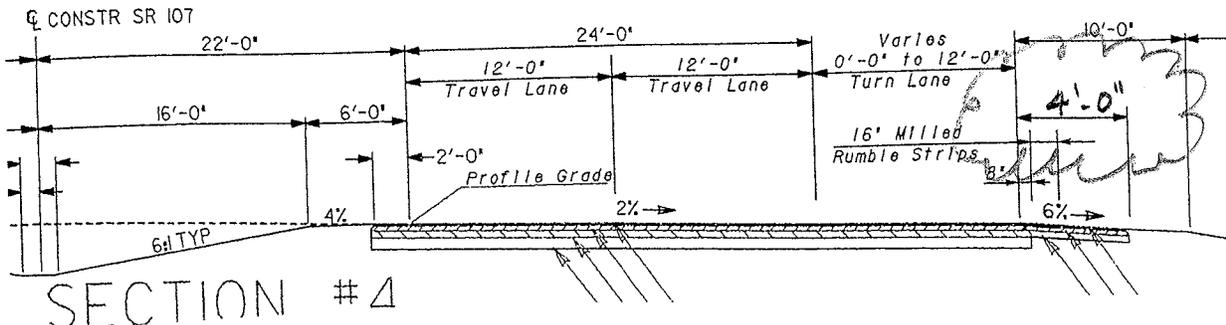
T-6

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: *2* of *4*



ORIGINAL DESIGN



ALTERNATIVE DESIGN

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313) P.I. No. 0000313

ALTERNATIVE NO.: **T-6**

SHEET NO.: **3 of 4**

Shoulder pavement area = $(49069-13080)(2)(6.5-4) = 179,945$ SF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-7

DESCRIPTION: **ELIMINATE SIDEWALK FROM THE URBAN SECTION**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design includes 5-ft sidewalks in the urban typical section from Sta. 490+69.06 to Sta. 620+46.88 on the south side and from Sta. 492+62.97 to Sta. 620+35.89 on the north side of the roadway.

ALTERNATIVE: (sketch attached)

Eliminate the concrete used for the 5-ft sidewalk on either side of the roadway.

ADVANTAGES:

- Saves cost of concrete

DISADVANTAGES:

- No designated path for pedestrians
- Requires an additional 5 ft of grassing

DISCUSSION:

There is not enough demand to justify the proposed sidewalk. With no outstanding numbers of residents in the area, it does not appear that any significant pedestrian demand will occur now through the design year. Grassing the entire shoulder will enable future addition of sidewalks as development occurs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 586,152	—	\$ 586,152
ALTERNATIVE	\$ 80,895	—	\$ 80,895
SAVINGS	\$ 505,257	—	\$ 505,257

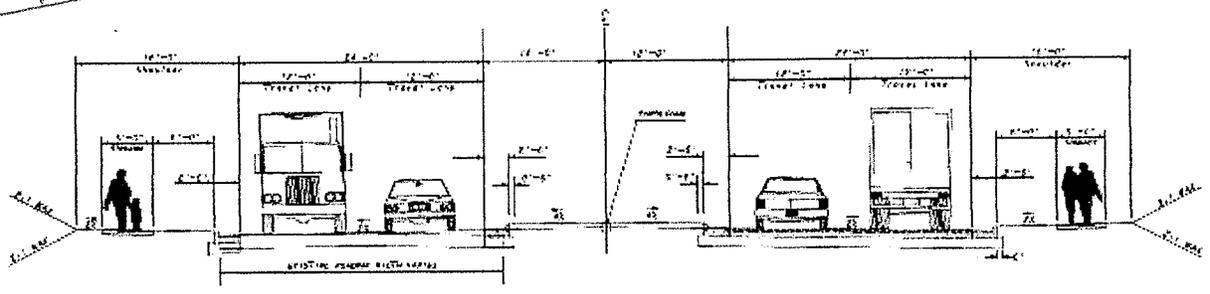
PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
 STP00-0000-00(313), P.I. 0000313

ALTERNATIVE NO.: T-7

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

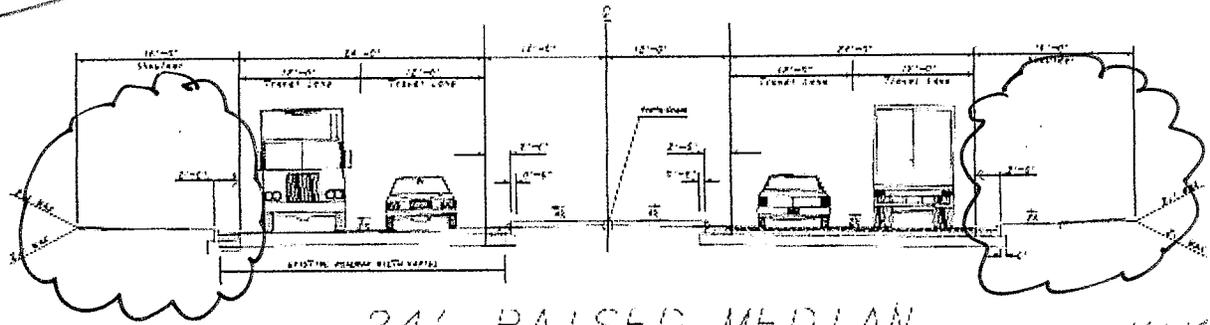
SHEET NO.: 2 of 4

Original



24' RAISED MEDIAN

Alternative



24' RAISED MEDIAN

SIDEWALK
 REPLACED WITH
 GRASSED AREA

SIDEWALK
 REPLACED
 WITH GRASSED
 AREA

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.: T-7

SHEET NO.: 3 of 4

South Side (sta. 490+69.06 to sta. 620+46.88)

12,977.82' sidewalk

$$12,978 (5') = \underline{64,890 \text{ sf sidewalk}}$$

North Side (sta. 492+62.97 to sta. 620+35.89)

12,772.92' sidewalk

$$12,773 (5') = \underline{63,865 \text{ sf sidewalk}}$$

Including sideroads 15020 sf

$$\begin{array}{r} 128,755 \text{ sf} \\ \sim \\ \underline{128,755} \\ 9 \end{array} = 14,306 \text{ sf}$$

$$\frac{15020 \text{ sf}}{4840 \text{ sf}} : 1 \text{ acre} = \underline{3.10 \text{ acre}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-8

DESCRIPTION: **USE 24-IN-WIDE CURB AND GUTTER IN LIEU OF 30-IN-WIDE CURB AND GUTTER**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The original design includes 30-in-wide curb and gutter throughout the project.

ALTERNATIVE:

Use 24-in-wide curb and gutter throughout the project.

ADVANTAGES:

- Reduces material cost

DISADVANTAGES:

- Increases gutter spread which may result in increased drainage cost

DISCUSSION:

The savings from 24-in-wide curb and gutter do not include the right-of-way savings resulting from 6 in less width on both sides of the road. The median width would remain 24-ft-wide.

The potential right-of-way savings might get offset by a possible increase in the cost of additional catch basin that could be required due to increased gutter spread.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 744,732	—	\$ 744,732
ALTERNATIVE	\$ 694,470	—	\$ 694,470
SAVINGS	\$ 50,262	—	\$ 50,262

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

T-9

DESCRIPTION: **USE 11-FT-WIDE IN LIEU OF 12-FT-WIDE INSIDE LANES**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design includes 12-ft-wide lanes from CR 264 to SR 11/US 129.

ALTERNATIVE: (sketch attached)

Use 11-ft-wide inside lanes from CR 264 to SR 11/US 129. Maintain 12-ft-wide outside lanes to accommodate truck traffic.

ADVANTAGES:

- Reduces pavement requirement
- Reduces right-of-way requirement
- Reduces bridge width

DISADVANTAGES:

- Narrower inside lanes

DISCUSSION:

Downtown Atlanta has 11-ft-wide lanes on its freeways without any significant problems. Design year traffic volumes along SR 107 range from 1,875 ADT at CR 264 to 10,950 ADT at SR 11/US 129. Constructing 11-ft-wide inside lanes on SR 107 from CR 264 to SR 11/US 129 will save material and construction requirements without sacrificing the quality of traffic movement. Keeping 12-ft-wide outside lanes will provide enhanced goods movement for 30 percent truck traffic traveling through the corridor.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 15,835,142	—	\$ 15,835,142
ALTERNATIVE	\$ 15,175,481	—	\$ 15,175,481
SAVINGS	\$ 659,661	—	\$ 659,661

PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 149**
 STP00-0000-00(313), P.I. 0000313

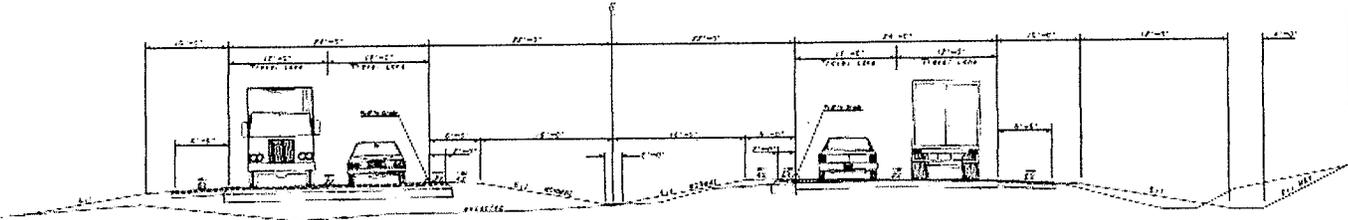
ALTERNATIVE NO.: **T-9**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 5**

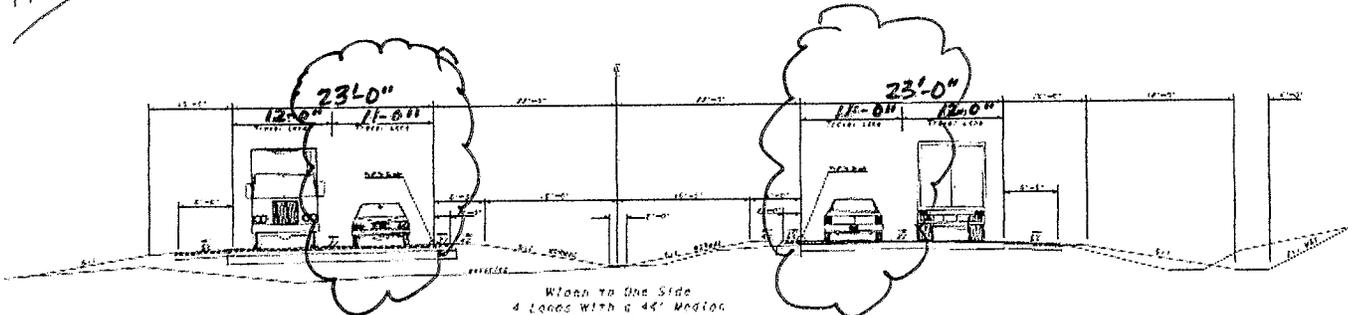
RURAL SECTION

original



Widen to One Side
 4 Lanes With a 4' Median
 (D.S. 65mph)

Alternate



Widen to One Side
 4 Lanes With a 4' Median
 (D.S. 65mph)

CALCULATIONS



PROJECT:

WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.: **T-9**

SHEET NO.: **4 of 5**

SLD17 / STP-0000-00(313) (Rural section)
Full Depth Pavement

$$(9.5\text{mm}) 165 \text{ lb/sy} \times \frac{T}{2000\#} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$85}{\text{TN}} = \$0.78/\text{sf}$$

$$(19\text{mm}) 220 \text{ lb/sy} \times \frac{T}{2000\#} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$76}{\text{TN}} = \$0.93/\text{sf}$$

$$(25\text{mm}) 440 \text{ lb/sy} \times \frac{T}{2000\#} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$73}{\text{TN}} = \$1.78/\text{sf}$$

$$(10" \text{ GAB}) 0.833' \times \frac{0.0735T}{\text{cf}} \times \frac{\$26}{\text{TN}} = \$1.59/\text{sf}$$

(Full-Depth) Total = **\\$5.08/sf**

SR 1211 ST-0000-00(313) Urban section
Full Depth Pavement

$$(9.5\text{mm}) 165 \text{ lb/sy} \times \frac{T}{2000\#} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$85}{\text{TN}} = \$0.79/\text{sf}$$

$$(19\text{mm}) 220 \text{ lb/sy} \times \frac{T}{2000\#} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$76}{\text{TN}} = \$0.93/\text{sf}$$

$$(25\text{mm}) 550 \text{ lb/sy} \times \frac{T}{2000\#} \times \frac{\text{SY}}{9\text{sf}} \times \frac{\$73}{\text{TN}} = \$2.23/\text{sf}$$

$$(10" \text{ GAB}) 0.833' \times \frac{0.0735T}{\text{cf}} \times \frac{\$26}{\text{TN}} = \$1.59/\text{sf}$$

(Full-Depth) Total = **\\$5.53/sf**

Rural

From sta 100+00 to sta 490+69.06

$$39069 - 168.42 = \underline{38,901 \text{ LF}}$$

From sta 620+35.89 to 631+00

$$\underline{1064 \text{ LF}}$$

$$38,901 + 1064 = 39,965 \text{ LF}$$

4 Lanes $(39,965' \times 48') = 1,918,320 \text{ sf}$

less 1ft $(39,965') \times (46') = 1,838,390 \text{ sf}$

Urban

From sta. 490+69.06

to 620+35.89

$$\underline{12967 \text{ LF}}$$

4 lanes $(12967' \times 48') = 622,416 \text{ sf}$

less 1ft $(12967') \times (46') = 596,482 \text{ sf}$

Bridge

Length = 168.42' (sta. 467+67.73 to sta. 469+36.15)

$$(168.42') \times (24') =$$

$$\underline{4042 \text{ sf}}$$

Westbound Bridge $\frac{\$691,000 \text{ LS}}{4042} = \underline{\$171 \text{ per sf}}$

Eastbound Bridge $\frac{\$518,250 \text{ LS}}{4042} = \underline{\$128 \text{ per sf}}$

WB Less 1ft $(168.42') \times (23') = 3874 \text{ sf} \rightarrow (3874 \text{ sf}) \times (\$171 \text{ per sf}) = \underline{\$662,454}$

EB Less 1ft $(168.42') \times (23') = 3874 \text{ sf} \rightarrow (3874 \text{ sf}) \times (\$128 \text{ per sf}) = \underline{\$495,872}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

DESCRIPTION: **ELIMINATE THE SIDEWALK FROM THE SOUTH SIDE OF THE URBAN SECTION OF SR 107**

ALTERNATIVE NO.:
T-10

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design calls for urban shoulders with 5-ft-wide sidewalk, curb and gutter from Sta. 490+69 to Sta. 620+46.8 on both sides of SR 107.

ALTERNATIVE: (sketch attached)

Remove the 5-ft-wide sidewalk from the south side of SR 107 from Sta. 490+69 to Sta. 620+46.8.

ADVANTAGES:

- Reduces pavement requirements
- Reduces right-of-way requirements

DISADVANTAGES:

- No pedestrian access from the south side of SR 107
- Requires an additional 5 ft of grassing

DISCUSSION:

There is not enough demand to justify the proposed sidewalk. With no outstanding numbers of residents in the area, it does not appear that any significant pedestrian demand will occur now through the design year. Grassing the entire shoulder will enable future addition of sidewalks as development occurs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 586,152	—	\$ 586,152
ALTERNATIVE	\$ 321,124	—	\$ 321,124
SAVINGS	\$ 265,028	—	\$ 265,028

SKETCH



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. 0000313

ALTERNATIVE NO.: *T-10*

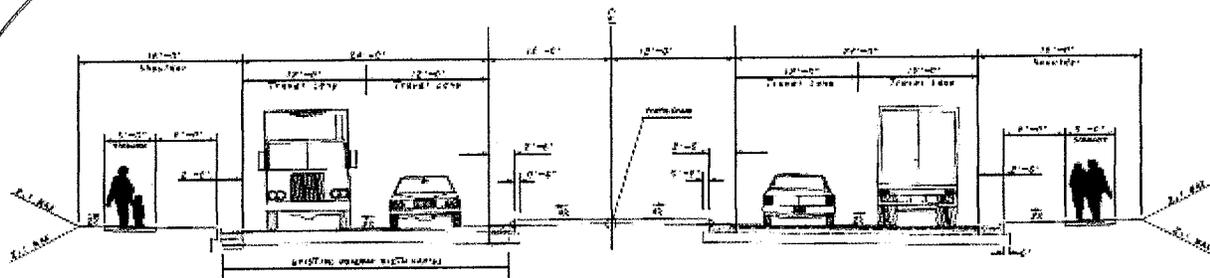
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

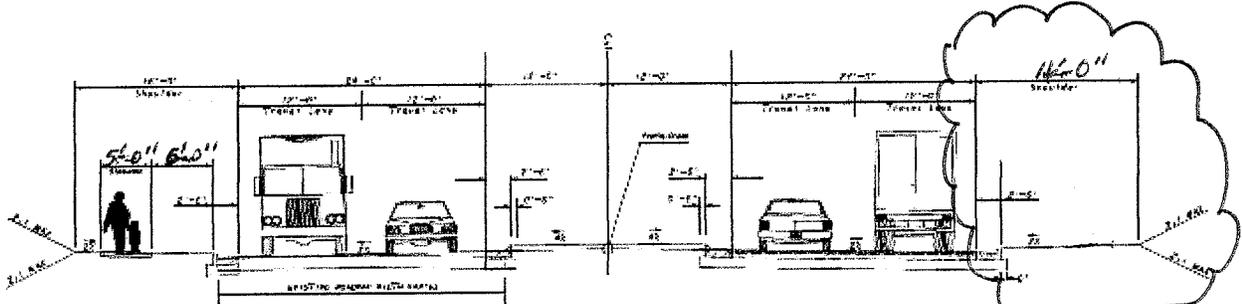
SHEET NO.: *2 of 4*

original



24' RAISED MEDIAN

Alternate



24' RAISED MEDIAN

CALCULATIONS



PROJECT:

WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.: T-10

SHEET NO.: 3 of 4

Urban Shoulder + Rural Shoulder

$$490 + 69 + 620 + 46.88 = \underline{\underline{12978 \text{ LF}}}$$

$$\times 10' = \underline{\underline{129,780 \text{ sf}}}$$

Sidewalk \rightarrow

$$(12,978 \times 5') = 64,890 \text{ sf}$$
$$\frac{64,890}{9} = 7210 \text{ sy}$$

grass \rightarrow $(12,978 \times 5') = 64,890 \text{ sf}$

$$\frac{64,890}{9} = 7210 \text{ sy}$$

$$\underline{\underline{7210 \text{ sy}}} \Rightarrow \frac{7210 \text{ sy}}{4840 \text{ sy}} (1.49 \text{ ac})$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

D-1

DESCRIPTION: **USE HDPE PIPE IN LIEU OF RCP PIPE FOR
 LONGITUDINAL DRAINAGE**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The original design uses RCP (Rigid Concrete Pipe) for all storm drains.

ALTERNATIVE:

Use HDPE (High Density Polyethylene) pipe for the urban longitudinal drainage system.

ADVANTAGES:

- Reduces construction cost
- Reduces installation time

DISADVANTAGES:

- Requires 6 in of TP2 foundation backfill

DISCUSSION:

The alternative would use HDPE pipe along the urban curb and gutter section only. HDPE pipe is lower cost per linear foot than RCP and comes in 20 ft lengths. In addition, HDPE pipe is light-weight which would reduce installation time.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 459,239	—	\$ 459,239
ALTERNATIVE	\$ 298,123	—	\$ 298,123
SAVINGS	\$ 161,116	—	\$ 161,116

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
 STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.:

D-1

SHEET NO.:

2 of 3

HDPE pipe used ILO R.C.P. pipe
 under Alternate D-1

Longitudinal pipe Quantities:

18" pipe = 8,430 LF (from plans)

24" pipe = 1000 LF (from plans)

Found. Backfill TP2 MAT'L.

$$\frac{1.5' \times .5' \times 8,430'}{27 \text{ cf/cy}} = 235 \text{ cy}$$

$$\frac{2' \times .5' \times 1000'}{27 \text{ cf/cy}} = 37 \text{ cy}$$

$$272 \text{ cy}$$

$$18" \text{ HDPE pipe} = \frac{\$7.70}{\text{LF}} (\text{mat'l}) + \frac{\$18}{\text{LF}} (\text{Install}) = \frac{\$25.70}{\text{LF}}$$

$$24" \text{ HDPE Pipe} = \frac{\$12.50}{\text{LF}} + \frac{\$24}{\text{LF}} = \frac{\$36.50}{\text{LF}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:

G-1

DESCRIPTION: **SHORTEN THE LEFT-TURN LANES TO THE MINIMUM ALLOWABLE DECELERATION LENGTH**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design uses the maximum “x” length of 450 ft for storage and deceleration for left-turn lanes per GA. Construction Detail M-3.

ALTERNATIVE:

Use the minimum “x” length of 300 ft for storage and deceleration for left-turn lanes per GA. Construction Detail M-3.

ADVANTAGES:

- Reduces pavement requirements
- Reduces long-term pavement maintenance

DISADVANTAGES:

- None identified

DISCUSSION:

300 ft is adequate for left-turn lanes given the low design year traffic volumes, which range from 1,875 ADT at CR 264 to 10,950 ADT, at SR 11/US 129 along SR 107.

