



Georgia Department of Transportation

SR 151 @ I-75

STP-IM-180-1(6) Catoosa County

P.I. No. 621530

Value Engineering Study Report

Preliminary Design Stage

June 2007

Designer

Clark Patterson Associates

Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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July 3, 2007

Ms. Lisa Myers
Design Review Engineering Manager
State of Georgia
Department of Transportation
No. 2 Capital Square - Room 265
Atlanta, Georgia 30334

re: SR 151/Old Alabama Road Widening
Project No. STP-IM-180-1(6) Catoosa County
P.I. No. 621530
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to present four copies and one CD of the value engineering study report on the referenced project. We appreciate your assistance during the study and hope that these VE recommendations provide a variety of improvements to enhance the value and constructability of the SR 151 Project.

The key cost driver on the project is the \$18M in new right-of-way. So, decisions made on the alignment and typical section will significantly impact the total project cost. Therefore, the VE team focused on several concepts to reduce the amount of borrow, right-of-way, construction staging, and overall disruption to the local traffic. Savings may be realized in modifying the grade of the ramps to I-75; jacking the existing I-75 bridge and reusing the existing steel girders; and refurbishing the bridge over Chickamauga Creek instead of total removal and replacement. These and other options presented in the report provide GDOT and the design team with options to meet the basic project functions at a lower total life cycle cost.

We appreciate the excellent participation of the GDOT staff and Clark Patterson Associates design personnel throughout the study. Please feel free to contact me at 253/925-8741 if you have any questions as you review this report. On behalf of Lewis & Zimmerman Associates Inc., and the entire VE team, we hope our services have been informative and useful to the goal of value improvement on this project.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

David A. Hamilton, P.E., CVS, CCE, LEED™ AP
Vice President
Certified Value Specialist No. 910506 - Life

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) report summarizes the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the SR 151/Old Alabama Widening and Reconstruction starting from Hazel Drive on the south to US 41 on the north. The project is being designed by Clark Patterson Associates, Inc. for GDOT.

This project includes major lane widening, turn lanes, signals, and curb and gutter along a 2.25-mile segment of Old Alabama Road located just west of the City of Ringgold in Catoosa County. The current project total cost is \$40M, which includes \$21M in construction cost, \$18M in new right-of-way, and \$1.1M in reimbursable utilities.

A VE Workshop was conducted June 12 - 15, 2007 at the GDOT Central Office, in Atlanta under the value engineering guidelines of GDOT, FHWA, and SAVE International. VE team members consisted of a Certified Value Specialist and design and construction professionals.

Decision Making

Value engineering studies by their nature identify alternate design schemes, construction methods, and project delivery options, which, if accepted by the project users and design team, may impact the final scope, design documents, budget, schedule, functionality, and appearance of the SR 151 project. The task of the VE team is to identify possible solutions, whereas the task of GDOT and the design team is to choose the most favorable of the VE alternatives for incorporation into the project.

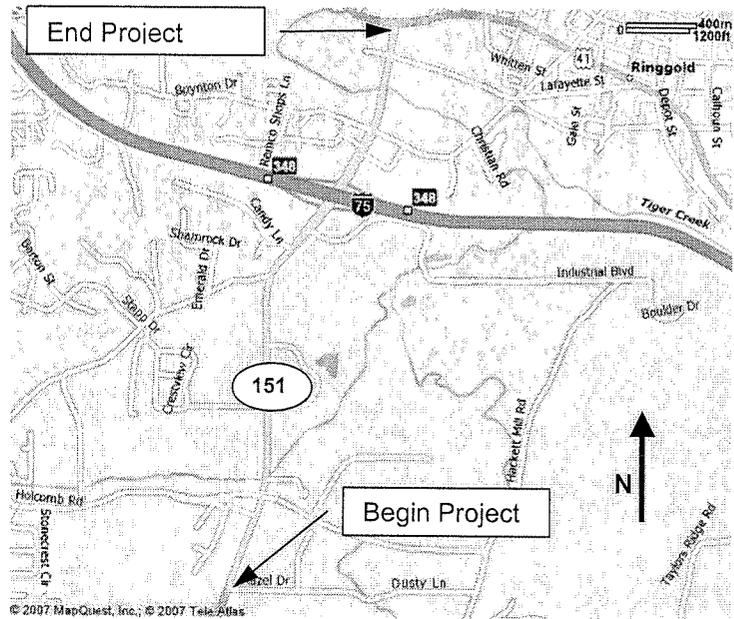
Decisions are needed on each of the alternatives presented in this report. Personnel from GDOT and the design team will accept, reject, or modify these alternatives. Value engineering searches for new, unique, and different methods to provide for the needed project functions at the lowest total life cycle (30-yr.) cost. The blending of these new and sometimes challenging ideas with established procedures, norms, and protocol is the responsibility of user representatives. The project team should accept alternatives which support the construction program and similarly reject alternatives which do not optimize the goals for the SR 151 project.

PURPOSE AND NEED

This project will provide local and through traffic along SR 151/Old Alabama Road with a facility that will adequately serve current and future travel demands and provide the public with a safer driving environment. The SR 151 improvements are part of the Chattanooga Urban Area Transportation Study and involve the multi-lanes of this primarily north-south corridor in north Georgia near the City of Ringgold. The project also provides for future expansion of I-75 with a longer bridge and relocated ramps.

PROJECT DESCRIPTION

The project is located near the Georgia/Tennessee border at Exit 348 on Interstate 75 in Catoosa County, and has an approximate length of two miles beginning near Hazel Drive on the south and ending at US 41 (Dixie Highway) on the north. The project includes a new bridge over I-75 and the South Chickamauga Creek. The bridge over I-75 will be raised to meet the 17-ft. clear requirement and length requirements to accommodate future I-75 lanes. The I-75 bridge will be 327 ft. long x 110 ft. wide. The bridge over Chickamauga Creek is being raised five ft. to allow adequate stream flow during flood conditions and will be 224 ft. long x 102 ft. wide. Both structures are planned with new drilled caisson foundations, concrete girders, and concrete deck. The alignment will provide for four 12-ft. lanes and a 24-ft. wide raised concrete median with curb and gutter on both sides. Additional right-of-way will be purchased both on the east and west sides of SR 151 to allow for the wider road cross-section. The majority of the profile south of I-75 matches the existing elevations of SR 151, but that section north of I-75 near the new Chickamauga Creek Bridge will be raised up to five ft. to accommodate the new flood elevation requirement.



Project traffic analysis along SR 151 is based upon a Base Year (2008) ADT of 15,150 and a Design Year (2028) of 22,500, which reflects the significant growth currently taking place in the area. Truck volumes are also higher than average along this corridor due mainly to the large number of industries located south of I-75 and using SR 151 as their main business access. Improvements will also be made to all four ramps on the Exit 348 interchange to improve sight distance and acceleration/deceleration distances. The four ramps will have a single 12-ft.-wide lane with a maximum slope of 4%. The VE study focused on reducing the 130,000 CY of borrow required for the job, streamlining the four-stage construction program and minimizing the right-of-way requirements. The total project cost at the preliminary engineering phase is estimated at \$40M.

CONCERNS AND OBJECTIVES

During the presentation by the representatives from the Clark Patterson design team on the first day of the VE workshop, several areas of concern in the development of the project were noted. These items were identified as areas of opportunity to improve value, meet design requirements, satisfy goals, and reduce project risk.

- The project requires more than 130,000 CY of borrow material.
- A four-stage construction procedure is required for the project.
- Right-of-way cost is over \$18M.

- The existing I-75 bridge structure is still serviceable and could be jacked instead of replaced.
- The median width of 20 ft. exacerbates the right-of-way cost.
- I-75 ramps are designed with only a 4% slope, resulting in very long ramps.
- Bridge widening for future I-75 laneage is costly and may not be required for many years.
- Project start and end locations may extend beyond actual needs.
- The amount of commercial property being purchased is substantial.
- There is no landscaping or lighting proposed for this corridor.
- The construction on side streets appears to extend beyond that needed for the main line improvements.
- The ADT traffic projections for the design year (2028) of 22,000 appears at first glance to be high for an area served by three freeway exits, 345, 348, and 350.

Project Constraints

Discussions held during the VE workshop evolved around several key constraints that must be incorporated in the design:

- The present alignment of the SR 151 corridor is fixed and permanent detours are not possible.
- Exit 348 must remain open for traffic under all conditions during the construction period.
- Old Alabama Road must remain open.
- Bridge clearances must be a minimum of 17'-0".

RESULTS

To address the concerns noted above, the VE team conducted a brainstorming session and identified ways to improve the value and constructability of the structure.

A summary of the key recommendations includes:

General/Scope (G)

- The traffic volumes do not appear to warrant the improvements north of Lafayette Street to SR 41, including the Chickamauga Creek Bridge, since most of the traffic is at the I-75 interchange. New project limits could be set from STA 13+00 to STA 101. This concept would also eliminate the right-of-way in this northern segment, resulting in a total project savings in the range of \$12M.
- Traffic counts for both the base and projected year appear to be quite high for a modest sized community currently being served with three exits off I-75. It is suggested that these numbers be checked and possibly field verified for accuracy.

Typical Section (S)

Continuing the discussion point about traffic projections and Level of Service, it is proposed to reduce the amount of improvements on the far south end of the project, especially those south of Holcomb Road. Improvements in this area could be reduced proportionally with the projected traffic for this specific area. The southbound through lane could be dropped at Holcomb Road.

Alignment (A)

Since this corridor is becoming a prime commercial and retail area, some type of landscaping or, at a minimum, grass should be used in lieu of the paved median. The present worth savings of a grassed median, including the cost for mowing the grass, is over \$100,000.

Ramps (R)

- The ramps at I-75 are being modified to accommodate the future widening of I-75. The exact year of this widening is not known at this time, but it may be more in the future than the near horizon. The benefit of investing dollars in these facilities at this time may offer marginal returns due to the length of time before they would actually be required. Expansion of the bridge at I-75 is logical since the life of a bridge is 50+ years, but including the ramps, improvements at this time may be questionable. Deferring the ramp improvements now could save nearly \$2M.
- If the ramps are constructed, their profiles should be evaluated to reduce the amount of fill required. For example, Ramp C requires nearly 15 ft. of fill in places. A combination of grade and alignment changes are required on Ramps A and C, especially to reduce the fill requirements.

Bridges (B)

- As noted in the concerns above, the I-75 bridge is in acceptable condition and could be jacked in lieu of demolished. This would save the \$40/sf required to demolish the existing bridge, and eliminate a portion of the cost of a brand new bridge. New decks and handrails would need to be included with this concept. Even considering these costs, a net savings in the range of \$500,000 could be achieved by jacking the existing bridge structure.
- Similarly, the Chickamauga Creek Bridge could be jacked, saving an estimated \$400,000.
- Optimization to the I-75 bridge design could also be achieved by using MSE walls instead of a paved slope. The MSE concept could save an estimated \$700,000.

Construction Management (CM)

Since right-of-way is a huge portion of this project, management of these costs should include investigating the option of shifting the centerline of Old Alabama Road either all to the west or all to the east. As part of this investigation, it was assumed that the road would shift all to the east, and that the construction could be done in two stages instead of four. This efficiency in construction could be substantial due to schedule savings. Shifting the road totally to the east could save a combined total of approximately \$3M in construction and right-of-way costs.

Many options exist for this project, and value improvement is possible through the acceptance of these ideas. These and many more VE alternatives are presented in this report and include the joint recommendations of the VE team members.



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
GENERAL/SCOPE (G)						
G-1	Since there are four lanes in the Lafayette area, delete the segment of the project from Lafayette Street north to SR 41, including the Chickamauga Creek Bridge. New project limits would be from STA 13+00 to STA 101+00. Eliminate the right-of-way in the Lafayette segment also.	\$ 15,015,176	\$ 12,507,244	\$ 2,507,932		\$ 2,507,932
G-4	Add empty conduits along SR 151 for future integration of the traffic lights.	DESIGN SUGGESTION				
G-5	Add several overhead lights at the I-75 interchange and other key intersections.	DESIGN SUGGESTION				
G-6	The ADT of 22,000 in the design years appears very high; research traffic volume numbers and recheck in the field if possible.	DESIGN SUGGESTION				
ALIGNMENT (A)						
A-3	Reduce the amount of construction south of Holcomb Road; drop the southbound through lane on SR 151 at Holcomb Road. Grade out for sidewalks but do not pave.	\$ 510,155		\$ 510,155		\$ 510,155
TYPICAL SECTION (C)						
C-1	Add curb and gutters to both sides of Old Alabama Road and reduce the right-of-way requirements in total on the west side of the road.	\$ 3,263,895	\$ 2,530,755	\$ 733,140		\$ 733,140
C-9	Use a grassed median in lieu of pavement. Maintenance cost should be managed by the city.	\$ 227,186	\$ 1,200	\$ 225,986	\$ (120,741)	\$ 105,245
C-10	Reduce the section from 4 lanes to 3 lanes for Old Alabama Road south of Poplar Lane. Revisit the traffic projections to establish feasibility.	\$ 4,493,474		\$ 4,493,474		\$ 4,493,474



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
RAMPS (R)						
R-1	Reduce the amount of fill required by realigning Ramp C to use the existing ramp pavement, grading, and right-of-way. Reduce the taper by 900 ft. Defer major I-75 expansion improvements.	\$ 949,606	\$ 49,900	\$ 899,706		\$ 899,706
R-2	Retain existing Ramp A pavement and grading. Defer improvements until I-75 is expanded. Do nothing now.	\$ 1,420,385		\$ 1,420,385		\$ 1,420,385
R-4	Defer all improvements to the tapers on Ramps A, B, C, and D until the I-75 lane widening takes place.	\$ 1,827,706		\$ 1,827,706		\$ 1,827,706
BRIDGES (B)						
B-1	Reduce fill depth and resulting right-of-way requirements by using four spans in lieu of three spans on the South Chickamauga Creek Bridge and reduce the superstructure depth by 1 ft.-5 in.	\$ 75,505		\$ 75,505		\$ 75,505
B-5	Reuse the existing I-75 bridges since they are in serviceable condition. Jack the existing bridges to meet the 17 ft. clearance requirements and widen as necessary.	\$ 3,180,287	\$ 2,612,690	\$ 567,597		\$ 567,597
B-6	Rehabilitate the existing South Chickamauga Creek Bridge instead of demo and total replacement. Expand the existing steel bridge as necessary to meet new width requirements.	\$ 1,925,440	\$ 1,532,446	\$ 392,994		\$ 392,994
B-9	Use MSE abutment walls on the I-75 bridge in lieu of sloped paving and eliminate the two end spans on the bridge.	\$ 3,030,362	\$ 2,324,289	\$ 706,073		\$ 706,073
B-10	Reduce the median width on the South Chickamauga Creek Bridge from 20 ft. to 14 ft. to match the typical section median width of 14 ft.	\$ 207,498		\$ 207,498		\$ 207,498



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
CONSTRUCTION MANAGEMENT (CM)						
CM-1	Shift the alignment of Old Alabama Road entirely to the east and construct the project in two stages in lieu of four. Purchase right-of-way on the east side only.	\$ 5,629,328	\$ 2,577,996	\$ 3,051,332		\$ 3,051,332
CM-2	Incorporate the "Economic Price Adjustment" clause into the bid documents (Federal Acquisition Regulation Part 16) to share the risk of possible price escalation of materials such as asphalt, fuel, steel, and concrete.	DESIGN SUGGESTION				
CM-4	Add a line item to the project estimate for demolition of the two existing bridges. Demo cost could be \$40/sf on each bridge for a total cost of \$1M.	DESIGN SUGGESTION				
CM-6/7	Temporarily close Old Alabama Road at Chickamauga Creek to allow faster construction of the new bridge. Use local surface streets to temporarily detour traffic around the site. Construct the bridge in 4 months in lieu of 8 months.	\$ 300,000		\$ 300,000		\$ 300,000

STUDY RESULTS

INTRODUCTION

The results are the major feature of a VE study since they represent the benefits that can be realized on the project by GDOT, local patrons who use SR 151, and the Clark Patterson design team.

The recommended engineering and construction management suggestions are presented as individual alternatives for specific change. These may be in the form of VE alternatives with cost savings or design suggestions without associated cost. Individual comments on the current design are presented with a summary of the original design, a description of the proposed enhancements to the chosen improvement scheme, and, if appropriate, a descriptive evaluation of the advantages and disadvantages. Suggested alternatives on the current project are accompanied by a brief narrative to compare the original design and the proposed modifications. Sketches, where appropriate, are also presented.

Examples of improved value include improved constructability, ease of maintenance, minimization of risk, and less disruption upon roadway operations during construction. Some ideas cannot be quantified in terms of cost with the design information provided; these are presented as design suggestions and are intended to improve the quality of the project.

A summary of the more favorable improvements to the interchanges follows this narrative on the Summary of Potential Cost Savings table. The table is divided into major project elements divides the results section. The complete documentation of the developed VE alternatives follows the Summary of Potential Cost Savings.

RESULTS OF THE STUDY

The value engineering team brainstormed 42 ideas that could enhance the value of the project in the areas noted by GDOT as being desirable, such as cost control, safety, durability, ease of operation, expected life, and traffic improvement. Evaluation of those ideas considered the full range of project value objectives and resulted in the development of a number of recommendations.

The alternatives are presented with the following designations to aid in organization and review.

CATEGORY	PREFIX
General/Scope	G
Typical Section	S
Alignment	A

CATEGORY	PREFIX
Bridges	B
Ramps	R
Construction Management	CM

EVALUATION OF ALTERNATIVES

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

Cost is a primary basis of comparison for alternative designs, but other project criteria must be considered also when selecting alternatives for further analysis. Negative impacts upon existing traffic is extremely critical and design modifications that impact traffic, right-of-way, safety, or environment elements should be selected carefully following detailed review.

The various alternatives are “mutually exclusive,” so acceptance of one may preclude the acceptance of another. Multiple solutions to a single function were sought. All alternatives or design suggestions were developed independently of each other. However, some of the alternatives are interrelated so acceptance of one element may also be included in other alternatives. The reader should evaluate those alternatives carefully in order to select the combination of ideas with the greatest beneficial impact on the project.



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING		PRESENT WORTH OF COST SAVINGS				
<i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>						
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G-4	Add empty conduits along SR 151 for future integration of the traffic lights.	DESIGN SUGGESTION				
G-5	Add several overhead lights at the I-75 interchange and other key intersections.	DESIGN SUGGESTION				
G-6	The ADT of 22,000 in the design years appears very high; research traffic volume numbers and recheck in the field if possible.	DESIGN SUGGESTION				
ALIGNMENT (A)						
A-3	Reduce the amount of construction south of Holcomb Road; drop the southbound through lane on SR 151 at Holcomb Road. Grade out for sidewalks but do not pave.	\$ 510,155		\$ 510,155		\$ 510,155
TYPICAL SECTION (C)						
C-1	Add curb and gutters to both sides of Old Alabama Road and reduce the right-of-way requirements in total on the west side of the road.	\$ 3,263,895	\$ 2,530,755	\$ 733,140		\$ 733,140
C-9	Use a grassed median in lieu of pavement. Maintenance cost should be managed by the city.	\$ 227,186	\$ 1,200	\$ 225,986	\$ (120,741)	\$ 105,245
C-10	Reduce the section from 4 lanes to 3 lanes for Old Alabama Road south of Poplar Lane. Revisit the traffic projections to establish feasibility.	\$ 4,493,474		\$ 4,493,474		\$ 4,493,474

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **G-1**

DESCRIPTION: **END SR 151 AT LAFAYETTE STREET**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current project scope begins south of CR 170 and terminates at U.S. Highway 41.