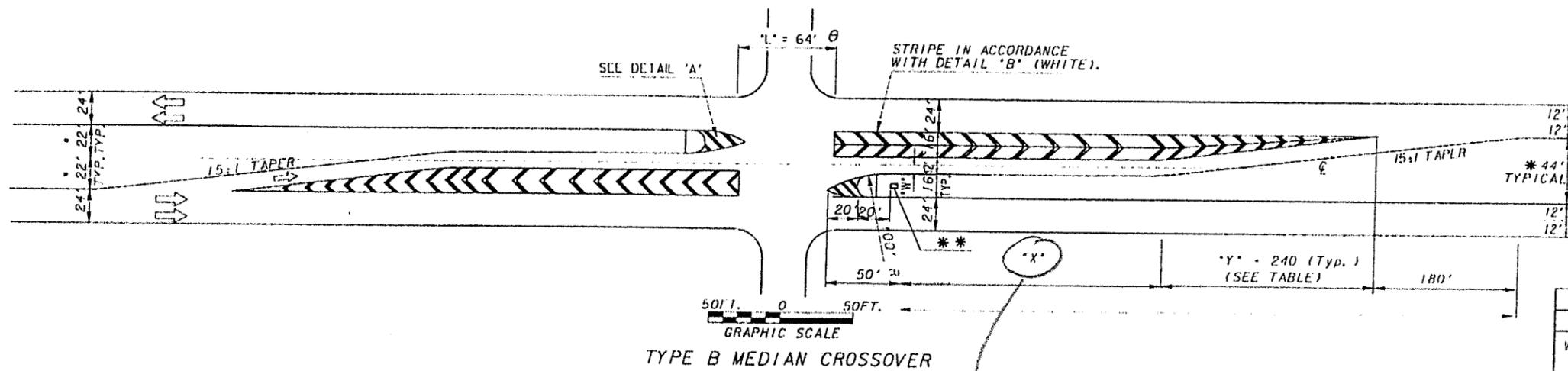
The right-turn lanes were not shortened since they already meet the minimum deceleration length for a 65 mph design speed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 459,878	—	\$ 459,878
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 459,878	—	\$ 459,878

2/4
 Alt. G-1
 (313)

Project:
 STP-0000-00(313)

Sketch
 Alt. G-1
 2/4



Δ 'X' DIMENSION IS FOR DECELERATION ONLY. DOES NOT ACCOUNT FOR ANY STORAGE NEEDED. MIN. VALUES FOR 'X' ARE ONLY TO BE USED WHERE SPACING BETWEEN MEDIAN OPENINGS DOES NOT ALLOW FOR THE MORE DESIRABLE LENGTH.

TYPE B MEDIAN CROSSOVERS					
WIDTH OF MEDIAN	DECELERATION LENGTH - Δ (FT.)			Y	W
	DESIGN SPEED ↓				
	45 MPH	55 MPH	65 MPH		
32	350(200MIN)	450(350MIN)	650(450MIN)	60	4
44	150(150MIN)	300(150MIN)	450(300MIN)	240	16
64	N/A	150(150MIN)	300(150MIN)	390	26

X = 450' for "Original"

X = 300' for "Alternate Design"

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
 STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.:

G-1
 SHEET NO.: 3 of 4

Median Openings Left Turn Lane
 Length 5'aved. use 300' min for 65mph

→ 3 median opening @ 450' (storage/decel)
 $((450' - 300') \times 3 \text{ intersections} \times 28' \times 2 \text{ turn lanes}) = 25,200 \text{ sf}$

→ 4 median openings @ 500' (storage/decel)
 $((500' - 300') \times 4 \text{ intersections} \times 28' \times 2 \text{ turn lanes}) = 44,800 \text{ sf}$

→ 1 median openings only 1 left turn lane
 is longer than 300' storage.
 $(500' - 300') \times 28' \times 1 \text{ turn lane} = 5,600 \text{ sf}$

Total = 75,600 sf

STP-0000-00(313) Irwin-Ben Hill

SR 107 Urban Section

Full Depth Pavement

9.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$85/TN) =	\$0.78/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$76/TN) =	\$0.93/SF
25 mm	(550#/SY)(1TN/2000#)(1SY/9SF)(\$73/TN) =	\$2.23/SF
10" GAB	(10/12)(0.0735TN/CF)(\$26/TN) =	\$1.59/SF

Total \$5.53/SF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:
G-2

DESCRIPTION: **USE TYPE A MEDIAN OPENINGS IN LIEU OF TYPE B**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design calls for Type B median openings throughout the project limits.

ALTERNATIVE:

Use Type A median openings throughout the project limits.

ADVANTAGES:

- Reduces pavement requirement

DISADVANTAGES:

- None identified

DISCUSSION:

A total of seven median openings are placed throughout the length of the project. Type B median openings were used but Type A median openings are adequate based upon design year traffic volumes along SR 107 which range from 1,875 ADT at CR 264 to 10,950 at SR 11/US 129.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 759,220	—	\$ 759,220
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 759,220	—	\$ 759,220

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313) P.I. Number 0000313

ALTERNATIVE NO.: **G-2**

SHEET NO.: **3 of 4**

Powt needed for Type B: $450' \times 28' = 18900 \text{ SF}$

$$(420' \times 28') \div 2 = 5880 \text{ SF}$$

$$(50' \times 34') \div 2 = 850 \text{ SF}$$

25,630 SF

Type A: $525' \times 12' = 6300 \text{ SF}$

$$(180' \times 12') \div 2 = 1080 \text{ SF}$$

$$(42' \times 20') \div 2 = 420 \text{ SF}$$

7800 SF

Type A saves 17,830 SF $\therefore 17,830 \text{ SF} \times \$5.53/\text{SF} = \$98,600$ opening

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 149**
STP00-0000-00(313), P.I. No. 0000313
Irwin and Ben Hill Counties, Georgia

ALTERNATIVE NO.:
G-17

DESCRIPTION: **REDUCE THE SPEED LIMIT TO 55 MPH AT VAN
 BUREN/WEBSTER ROAD AND SHORTEN THE CURVE
 RADIUS AT STATION 364+09**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design provides a 1°-45 ft minute curve with a length of 5,062.26 ft.

ALTERNATIVE: (sketch attached)

Provide a 2°-45 ft minute curve with a length of 3,221.43 ft and extend the tangent section by 1,191 ft on each end.

ADVANTAGES:

- Reduces right-of-way cost
- Reduces construction on new location

DISADVANTAGES:

- Sharper curve for trucks to negotiate
- Lower speed limit

DISCUSSION:

The flat curve provided in the original design requires a large amount of right-of-way and construction on new location. It is designed for 65 mph. The speed limit drops to 55 mph at SR 125, which is 2 1/8 miles east of Van Buren/Webster Road (on the original alignment). Dropping the speed limit to 55 mph at Van Buren/Webster Road would create only a minor inconvenience to the traveling public. This alternative would also allow a shorter Redwood Road Connector.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,076,182	—	\$ 2,076,182
ALTERNATIVE	\$ 1,884,302	—	\$ 1,884,302
SAVINGS	\$ 191,880	—	\$ 191,880

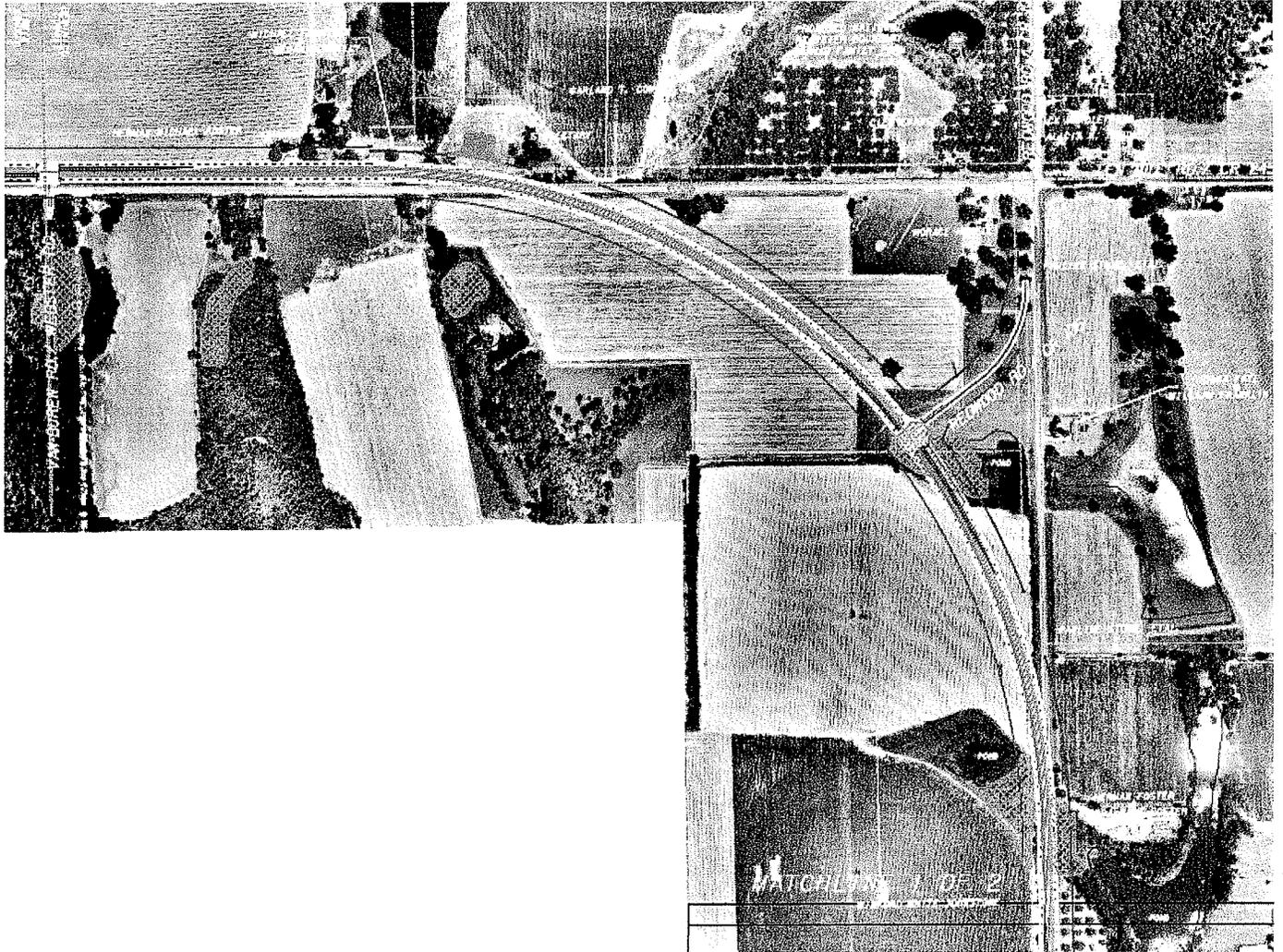
PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. 0000313

ALTERNATIVE NO.:

G-17

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: *2 of 5*

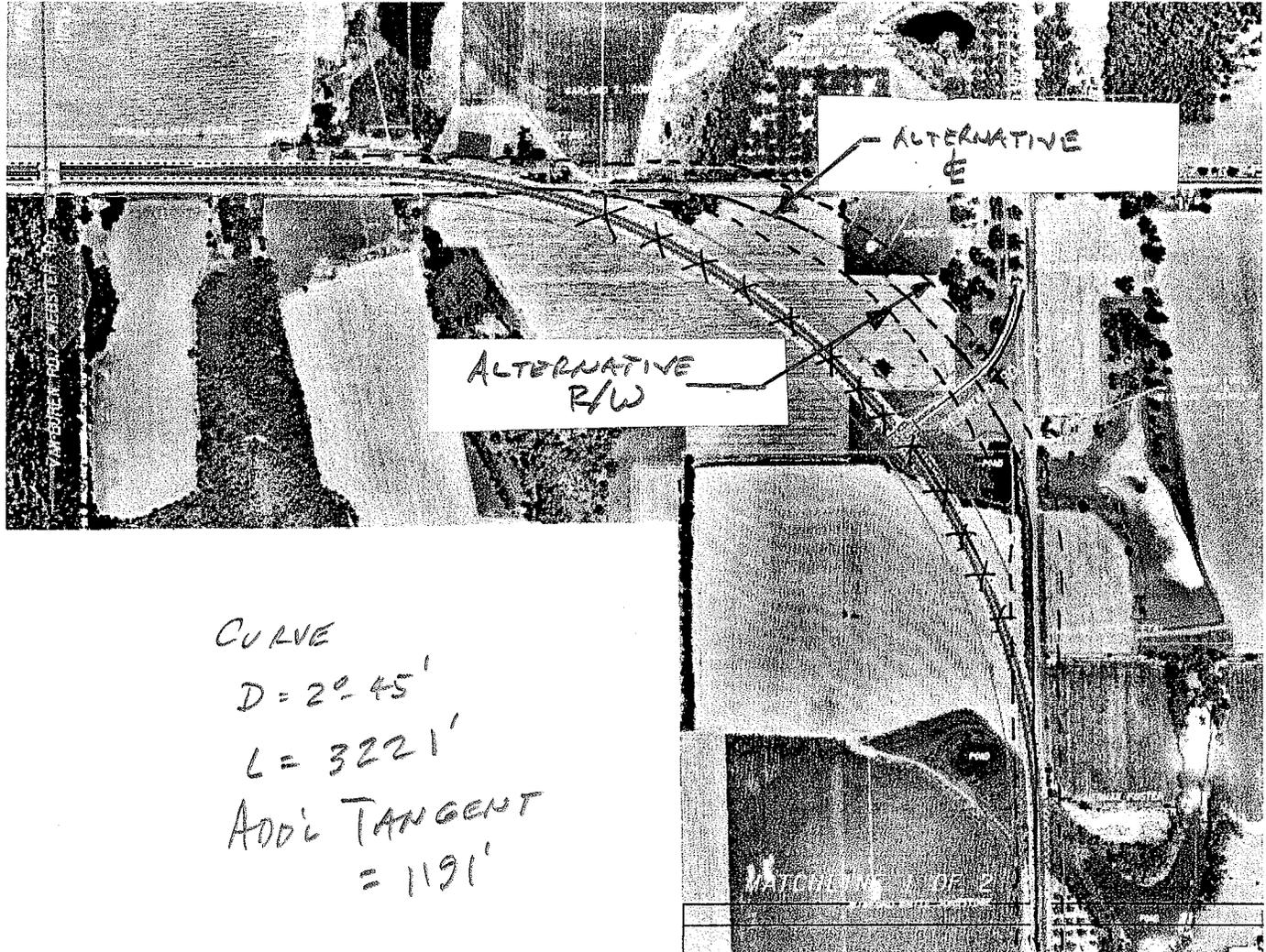


PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313), P.I. 0000313

ALTERNATIVE NO.:
G-17

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **3 of 5**



CURVE
 $D = 20-45'$
 $L = 3221'$
ADD'L TANGENT
 $= 1191'$

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129**
STP00-0000-00(313) P.I. No. 0000313

ALTERNATIVE NO.: **G-17**

SHEET NO.: **4 of 5**

Original Design:

Alignment length = Curve length = 5062'

Full-depth pavement area = $2(26)(5062) = 263,224$ SF

Shoulder pavement area = $2(6.5)(5062) = 65,806$ SF

Right-of-way = $5062(240)/43560 = 27.9$ AC

Additional construction on Redwood Road Connector = 52' long

Full depth pavement = $52(28) = 1456$ SF

Right-of-way = $52(150)/43560 = 0.2$ AC

Total full-depth pavement = 264,680 SF

Total R/W = 28.1 AC

Alternative Design:

Full-depth pavement = $3221(2)(26) + 26(2)(1191) = 229,424$ SF

Shoulder pavement area = $2(6.5)[3221+2(1191)] = 72,839$ SF

Right-of-way = $[3221(240) + 2(1191)(240-80)]/43560 = 26.5$ AC

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

T-2

DESCRIPTION: **USE INTERMITTENT PASSING LANES IN LIEU OF A
 FOUR-LANE RURAL DIVIDED SECTION**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design provides a four-lane divided section for SR 107 from the ramps on the east side of I-75 to US 129 in Fitzgerald.

ALTERNATIVE:

Retain the existing two-lane highway and provide one, one-mile passing lane in each direction between Hawkins Road/CR 62 and Eleanor Circle/CR 282. Includes improvements to all intersections (see sheet 2 of 3) and reconstruction of 14% of the existing two-lane rural section to correct sight distance deficiencies.

ADVANTAGES:

- Reduces construction time
- Reduces construction cost
- Reduces right-of-way requirements
- Reduces long-term maintenance requirements

DISADVANTAGES:

- Does not provide four lanes of capacity as documented in the Need and Purpose statement.

DISCUSSION:

The Need and Purpose statement for this project states that no improvements are required in this corridor for future traffic or because of accidents. Additionally, design year traffic volumes range from 1,600 ADT at CR 250 to 1,700 ADT at CR 264. Providing passing lanes will allow traffic to pass slower vehicles safely without the expense of providing four lanes for the entire corridor.

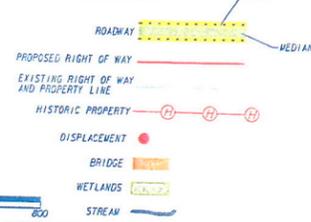
It may be advantageous to purchase the right-of-way now for a future four-lane rural section as traffic demand increases, however additional right-of-way cost is not included in this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 37,501,468	—	\$ 37,501,468
ALTERNATIVE	\$ 4,923,013	—	\$ 4,923,013
SAVINGS	\$ 32,578,455	—	\$ 32,578,455

ALT. NO.
T-2
Sht. 2 of 4

Carter Burgess
Atlanta, GA

LEGEND



www.mcgeepartners.com
GDOT
Georgia Department of Transportation

Carter Burgess
Atlanta, GA

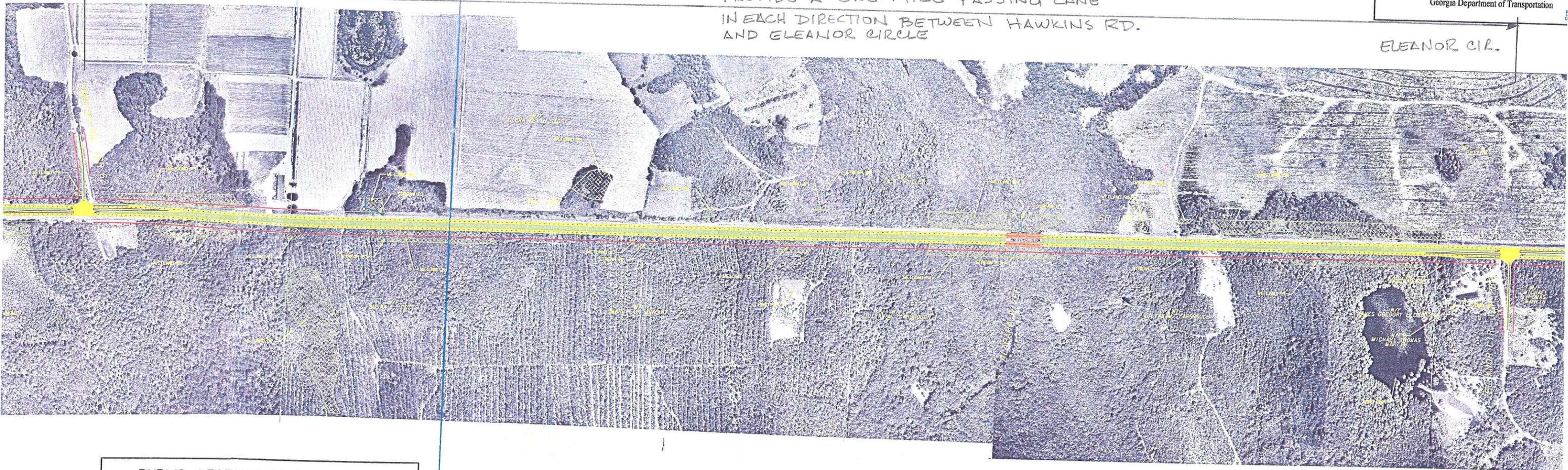
www.mcgeepartners.com
GDOT
Georgia Department of Transportation



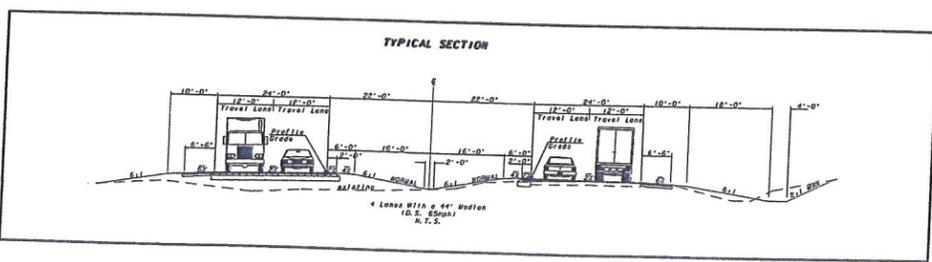
HAWKINS RD

PROVIDE A ONE-MILE PASSING LANE
IN EACH DIRECTION BETWEEN HAWKINS RD.
AND ELEANOR CIRCLE

ELEANOR CIR.



PUBLIC INFORMATION OPEN HOUSE
STP-0000-00(314)
P.I. 0000314
TURNER & IRWIN COUNTY
SR 107 FROM CR 250 TO CR 264
JUNE 2008



PUBLI
T
SR 107
131

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. No. 0000314

ALTERNATIVE NO.: T-2

SHEET NO.: 3 of 4

Alternative Design

Use 800-foot tapers and a one-mile passing lane

Full-depth pavement: $2(0.5)(800)(12) + 5280(12) = 72,960$ SF X 2 passing lanes = 145,920 SF

Earthwork: Assume average depth of 5 feet over the area of the passing lane

$$\text{Volume} = 145920(5)/27 = 27,022 \text{ CY}$$

Right-of-way: Assume 40 feet over the total length of the passing lanes

$$\text{Area} = \{2(800) + 5280\}(40)(2)/43560 = 12.64 \text{ AC}$$

Drainage: Assume culvert extensions will be 20% of that for the original design and that every culvert on the project will be lengthened (conservative assumption)

$$\text{Concrete} = 0.20(380) = 76 \text{ CY}$$

$$\text{Reinforcing steel} = 0.20(34700) = 6,940 \text{ LB}$$

Improvements to existing intersections:

Assume \$100,000 per small intersection including Eleanor Circle #2 and Kennedy Road

Assume \$350,000 per intersection with Type B median, left and right turn lanes including Hawkins Road, Eleanor Circle #1, Truman Road, Eisenhower Road, Reagan/Arthur Road, Cleveland/Jeff Davis Road.