ALTERNATIVE: (Sketch attached)

Begin the project south of CR 170 and terminate at Lafayette Street/Boynton Drive.

ADVANTAGES:

- Reduces costs
- Reduces project schedule
- Reduces right-of-way acquisition
- Eliminates bridge replacement over Chickamauga Creek

DISADVANTAGES:

- None apparent

DISCUSSION:

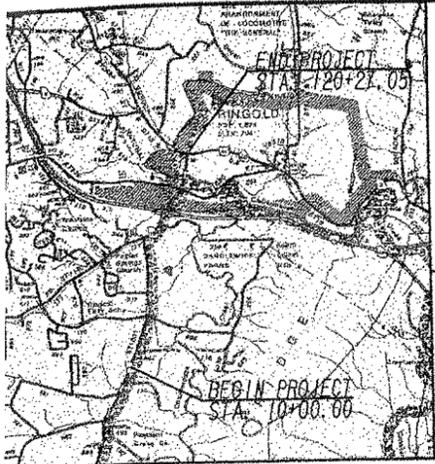
Consider reverting to the original scope to reduce costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 15,015,177	—	\$ 15,015,177
ALTERNATIVE	\$ 12,507,245	—	\$ 12,507,245
SAVINGS (Original minus Alternative)	\$ 2,507,932	—	\$ 2,507,932

DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED SR 151/OLD ALABAMA ROAD WIDENING & RECONSTRUCTION

G-1
2 of 4

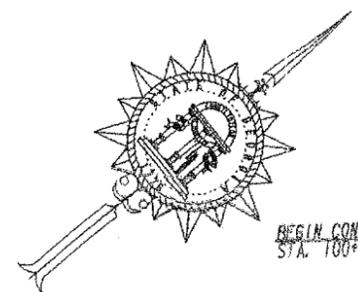


LOCATION SKETCH

DATA:
C.A.D.T.: 30,300 (2008)
C.A.D.T.: 45,000 (2028)
TOTAL DIST.: 50/50
KS: 6%
TRUCKS %: 7%
DESIGN: 45 MPH (SR 151) AND 70 MPH (I-75)

PROJECT IS LOCATED 100 PERCENT IN CATOOSA COUNTY.
PROJECT IS LOCATED 100 PERCENT IN CONGRESSIONAL DISTRICT 5 SECTION 2
LOT(S): 132, 167 AND 168
MENTAL DATUM: NAD 83/ HARN 94
IA COORDINATE SYSTEM:
CAL DATUM: NAVD 88
CT DESIGNATION: FULL OVERSIGHT

ALL WORK TO BE DONE IN ACCORDANCE WITH THE DEPARTMENT OF TRANSPORTATION OF GEORGIA STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF ROADS AND BRIDGES, CURRENT EDITION, AND SUPPLEMENTS THERETO, AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION.



FEDERAL AID PROJECT
STP-1M-180-1(6)
CATOOSA COUNTY

FEDERAL ROUTE * NA
STATE ROUTE * 151
P. I. NO. 621530

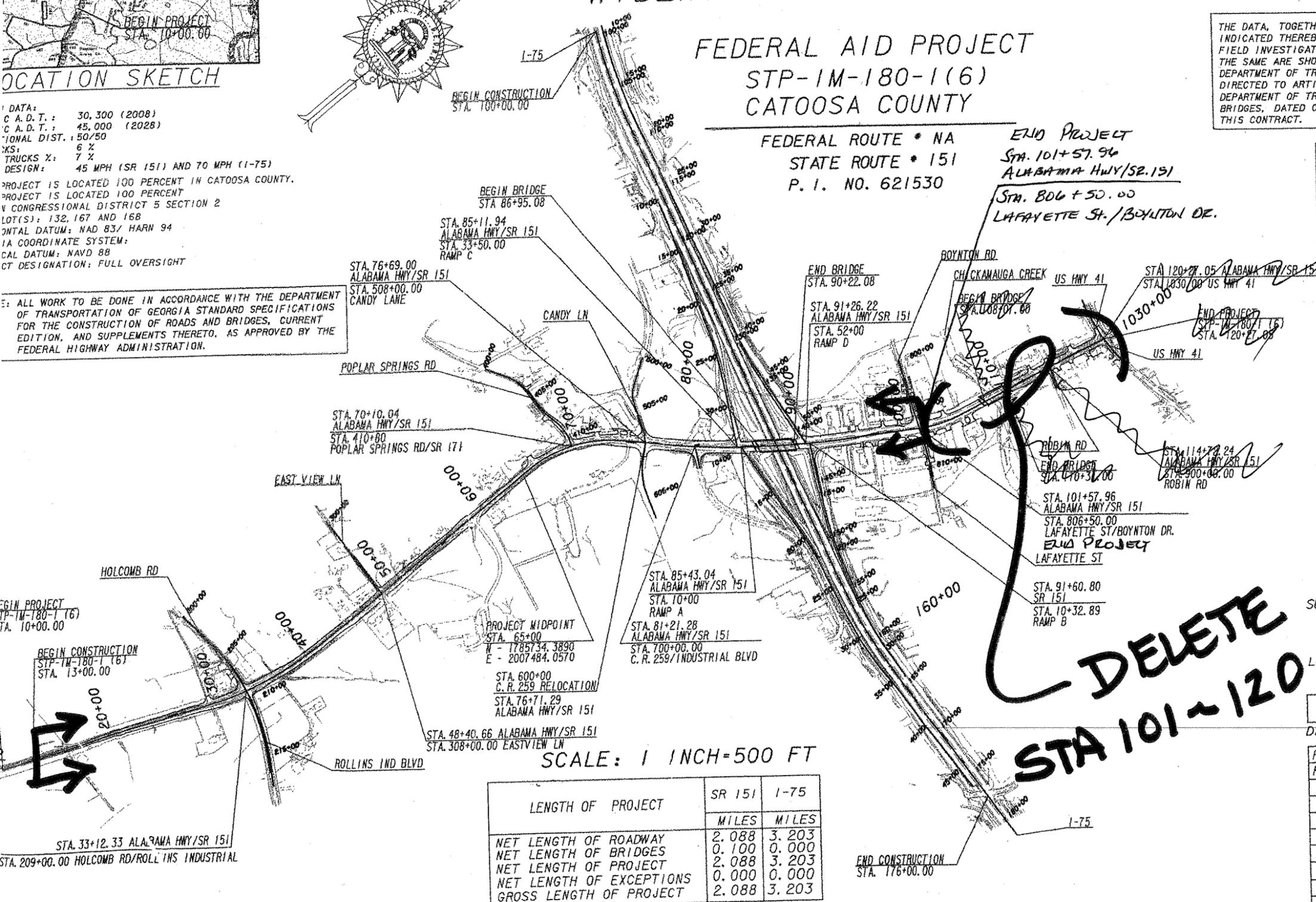
END PROJECT
Sta. 101+57.96
ALABAMA HWY/SR 151
LAFAYETTE ST./BOYNTON DR.

THE DATA, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY, WHETHER BY DRAWINGS OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT OF TRANSPORTATION IN ANY WAY. THE ATTENTION OF BIDDER IS SPECIFICALLY DIRECTED TO ARTICLES 102.04, 102.05, AND 104.03 OF THE STANDARD SPECIFICATIONS OF THE DEPARTMENT OF TRANSPORTATION, STATE OF GEORGIA, FOR THE CONSTRUCTION OF ROADS AND BRIDGES, DATED CURRENT EDITION AND ANY MODIFICATION THEROF, WHICH WILL BE A PART OF THIS CONTRACT.

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



DESIGN PROFESSIONALS
4000 Smithtown Road
Suite 200
Suwanee, Georgia 30024
770-831-9000 Tel. 770-831-9243 Fax.



**DELETE
STA 101~120**

SCALE: 1 INCH=500 FT

LENGTH OF PROJECT	SR 151	I-75
	MILES	MILES
NET LENGTH OF ROADWAY	2.088	3.203
NET LENGTH OF BRIDGES	0.100	0.000
NET LENGTH OF PROJECT	2.088	3.203
NET LENGTH OF EXCEPTIONS	0.000	0.000
GROSS LENGTH OF PROJECT	2.088	3.203

SUBMITTED BY: _____
STATE PROGRAM DELIVERY AND CONSULTANT DESIGN ENGINEER

LOCATION AND DESIGN APPROVAL DATE: _____

DATE	CHIEF ENGINEER

FUNCTIONAL CLASSIFICATION: RURAL & URBAN MINOR ARTERIAL

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: G-1

SHEET NO.: 3 of 4

ELWD SR 151 AT LAFAYETTE ST.

PROJECT REDUCTION LENGTH - 1,645.09 FT.
EXCEPTION: 0.0 AZALEA

EST'D ROWLY COST PER MILE
\$ 8,049,335.362

TOTAL PROJECT LENGTH = 10,176.05

PROJECT REDUCTION LIMITS ARE FROM
STA. 101+57.96 TO STA. 120+27.05

$$\$ 8,049,335.362 \times 0.312 = \underline{\underline{\$ 2,507,932.02}}$$

COST WORKSHEET



PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING
 Project No. STP-IM-180-1(6), Catoosa County, Georgia
 END SR. 151 AT LAFAYETTE ST.
DESCRIPTION: IDEA DESCRIPTION (abbreviate if necessary to fit)

ALTERNATIVE NO.: G-1
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
REDUCTION OF PROJECT LENGTH		0.312 MI	\$8,049,335.36				
			= \$2,507,932.02				
PROPOSED ESTIMATED							\$15,015,176.69
			ESTIM'D CONSTR. COST.				\$15,015,176.69
			CONSTR. SAVINGS				\$2,507,932.02
			TOTAL REDUCTION				\$12,507,244.67
Subtotal							
Markup (%) at							
TOTAL							

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **A-3**

DESCRIPTION: **REDUCE THE AMOUNT OF CONSTRUCTION SOUTH OF
 HOLCOMB ROAD; DROP SOUTHBOUND THROUGH
 LANE ON SR 151 AT HOLCOMB ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The design begins a taper and lane addition/reduction at Station (STA) 13+00.

ALTERNATIVE: (Sketch attached)

Drop the southbound (SB) through lane at Holcomb Road, begin construction at STA 26+85 and add the second northbound (NB) through lane using a steeper taper.

ADVANTAGES:

- Shortens construction limits
- Less right-of-way
- Less paving
- Eliminates need for long lane reduction taper

DISADVANTAGES:

- Less capacity
- More potential queuing

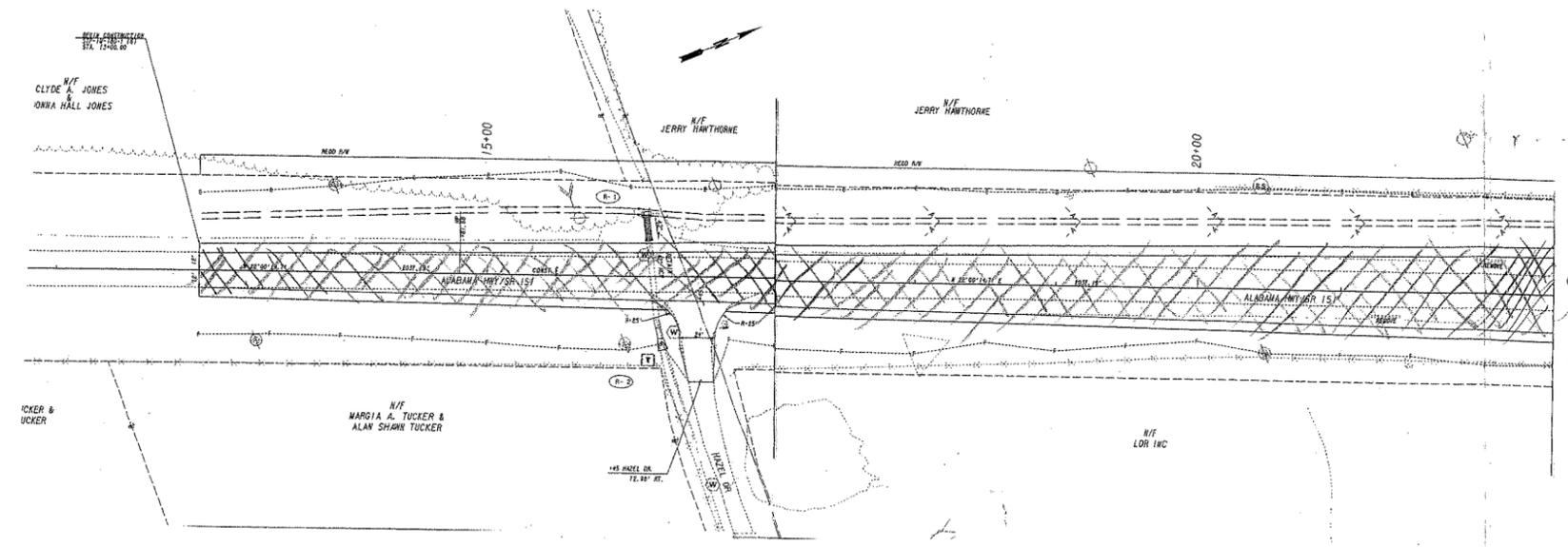
DISCUSSION:

By dropping a SB through lane at Holcomb Road and by using a steeper taper for the NB lane addition, construction limits are reduced by about 1,400 ft.

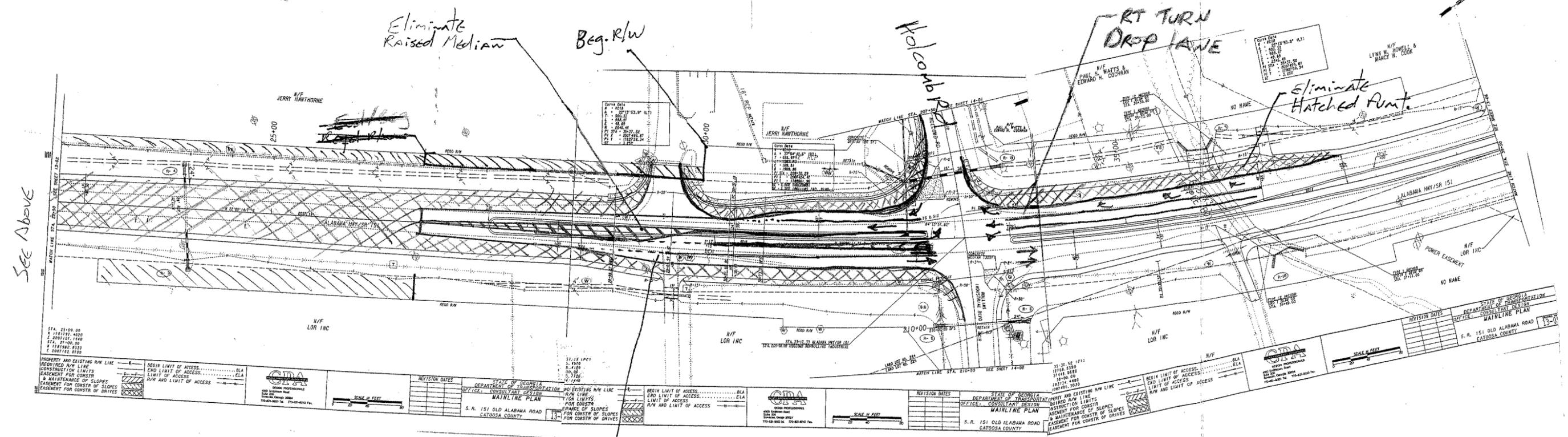
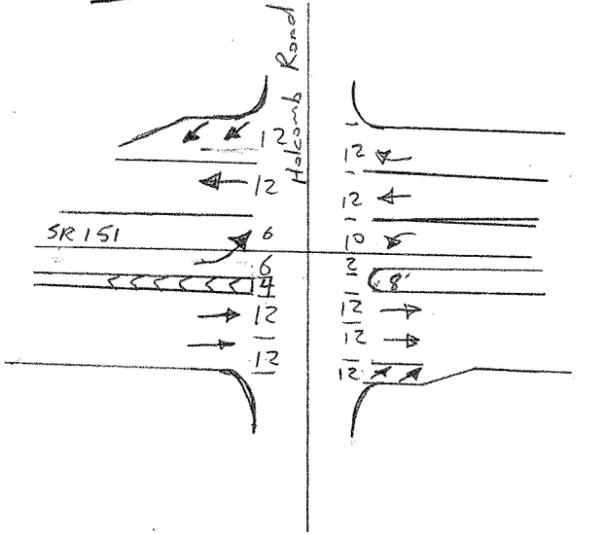
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 510,155	—	\$ 510,155
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 510,155	—	\$ 510,155

Eliminate all construction station 13+00 to 26+85

VE AH.



See Below



Eliminate Raised Median

Beg. R/W

Hokomb Road

RT TURN DROP LANE

Eliminate Hatched Point

See Above

Use an outside widening to add lane

<p>STA. 25+00.00 P 151751.4800 E 2097151.7440 STA. 27+00.00 P 151752.8320 E 2097151.7440</p>	<p>PROPERTY AND EXISTING R/W LINE REQUIRED R/W LINE CONSTRUCTION LIMITS EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES EASEMENT FOR CONSTR OF DRIVES</p>	<p>REVISION DATES</p>	<p>STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE - CONSULTANT DESIGN MAINLINE PLAN S. R. 151 OLD ALABAMA ROAD CATOOSA COUNTY</p>	<p>37-19 APC1 S. 4370 E. 4128 N. 30.00 E. 1748</p>	<p>PROPERTY AND EXISTING R/W LINE REQUIRED R/W LINE CONSTRUCTION LIMITS EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES EASEMENT FOR CONSTR OF DRIVES</p>	<p>REVISION DATES</p>	<p>STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE - CONSULTANT DESIGN MAINLINE PLAN S. R. 151 OLD ALABAMA ROAD CATOOSA COUNTY</p>	<p>35-37 151 APC1 S. 4148 E. 4148 N. 30.00 E. 1748</p>	<p>PROPERTY AND EXISTING R/W LINE REQUIRED R/W LINE CONSTRUCTION LIMITS EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES EASEMENT FOR CONSTR OF DRIVES</p>	<p>REVISION DATES</p>	<p>STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE - CONSULTANT DESIGN MAINLINE PLAN S. R. 151 OLD ALABAMA ROAD CATOOSA COUNTY</p>
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CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **A-3**

SHEET NO.: **3 of 4**

Reduced Paving 26+85 to 37+65 → 5144 + 5017 + 10,084 + 4671 = 24,916 sf

*All AREAS ARE FROM
 Micro Station 13+00 to 26+85 → 62,037 sf

Total = 86,953 sf
 = 9661 sy

Area Exist Road (24 x 1385) = 33,240 sf
 (13+00 to 26+85) = 3693 sy

to Reduce

→

5968 sy Full-depth
3693 sy level/overlay

Area Raised Median LF = 614

$A_1 = 8 \times 253 = \underline{2024}$

$A_3 = 20 \times 81 = \underline{1620}$

$A_2 = \left(\frac{8+20}{2}\right) \cdot 180 = \underline{2520}$

Total median pavement = 6164 sy = 685.5 sy

LF curb Tp. 7 = (2 · 614) + 8 + 20 = 1256

Drainage 42" SES / Grate - 1 24" SES / Grate - 2 18" RCP - 62'
 - 42" RCP - 14' - 24" RCP - 54'
 - 42" FES - 1 - 10336 C.B. - 1