Correction of Geometric Deficiencies:

Assume 50% of Roadway Subtotal to represent two lane complete reconstruction = $\$20,978,161/2 = \$10,489,080$.

Assume 14% reconstruction of existing Roadway = $(10,489,080)(0.14) = \$1,468,471$

COST WORKSHEET

PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.: **T-2**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Full-depth Pavement	SF				145,920	4.92	717,926
Class A Concrete	CY				76	620.00	47,120
Reinforcing Steel	LB				6,940	1.00	6,940
Earthwork	CY				27,022	5.00	135,110
Intersection Improvements:							
Small Intersection	EA				2	100,000.00	200,000
Intersection with Type B Median	EA				6	350,000.00	2,100,000
Correct Geometric Deficiencies	EA				1	1,468,471.00	1,468,471
Right-of-way	AC				12.64	5,000.00	63,200
Right-of-way markup @ 148%	LS				1	93,536.00	93,536
Total Project Cost minus Utilities	LS	1	37,501,468.46	37,501,468			
Subtotal (Less Right-of-Way)				37,501,468			4,675,567
Markup (%) at 10% minus R/W				Included			90,710
TOTAL (Incl. Right-of-Way)				37,501,468			4,923,013

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

T-3

DESCRIPTION: **USE A 32-FT-WIDE RURAL GRASSED MEDIAN IN LIEU OF
 A 44-FT-WIDE RURAL GRASSED MEDIAN**

SHEET NO.:

1 of 5

ORIGINAL DESIGN: (sketch attached)

The original design uses a 44-ft-wide depressed grassed median the entire length of the project.

ALTERNATIVE: (sketch attached)

Use a 32-ft-wide depressed grassed median the entire length of the project.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time
- Reduces environmental impacts
- Reduces right-of-way requirement

DISADVANTAGES:

- Less separation between opposing traffic

DISCUSSION:

The 32-ft-wide depressed median meets the required criteria for a high speed design (65 mph) facility. The narrower median will save right-of-way, pavement, drainage, and earthwork costs and has been implemented on other GDOT projects.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 628,569	—	\$ 628,569
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 628,569	—	\$ 628,569

PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.:

T-3

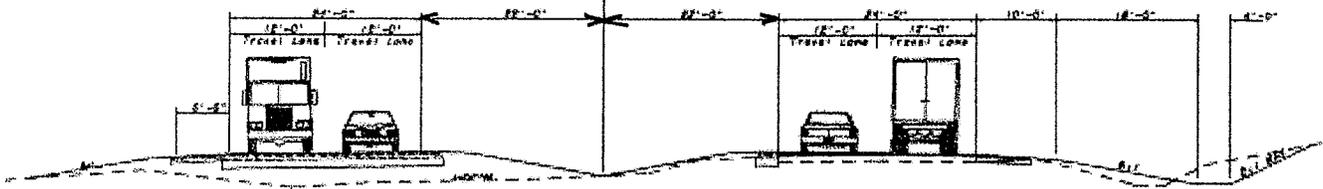
ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 2 of 5

Original

TYPICAL SECTIONS

22' 22'

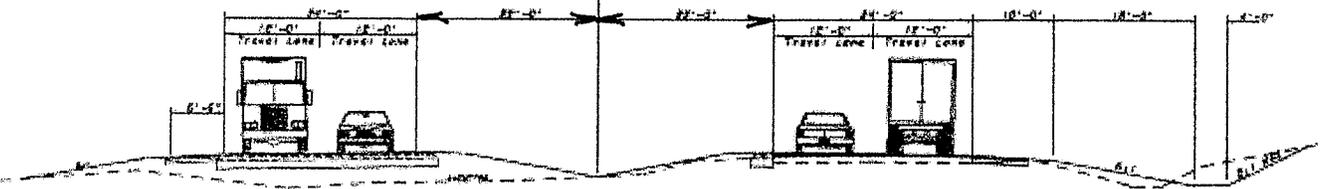


Widen To One Side
 4 Lanes With a 44' Median
 (D.S. 65mph)

Alternate

TYPICAL SECTIONS

16' 16'



Widen To One Side
 4 Lanes With a 44' Median
 (D.S. 65mph)

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.:

T-3

SHEET NO.:

3 of 5

STP-0000-00(314)Turner-Irwin SR 107

Full Depth Pavement

12.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$87/TN) =	\$0.80/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$76/TN) =	\$0.93/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$73/TN) =	\$1.78/SF
10" GAB	(10/12)(0.0735TN/CF)(\$23/TN) =	\$1.41/SF

Total \$4.92/SF

$$\text{Pavement Saved: } (12' \times 100' \text{ Avg.} \times 11 \text{ median Openings}) = \\ = 13,200 \text{ sf}$$

$$\text{Earthwork saved: } \frac{(12' \times 4' \text{ Avg} \times 36,700')}{27 \text{ cf/cy}} = 65,245 \text{ cy}$$

R/W saved: use 10' savings in R/W even increment.

$$\frac{(10' \times 36,700')}{43,560 \frac{\text{sf}}{\text{AC}}} = 8.43 \text{ AC}$$



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.:

T-3

SHEET NO.: 4 of 5

DRAINAGE SAVED X-DRAINS
 estimated from similar projects

18" RCP = 300 LF

24" RCP = 60 LF

30" RCP = 60 LF

36" RCP = 80 LF

48" RCP = 60 LF

8'x6' single Box Culvert

Class "A" Conc.: 12'x .976 cy/LF = 11.7 cy ≈ 12 cy

Reinf. BAR Steel: 12'x 118.1 Lbs/LF = \$1,418 Lbs

COST WORKSHEET



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.: **T-3**

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
Full Depth Pavement	SF	13,200	4.92	64,944			
Earthwork	CY	65,245	5.00	326,225			
Clearing and Grubbing	AC	8.43	5,000.00	42,150			
18-inch RCP	LF	300	43.00	12,900			
24-inch RCP	LF	60	55.00	3,300			
30-inch RCP	LF	60	75.00	4,500			
36-inch RCP	LF	80	82.00	6,560			
48-inch RCP	LF	60	116.00	6,960			
Culvert saved:							
Class "A" Concrete	CY	12	620.00	7,440			
Bar Reinforced Steel	LB	1,418	1.00	1,418			
Right-of-Way Saved	AC	8.43	5,000.00	42,150			
Right-of-Way Markup (148%)	LS	1	62,382.00	62,382			
Subtotal (Less Right-of-Way)				476,397			
Markup (%) at 10.0%				47,640			
TOTAL (Incl. Right-of-Way)				628,569			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

T-6

DESCRIPTION: **USE 4 FT PAVED SHOULDERS IN LIEU OF 6 FT 6 IN PAVED SHOULDERS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design calls for 6 ft 6 in of pavement on the outside shoulders the entire length of the project limits.

ALTERNATIVE: (sketch attached)

Use 4 ft of pavement on the shoulder the entire length of the project limits.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time

DISADVANTAGES:

- Reduces paved area for pulling off the road

DISCUSSION:

Before consideration was given to bicycles, outside shoulders typically had 4 ft of pavement. Since there is not a bicycle route at this location, there is no reason to provide 6 ft 6 in of pavement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 681,424	—	\$ 681,424
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 681,424	—	\$ 681,424

SKETCH



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.:

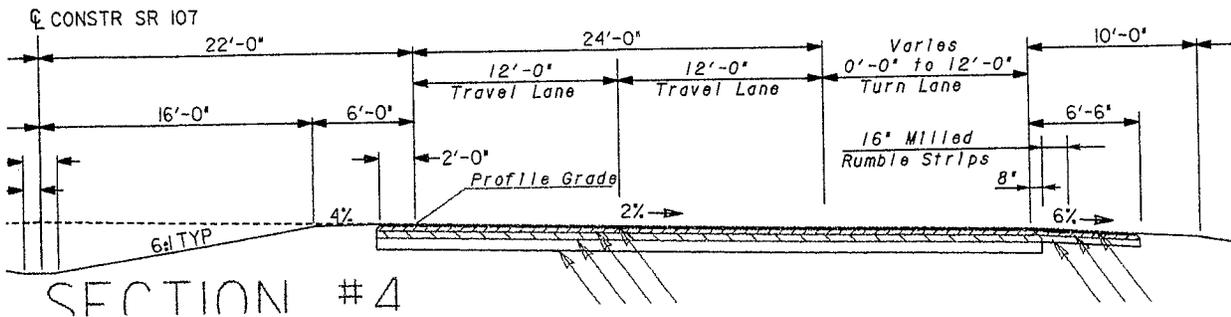
T-6

ORIGINAL DESIGN

ALTERNATIVE DESIGN

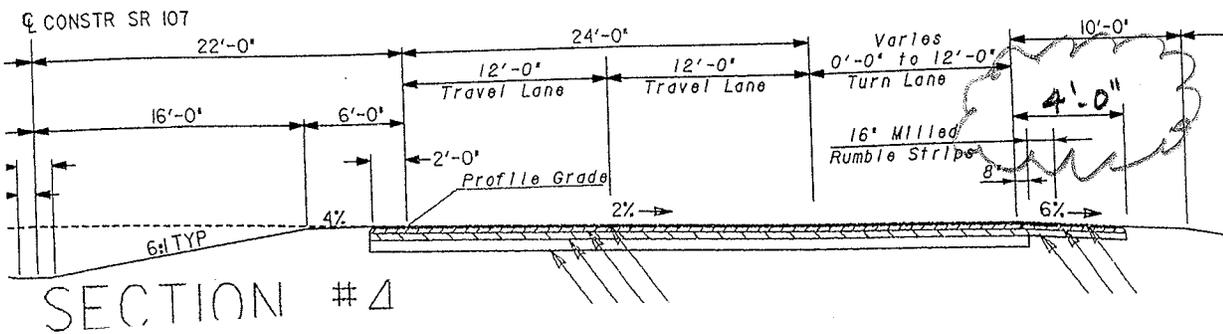
BOTH

SHEET NO.: 2 of 4



SECTION #4

ORIGINAL DESIGN



SECTION #4

ALTERNATIVE DESIGN

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. No. 0000314

ALTERNATIVE NO.: **T-6**

SHEET NO.: **3 of 4**

Shoulder pavement area = $(49266-11722)(2)(6.5-4) = 187,720$ SF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

T-9

DESCRIPTION: **USE 11-FT-WIDE INSIDE LANES IN LIEU OF 12-FT-WIDE INSIDE LANES**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design includes 12-ft-wide lanes from CR 250 to CR 264.

ALTERNATIVE: (sketch attached)

Use 11-ft-wide inside lanes from CR 250 to CR 264. Maintain 12-ft-wide outside lanes to accommodate truck traffic.

ADVANTAGES:

- Reduces pavement requirement
- Reduces right-of-way requirement
- Reduces bridge width

DISADVANTAGES:

- Narrower inside lanes

DISCUSSION:

Downtown Atlanta has 11-ft-wide lanes on its freeways without any significant problems. Design year traffic volumes along SR 107 from I-75 to CR 250 range from 1,600 ADT at CR 250 to 1,700 ADT at CR 264. Constructing 11-ft-wide inside lanes on SR 107 from CR 250 to CR 264 will save material and construction cost without sacrificing the quality of traffic movement. Keeping 12-ft-wide outside lanes will provide enhanced goods movement for 30 percent truck traffic traveling through the corridor.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 15,963,041	—	\$ 15,963,041
ALTERNATIVE	\$ 15,225,936	—	\$ 15,225,936
SAVINGS	\$ 737,105	—	\$ 737,105

PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314), P.I. 0000314

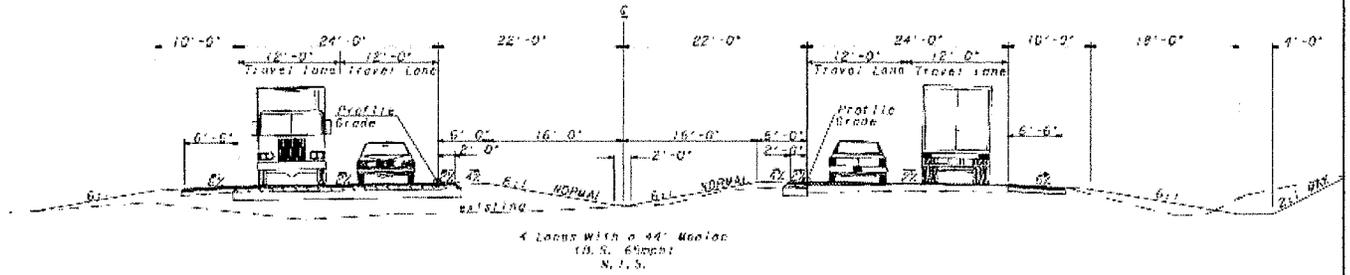
ALTERNATIVE NO.: *T-9*

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 4**

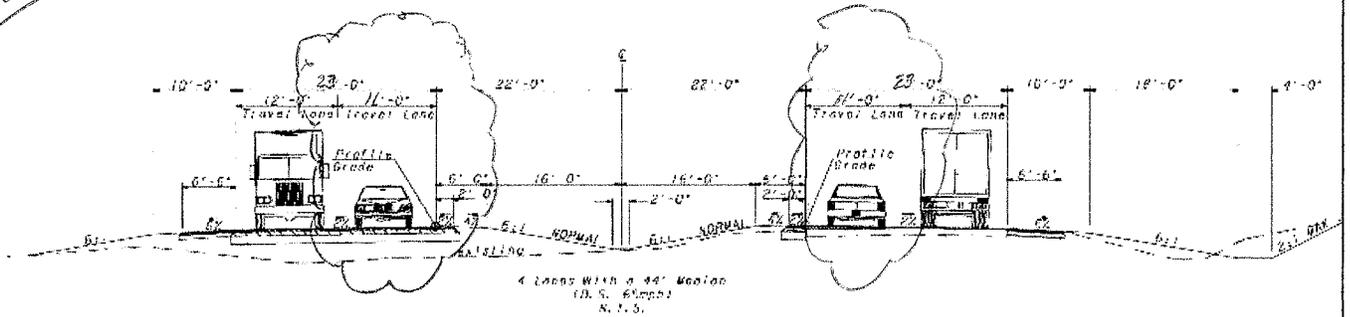
original

TYPICAL SECTION



alternate

TYPICAL SECTION



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: T-9

SHEET NO.: 3 of 4

STP-0000-00(314)Turner-Irwin SR 107

Full Depth Pavement

12.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$87/TN) =	\$0.80/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$76/TN) =	\$0.93/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$73/TN) =	\$1.78/SF
10" GAB	(10/12)(0.0735TN/CF)(\$23/TN) =	\$1.41/SF

Total \$4.92/SF

Roadway

Begin Sta. 115+00

End Sta. 495+00

38,000 LF

4 lane section $(38,000 \times 48') = 1,824,000 \text{ sf}$

less 1 lane $(38,000 \times 46') = 1,748,000 \text{ sf}$

Bridge

#1 - over Deep Creek (New) $\frac{28,572'}{600'} = 47.62' \text{ (width)}$

less 2 ft $(45.62' \times 600) =$

27,372 sf

#2 - over Deep Creek (replace) $\frac{23,550'}{600'} = 39.25' \text{ (width)}$

less 2 ft $(37.25' \times 600) =$

22,350 sf

#3 over Alapaha (widen) $\frac{4837'}{304} = 16' \text{ (widening)}$

less 2 ft $(14' \times 304) =$

4,256 sf

#4 over Alapaha (new) $\frac{16,876'}{430} = 39' \rightarrow$ less 2 ft $(37' \times 430) =$

15,910 sf

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

B-2

DESCRIPTION: **USE A TYPE A MEDIAN CROSSOVER AND SHORTEN THE WESTBOUND TURN LANE TO REBECCA WATERLOO HIGHWAY SO IT DOES NOT AFFECT THE BRIDGE OVER DEEP CREEK**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design uses a Type B median crossover with a long taper. The westbound bridge width is stepped up to accommodate the taper.

ALTERNATIVE: (sketch attached)

Use a Type B median crossover with a 100 ft taper. There will be no taper on the bridge.

ADVANTAGES:

- Reduces cost
- Reduces bridge area
- Reduces construction time

DISADVANTAGES:

- Less left-turn taper

DISCUSSION:

It will be expensive and time consuming to build the westbound bridge as in the original design. By using a Type A median crossover, the amount that the edge of travel way tapers is greatly reduced. The alternative design provides a 100 ft taper, then approximately 400 ft of left-turn storage. The design year ADT for this left turn is only 50, so this arrangement will be satisfactory.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 450,322	—	\$ 450,322
ALTERNATIVE	\$ 32,472	—	\$ 32,472
SAVINGS	\$ 417,850	—	\$ 417,850



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.:

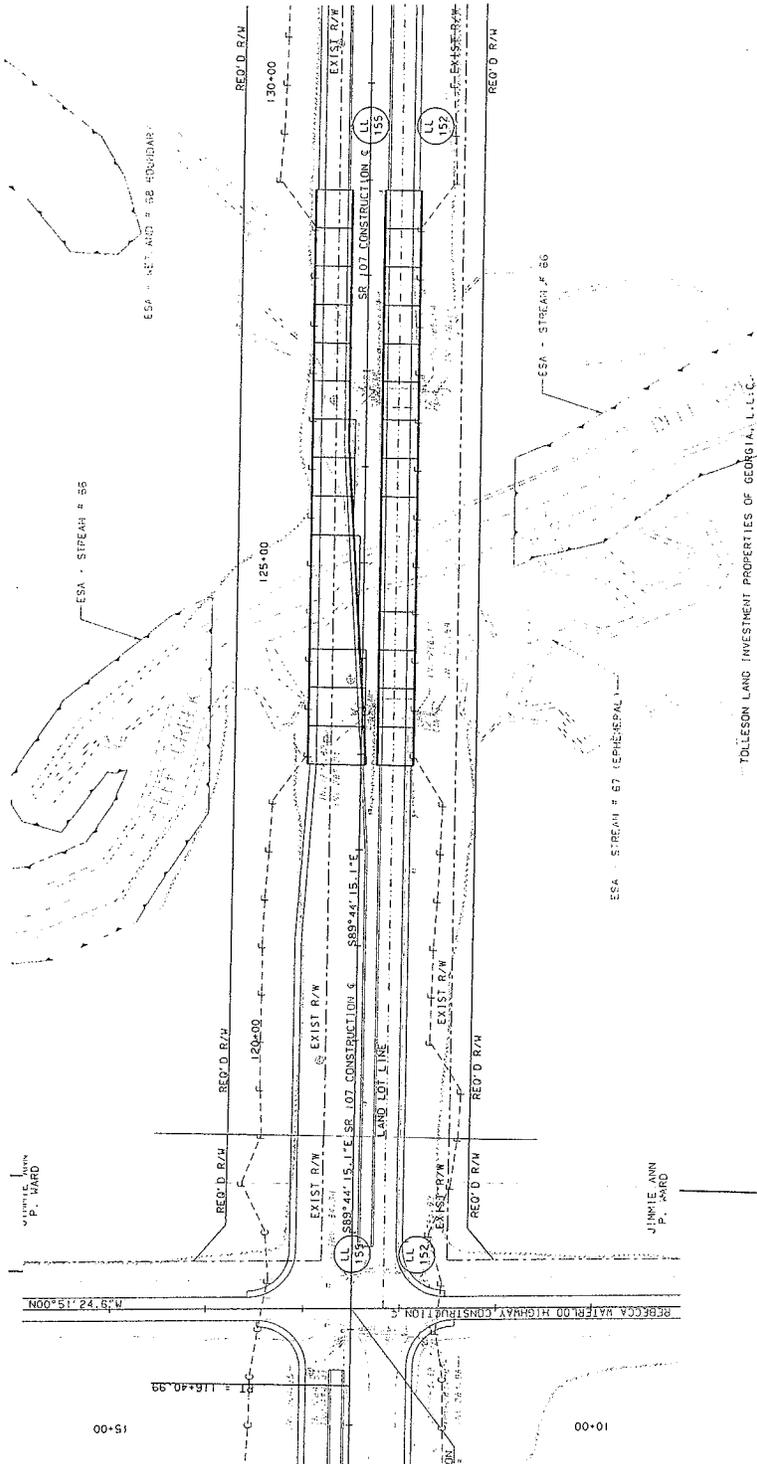
B-2

ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.: 2 of 5





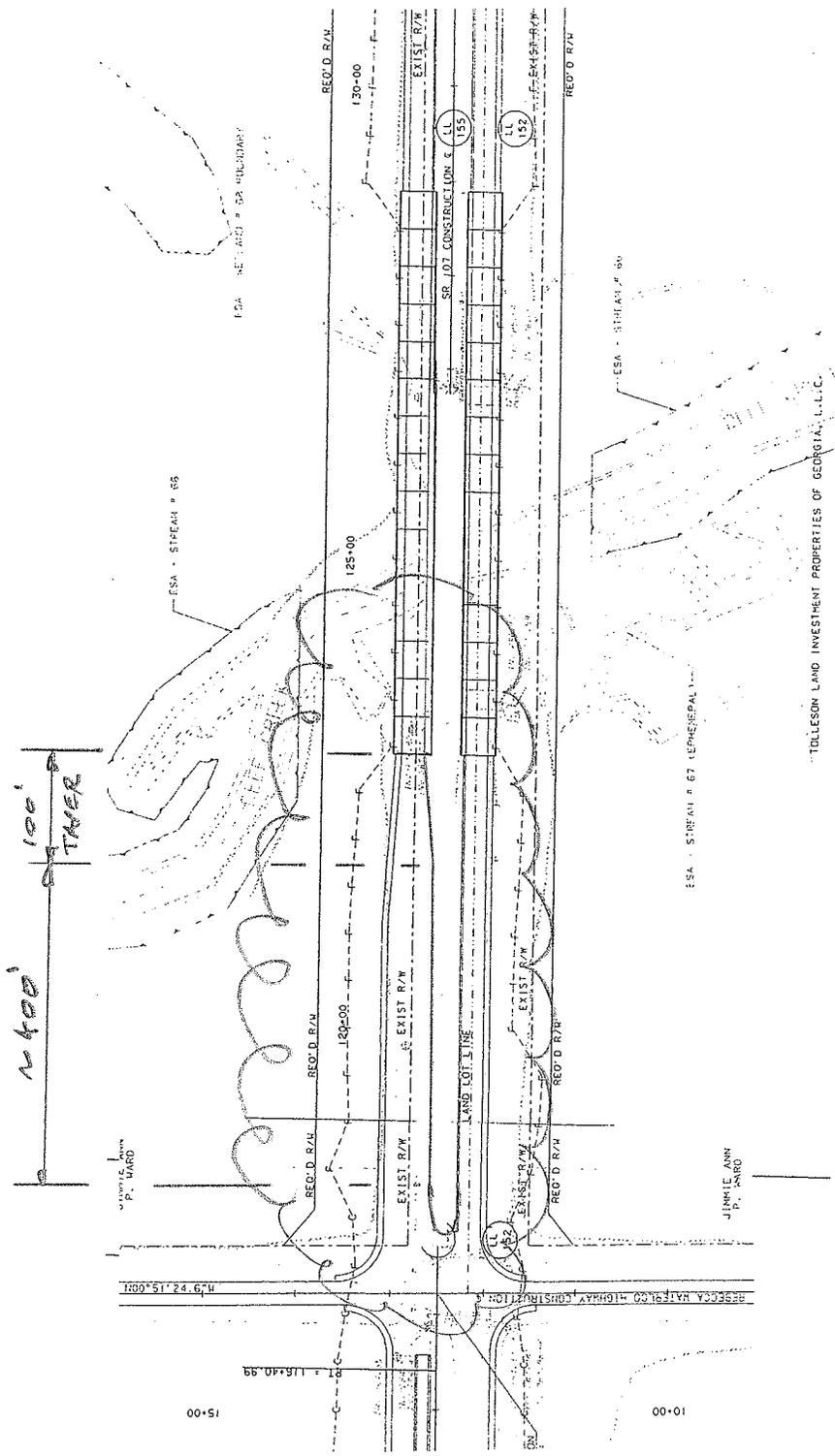
PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.:

B-2

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 3 of 5



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. No. 0000314

ALTERNATIVE NO.: **B-2**

SHEET NO.: **4 of 5**

Original Design

Additional bridge area:

$$3(40)(59-38) + 120(49-38) + 3(40)(44-38) = 4560 \text{ SF}$$

$$\text{Pavement area} = (12200-11788)(28) + .5(20+28)(90) = 13,696 \text{ SF}$$

Alternative Design

$$\text{Pavement Area} = 450(12) + .5(12)(100) = 6000 \text{ SF}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

G-1

DESCRIPTION: **SHORTEN THE LEFT-TURN LANES TO THE MINIMUM ALLOWABLE DECELERATION LENGTH**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design uses the maximum “x” length of 450 ft for storage and deceleration for left-turn lanes per GA. Construction Detail M-3.

ALTERNATIVE:

Use the minimum “x” length of 300 ft for storage and deceleration for left-turn lanes per GA. Construction Detail M-3.

ADVANTAGES:

- Reduces pavement requirements

DISADVANTAGES:

- None identified

DISCUSSION:

300 ft of length is adequate for left-turn lanes given the low design year traffic volumes along SR 107 which range from 1,600 ADT at CR 250 to 1,700 ADT at CR 264.

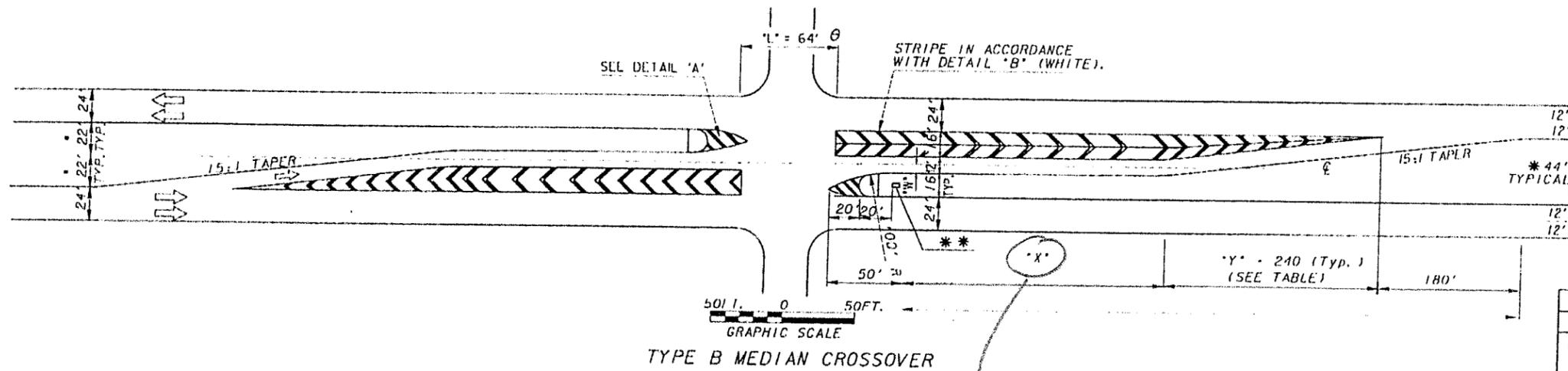
The right-turn lanes were not shortened since they already meet the minimum deceleration length for 65 mph design speed.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 500,069	—	\$ 500,069
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 500,069	—	\$ 500,069

2/4
Alt. G-1

Project:
STP-0000-00(314)

Sketch
Alt. G-1
2/4



Δ 'X' DIMENSION IS FOR DECELERATION ONLY. DOES NOT ACCOUNT FOR ANY STORAGE NEEDED. MIN. VALUES FOR 'X' ARE ONLY TO BE USED WHERE SPACING BETWEEN MEDIAN OPENINGS DOES NOT ALLOW FOR THE MORE DISTRIBLBLE LENGTH.

WIDTH OF MEDIAN	TYPE B MEDIAN CROSSOVERS			Y	W
	DECELERATION LENGTH - Δ (FT.)				
	DESIGN SPEED ↓				
	45 MPH	55 MPH	65 MPH		
32	350(200MIN)	450(350MIN)	650(450MIN)	60	4
44	150(50MIN)	300(150MIN)	450(300MIN)	240	16
64	N/A	150(50MIN)	300(150MIN)	390	26

X = 450' for "Original"
X = 300' for "Alternate Design"

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.:

G-1

SHEET NO.: 3 of 4

Median Opening Left Turn Length
 Saved.

$$450' - 300' = 150' \times 2 \text{ Left Turns} = 300' \text{ Per median opening}$$

$$28' \times 11 \text{ EA. TPB, Median Openings} \times 300' = 92,400 \text{ SF}$$

STP-0000-00(314)Turner-Irwin SR 107
 Full Depth Pavement

12.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$87/TN) =	\$0.80/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$76/TN) =	\$0.93/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$73/TN) =	\$1.78/SF
10" GAB	(10/12)(0.0735TN/CF)(\$23/TN) =	\$1.41/SF

Total

Pavement Unit Cost: \$4.92/SF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

G-2

DESCRIPTION: **USE TYPE A MEDIAN OPENINGS IN LIEU OF TYPE B**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The original design calls for Type B median openings throughout the project limits.

ALTERNATIVE:

Use Type A median openings throughout the project limits.

ADVANTAGES:

- Reduces pavement requirement

DISADVANTAGES:

- None identified

DISCUSSION:

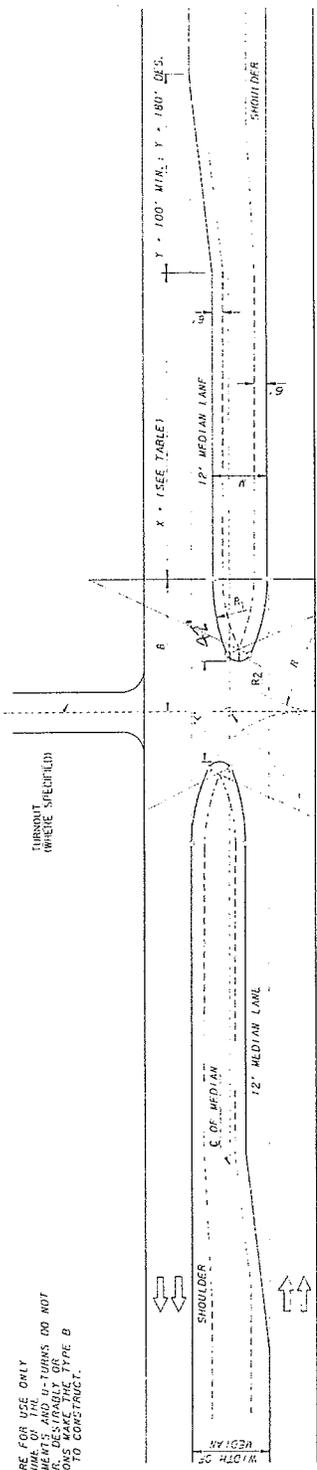
A total of eleven median openings are placed throughout the length of the project. Type B median openings were used but Type A median openings are adequate based upon the design year traffic volumes which range from 1,600 ADT at CR 250 to 1,700 ADT at CR 264.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,061,460	—	\$ 1,061,460
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 1,061,460	—	\$ 1,061,460

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

CONSTRUCTION DETAILS
MEDIAN CROSSOVERS

DATE: JULY, 1987
REVISION: M-3



TYPE A MEDIAN CROSSOVER

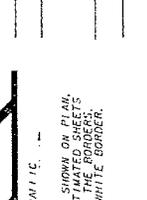
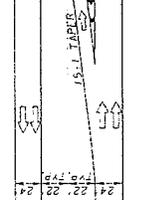
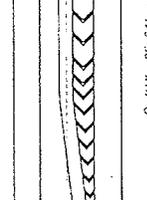
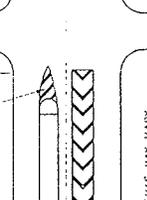
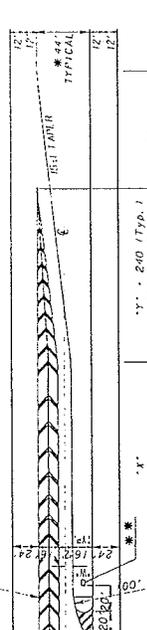
W	I	B	R	R ₁	R ₂	DECELERATION LENGTH - X & Y	DESIGN SPEED	DESIGN SPEED
40	24	67	50	90	90	45 MPH	45 MPH	65 MPH
44	28	50	67	50	90	400/250(MIN)	400/250(MIN)	700/525(MIN)
64	50	44	95	50	150	400/250(MIN)	400/250(MIN)	700/525(MIN)

NOTE FOR TYPE 'A' AND TYPE 'B' THE UPGRADES SHOULD BE COMPLETED AT 20' DESIRABLE 10' MIN. NORMALTY. UNDER FORTY-FIVE MPH PER HOUR.

TYPE A MEDIAN CROSSOVER

STATION WHERE MED. OPEN ROAD CONSTR. SYMMETRICAL ABOUT THIS POINT.

NOTE: B MEDIAN CROSSOVERS ARE THE PREFERRED TYPE OF MEDIAN CROSSOVER. IN SITUATIONS WHERE DRAINAGE CONSIDERATIONS MAKE THE TYPE A MEDIAN CROSSOVER A MORE DESIRABLE OPTION.



TYPE B MEDIAN CROSSOVERS

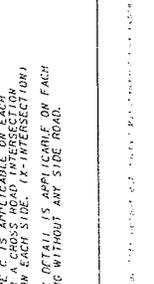
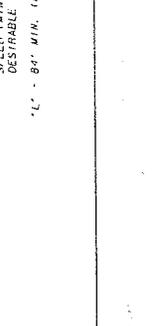
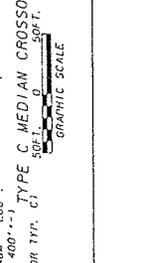
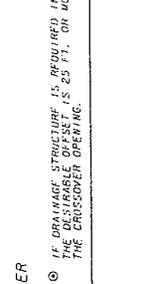
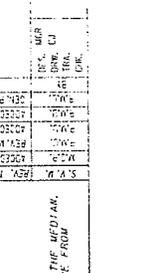
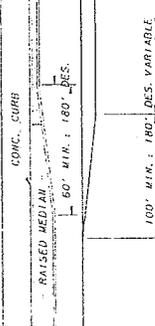
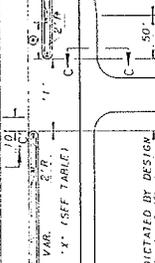
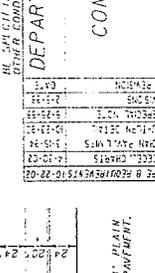
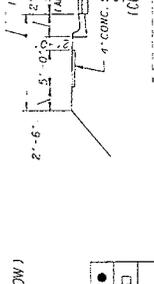
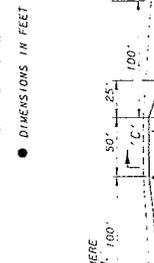
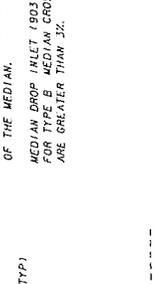
W	I	B	R	R ₁	R ₂	DECELERATION LENGTH - X & Y	DESIGN SPEED	DESIGN SPEED
32	24	50	50	90	90	45 MPH	45 MPH	65 MPH
44	28	50	67	50	90	400/250(MIN)	400/250(MIN)	700/525(MIN)
64	50	44	95	50	150	400/250(MIN)	400/250(MIN)	700/525(MIN)

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

TYPE B MEDIAN CROSSOVER

SECTION C-C

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.



NOTE: MEDIAN CROSSOVERS ARE FOR USE ONLY WHERE THE VOLUME TOTAL VOLUME OF THE COMBINED LEFT TURNING MOVEMENTS AND U-TURNS DO NOT EXCEED 10% OF THE TOTAL VOLUME OF TRAFFIC. WHERE LARGE CONSIDERATIONS MAKE THE TYPE B MEDIAN CROSSOVER DIFFICULT TO CONSTRUCT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

NOTE: DIMENSIONS MAY VARY WHERE ADJUSTMENTS TO BE SHOWN FOR ANY WIDTH OTHER THAN 44 FT.

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: G-2

Use Type A Median Openings ILO Type B

SHEET NO.: 3 of 4

Flow needed for Type B: $450' \times 28' = 18900 \text{ SF}$

$$(420' \times 28') \div 2 = 5880 \text{ SF}$$

$$(50' \times 34') \div 2 = 850 \text{ SF}$$

25,630 SF

Type A: $525' \times 12' = 6300 \text{ SF}$

$$(180' \times 12') \div 2 = 1080 \text{ SF}$$

$$(42' \times 20') \div 2 = 420 \text{ SF}$$

7800 SF

Type A saves 17,830 SF $\therefore 17,830 \text{ SF} \times \$4.92/\text{SF} = \$87,724$
~~17,830 SF~~ $\times \$5.00/\text{SF} = \$89,150/\text{opening}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:
G-10

DESCRIPTION: **MAINTAIN THE EXISTING ALIGNMENT AT HAWKINS ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design includes relocation of the Hawkins Road intersection to eliminate the skew angle.

ALTERNATIVE: (sketch attached)

Maintain the existing skew angle at Hawkins Road.

ADVANTAGES:

- Reduces pavement cost

DISADVANTAGES:

- Skew angle remains

DISCUSSION:

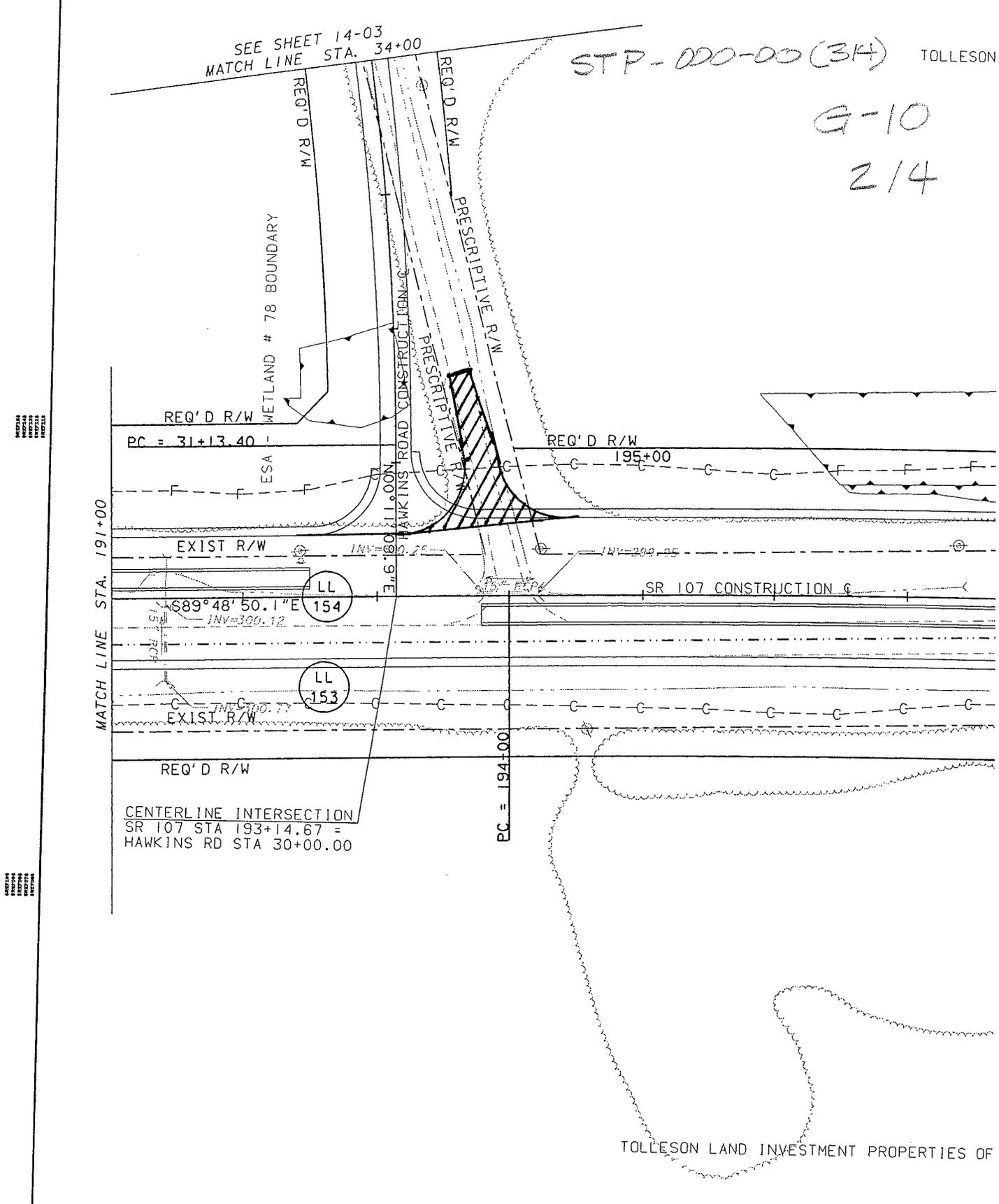
The existing skew angle is within acceptable limits and does not require relocation. No traffic data was provided for Hawkins Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 93,842	—	\$ 93,842
ALTERNATIVE	\$ 21,678	—	\$ 21,678
SAVINGS	\$ 72,164	—	\$ 72,164

SEE SHEET 14-03
MATCH LINE STA. 34+00

STP-000-00 (34) TOLLESON

G-10
2/4



WETLAND
BOUNDARY
WETLAND
BOUNDARY

WETLAND
BOUNDARY
WETLAND
BOUNDARY

PROPERTY AND EXISTING R/W LINE	---
REQUIRED R/W LINE	---
CONSTRUCTION LIMITS	---
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	▨
EASEMENT FOR CONSTR OF SLOPES	▧
EASEMENT FOR CONSTR OF DRIVES	▩

BEGIN LIMIT OF ACCESS.....BLA
 END LIMIT OF ACCESS.....ELA
 LIMIT OF ACCESS
 REQ'D R/W & LIMIT OF ACCESS



McGee Part
www.mcgeepa

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: 6-10

Maintain Existing Alignment at Hawkins Rd.

SHEET NO.: 3 of 4

$$\text{Current Pavement: } 500 \text{ LF} \times 24' = \underline{12,000 \text{ SF}}$$

$$\text{" Shoulder: } 500 \text{ LF} \times 2' \times 2 = \underline{2,000 \text{ SF}}$$

$$\text{R/W: } 415 \text{ LF} \times 70' = 29,050 \text{ SF} \div 43,560 \text{ SF/Ac} = \underline{0.7 \text{ Ac}}$$

$$\text{Revised Pavement: } 120 \text{ LF} \times 24' = \underline{2,880 \text{ SF}}$$

$$\text{" Shoulder: } 120 \text{ LF} \times 2' \times 2 = \underline{480 \text{ SF}}$$

$$\text{R/W: } 60 \text{ LF} \times 60' = 3,600 \text{ SF} \div 43,560 \text{ SF/Ac} = 0.1 \text{ Ac}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

G-11

DESCRIPTION: **MAINTAIN ELEANOR CIRCLE AT THE EXISTING ALIGNMENT AT STA. 313+38**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design includes relocating Eleanor Circle to intersect SR 107 at a 90 degree angle.

ALTERNATIVE: (sketch attached)

Maintain Eleanor Circle at the existing alignment at Sta. 313+38.

ADVANTAGES:

- Reduces pavement requirement
- Reduces right-of-way requirement

DISADVANTAGES:

- Keeps the skewed intersection

DISCUSSION:

Maintaining Eleanor Circle at the existing alignment will save right-of-way and pavement costs. No traffic data was provided for Eleanor Circle.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 94,347	—	\$ 94,347
ALTERNATIVE	\$ 31,173	—	\$ 31,173
SAVINGS	\$ 63,174	—	\$ 63,174

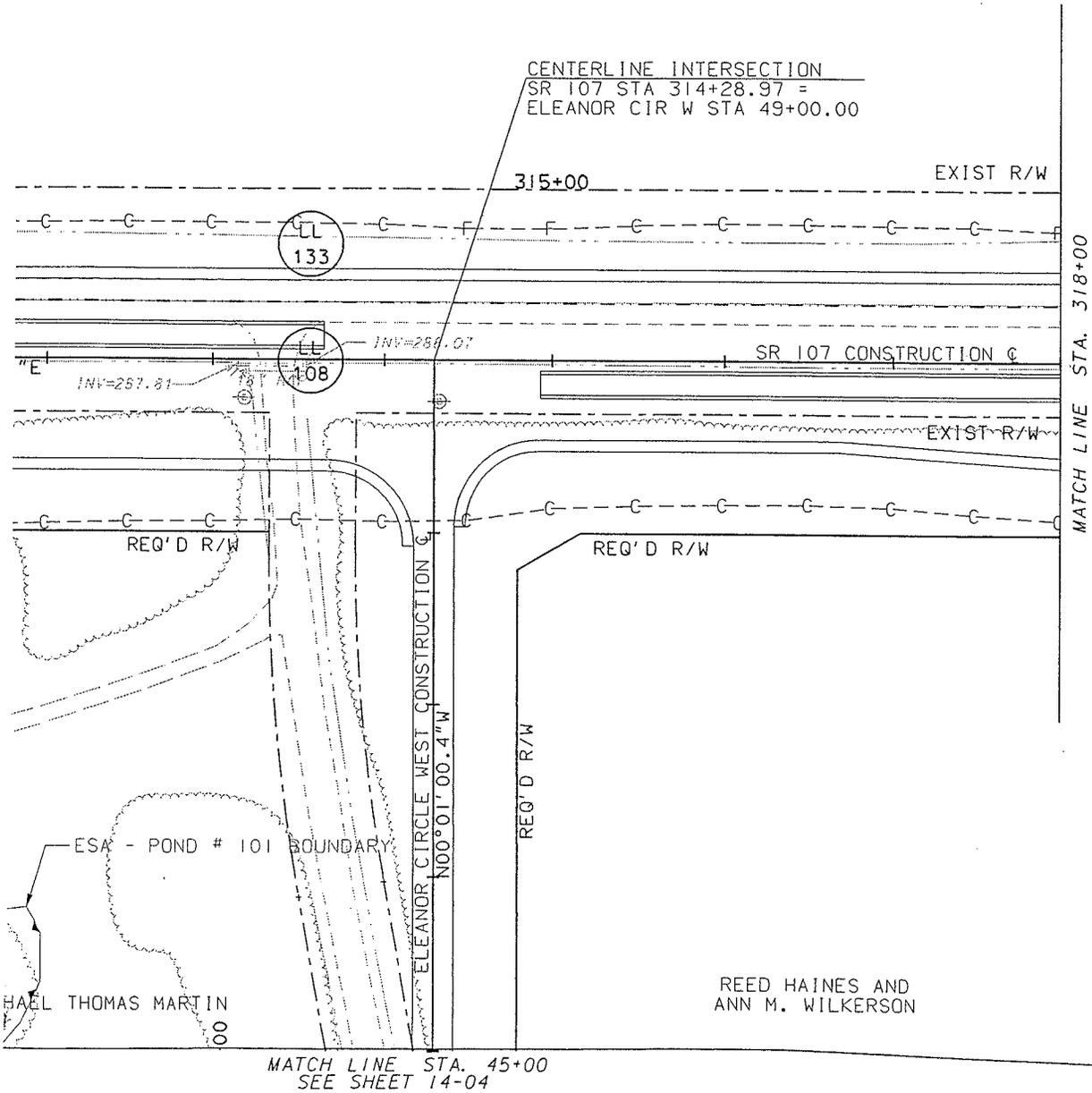


PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: G-11

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 2 of 5

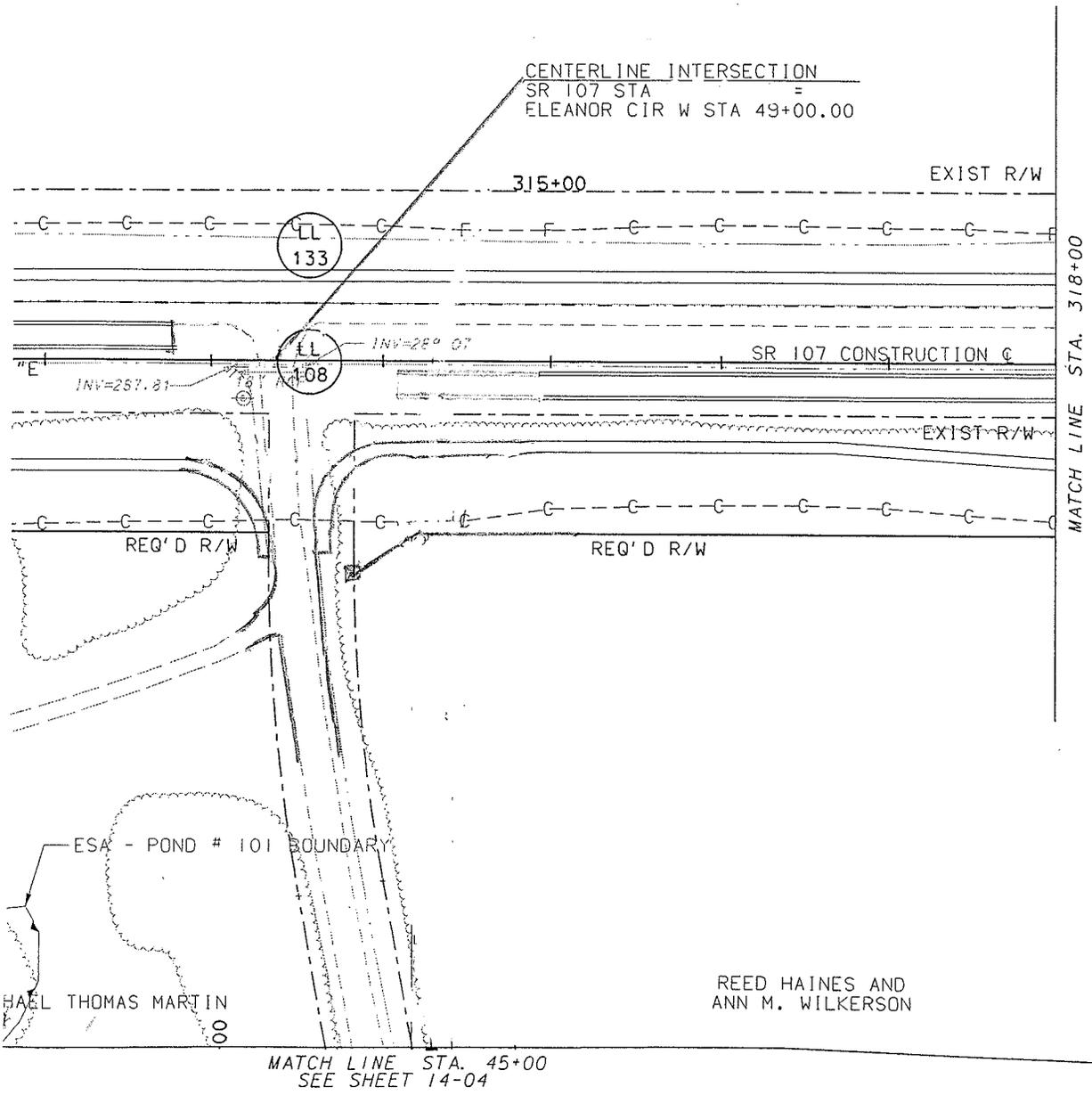


PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: *G-11*

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: *3* of *5*



CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: **G-11**

SHEET NO.: **4** of **5**

Proposed Re-Alignment

$$(24') \times (650') = \underline{15600 \text{ sf}}$$

Alternate

$$(24') \times (240') = \underline{5760 \text{ sf}}$$

STP-0000-00(314)Turner-Irwin SR 107

Full Depth Pavement

12.5 mm	(165#/SY)(1TN/2000#)(1SY/9SF)(\$87/TN) =	\$0.80/SF
19 mm	(220#/SY)(1TN/2000#)(1SY/9SF)(\$76/TN) =	\$0.93/SF
25 mm	(440#/SY)(1TN/2000#)(1SY/9SF)(\$73/TN) =	\$1.78/SF
10" GAB	(10/12)(0.0735TN/CF)(\$23/TN) =	\$1.41/SF

Total \$4.92/SF

Right-of-Way

$$\textcircled{1} (\frac{1}{2}) \times (40') \times (20') = 400 \text{ sf}$$

$$\textcircled{2} (57') \times (20') = 1140 \text{ sf}$$

$$\textcircled{3} (\frac{1}{2}) \times (40') \times (20') = 400 \text{ sf}$$

$$\textcircled{4} (\frac{1}{2}) \times (280') \times (40') = 5600 \text{ sf}$$

$$\textcircled{5} (57') \times (480') = 27,360 \text{ sf}$$

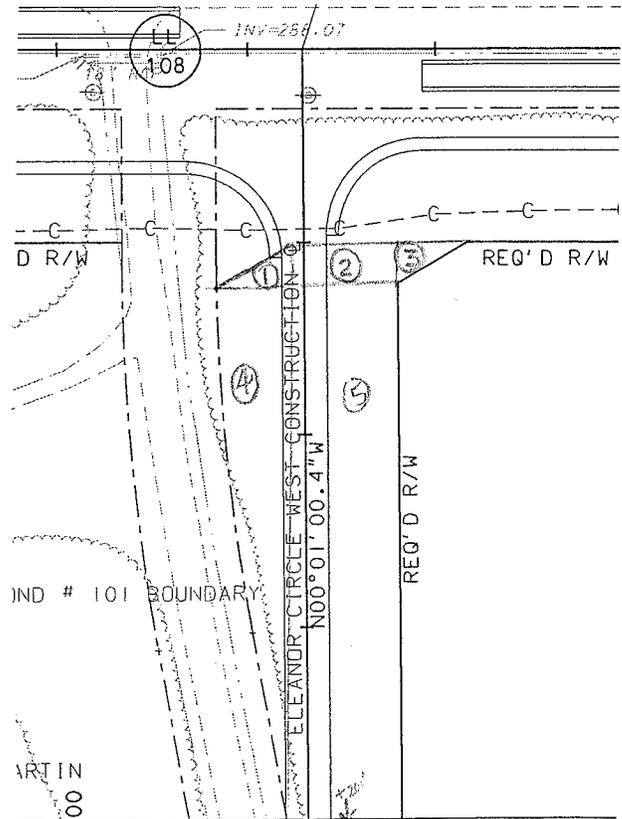
$$\underline{34,900 \text{ sf}}$$

$$\frac{34,900 \text{ sf}}{9} =$$

$$3878 \text{ sy} \approx$$

$$\frac{3878}{4840}$$

.8011 acres



MATCH LINE STA. 45+00
 SEE SHEET 14-04

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

G-12

DESCRIPTION: **MAINTAIN THE EXISTING ALIGNMENT AT THE BIG CREEK/TRUMAN ROAD INTERSECTION**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The Big Creek/Truman Road Intersection is relocated to eliminate the skew angle.

ALTERNATIVE: (sketch attached)

Maintain the existing skew angle of 75 degrees.

ADVANTAGES:

- Reduces construction costs

DISADVANTAGES:

- Slight inconvenience for traveling public

DISCUSSION:

Reconstructing the Big Creek/Truman Road Intersection to eliminate the skew angle is not required. The design year ADT is extremely low at 50 VPD on Big Creek Road South of SR 107 and 75 VPD north of SR 107.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 354,183	—	\$ 354,183
ALTERNATIVE	\$ 44,421	—	\$ 44,421
SAVINGS	\$ 309,762	—	\$ 309,762

SEE SHEET 14-08
MATCH LINE STA. 84+00

ALT. G-12

214

STP-0000-00(314)



G.M.D.#1662

G.M.D.#1662

RLINE INTERSECTION
7 STA 353+39.48 =
REEK RD STA 80+00.00

EXIST R/W

355+00 INV=339.25

MATCH LINE STA. 357+00

G.M.D. LINE

CURVE KC6

SR 107 CONSTRUCTION

EXIST R/W

REQ'D R/W

PT = 78+57.77

G.M.D.#901

G.M.D.#1662

RONALD MERRITT

- Original

- Revised

CURVE KC6

STA = 352+17.37
N = 626600.7427
E = 2525622.4899
LTA = 04°56'26.3" RT
D = 00°22'55.1"
T = 647.13'
L = 1293.46'
R = 15000.00'
E = 13.95'
SE = NC

MATCH LINE STA. 76+00
SEE SHEET 14-07

ners, Inc.
tners.com

GEORGIA
DEPARTMENT
OF
TRANSPORTATION

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: CONSULTANT DESIGN
MAINLINE PLAN

SR 107 WIDENING

DRAWING No.
13-21

CALCULATIONS



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
 STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: 6-12

Maintain Existing Alignment of the Big Creek/^{Intersection} Truman Rd.

SHEET NO.: 3 of 4

Truman Rd: Pavement - $550 \text{ LF} \times 24' = \underline{13200 \text{ SF}}$

Shoulder - $550 \text{ LF} \times 2' \times 2 = \underline{2200 \text{ SF}}$

Excavation - $550 \text{ LF} \times 24' \times 2' \div 27 \text{ CF/CY} = \underline{978 \text{ CY}}$

R/W - $550 \text{ LF} \times 75' \div 43560 \text{ SF/AC} = \underline{0.9 \text{ AC}}$

Big Creek Rd: Pavement - $1500 \text{ LF} \times 24' = \underline{36,000 \text{ SF}}$

Shoulder - $1500 \text{ LF} \times 2' \times 2 = \underline{6,000 \text{ SF}}$

Excavation - $1500 \text{ LF} \times 24' \times 2' \div 27 \text{ CF/CY} = \underline{2,667 \text{ CY}}$

R/W - $1500 \text{ LF} \times 85' \div 43560 \text{ SF/AC} = \underline{2.92 \text{ AC}}$

Revised Truman Rd: Pavement - $130 \text{ LF} \times 24' = \underline{3,120 \text{ SF}}$

Shoulder - $130 \text{ LF} \times 2' \times 2 = \underline{520 \text{ SF}}$

Excavation - $130 \text{ LF} \times 24' \times 2' \div 27 \text{ CF/CY} = \underline{231 \text{ CY}}$

R/W - $60' \times 40' \div 43560 \text{ SF/AC} = \underline{0.1 \text{ AC}}$

Revised Big Creek Rd: Pavement - $150 \text{ LF} \times 24' = \underline{3,600 \text{ SF}}$

Shoulder - $150 \text{ LF} \times 2' \times 2 = \underline{600 \text{ SF}}$

Excavation - $150 \times 24' \times 2' \div 27 \text{ CF/CY} = \underline{267 \text{ CY}}$

R/W - $80' \times 50' \div 43560 \text{ SF/AC} = \underline{0.1 \text{ AC}}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

G-13

DESCRIPTION: **MAINTAIN THE EXISTING ALIGNMENT AT EISENHOWER ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design shows Eisenhower Road relocated just to the west of its original location to straighten the skew angle to 90 degrees with SR 107.

ALTERNATIVE: (sketch attached)

Maintain the existing alignment at Eisenhower Road.

ADVANTAGES:

- Reduces pavement requirements
- Reduces right-of-way requirements

DISADVANTAGES:

- Skew angle remains

DISCUSSION:

The existing skew angle is within acceptable limits and does not require relocation. The design year ADT is 175 VPD on Eisenhower Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 92,859	—	\$ 92,859
ALTERNATIVE	\$ 22,081	—	\$ 22,081
SAVINGS	\$ 70,778	—	\$ 70,778

SKETCH

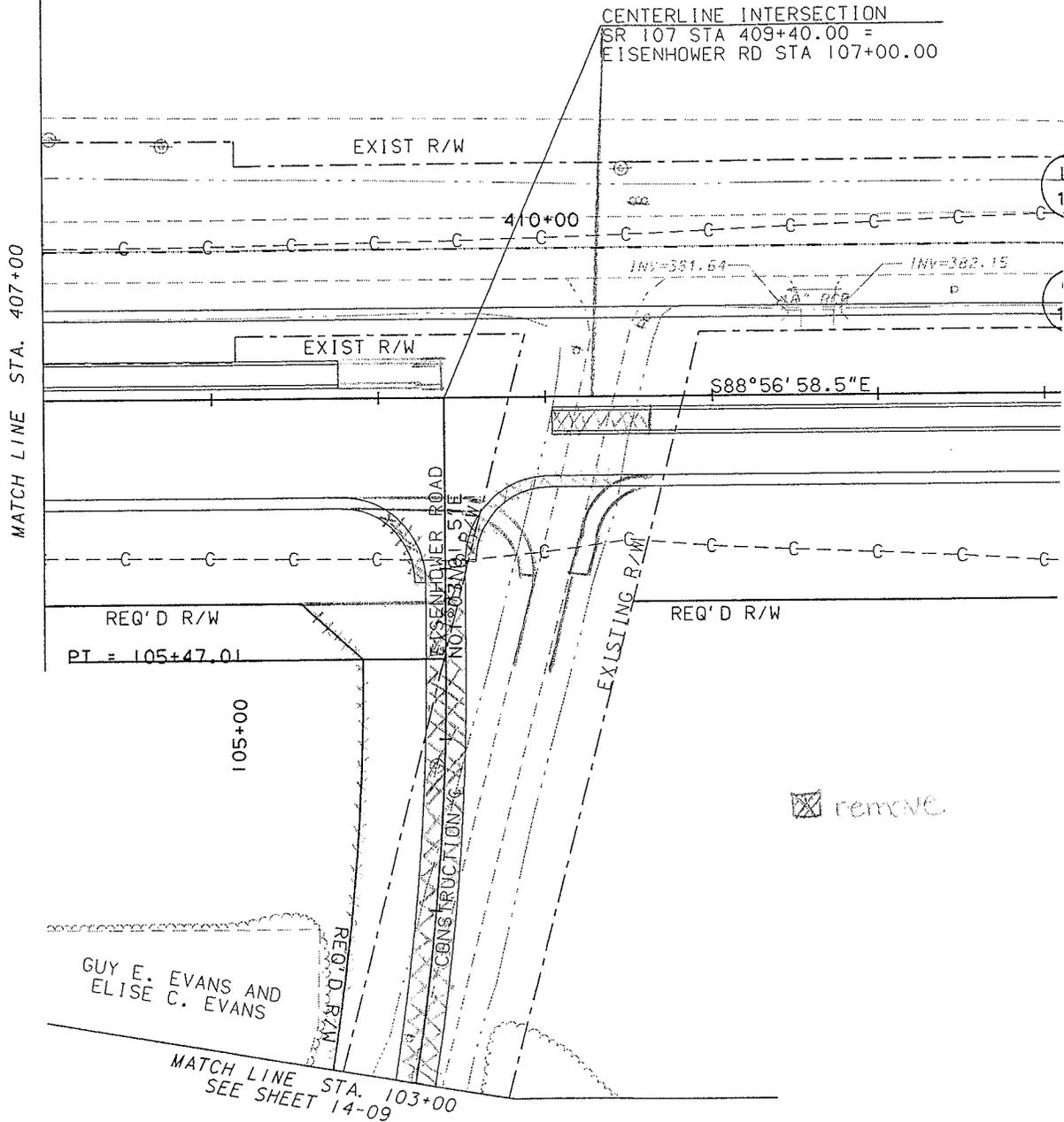


PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. Number 0000314

ALTERNATIVE NO.: **G-13**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2 of 4**



VALUE ENGINEERING ALTERNATIVE



PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314), P.I. No. 0000314
Turner and Irwin Counties, Georgia

ALTERNATIVE NO.:

G-14

DESCRIPTION: **ELIMINATE THE MEDIAN OPENINGS AT STATIONS 214+80, 258+40, AND 288+00 AND REPLACE THEM WITH OPENINGS AT STATIONS 233+53 AND 273+91**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

Median openings are spaced at less than the maximum spacing of one mile.

ALTERNATIVE:

Eliminate the median openings at Stations 214+80, 258+40, and 288+00 and replace them with openings at Stations 233+53 and 273+91.