Triple 6.5' x 3' Box → Reduce 22'

Rebar → 20116/ft → 4422 lb

Conc → 1.56 cy/ft → 34.3 cy cl. "A"

E/W Excav (Appx.) = 2000 cy

Embank (Appx.) = 3000 cy

Grass: -g (50 x 1400) + (40 x 1400) + (35 x 200) = 133,000 sf = 3.05 AC
 70,000 56,000 7000

R/W Reduction $\begin{matrix} 7,562 \\ 10,114 \\ 19,108 \\ 4035 \end{matrix} > \underline{\underline{40,819}} \text{ sf}$

COST WORKSHEET



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **A-3**

DESCRIPTION: **IDEA DESCRIPTION (abbreviate if necessary to fit)**

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
12.5 mm Asph, 165Lb	TN	797	75	59,775			
19 mm Asph, 220Lb	TN	656	75	49,200			
25 mm Asph, 440Lb	TN	1313	75	98,475			
GAB 12"	TN	3939	15.94	62,788			
Milling	SY	3693	2.42	8,937			
Leveling (1", 1-lane)	TN	102	49.96	5,096			
Conc Median, 7 1/2"	SY	685	39.36	26,962			
Unclass Excav.	CY	7000	4.34	30,380			
18" RCP	LF	62	36.25	2,248			
24" RCP	LF	54	44.42	2,399			
42" RCP	LF	14	72 (est)	1,008			
42" FES	EA	1	1000 (est)	1,000			
Catch Basin	EA	1	1962.59	1963			
Safety Grate, Top	SF	32	50.90	1,629			
Safety Grate, Top 3	SF	98	33.94	3,326			
Bar Reinf. Steel	LB	4422	0.86	3,803			
Class "A" Conc.	CY	34	509.29	17,316			
Grassing Temp	AC	1.5	523.	785			
Grassing Perm	AC	3.1	1000 (adj)	3100			
Silt Fence	LF	2800	1.81	5,068			
Check Dams	EA	25	236.72	5,918			
			Sub-Tot	391,176			
R/W (Industrial)	SF	40819	0.84	34,288			
			247% Markup	84,691			
				118,979			
	Subtotal			\$519,155			
	Markup (%) at			/			
	TOTAL			\$510,155			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **C-1**

DESCRIPTION: **ADD CURB AND GUTTER ON SR 151 BEGINNING AT
 STATION 13+00 – STATION 74+00**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The original project design calls for a rural section beginning south of Holcomb Road until reaching the project midpoint at STA 65+49.51.

ALTERNATIVE: (Sketch attached)

Add curb and gutter to the project beginning south of Holcomb Road and continuing until the end of the project.

ADVANTAGES:

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

DISADVANTAGES:

- Increases construction costs for curbs and gutters
- Additional costs for drainage structures and pipes

DISCUSSION:

This alternative will reduce construction impacts and right-of-way for both commercial and residential properties along SR 151.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,263,895	—	\$ 3,263,895
ALTERNATIVE	\$ 2,530,755	—	\$ 2,530,755
SAVINGS (Original minus Alternative)	\$ 733,140	—	\$ 733,140

ALLOWABLE RANGES TABLE

FOR THIS PROJECT, CROSS SLOPES THAT ARE ADJUSTED TO "BEST FIT" EXISTING PAVEMENT SLOPES ARE SUBJECT TO THE FOLLOWING LIMITS:

A. NORMAL CROWN

SECTION WITH GRADES 0.5% OR GREATER	SECTION WITH GRADES LESS THAN 0.5%
0.0150 FT/FT - MINIMUM	0.0156 FT/FT - MINIMUM
0.0208 FT/FT - DESIRABLE	0.0208 FT/FT - DESIRABLE
0.0250 FT/FT - MAXIMUM	0.0300 FT/FT - MAXIMUM

B. SUPERELEVATION RATE

S.E. RATE SHOWN ON PLANS OR SE RATE EXISTING IN FIELD, WHICHEVER IS GREATER.

C. SUPERELEVATION TRANSITION LENGTH (LENGTH FROM FLAT POINT TO FULL SE)

RATE OF CHANGE	CORRESPONDING DIFFERENCE IN GRADE BETWEEN PIVOT POINT AND EDGE OF PAVEMENT
MINIMUM 1:150	0.67%
DESIRABLE 1:100	0.50%
MAXIMUM 1:300	0.33%

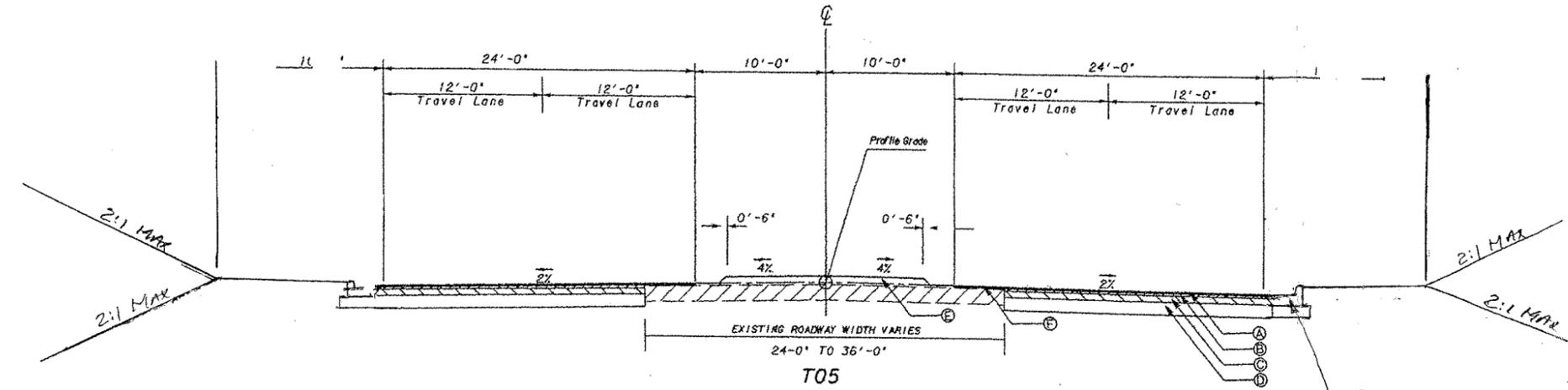
LENGTH SHALL BE SET TO AVOID CREATING A FLAT GUTTER GRADE ON LOW SIDE AND TO AVOID FLAT CROSS SLOPES AT OR NEAR THE LOW POINT OF VERTICAL CURVES.

D. POSITIONING OF SUPERELEVATION TRANSITION LENGTH ON SIMPLE CURVES

50% OF TRANSITION INSIDE CURVE - MAXIMUM
33% OF TRANSITION INSIDE CURVE - DESIRABLE
20% OF TRANSITION INSIDE CURVE - MINIMUM

NOTE: CROWN WIPE-OUT SHALL BE AT THE SAME RATE AS THE SE TRANSITION.

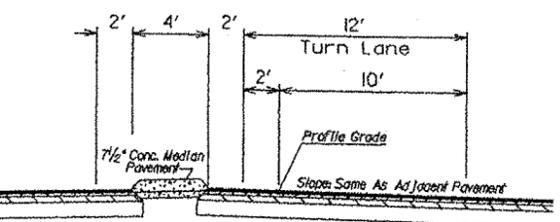
E. SMOOTHING OF BREAKS IN EDGE PROFILE AT BEGIN AND END OF TRANSITION SHALL BE ACCOMPLISHED BY VERTICAL CURVE WITH A MINIMUM LENGTH (IN FEET) EQUAL TO THE SPEED DESIGN (IN MPH).



T05
SR 151/OLD ALABAMA ROAD
TANGENT SECTION
STA 13+00 - 65+49.51

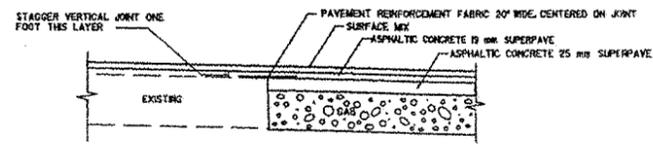
NOTE: UNDERDRAINS AND DRAINAGE STONE SHALL BE SET UP ON AS NEEDED BASIS BETWEEN STA. 43+50± TO 44+50± LT AS SHOWN IN THE UNDERDRAIN PLACEMENT DETAIL.