ADVANTAGES:

- Reduces construction cost
- Reduces construction time
- Fewer traffic conflict points

DISADVANTAGES:

- Reduces access to U-turns

DISCUSSION:

Median openings should be spaced at a maximum of one mile. At this location, the distances between openings are less than one mile, sometimes as little as 2,165 ft. There are driveways at Station 258+40 and 288+00, but no roads at any of the original openings. Providing openings at Stations 233+53 and 273+91 gives spaces of 4,038 ft, less than the maximum.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 208,687	—	\$ 208,687
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 208,687	—	\$ 208,687

CALCULATIONS

PROJECT: **WIDENING OF SR 107 FROM CR 250 TO CR 264**
STP00-0000-00(314) P.I. No. 0000314

ALTERNATIVE NO.: **G-14**

SHEET NO.: **2 of 3**

Pavement area = $2(.5)(28)(420) + 2(400)(28) + 100(44) = 38,560$ SF

PROJECT DESCRIPTION

The widening of 25.45 miles of SR 107 from I-75 to SR 11/US 129 in Turner, Irwin, and Ben Hill Counties has been divided into three projects. Project STP-0000-00(311), P.I. No. 0000311, being designed by Jacobs Engineering, runs from I-75 to CR 250/Waterloo Highway in Turner County and is 7.9 miles in length. Project STP-0000-00(314), P.I. No. 0000314, being designed by McGee Partners as a subcontractor to Jacobs Engineering, picks up at CR 250/Waterloo Highway in Turner County and continues 7.1 miles east to the intersection of SR 107 and CR 264/Jeff Davis Road in Irwin County. Project STP-0000-00(313), P.I. No. 0000313, being designed by Florence & Hutcheson, begins at CR 264/Cleveland Road/Jeff Davis Road in Irwin County and ends approximately 1,600 feet east of SR 11/US 129 in Ben Hill County. The three projects will provide a continuous four-lane corridor between the City of Ashburn, at I-75, and the City of Fitzgerald, at SR 11/US 129.

Existing Conditions

Project STP-0000-00(311), P.I. No. 0000314, I-75 to CR 250/Waterloo Highway

The existing roadway is a two-lane rural section with 12-foot-wide lanes and 5 ft shoulders in a right-of-way width of 100 ft. From I-75, SR 107 and SR 112 run concurrently to the east for 3.2 miles before SR 112 splits northeast towards Rebecca and SR 107 continues east towards the City of Fitzgerald. Approximately 34 percent of this 7.9 mile stretch of SR 107 has either vertical or horizontal design deficiencies. Major intersections along the project include I-75, SR 112, and CR 250/Waterloo Highway. The base year (2012) traffic is 2,475 VPD and the design year (2032) traffic is 3,700 VPD. Truck traffic along the SR 107 corridor averages 30 percent. The posted speed is 55 mph.

Project STP-0000-00(314), P.I. No. 0000314, CR 250/Waterloo Highway to CR 264/Jeff Davis Road

The existing roadway is a two-lane rural section with 12-foot-wide lanes and 5 ft shoulders on a right-of-way width which varies between 100 to 130 ft wide. Approximately 14 percent of this 7.1 mile stretch of roadway has sight distance deficiencies. Major structures along the project include the two-lane bridge over Deep Creek and the two-lane bridge over the Alapaha River. Major intersections along the project include I-75, SR 112, and CR 250/Waterloo Highway. The base year (2012) traffic is 2,150 VPD and the design year (2032) traffic is 3,400 VPD. Truck traffic along the SR 107 corridor averages 30 percent. The posted speed is 55 mph.

Project STP-0000-00(313), P.I. No. 0000313, CR 264/Jeff Davis Road to SR 11/US 129

The existing roadway is a two-lane section with 12-ft-wide lanes and graded shoulders varying from 4-ft-wide to 5-ft-wide on a right-of-way width of 100 ft. Major structures along the project include the Willacoochee Creek Bridge, a quad 10 ft by 10 ft bridge culvert at mile marker 5.46 (Irwin), a single 6 ft by 6 ft box culvert at mile marker 1.97 (Ben Hill), a double 10 ft by 10 ft box culvert at mile marker 5.81 (Ben Hill), and a triple 8 ft by 8 ft box culvert at mile marker 5.94 (Ben Hill). Major intersections along the project include SR 125, Perry House Road/CR 247, and SR 11/US 129. The base year (2012) traffic is 6,900 AADT and the design year (2032) traffic is 10,950 AADT.

Truck traffic along the SR 107 corridor averages 20 percent. The posted speed varies from 55 mph to 45 mph.

Need and Purpose

In 1998, the Office of Planning completed a study that evaluated the benefits of widening SR 107 in Ben Hill, Irwin and Turner Counties. The study concluded that no improvements are required for SR 107 in Turner, Irwin or Ben Hill Counties based upon existing or forecast traffic and accident rates. Current data supports the findings of the 1998 study with exception of SR 107 within the City Limits of Fitzgerald, which are projected to operate at an unacceptable Level of Service "E". In 2002, SR 32 and SR 125 were added to the Governor's Road Improvement Program to be expanded to four lanes. These routes provide a parallel corridor to SR 107.

The primary goal for Projects STP-0000-00(311) and STP-0000-00(314) is to enhance safety by bringing the rural sections of the corridor up to current GDOT standards for the existing posted speed of 55 mph. The primary goal for Project STP-0000-00(313) is to improve the Level of Service by expanding the capacity of the corridor and enhance safety by bringing the rural sections up to current GDOT standards.

The secondary goal for all three projects is to improve the corridor for the purpose of enhancing goods movement through the corridor and promoting area economic development. To assist in the accomplishment of this goal, all three proposed projects would provide four-lanes of capacity and increase the posted speed to 65 mph in the non-urban area.

Project Location

Project STP-0000-00(311), P.I. No. 0000311 widens SR 107 from I-75 in the City of Ashburn to mile marker 7.90 at the SR 107/CR 250/Waterloo Highway intersection in Turner County and is 7.9 miles in length.

Project STP-0000-00(314), P.I. No. 0000314 widens SR 107 beginning at mile marker 7.90 at the SR 107/CR 250/Waterloo Highway intersection in Turner County and ending at mile marker 4.84 at the SR 107/CR 264/Cleveland Road/Jeff Davis Road intersection in Irwin County.

Project STP-00-00(313), P.I. No. 0000313 widens SR 107 beginning at mile marker 4.84 at the SR 107/CR 264/Cleveland Road/Jeff Davis Road intersection in Irwin County and ending approximately 1,600 ft east of the SR 107/SR 11/US 129 intersection at mile marker 5.90 in Ben Hill County.

Description of the Proposed Concept

Project STP-0000-00(311), P.I. No. 0000311 will tie to the new I-75 interchange ramps from a separate project and widen SR 107 from three lanes to four lanes with a 24 ft raised median and rural shoulders that will transition to a four-lane rural section with a 44 ft grassed median near Thompson Road. The project will then consist of a four-lane rural section with a 44 ft grassed median from Thompson Road to CR 250/Waterloo Highway. Proposed typical sections will include four 12-ft-wide travel lanes, 6 ft inside shoulders with 2 ft paved, and 10 ft outside shoulders with 6.5 ft paved. Left and right turn lanes are included where warranted. The typical right-of-way for the rural section is 200 ft wide, and 120 ft wide for the urban section. The proposed design speed for SR 107 will be

55 mph from I-75 to Thompson Road and 65 mph from Thompson Road to CR 250/Waterloo Highway.

Project STP-0000-00(314), P.I. No. 0000314 widens SR 107 to a four-lane roadway with a 44 ft depressed median from CR 250/Waterloo Highway to CR 264/Cleveland Road/Jeff Davis Road. The proposed rural section will include four 12-ft-wide travel lanes, 6 ft inside shoulders with 2 ft paved, and 10 ft outside shoulders with 6.5 ft paved. Left and right turn lanes are included where warranted. The typical right-of-way for the rural section is 200 ft wide. Two bridges along the project, one over Deep Creek and the other over the Alapaha River, will be replaced with four bridges providing a separate bridge for each direction of travel. Additional median openings that are not adjacent to a roadway intersection will also be provided where warranted. The proposed design speed for SR 107 will be 65 mph the entire length of the project.

Project STP-0000-00(313), P.I. No. 0000313 widens SR 107 to a four-lane road from CR 264/Cleveland Road/Jeff Davis Road to approximately 1,600 ft east of SR 11/US 129. The proposed rural section will include two 12-ft-wide travel lanes in each direction separated by a 44 ft depressed median, 6 ft inside shoulders with 2 ft paved, and 10 ft outside shoulders with 6.5 ft paved. Left and right turn lanes are included where warranted. The urban section will include two 12-ft-wide travel lanes separated by a 24 ft raised median, with a 16 ft shoulder on each side with curb and gutter and a 5 ft sidewalk. The rural section will end at mile marker 3.60 in Ben Hill County and transition for approximately 500 ft to the urban section. The typical right-of-way for the rural section is 200 ft wide, and 120 ft wide for the urban section. The intersection of SR 107/10 Mile Road (CR 245) and SR 107/Redwood Road (CR 106) will be removed and replaced with an approximately 2.75 degree curve that will provide a continuous travel way along SR 107. The length of the project is approximately 10.45 miles including 80 percent rural section and 20 percent urban section. The proposed design speed for SR 107 will vary between 55mph to 65 mph in the rural section and 45 mph in the urban section.

Table 1 shows a summary of estimated costs by project.

Table 1: Summary of Estimated Costs by Project

Project No.	P.I. No.	Estimated Cost of Construction	Estimated Cost of Right-of-Way	Estimated Reimbursable Utilities	Total Estimated Cost
STP-0000-00(311)	0000311	\$29,857,724	\$4,774,000	\$576,000	\$35,207,724
STP-0000-00(314)	0000314	\$31,959,543	\$6,187,900	\$569,400	\$38,716,843
STP-0000-00(313)	0000313	\$35,262,762	\$7,290,650	\$1,355,000	\$43,908,412

Plans of the three projects follow.

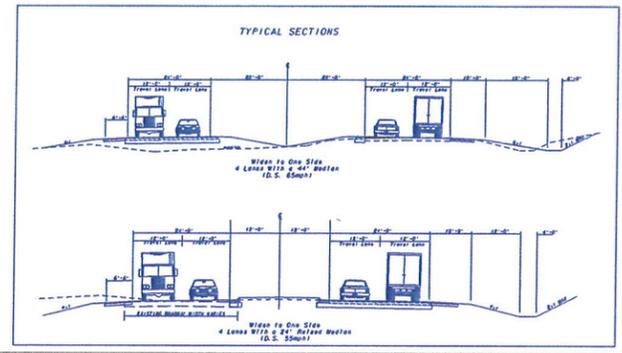
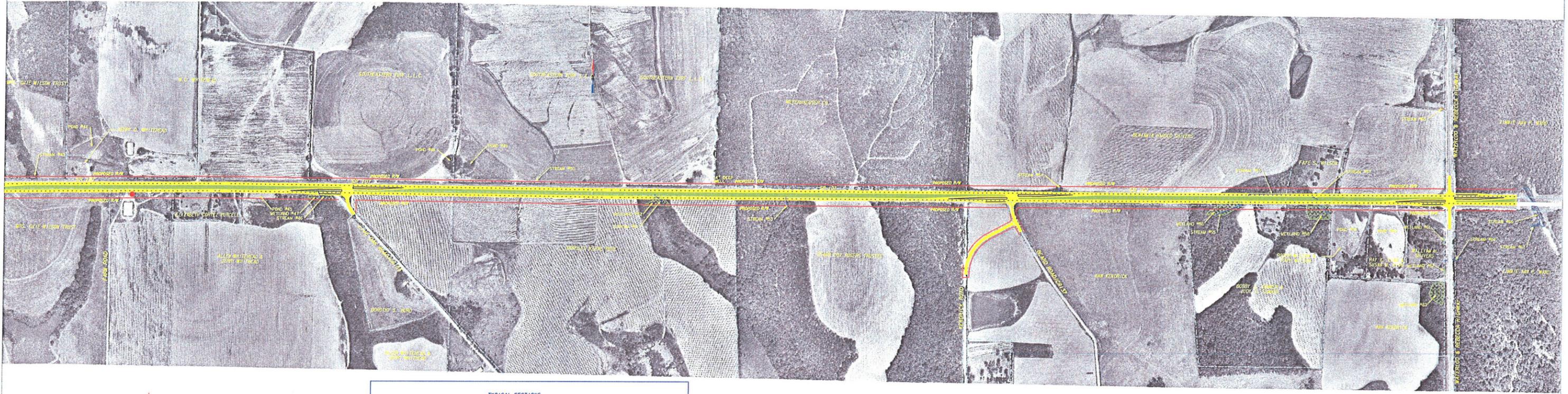


Carter Burgess
Atlanta, GA



LEGEND

- ALTERNATIVES PROPOSED FOR PI01H
- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY AND PROPERTY LINE
- HISTORIC PROPERTY
- DISPLACEMENT
- STREAM
- WETLANDS
- LAKE
- MEDIAN



PUBLIC INFORMATION OPEN HOUSE
STP-0000-00(3II)
P.I. 00003II
TURNER COUNTY
SR 107 FROM I-75 TO CR 250
MAY 15, 2007



Carter-Burgess

Atlanta, GA

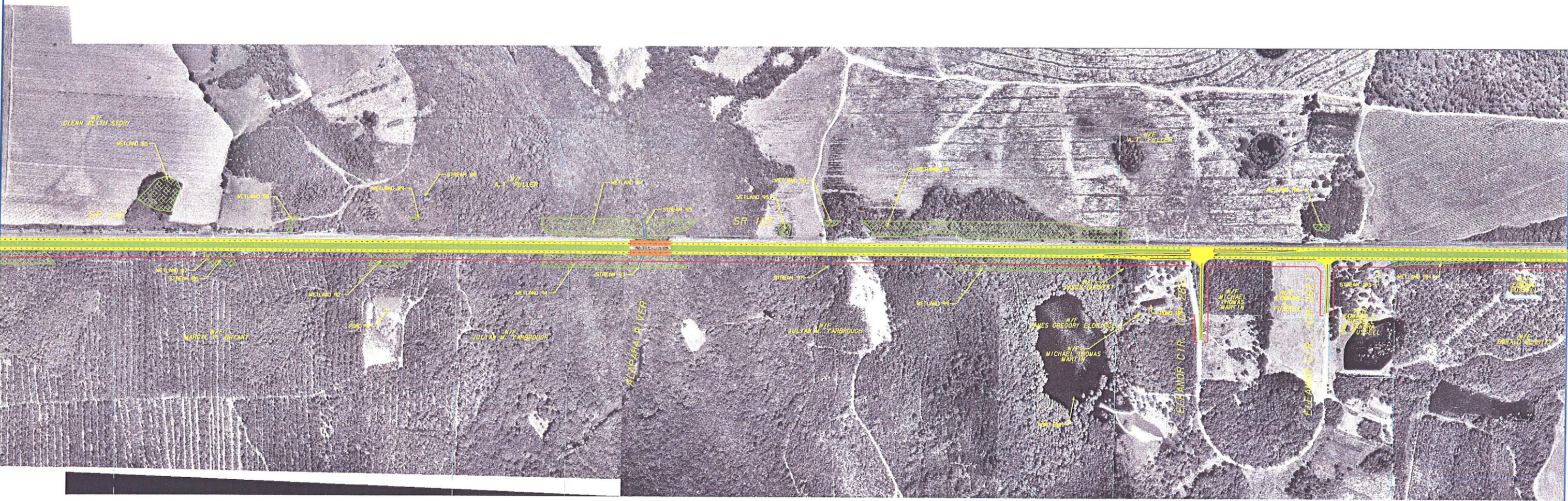
McGehee Partners, Inc.

www.mcgeepartners.com

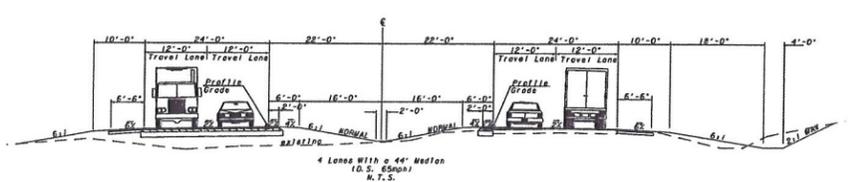


LEGEND

- ROADWAY
- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY AND PROPERTY LINE
- HISTORIC PROPERTY
- DISPLACEMENT
- BRIDGE
- WETLANDS
- STREAM
- LAKE
- MEDIAN



TYPICAL SECTION



PUBLIC INFORMATION OPEN HOUSE
 STP-0000-00(314)
 P.I. 0000314
 TURNER & IRWIN COUNTY
 SR 107 FROM CR 250 TO CR 264
 JUNE 2008

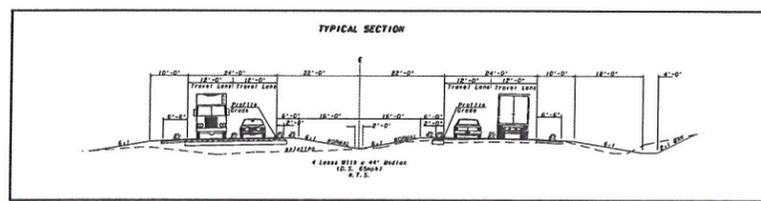
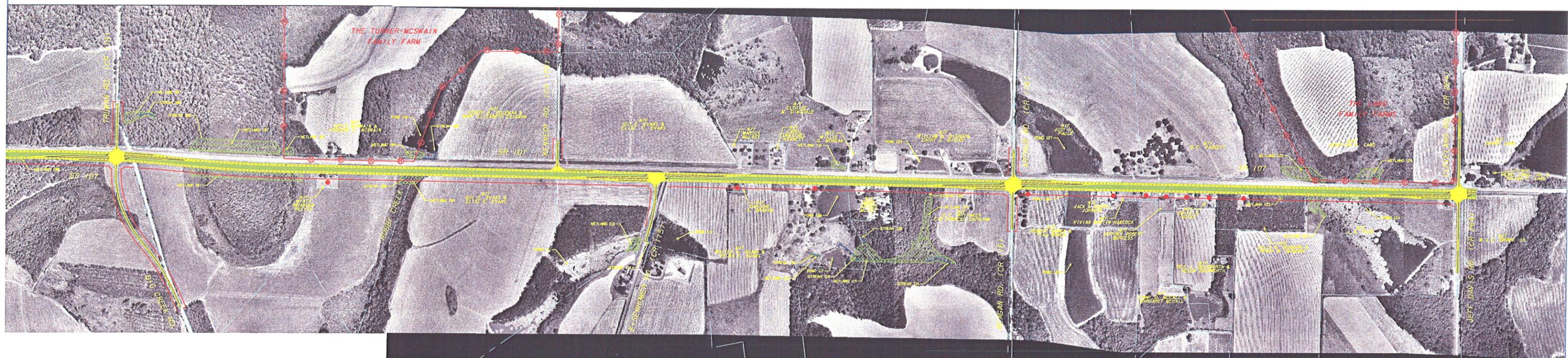
Carter Burgess
Atlanta, GA
www.mcgeepartners.com

GOVT
Georgia Department of Transportation

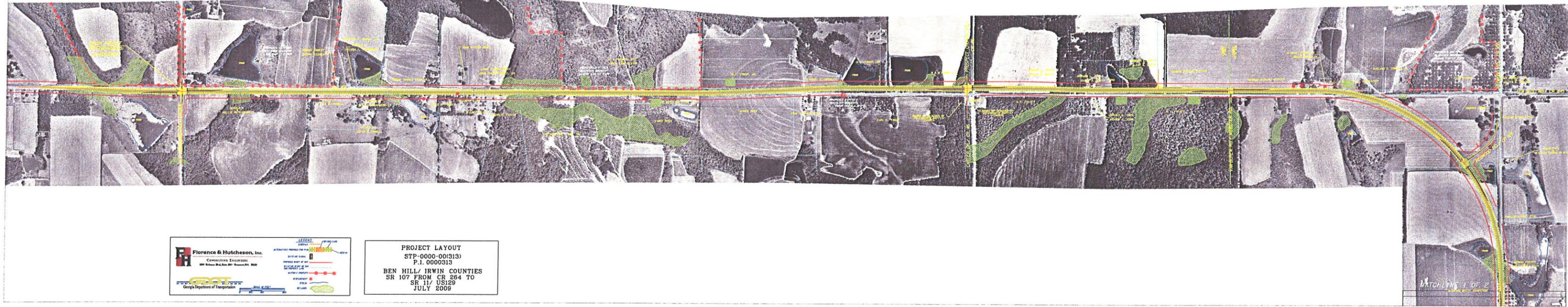
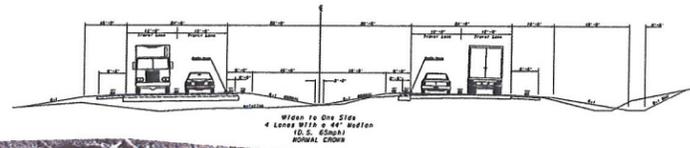
LEGEND

- ROADWAY
- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY AND PROPERTY LINE
- HISTORIC PROPERTY
- DISPLACEMENT
- BRIDGES
- WETLANDS
- STREAM
- LAKE
- MEDIAN

SCALE IN FEET
0 200 400 600



PUBLIC INFORMATION OPEN HOUSE
STP-0000-00(314)
P.I. 0000314
TURNER & IRWIN COUNTY
SR 107 FROM CR 250 TO CR 264
JUNE 2008



Florence & Hutcheson, Inc.
CONSULTING ENGINEERS
2000 North Peachtree Street, Suite 200
Atlanta, Georgia 30309
404.525.1100
www.florence-hutcheson.com

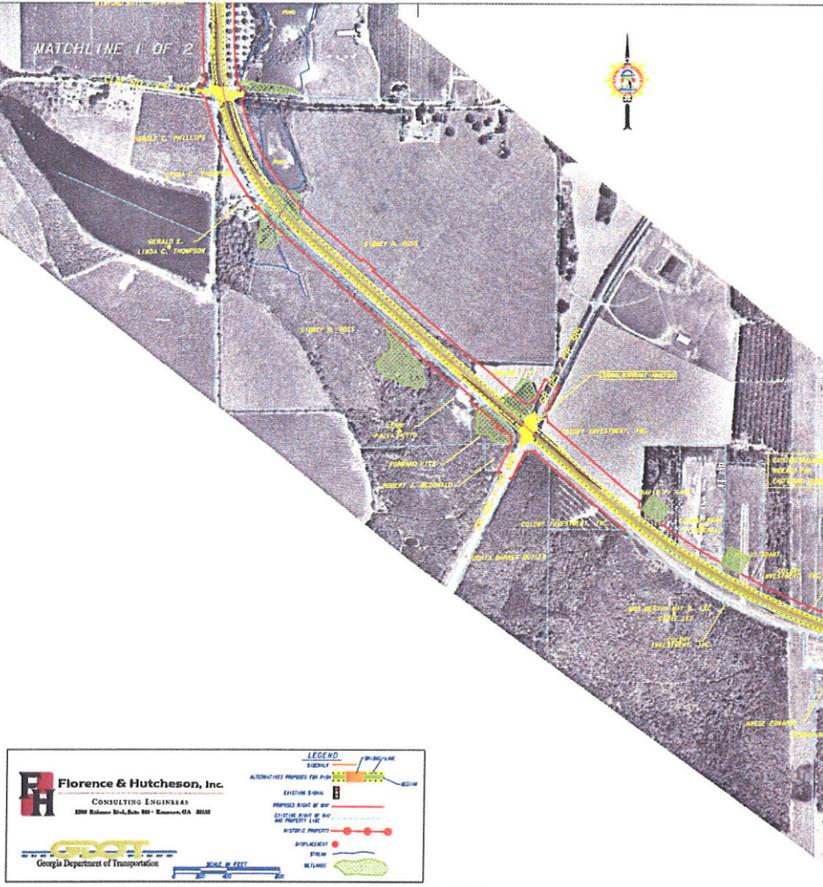
LEGEND

- PROPOSED ROADWAY
- EXISTING ROADWAY
- PROPOSED SIDEWALK
- EXISTING SIDEWALK
- PROPOSED BIKEWAY
- EXISTING BIKEWAY
- PROPOSED UTILITY
- EXISTING UTILITY
- PROPOSED EROSION CONTROL
- EXISTING EROSION CONTROL
- PROPOSED DRAINAGE
- EXISTING DRAINAGE
- PROPOSED FLOODPLAIN
- EXISTING FLOODPLAIN
- PROPOSED WETLAND
- EXISTING WETLAND
- PROPOSED ENVIRONMENTAL SENSITIVE AREA
- EXISTING ENVIRONMENTAL SENSITIVE AREA

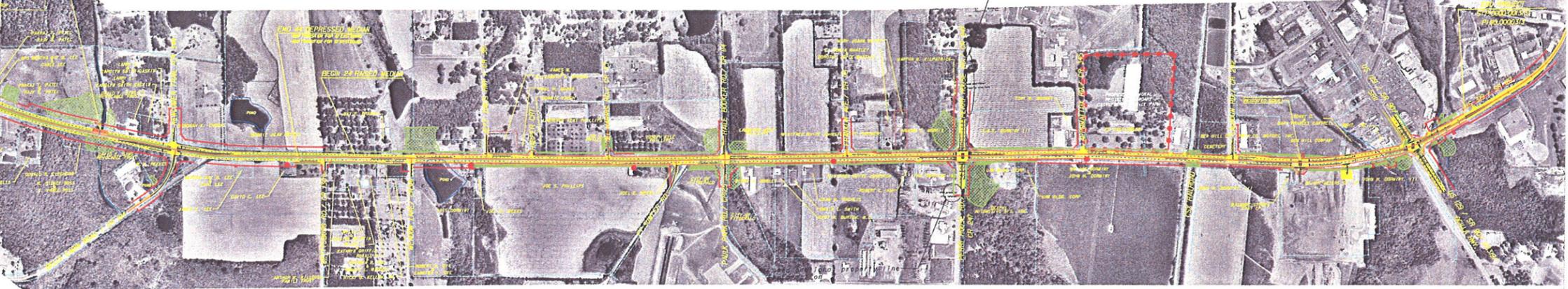
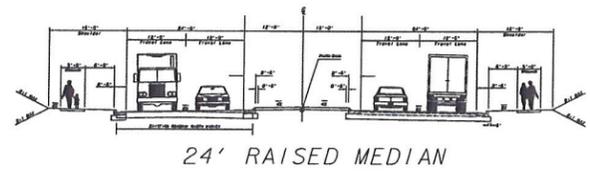
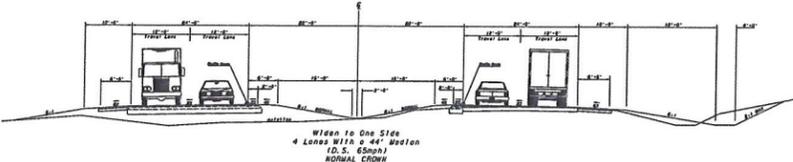
Georgia Department of Transportation

PROJECT LAYOUT
STP-0000-00(313)
P.I. 0000313
BEN HILL/ IRWIN COUNTIES
SR 107 FROM CR 264 TO
SR 11/ US129
JULY 2009

MATCHLINE 1 OF 2



PROJECT LAYOUT
 STP-0000-00(313)
 P.I. 0000313
 BEN HILL/ IRWIN COUNTIES
 SR 107 FROM CR 264 TO
 SR 11/ US129
 JULY 2009



Florence & Hutcheson, Inc.
 CONSULTING ENGINEERS
 2300 Highway 26, Suite 200 - Marietta, GA 30066

LEGEND

- ALTERNATIVE PROPOSED FOR P&I
- EXISTING ROAD
- PROPOSED ROAD BY A/E
- PROPOSED ROAD BY A/E
- EXISTING PROPERTY
- APPLICABLE
- STREET
- RESERVED

Georgia Department of Transportation

VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

This section describes the procedures used during the VE study. It is followed by separate narratives and conclusions including:

- Value Engineering Study Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Model
- Function Analysis
- Creative Idea Listing and Evaluation of Ideas

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

PREPARATION EFFORT

Pre-study preparation for the VE effort consisted of scheduling study participants and tasks, gathering necessary background information on the facilities, and compiling project data into cost models and graphic cost histograms. Information relating to the design, construction, and operation of the facilities is important as it forms the basis of comparison for the study effort. Information relating to funding, project planning operating needs, systems evaluations, basis of cost, soil conditions, and construction of the facilities was also a part of the analysis.

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guides the search for high cost areas in each of the three projects and includes procedures for developing alternative solutions for consideration. It has six phases:

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



Value Engineering Study Task Flow Diagram

Preparation Effort

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

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

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

LCC Model
 Roadway
 Bridges
 MOT
 Energy
 User Impact

Workshop Effort

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

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

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

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

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

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

Post-Workshop Effort

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

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

Final Acceptance
 Redesign by Designer

Information Phase

At the beginning of the study, the conditions and decisions that have influenced the development of the projects must be reviewed and understood. For this reason, the design teams presented information about the projects to the VE team on the first day of the session. Following the presentations, the VE team discussed the projects using the following documents:

- Plan and Profile of Proposed Widening of SR 107 from I-75 to CR 250 in Ashburn, Project STP-0000-00(311), P.I. No. 0000311, Turner County, Georgia, prepared by Jacobs Engineering, dated 7/21/2009;
- Project Concept Report, Department of Transportation, State of Georgia, Project STP-0000-00(311), P.I. No. 0000311, Turner County, Georgia, Widening of SR 107 from I-75 to CR 250;
- Estimate Report for SR 112/SR 107 Turner, prepared by State of Georgia Department of Transportation; dated 09/11/2008;
- Plan and Profile of Proposed Widening of SR 107 from CR 250 to CR 264, , Project STP-0000-00(314), P.I. No. 0000314, Turner and Irwin Counties, Georgia, prepared by McGee Partners, Inc., dated 7/24/2009;
- Project Concept Report, Department of Transportation, State of Georgia, Project STP-0000-00(314), P.I. No. 0000314, Turner and Irwin Counties, Georgia, Widening of SR 107 from CR 250 to CR 264, dated 7/24/09;
- Estimate Report for SR 107 from Waterloo/Rebecca Hwy (CR 250) to Cleveland Road/Jeff Davis Road (CR 264), prepared by State of Georgia Department of Transportation; dated 07/24/2009;
- Existing Bridge Plans, Project STP-0000-00(314), P.I. No. 0000314, Turner and Irwin Counties, Georgia, prepared by McGee Partners, Inc.;
- Bridge Alternative Study, Project STP-0000-00(314), P.I. No. 0000314, Turner and Irwin Counties, Georgia, prepared by McGee Partners, Inc.;
- Plan and Profile of Proposed Widening of SR 107 from CR 264 to SR 11/US 129, Project STP-0000-00(313), P.I. No. 0000313, Irwin and Ben Hill Counties, Georgia, prepared by Florence & Hutcheson, Inc., dated 7/24/2009;
- Project Concept Report, Department of Transportation, State of Georgia, Project STP-0000-00(313), P.I. No. 0000313, Irwin and Ben Hill Counties, Georgia, Widening of SR 107 from CR 264 to SR 11/US 129, not dated;
- Estimate Report for SR 107 from CR 264 to SR 11/US 129, prepared by State of Georgia Department of Transportation; dated 7/24/2009;
- Item Mean Summary for 01/2009 to 12/2008 compiled by the State of Georgia Department of Transportation; dated January 20, 2009;
- Standards and Construction Details Binder; prepared by the Department of Transportation, State of Georgia; undated;
- Standard Specifications Construction of Transportation Systems; prepared by the Department of Transportation, State of Georgia; 2001 Edition;
- Design Policy Manual; A Georgia Department of Transportation Publication; Version 2.0; revised May 21, 2007; and
- A Policy on Geometric Design of Highway and Streets; prepared by the American Association of State Highway and Transportation Officials; dated 2004.

Function Identification and Analysis Phase

Based on historical and background data, a cost model and graphic function analysis was developed for each project by major construction elements. They were used to distribute costs by project element, serve as a basis for alternative functional categorization, and assign worth to the categories, where worth is the least cost to provide the required function, as determined by the VE team. The VE team identified the functions of the various project elements and subsystems by using random function generation techniques resulting in the attached Random Function Analysis worksheet.

Creative Phase

This VE study phase involved the creation and listing of ideas. Creative idea worksheets were organized by segment and project element. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower cost to the owner, or to improve the quality of the project. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and association of ideas.

GDOT and the design teams may wish to review the creative idea lists since they may contain ideas that can be further evaluated for potential use in the design.

Evaluation Phase

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

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

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

Development Phase

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

Presentation Phase

The last phase of the VE study was the presentation of the findings. The VE alternatives were screened by the VE team before draft copies of the Summary of Potential Cost Savings worksheets were provided to GDOT and representatives from each design team during an informal presentation on the last day of the workshop. The VE alternatives were arranged in the same order as the idea listing sheets to facilitate cross-referencing.

POST-WORKSHOP EFFORT

The post-study portion of the VE study includes the preparation of this report. It is recommended that personnel from GDOT and the design team analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before implementation, or presenting reasons for rejection.



VALUE ENGINEERING WORKSHOP AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 3-1/2 day Value Engineering (VE) workshop on Project Number STP-0000-00(311), P.I. No. 0000311, Widening of SR 107 from I 75 to CR 250/Waterloo Highway, Project Number STP-0000-00(314), P.I. No. 0000314, Widening of SR 107 from CR 250/Waterloo Highway to CR 264/Jeff Davis Road, and STP-0000-00(313), P.I. No. 0000313, Widening of SR 107 from CR 264/Jeff Davis Road to SR 11/US 129. The project is located in Turner, Irwin and Ben Hill Counties, Georgia. The workshop will be held August 10-13, 2009 at the following location:

Georgia Department of Transportation
One Georgia Center (OGC)
5th Floor Conference Room
600 West Peachtree Street
Atlanta, Georgia 30308

The point of contact is Ms. Lisa L. Myers, Transportation Engineer Assistant Administrator, and Value Engineering Coordinator, who can be reached at 404-631-1770.

The design consultants from Jacobs Engineering Group, McGee Partners, Inc., and Florence and Hutcheson, Inc. will provide an overview of each project at the beginning of the workshop and be available to answer questions during the VE study effort.

AGENDA

Monday, August 10, 2009

8:30 am - 9:00 am **VE Team Gathers for Introductions**

9:00 am - 9:05 am **Introduction to the Workshop**

- Welcome and opening remarks by GDOT
- Team member introductions
- VE process, workshop organization and agenda
- Objectives of the workshop

9:05 am - 10:30 am **Designer's Overview**

Representatives from Jacobs Engineering Group, McGee Partners, Inc., and Florence & Hutcheson, Inc. will provide an overview of each project. After the overview, the design team will answer VE team questions.

*Widening of SR 107 from IR 75 to CR 250/Waterloo Highway
GDOT Project No.: STP-0000-00(311), P.I. # 0000311
Widening of SR 107 from CR 250 to CR 264
GDOT Project No.: STP-0000-00(314), P.I. # 0000314
Widening of SR 107 from CR 264/Jeff Davis Road to SR 11/US 129
GDOT Project No.: STP-0000-00(313), P.I. # 0000313
August 10-13, 2009*

VE Workshop Agenda



10:30 am - 12:00 pm **Function Analysis Phase**

The VE team will perform function analysis by defining the function of each project element or system in the cost model, selecting the primary or basic functions, and determining the worth, or least cost, to provide the function. The goal is to identify those functions or project elements which offer the greatest opportunity for cost reduction or value improvement.

12:00 pm - 1:00 pm **Lunch**

1:00 pm – 5:00 pm **Creative Phase**

The team will conduct a brainstorming session and list as many ideas as possible for consideration. The aim is to obtain a large quantity of ideas through free association, by eliminating roadblocks to creativity and deferring judgment. The VE Team Leader will be responsible for developing an idea listing for the team.

Tuesday, August 11, 2009

8:00 am – 9:00 am **Conclude Creative Phase**

9:00 am - 10:00 am **Evaluation Phase**

The VE team will analyze the ideas listed in the creative phase and select the best ideas based on project criteria obtained during the design overview and a discussion of the ideas advantages and disadvantages. This will be accomplished by assigning each idea a *Gut Feel Index* rating between 1 and 5, with 5 being the best, based on the team's consensus of how well the idea meets the noted criteria.

The team selects the highly rated ideas for research and development.

10:00 am - 12:00 pm **Development Phase**

The VE team will develop creative ideas into alternate designs. Initial and life cycle cost estimates comparing original and proposed alternatives will be prepared. Selected alternatives will be developed and supported with sketches, calculations and substantiation for change. Suppliers of materials and equipment will be contacted and specialists consulted.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Continue Development Phase**



Wednesday, August 12, 2009

8:00 am - 8:30 am **Review Status and Progress of the Team**

The VE team will assess its status and plan for completion of the alternatives development.

8:30 am - 12:00 noon **Continue Development Phase**

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Completion of Development Phase**

The VE team will wrap up and complete the development effort. The VE Team Leader will be responsible for reviewing each developed idea for completion and preparing a summary of the VE alternatives in preparation for the out-briefing presentation.

Thursday, August 13, 2009

8:00 am - 9:00 am **Preparation for Presentation Phase**

The VE team will finalize a summary of the VE alternatives with descriptions and initial and life cycle costs for a verbal presentation to interested parties. Summary of Potential Cost Saving worksheets will be copied for distribution to VE presentation attendees.

9:00 am – 10:15 am **Presentation Phase**

The VE team will present its alternatives to GDOT, Jacobs Engineering Group, McGee Partners, Inc., and Florence & Hutcheson, Inc., and is available to clarify any points. The process for accepting/rejecting VE alternatives is described and a target schedule for meeting to finalize implementation decisions is established.

10:15 am – 10:30 am **Workshop “Post Mortem” and Closing Remarks**

10:30 am **Adjourn**

VALUE ENGINEERING WORKSHOP PARTICIPANTS

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

Joseph A. Leoni, PE	Roadway QA/QC Manager	ARCADIS-US, Inc.
John P. Tiernan, PE	Structural Engineer	ARCADIS-US, Inc.
Dominic Saulino, PE	Roadway Engineer	HNTB Corporation
Vinique Word	Transportation Engineer	Delon Hampton & Associates
Stephen G. Havens, PE, CVS	VE Team Leader	Lewis & Zimmerman Associates

OWNER/DESIGNER PRESENTATION

Representatives from GDOT, Jacobs Engineering, McGee Partners, Inc., and Florence & Hutcheson presented an overview of the project on Monday, August 10, 2009. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE study, was to bring the VE team “up-to-speed” regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING TEAM PRESENTATION

The VE team conducted an informal presentation on Thursday, August 13, 2009 to GDOT, Jacobs Engineering, McGee Partners, Inc., and Florence & Hutcheson. Copies of the draft Summary of Potential Cost Savings worksheets were provided for interim use.

A copy of the meeting participants is attached for reference.

ECONOMIC DATA

The VE team developed economic criteria used for evaluation with information gathered from the State of Georgia Department of Transportation. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for planning project period interest rates are based on the following parameters:

Year of Analysis:	2009
Economic Planning Life:	30 years for Pavement
Economic Planning Life:	50 years for Bridges
Discount Rate/Interest:	0% (Per GDOT)
Inflation/Escalation Rate:	5.00% Rural/10% Urban (Per GDOT)
Engineering and Contingencies:	10.00% (Per GDOT)

A Markup of 10.0% for engineering and contingencies was used for calculating costs associated with the VE proposals developed during the workshop.

COST ESTIMATE SUMMARY AND COST MODEL

The VE team prepared the attached cost models for each of the three projects prior to the workshop. The cost models are arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas. As can be expected, judgments at this stage of the study are based on experience and intuition rather than facts, which are not uncovered until well along in the analysis of function. As a result of these qualified hypotheses, there appears to be a potential for initial savings for each of the three projects in the following areas:

- Typical Sections
 - Additional lane requirements
 - Lane widths
 - Median widths
 - Shoulder widths
 - Curb and gutter widths
 - Sidewalk requirements
- Drainage
 - Drainage piping material
- General
 - Left-turn lane length requirements
 - Intersection alignment requirements
 - Median opening design/requirements

In order to facilitate the cost developments of the selected ideas, the VE team generated numerous “unit” prices for specific pavement costs that are noted below for each project:

P.I. No.	Asphaltic Concrete (9.5 mm Mix) Per Square Foot	Asphaltic Concrete (12.5 mm Mix) Per Square Foot	Asphaltic Concrete (19 mm Mix) Per Square Foot	Asphaltic Concrete (25 mm Mix) Per Square Foot	Graded Aggregate Base (10") Per Square Foot	Total Cost of Full Depth Pavement Section Per Square Foot	Total Cost of Full Depth Shoulder Section Per Square Foot
0000311 Rural		\$0.72	\$1.04	\$1.93	\$1.41	\$5.10	
0000314 Rural		\$0.80	\$0.93	\$1.78	\$1.41	\$4.92	
0000313 Rural	\$0.78		\$0.93	\$1.78	\$1.59	\$5.08	
0000313 Urban	\$0.78		\$0.93	\$2.23	\$1.59	\$5.53	
Shoulders For All Projects		\$0.78	\$0.93		\$1.59		\$3.30

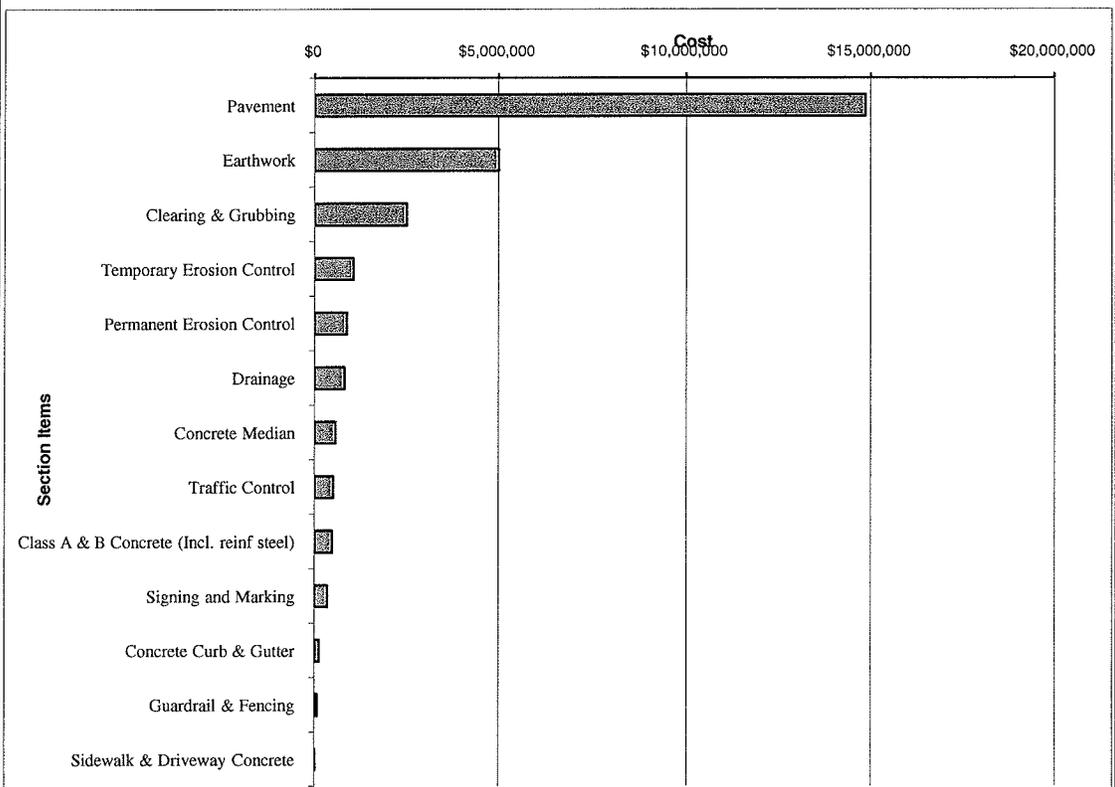
*Reference Value Engineering Alt. No. T-9 for Pavement unit pricing calculations.