- (A) ASPHALTIC CONC 12.5 mm, SUPERPAVE, INCL POLYMERS MODIFIED, 165 LBS./S.Y.
- (B) ASPHALTIC CONC 19 mm, SUPERPAVE, 220 LBS./S.Y.
- (C) ASPHALTIC CONC 25 mm, SUPERPAVE, 440 LBS./S.Y.
- (D) GRADED AGGREGATE BASE, 12"
- (E) CONC. MEDIAN 7 1/2" WITH CONC. CURB, TYPE 7, GA. STD. 9032B
- (F) ASPHALTIC CONC LEVELING, AS REQ'D
- (G) CONC. CURB & GUTTER, GA. STD. 9032B, TYPE 2, 8"x30"

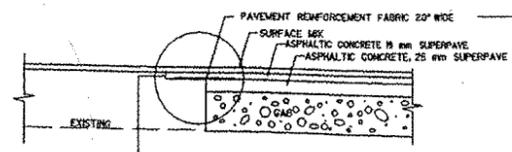


DETAIL FOR MEDIAN TURN LANE SEE PLAN FOR LOCATION

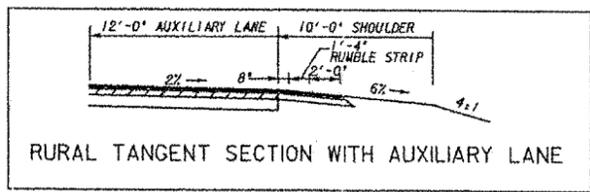
TYPICAL SECTION DETAIL TO BE USED WHEN EXISTING PAVEMENT IS TO BE RESURFACED WITH TWO INCHES OR MORE OF ASPHALTIC CONCRETE



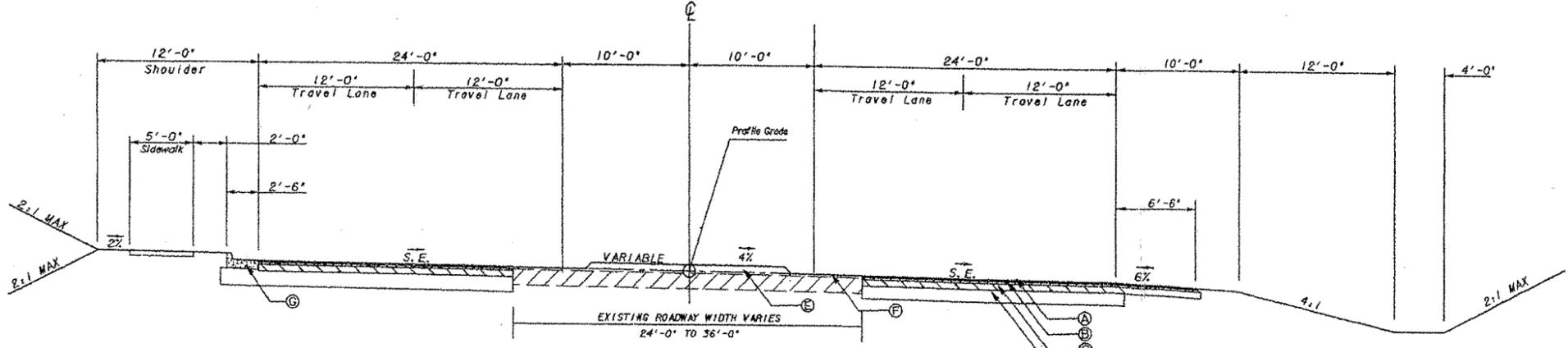
TYPICAL SECTION DETAIL TO BE USED WHEN EXISTING PAVEMENT IS TO BE RESURFACED WITH LESS THAN TWO INCHES OF ASPHALTIC CONCRETE



MILL EXISTING LANE ONE FOOT WIDE TO DEPTH OF ADJOINING LAYER TO BE PLACED. COST OF MILLING FOR THIS WORK TO BE INCLUDED IN THE UNIT PRICE BID FOR PAVEMENT REINFORCING FABRIC.



RURAL TANGENT SECTION WITH AUXILIARY LANE



T06
SR 151/OLD ALABAMA ROAD
S.E. SECTION
STA. 65+49.51 - 71+00

CPA
DESIGN PROFESSIONALS
4000 Smithtown Road
Suite 200
Suwanee, Georgia 30024
770-631-9000 Tel. 770-631-9243 Fax.



REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: CONSULTANT DESIGN
TYPICAL SECTIONS

COST WORKSHEET



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **C-1**

DESCRIPTION: **IDEA DESCRIPTION (abbreviate if necessary to fit)**

SHEET NO.: **3 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
310-1101 - G.A.B	TLS	1579.74	15.94	24,865.14			
402-3112 - 19MM ASPH.	TLS				1833.42	75	137,506.24
402-3113 - 12.50MM ASPH	TLS				1374.59	75	103,094.25
402-3121 - 25 MM ASPH	TLS				3,666.83	75	275,012.25
413-1000 - BIT TACK	GL				1,166.72	1.32	1,540.07
441-6222 - C & G	LF	10,989.51	14.75	162,095.27			
RIGHT-OF-WAY	West Side						2,013,602.33
	EAST Side			3,263,895.32			
Subtotal				3,450,855.73	-		2,530,755.19
Markup (%) at							
TOTAL					- 920,100.54		

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: C-1

SHEET NO.: 4 of 5

ADD CURB & GUTTER ON SR 151, BEG STA. 13+00 - STA. 74+00

LENGTH OF CURB & GUTTER LEFT SIDE OF S.R. 151
 4,889.51 LF

TOTAL C & G AND G.A.B. COSTS
\$ 186,960.41

LENGTH OF CURB & GUTTER, RIGHT SIDE OF SR. 151
 6,100 LF

TOTAL CURB & GUTTER LENGTH = 10,989.51 LF x \$14.75 = \$162,095.27 ✓

G.A.B.

2.50' x 10,989.51 x 1 = 27,473.78 FT.³ (115 ^{lbs}/FT.³) ÷ 2000 = 1,579.74 TNS

1,579.74 TNS x \$15.94 = \$24,865.14 ✓

1/2" - "E" TOP - 13' x 10,989.51 ÷ 9 = 15,873.74 x 165 ^{lbs}/40² ÷ 2000 = 1,309.58 TNS ✓

2" - "B" BINDER - 13' x 10,989.51 ÷ 9 = 15,873.74 x 220 ^{lbs}/40² ÷ 2000 = 1,746.11 TNS ✓

4" - "A" BASE - 13' x 10,989.51 ÷ 9 = 15,873.74 x 440 ^{lbs}/40² ÷ 2000 = 3,492.22 TNS ✓

PAVED SHOULDER REMOVAL

E-TOP 0.05 x 1309.58 TNS = 65.48 + 1309.58 = 1,374.59 x \$75 = \$103,094.25

BINDER 0.05 x 1,746.11 TNS = 87.31 + 1746.11 = 1,833.42 x \$75 = \$137,506.24

A-BASE 0.05 x 3,492.22 TNS = 174.61 + 3492.22 = 3,666.83 x \$75 = \$275,012.25

\$ 515,612.74 ✓

BITUM TACK

10,989.51 LF x 13' ÷ 9 = 15,873.74 x 2 APPLICATIONS

= 31,747.48 SY. x 0.035 ^{gal}/SY

= 1,111.16 GALS x 0.05 = 55.55 + 1,111.16 GALS ✓

= 1,166.72 GALS x 1.32

= \$1,540.07

ASPHALT REDUCTION

TOTAL AMOUNT = \$517,152.81

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: C-1

ADD CURB & GUTTER ON S.R. 151, BEG. STA. 13+00 - STA. 74+00

SHEET NO.: 5 of 5

RIGHT-OF-WAY REDUCTION - WEST SIDE OF S.R. 151

RIGHT-OF-WAY IS ELIMINATED BETWEEN STA.

*USED CALCULATIONS FROM CM-1

RIGHT-OF-WAY COST \$ 2,013,602.38 - ELIMINATED IS A SAVINGS

RIGHT-OF-WAY COST - EAST SIDE OF S.R. 151

RIGHT WILL REMAIN AS IS WITH INSTALLATION OF CURB & GUTTER

*USED CALCULATIONS FROM CM-1

RIGHT-OF-WAY COST

RIGHT OF WAY COST \$ 3,263,895.32

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **C-9**

DESCRIPTION: **REPLACE MEDIAN PAVING WITH GRASSING**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

Seven and one-half inches of paved median is included in all areas.

ALTERNATIVE: (Sketch attached)

Use grass median instead of pavement where the median is wider than eight feet from the back of the curb to the front of the curb and greater than 300 feet long.

ADVANTAGES:

- Reduces costs
- Increase aesthetics

DISADVANTAGES:

- Increases maintenance

DISCUSSION:

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 227,186	—	\$ 227,186
ALTERNATIVE	\$ 1,200	—	\$ 121,941
SAVINGS (Original minus Alternative)	\$ 225,986	(120,741)	\$ 105,245

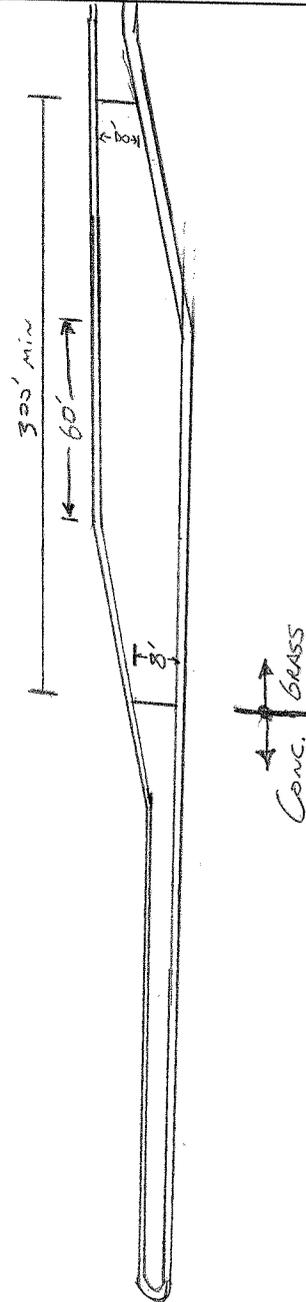


PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. *STP-IM-180-1(6)*, Catoosa County, Georgia

ALTERNATIVE NO.: *C-9*

SHEET NO.: *2 of 5*

PER GA CONSTR. DETAIL M-3





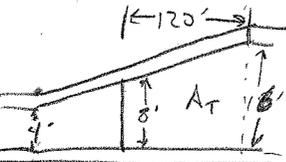
PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: C-9

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 5

TAPER AREA 180' Typ taper



$$A_T = 120 \left(\frac{8+16}{2} \right) = 1440 \text{ sf} = \underline{160 \text{ sy}}$$

← 180' →

Area Totals

16' median length	# Tapers
253	1
550	2
99	2
<u>902</u>	<u>5</u>

$$A = (902 \cdot 16) + 5(160) = \underline{15,232 \text{ sf}} = \underline{1692 \text{ sy}}$$

Other AREAS

$$\left(\frac{8+21}{2} \cdot 188 \right) + \left(336 \cdot \left(\frac{21+25}{2} \right) \right) = \underline{10,454}$$

$$\left(359 \cdot 28 \right) + \left(\frac{180}{2} (14+28) \right) + (106 \cdot 14) + (12 \cdot 408) = \underline{20,212}$$

12052 3780 1484 4896

$$11(404) + 100 \left(\frac{11+16}{2} \right) + 25(16) = \underline{6,194}$$

$$\left. \begin{array}{l} 10,454 \\ 20,212 \\ 6,194 \end{array} \right\} = \underline{36,860 \text{ sf}} = \underline{4096 \text{ sy}}$$

$$\text{Total} = \boxed{5788 \text{ sy}} \\ = \underline{\underline{1,20 \text{ AC}}}$$

LIFE CYCLE COST WORKSHEET



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **C-9**

SHEET NO.: **5 of 5**

LIFE CYCLE PERIOD: <u>30</u> years							
INTEREST RATE: <u>3.10%</u>		ESCALATION RATE: _____		ORIGINAL		PROPOSED	
A. INITIAL COST						\$ 227,186	\$ 1,200
Useful Life (Years)							
INITIAL COST SAVINGS							\$ 225,986
B. RECURRENT COSTS (Annual Expenditures)							
1. Mow grass (1.2ac) = 2 people x 2hrs/wk x \$30/hr x 52wks/yr =							\$ 6,240
2. Operating							
3. Energy							
4.							
5.							
6.							
Total Annual Costs						-	\$ 6,240
Present Worth Factor						19.3495	19.3495
Present Worth of RECURRENT COSTS						-	\$ 120,741
C. SINGLE EXPENDITURES							
			Year	Amount	PW factor	Present Worth	Present Worth
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)					
		1.			1.0000	-	-
		2.			1.0000	-	-
		3.			1.0000	-	-
		4.			1.0000	-	-
		5.			1.0000	-	-
		6.			1.0000	-	-
		7.			1.0000	-	-
		8.			1.0000	-	-
D. SALVAGE VALUE							
			Year	Amount	PW factor	Present Worth	Present Worth
		1.			(1.0000)	-	-
		2.			(1.0000)	-	-
Present Worth of SINGLE EXPENDITURES						-	-
E. Total Recurrent Costs & Single Expenditures (B + C + D)						-	\$ 120,741
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS							\$ (120,741)
TOTAL PRESENT WORTH COST (A + E)						\$ 227,186	\$ 121,941
TOTAL LIFE CYCLE SAVINGS							\$ 105,245

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **C-10**

DESCRIPTION: **CONSTRUCT A THREE-LANE SECTION SOUTH OF
 POPLAR SPRINGS AND WIDEN TO THE EAST**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

There are two travel lanes in each direction with two ft. of raised median.

ALTERNATIVE: (Sketch attached)

Use one travel lane in each direction with 14 ft. of flush median from STA 26+85 to approximately STA 70+00 (existing three lanes at this point).

ADVANTAGES:

- Reduces construction costs
- Reduces right-of-way
- Reduces staging
- Increases safety

DISADVANTAGES:

- Reduces capacity

DISCUSSION:

Traffic volumes drop off steadily the further south of I-75 on SR 151 you travel. It seems feasible that a capacity improvement is not needed at this time, yet the opportunity to increase safety still presents itself.

Because only three lanes are needed, the project is shortened to begin at STA 26+85.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,493,474	—	\$ 4,493,474
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 4,493,474	—	\$ 4,493,474



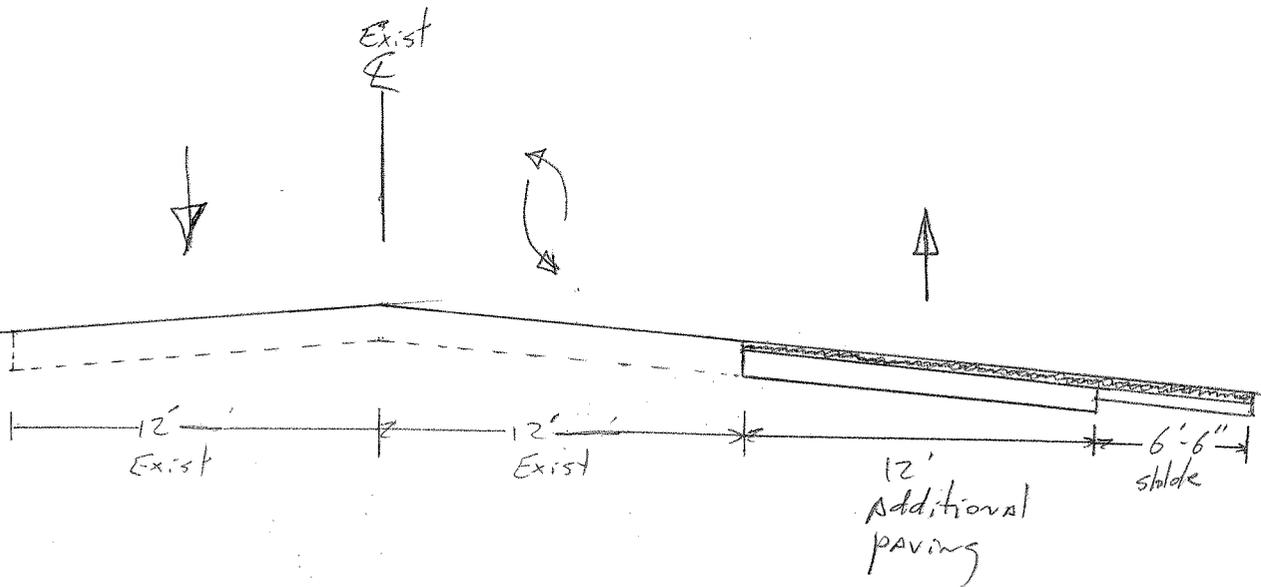
PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: C-10

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5

V.E. Proposed Typ. Section



* This section essentially eliminates 30' in paving width, compared to the proposed plan section.

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: C-10

SHEET NO.: 3 of 5

Reduction in paving (37+65 to 70+00)

$$30' (3235) = 97,050 \text{ sf} = \underline{10,783 \text{ sy}}$$

* This is also the reduction in R/W

Drwg Reduction

30' - 6.5' x 3' Triple Box

→ Headwall $\frac{246 \text{ Lb}}{13 \text{ CY}}$

→ 201 lb rebar/ft = $\frac{6030 \text{ lb}}$

↳ 1.5 cy conc/ft = $\frac{45 \text{ cy}}$

18" RCP - 92+07+55+62 = (316)

24" RCP (120)

~~24" FES~~

18" FES - ~~|||||~~ (20)

18" side drain - 93+38+110+59 = (300)

36" FES - ||| (3)

36" RCP - 145+91 = (236)

C.B. - ||| (3)

Median paving

$$2(254(8)) + 180\left(\frac{22+8}{2}\right)2 + 20(550) = 20,104 \text{ sf}$$

$$4064 + 5040 + 99(20) = 11,084 \text{ sf}$$

$$4064 + 5040 + 29(20) = 9684 \text{ sf}$$

} $\underline{4541 \text{ sy}}$

* The reductions calculated from CM-1 and A-3 will be added to the total savings. See corresponding report for calcs. A-3 will acct. for paving reduction / lane reduction / limits reduction from sta 13+00 to 37+65. CM-1 shifts construction to the East side of SR151.

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: C-10

SHEET NO.: 4 of 5

FILL REDUCTION

30' TYPICAL WIDTH REDUCTION FROM TYPICAL SECTION

STA 13+00	A = 0 SF	}	$\left(\frac{150+0}{2}\right)(26+00-13+00) \times 27 = 3,611 \text{ cy}$
STA 26+00	A = 30' x 5' = 150 SF		
STA 32+50	A = 30' x 7.5' = 225 SF	}	= 1,833
Hoccom B 33+50	A = 30' x 3' = 90 SF		
36+50	A = 30' x 8' = 240	}	= 5,333
48+50	A = 0		
51+00	A = 30' x 6' = 180	}	= 833
53+50	A = 0		
			-16,957 cy FILL