COST HISTOGRAM



Project: **WIDENING OF SR 107 FROM I-75 TO CR 250**
 Turner County, Georgia
 Design Development Stage

Project No. STP-0000-00(311) P.I. No. 0000311	COST	PERCENT	CUM. PERCENT
Pavement	14,849,700	54.71%	54.71%
Earthwork	5,000,000	18.42%	73.13%
Clearing & Grubbing	2,500,000	9.21%	82.34%
Temporary Erosion Control	1,040,173	3.83%	86.17%
Permanent Erosion Control	863,655	3.18%	89.35%
Drainage	800,863	2.95%	92.30%
Concrete Median	561,600	2.07%	94.37%
Traffic Control	500,000	1.84%	96.21%
Class A & B Concrete (Incl. reinf steel)	474,075	1.75%	97.96%
Signing and Marking	344,456	1.27%	99.23%
Concrete Curb & Gutter	124,800	0.46%	99.69%
Guardrail & Fencing	75,664	0.28%	99.97%
Sidewalk & Driveway Concrete	8,400	0.03%	100.00%
Construction Subtotal	\$ 27,143,386	100.00%	
Engineering and Construction at 10.00%	\$ 2,714,339		
Construction Total	\$ 29,857,724	Mark-Up:	10.00%
Right-of-Way: Land	\$ 490,000		
Right-of-Way: Improvements	\$ 565,000		
Right-of-Way: Relocation	\$ 120,000		
Right-of-Way: Damage	\$ 200,000		
Right-of-Way Subtotal	\$ 1,375,000		
Scheduling Contingency 55.00%	\$ 756,250		
Administration / Court Costs 60.00%	\$ 1,278,750		
Market Appreciation 40.00%	\$ 1,364,000		
Right-of-Way Total	\$ 4,774,000	Mark-Up:	247.20%
Reimbursable Utilities Costs	\$ 576,000		
Reimbursable Utilities Subtotal	\$ 576,000		
GRAND TOTAL	\$ 35,207,724		



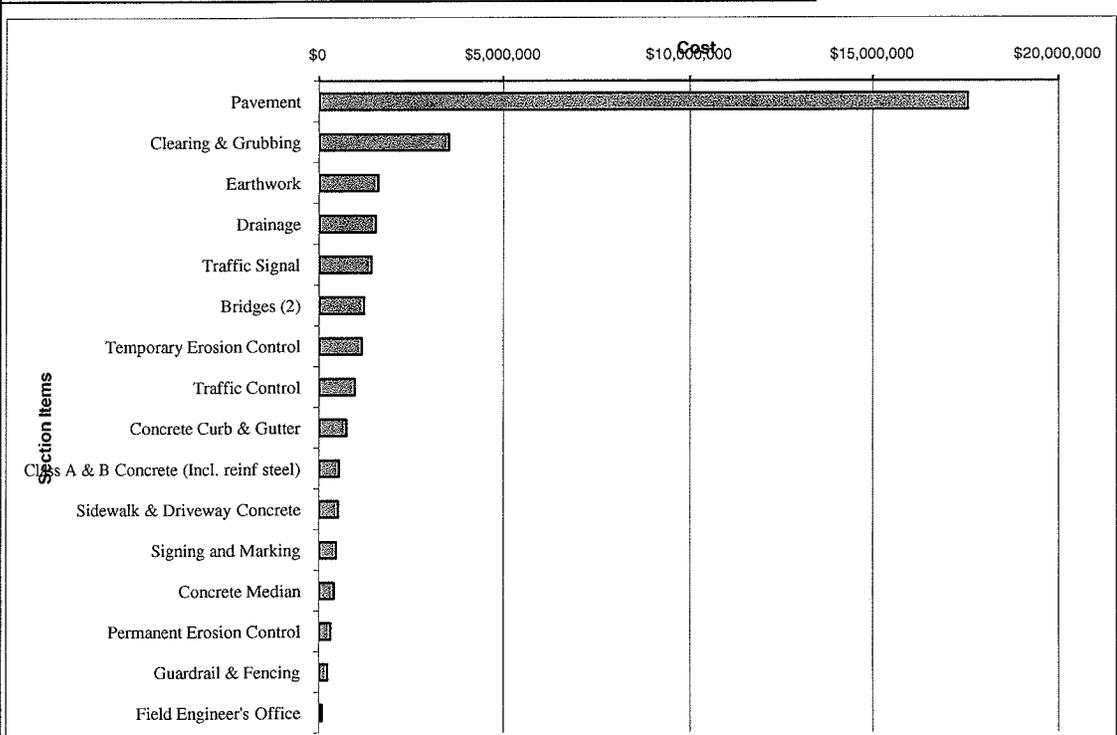
Costs in graph are not marked-up.

COST HISTOGRAM



Project: **WIDENING OF SR 107 FROM CR 264 TO US 11/SR 129**
Irwin and Ben Hill Counties, Georgia
Design Development Stage

Project No. STP-0000-00(313) P.I. No. 0000313	COST	PERCENT	CUM. PERCENT
Pavement	17,572,425	54.82%	54.82%
Clearing & Grubbing	3,500,000	10.92%	65.73%
Earthwork	1,578,227	4.92%	70.66%
Drainage	1,515,635	4.73%	75.39%
Traffic Signal	1,411,889	4.40%	79.79%
Bridges (2)	1,209,250	3.77%	83.56%
Temporary Erosion Control	1,152,165	3.59%	87.16%
Traffic Control	950,000	2.96%	90.12%
Concrete Curb & Gutter	721,797	2.25%	92.37%
Class A & B Concrete (Incl. reinf steel)	524,868	1.64%	94.01%
Sidewalk & Driveway Concrete	495,294	1.55%	95.55%
Signing and Marking	443,674	1.38%	96.94%
Concrete Median	384,528	1.20%	98.14%
Permanent Erosion Control	303,723	0.95%	99.08%
Guardrail & Fencing	219,667	0.69%	99.77%
Field Engineer's Office	73,914	0.23%	100.00%
Construction Subtotal		\$ 32,057,056	100.00%
Engineering and Construction at	10.00%	\$ 3,205,706	
Inflation Rate	0.00%	\$ -	
Construction Total		\$ 35,262,762	Construction Mark-Up: 10.00%
Right-of-Way: Land	\$ 1,054,100		
Right-of-Way: Improvements	\$ 575,000		
Right-of-Way: Relocation	\$ 360,000		
Right-of-Way: Damage	\$ 870,000		
Right-of-Way Subtotal		\$ 2,859,100	
Scheduling Contingency	55.00%	\$ 1,572,505	
Administration / Court Costs	60.00%	\$ 1,715,460	
Market Appreciation	40.00%	\$ 1,143,640	
Right-of-Way Total		\$ 7,290,650	ROW Mark-Up: 155.00%
Reimbursable Utilities Costs		\$ 1,355,000	
Reimbursable Utilities Subtotal		\$ 1,355,000	
GRAND TOTAL		\$ 43,908,412	

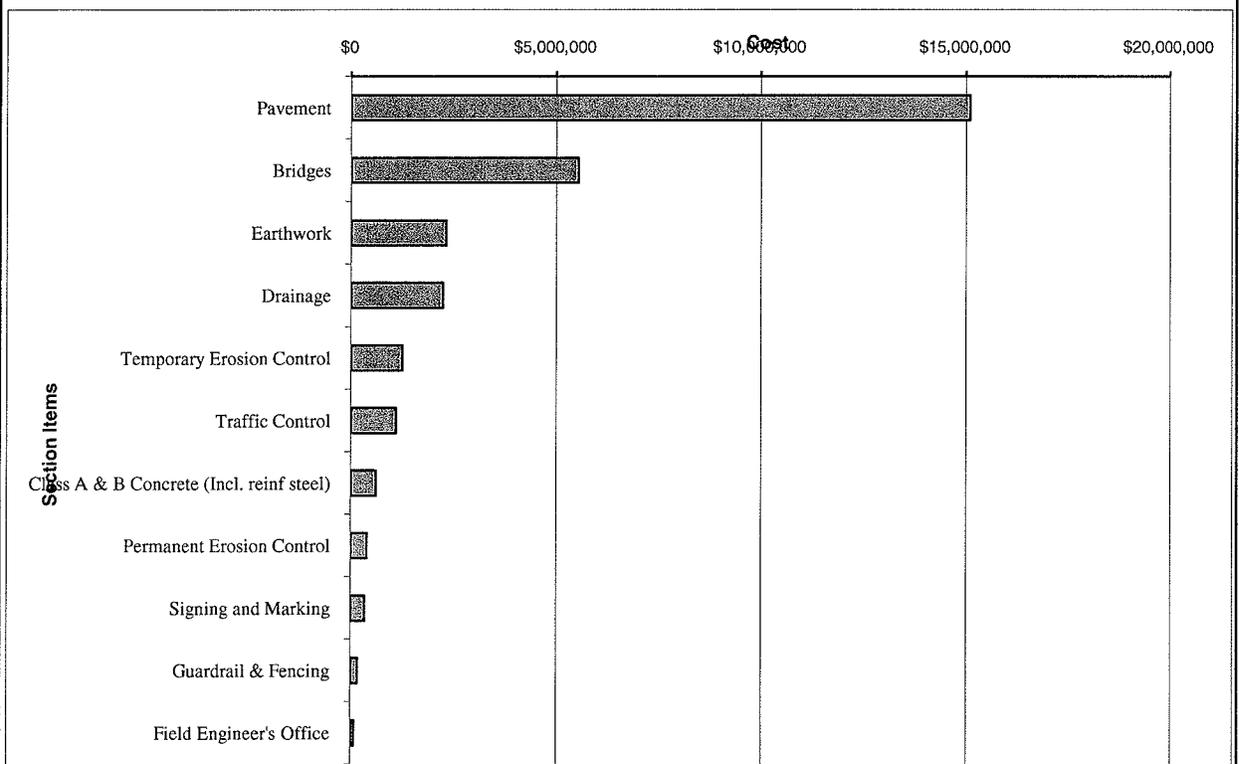


Costs in graph are not marked-up.

COST HISTOGRAM



Project: WIDENING OF SR 107 FROM CR 250 TO CR 264			
Turner and Irwin Counties, Georgia			
<i>Design Development Stage</i>			
Project No. STP-0000-00(314) P.I. No. 0000314	COST	PERCENT	CUM. PERCENT
Pavement	15,091,082	51.94%	51.94%
Bridges	5,537,775	19.06%	71.00%
Earthwork	2,296,824	7.91%	78.91%
Drainage	2,215,745	7.63%	86.53%
Temporary Erosion Control	1,238,683	4.26%	90.80%
Traffic Control	1,094,900	3.77%	94.56%
Class A & B Concrete (Incl. reinf steel)	607,294	2.09%	96.66%
Permanent Erosion Control	388,619	1.34%	97.99%
Signing and Marking	338,043	1.16%	99.16%
Guardrail & Fencing	166,400	0.57%	99.73%
Field Engineer's Office	78,765	0.27%	100.00%
Construction Subtotal	\$ 29,054,130	100.00%	
Engineering and Construction at 10.00%	\$ 2,905,413		
Inflation Rate 0.00%	\$ -		
Construction Total	\$ 31,959,543	Construction	
		Mark-Up:	10.00%
Right-of-Way: Land	\$ 545,100		
Right-of-Way: Improvements	\$ 1,550,000		
Right-of-Way: Relocation	\$ 400,000		
Right-of-Way: Damage	\$ -		
Right-of-Way Subtotal	\$ 2,495,100		
Scheduling Contingency 55.00%	\$ 1,372,305		
Administration / Court Costs 60.00%	\$ 2,320,443		
Market Appreciation 40.00%			
Right-of-Way Total	\$ 6,187,900	ROW	
		Mark-Up:	148.00%
Reimbursable Utilities Costs	\$ 569,400		
Reimbursable Utilities Subtotal	\$ 569,400		
GRAND TOTAL	\$ 38,716,843		



Costs in graph are not marked-up.

FUNCTION ANALYSIS

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

The key opportunity areas for potential cost reduction and value improvement established during the function analysis session (including input from the design teams during the design overview) includes the following:

- Typical Sections
 - Increase space
 - Add lanes
 - Increase right-of-way
 - Accommodate pedestrians
 - Accommodate historical sites
 - Accommodate 70 mph design speed
 - Widen paved shoulders
- Bridge
 - Accommodate left turns
- Drainage
 - Control runoff
- General
 - Improve intersection alignments
 - Accommodate left turns
 - Accommodate U-turns
 - Enhance safety

RANDOM FUNCTION ANALYSIS



PROJECT: **WIDENING OF SR 107 FROM I-75 TO SR 11/US 129**
P.I. Nos. 0000311, 0000313, and 0000314
Turner, Irwin, and Ben Hill Counties, Georgia

SHEET NO.: **1 of 3**

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
Project Functions	Promote	Economic Development	HO
	Correct	Geometric Deficiencies	B
	Accommodate	Future Traffic	S
	Sustain	Environment	HO
	Improve	Truck Access	B
	Enhance	Safety	B
	Increase	Design Speed	RS
	Accommodate	Farm Vehicles	RS
	Improve	Operations	G
	Reduce	Travel Time	B
	Improve	Sight Distance	RS
	Control	Traffic Conflicts	RS
Pavement Functions	Support	Loads	B
	Increase	Space	B
	Use	Existing Pavement	S
	Add	Lanes	RS
	Accommodate	Turn Lanes	RS
	Accommodate	Cross Roads	RS
	Accommodate	65 mph Speed Limit	RS
	Accommodate	Driveways	RS
	Widen	Paved Shoulders	RS

Function defined as:	Action Verb	Kind:	B = Basic	HO = Higher Order
	Measurable Noun		S = Secondary	LO = Lower Order
			RS = Required Secondary	G = Goal

RANDOM FUNCTION ANALYSIS



PROJECT: **WIDENING OF SR 107 FROM I-75 TO SR 11/US 129**
P.I. Nos. 0000311, 0000313, and 0000314
Turner, Irwin, and Ben Hill Counties, Georgia

SHEET NO.: **2 of 3**

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
Pavement Functions (Continued)	Accommodate	Historical Sites	RS
	Accommodate	Endangered Species	RS
	Increase	Useful Life	G
	Improve	Load Distribution	S
	Control	Stormwater	RS
	Accommodate	Pedestrians	S
Earthwork Functions	Accommodate	Grade Separation	RS
	Accommodate	Additional Lanes	B
	Achieve	Required Profile	RS
	Accommodate	MOT	RS
	Move	Earth	RS
Bridge Functions	Span	Creeks/ Wetlands	B
	Support	Load	RS
	Accommodate	Turn Lanes	S
	Accommodate	Additional Lanes	RS
	Accommodate	Hydraulic Flow	RS
	Accommodate	Wildlife	RS

Function defined as: Action Verb
 Measurable Noun

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

HO = Higher Order
 LO = Lower Order
 G = Goal

CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

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

PROJECT ELEMENT	PREFIX
Typical Sections	T
Bridge	B
Drainage	D
General	G

Creative Idea Evaluation

After discussing each idea, the team evaluated the ideas by consensus. The following table is a summary of the number of VE alternatives and design suggestions that were developed for each of the three projects. Only those ideas rated 4 or 5 were developed into VE alternatives including savings. In cases where there was little cost impact but an improvement to the project was anticipated, the designation DS, for design suggestion, was used. Ideas that were not developed further may have been combined with another related idea or discarded as a result of additional research indicating the concept as not being cost effective or technically feasible. The project team is encouraged to review the Creative Idea Listing since it may suggest additional ideas that can be applied to each design.

Project Number	Number of VE Alternatives Developed	Number of Design Suggestions Developed
STP-0000-00(311)	12	1
STP-0000-00(314)	12	0
STP-0000-00(313)	13	0

CREATIVE IDEA LISTING



PROJECT: WIDENING OF SR 107 FROM I-75 TO SR 11/US 129 <i>P.I. Nos. 0000311, 0000314, and 0000313</i> <i>Turner, Irwin, and Ben Hill Counties, Georgia</i>	SHEET NO.:	1 of 2
--	------------	---------------

NO.	IDEA DESCRIPTION	RATING
TYPICAL SECTIONS (T)		
T-1	Use a three-lane rural section in lieu of a four-lane urban divided section.	4
T-2	Use intermittent passing lanes in lieu a four-lane rural divided section.	4
T-3	Use a 32-ft-wide rural grassed median in lieu of a 44-ft-wide rural grassed median.	4
T-4	Use an 18-ft-wide raised median in lieu of a 24-ft-wide raised median in urban sections.	4
T-5	Use 12-ft-wide urban shoulders in lieu of 16-ft-wide urban shoulders.	4
T-6	Use 4-ft-wide paved rural shoulders in lieu of 6 ft 6-in-wide paved rural shoulders.	4
T-7	Eliminate sidewalk from urban sections.	4
T-8	Use 24-in-wide curb and gutter in lieu of 30-in-wide curb and gutter.	4
T-9	Use 11-ft-wide inside lanes in lieu of 12-ft-wide.	4
T-10	Eliminate sidewalk from one side of the urban sections.	4
T-11	Maintain the existing three-lane rural section from I-75 to just east of Thompson Road to avoid relocating the historic building at Resource #1.	DS
BRIDGES (B)		
B-1	Retain the existing bridge at Willacoochee Creek.	ABD
B-2	Shorten the left-turn lane at Rebecca Waterloo Highway to reduce the width of the Deep Creek Bridge.	4
DRAINAGE (D)		
D-1	Use HDPE (High Density Polyurethane) piping in lieu of reinforced concrete pipe for longitudinal drainage sections only.	4
GENERAL (G)		
G-1	Provide shorter turn lanes.	4
G-2	Use Type A median openings in lieu of Type B.	4
G-3	Eliminate the connector to Firetower Road by reusing the existing intersection at Jeanette Road.	4
G-4	Use a narrower median to prevent Resource #1 relocation.	2
G-5	Block Geoghagen Road/CR 62 just to the north of realigned SR 107.	4

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

CREATIVE IDEA LISTING



PROJECT: WIDENING OF SR 107 FROM I-75 TO CR 250 <i>STP00-0000-00(311), P.I. No. 0000311</i> <i>Turner County, Georgia</i>	SHEET NO.:	1 of 1
--	------------	---------------

NO.	IDEA DESCRIPTION	RATING
	TYPICAL SECTIONS (T)	
T-2	Use intermittent passing lanes in lieu a four-lane rural divided section.	4
T-3	Use a 32-ft-wide rural grassed median in lieu of a 44-ft-wide rural grassed median.	4
T-4	Use an 18-ft-wide raised median in lieu of a 24-ft-wide raised median in urban sections.	4
T-6	Use 4-ft-wide paved rural shoulders in lieu of 6-ft 6-in wide paved rural shoulders.	4
T-8	Use 24-in-wide curb and gutter in lieu of 30-in-wide curb and gutter.	4
T-9	Use 11-ft-wide inside lanes in lieu of 12-ft-wide lanes.	4
T-11	Extend the existing three-lane rural section from I-75 to just east of Thompson Road to avoid relocating the historic building at Resource #1.	DS
	GENERAL (G)	
G-1	Provide shorter turn lanes.	4
G-2	Use Type A median openings in lieu of Type B.	4
G-3	Eliminate the connector to Firetower Road by reusing the existing intersection at Jeanette Road.	4
G-4	Use a narrower median to prevent Resource #1 relocation.	2
G-5	Cul-de-sac Geoghagen Road/CR 62 just to the north of realigned SR 107.	4
G-6	Shorten improvements at Zorn Road.	ABD
G-7	Shorten improvements at A. F. Shivers Road.	ABD
G-8	Shift the median opening back to the original alignment at Live Oak Road.	4
G-14	Eliminate median openings at Sta. 304+70 and Sta. 334+00 and replace with a single median opening at Sta. 319+35.	4

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

CREATIVE IDEA LISTING



PROJECT: WIDENING OF SR 107 FROM CR 264 TO SR 11/US 129 <i>STP00-0000-00(313), P.I. No. 0000313</i> <i>Irwin and Ben Hill Counties, Georgia</i>	SHEET NO.:	1 of 1
--	------------	---------------

NO.	IDEA DESCRIPTION	RATING
TYPICAL SECTIONS (T)		
T-1	Use a three-lane rural section in lieu of a four-lane urban divided section.	4
T-2	Use intermittent passing lanes in lieu a four-lane rural divided section.	4
T-3	Use a 32-ft-wide rural grassed median in lieu of a 44-ft-wide rural grassed median.	4
T-4	Use an 18-ft-wide raised median in lieu of a 24-ft-wide raised median in urban sections.	4
T-5	Use 12-ft-wide urban shoulders in lieu of 16-ft-wide urban shoulders.	4
T-6	Use 4-ft-wide paved rural shoulders in lieu of 6 ft 6-in-wide paved rural shoulders.	4
T-7	Eliminate sidewalk from urban sections.	4
T-8	Use 24-in-wide curb and gutter in lieu of 30-in-wide curb and gutter.	4
T-9	Use 11-ft-wide inside lanes in lieu of 12-ft-wide lanes.	4
T-10	Eliminate sidewalk from one side of the urban section.	4
BRIDGES (B)		
B-1	Retain the existing bridge at Willacoochee Creek.	ABD
DRAINAGE (D)		
D-1	Use High Density Polyurethane pipe in lieu of reinforced concrete pipe for longitudinal drainage sections only.	4
GENERAL (G)		
G-1	Provide shorter turn lanes.	4
G-2	Use Type A median openings in lieu of Type B.	4
G-16	Shorten improvements at Cleveland Road.	4
G-17	Reduce the speed limit to 55 at Van Buren/Webster Road and shorten the curve radius.	4
G-18	Maintain the existing alignment at Sta. 448 (Unit 313).	4
G-19	Maintain the existing alignment at Fort Sumter Road (Unit 313).	4

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