CUT REDUCTION

STA 53+50	A = 0	}	1,000 cy
56+50	A = 30' x 6' = 180 SF		
58+00	A = 0	}	500 cy

7 1/2" RAISED MEDIAN REDUCTION

~~$$16' \text{ WIDTH} \Rightarrow [(28+35) - (27+54)] + (4350 - 3800) + (5410 - 5317) + (6395 - 6366) = 753$$

$$16' \text{ TO } 6' \Rightarrow \left[\frac{(30415) - (27135)}{(6366 - 6186)} + \frac{(3800 - 3619)}{(6575 - 6395)} \right] + (4530 - 4350) + (5317 - 5137) + (5590 - 5410) = 1,355$$

$$6' \Rightarrow (3268 - 3015) + (3619 - 3266) + (4784 - 4530) + (5137 - 4884) + (5894 - 5590) + (6186 - 5932) + (6978 - 6575) = 2,624$$

$$\Sigma = 40,452 \text{ SF}$$

$$\underline{\underline{4,995 \text{ cy}}}$$~~



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING		PRESENT WORTH OF COST SAVINGS				
Project No. STP-IM-180-1(6), Catoosa County, Georgia						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
RAMPS (R)						
R-1	Reduce the amount of fill required by realigning Ramp C to use the existing ramp pavement, grading, and right-of-way. Reduce the taper by 900 ft. Defer major I-75 expansion improvements.	\$ 949,606	\$ 49,900	\$ 899,706		\$ 899,706
R-2	Retain existing Ramp A pavement and grading. Defer improvements until I-75 is expanded. Do nothing now.	\$ 1,420,385		\$ 1,420,385		\$ 1,420,385
R-4	Defer all improvements to the tapers on Ramps A, B, C, and D until the I-75 lane widening takes place.	\$ 1,827,706		\$ 1,827,706		\$ 1,827,706
BRIDGES (B)						
B-1	Reduce fill depth and resulting right-of-way requirements by using four spans in lieu of three spans on the South Chickamauga Creek Bridge and reduce the superstructure depth by 1 ft.-5 in.	\$ 75,505		\$ 75,505		\$ 75,505
B-5	Reuse the existing I-75 bridges since they are in serviceable condition. Jack the existing bridges to meet the 17 ft. clearance requirements and widen as necessary.	\$ 3,180,287	\$ 2,612,690	\$ 567,597		\$ 567,597
B-6	Rehabilitate the existing South Chickamauga Creek Bridge instead of demo and total replacement. Expand the existing steel bridge as necessary to meet new width requirements.	\$ 1,925,440	\$ 1,532,446	\$ 392,994		\$ 392,994
B-9	Use MSE abutment walls on the I-75 bridge in lieu of sloped paving and eliminate the two end spans on the bridge.	\$ 3,030,362	\$ 2,324,289	\$ 706,073		\$ 706,073
B-10	Reduce the median width on the South Chickamauga Creek Bridge from 20 ft. to 14 ft. to match the typical section median width of 14 ft.	\$ 207,498		\$ 207,498		\$ 207,498

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **R-1**

DESCRIPTION: **REALIGN RAMP C TO USE THE EXISTING RAMP
 PAVEMENT, GRADE, AND RIGHT-OF-WAY AND
 REDUCE TAPER BY APPROXIMATELY 900 FT.**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The design moves the terminus of Ramp C further south along Old Alabama Road to account for the future expansion of I-75. This alignment requires substantial quantities of fill to meet the grades.

ALTERNATIVE: (Sketch attached)

Realign Ramp C to more closely match the existing profile and grades. Defer any improvements for the I-75 expansion to future years.

ADVANTAGES:

- Greatly reduces the amount of fill
- Reduces right-of-way costs
- Reduces pavement requirements
- Aligns better with Ramp A
- Possibly reduces the grade

DISADVANTAGES:

- Defers the I-75 improvements
- Construction proximity closer to active traffic
- Possible undesirable deceleration distance

DISCUSSION:

Right-of-way and construction costs can be reduced by eliminating the taper lengths for the future I-75 expansion. When the time comes to expand I-75, realignment of the ramp could take place.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 949,606	—	\$ 949,606
ALTERNATIVE	\$ 49,900	—	\$ 49,900
SAVINGS (Original minus Alternative)	\$ 899,706	—	\$ 899,706

SKETCHES

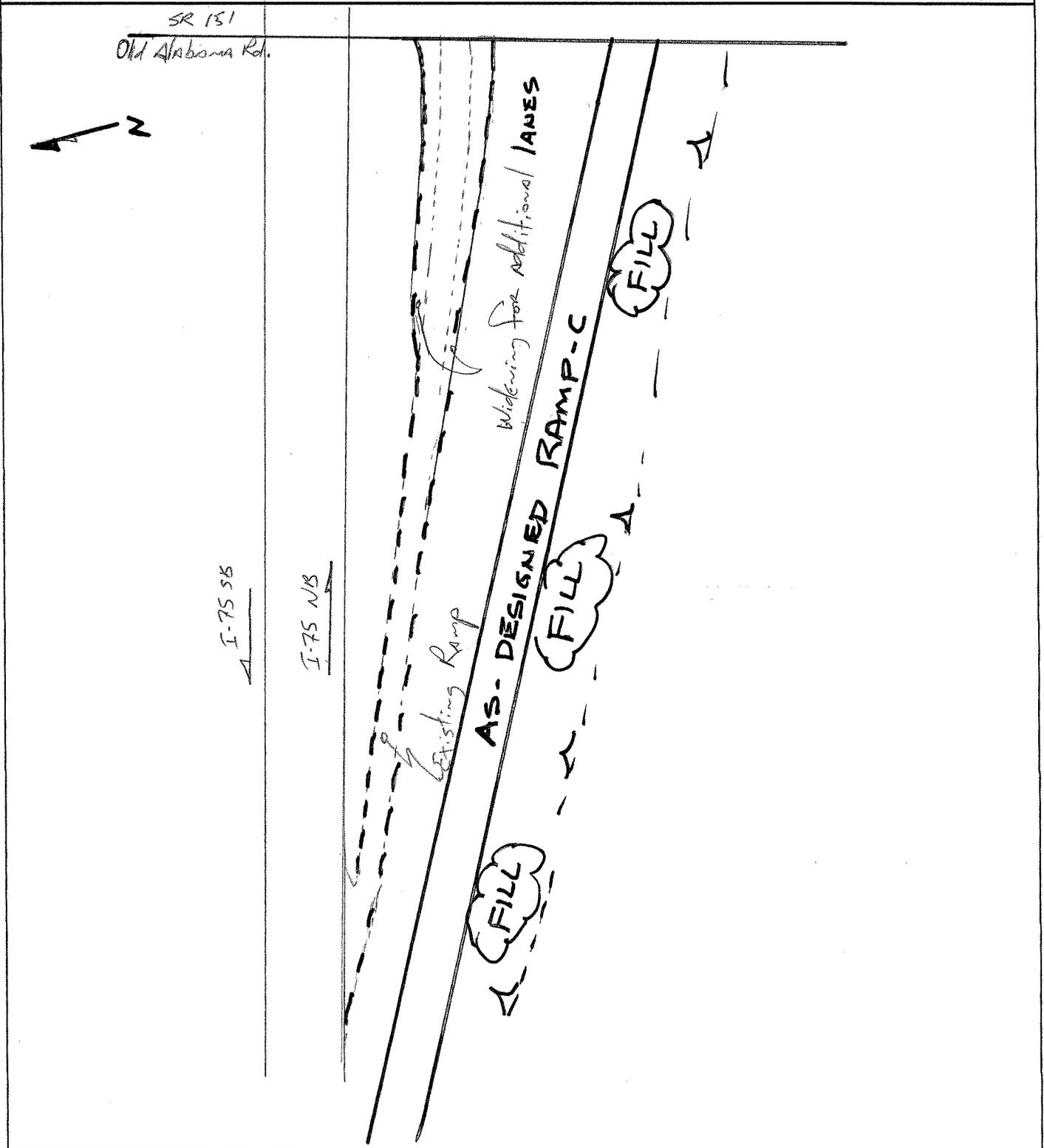


PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: R-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: R-1

SHEET NO.: 3 of 4

	Ramp C	Grading	Avg SF	Vol. (CY)	Cum
	Sta	Area			
	10+00	0	0	0	0
300	14+00	0	0	0	0
500	19+00	0	680	8815	8815
350	22+50	1560	1423	15,811	24626
300	25+50	1485	1195	13,256	37,881
300	28+50	900	1026	11,400	49,281
300	31+50	1152	894	3311	52,592
100	32+50	636	318	1767	<u>54,359</u>
150	33+00	0			

54,360 CY (\$271,256.4)

* Assume 10,000 cy to build proposed design alt.

Realign Ramp C to utilize Exist align

$$A = (30 \times 115) + (190 \times 30) + 220(20) = 13,550 \text{ sf} = \underline{1506 \text{ sy}}$$

* 30' of paving req'd to widen to full width section.

Reduce Taper length 900' (and GORGE)

$$\text{Shoulder paving } 200' \rightarrow 200' \times 10 = 2000 \text{ sf} = \underline{222 \text{ sy}}$$

$$\text{Ramp (sta 14+22 to 19+00)} \rightarrow 478' (10' + 16' + 10') = 17,208 \text{ sf} = \underline{1912 \text{ sy}}$$

$$\text{TAPER} \rightarrow \left(\frac{10+26}{2}\right) 222 = 3996 \text{ sf} = \underline{444 \text{ sy}}$$

$$\text{Total PAVE AREA} = \underline{4084 \text{ sy}}$$

R/W AREA

$$A = \left(\frac{695 \cdot 47}{2}\right) + \left(382 \left(\frac{47+99}{2}\right)\right) + \left(675 \left(\frac{90+30}{2}\right)\right) + \left(30 \left(\frac{85+115}{2}\right)\right)$$

$$= 16,333 + 26,167 + 40,500 + 4,275$$

$$= \underline{87,275 \text{ sf}} = \underline{2.00 \text{ ACRES}}$$

DRAINAGE \rightarrow Remove 10'x10' culv (35 LFP) - $337.9 \text{ lb/ft} = \underline{11,830 \text{ lb}}$
 HW 2320 C-D \rightarrow 225 CY/ft = $\underline{78.8 \text{ CY}}$
 \rightarrow ~200 cy dia conc, 2200 lb reinf

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **R-2**

DESCRIPTION: **RETAIN RAMP A PAVEMENT AND GRADING AND DEFER IMPROVEMENTS UNTIL I-75 IS EXPANDED**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The new alignment moves Ramp A further to the south, allowing for future I-75 lanes. The taper becomes quite long to account for this additional travel distance over the future lanes. Required fill for the ramp is 4-5 ft. deep in places.

ALTERNATIVE:

Leave Ramp A in its present alignment and grade to defer this improvement until the I-75 expansion.

ADVANTAGES:

- Reduces construction costs
- Borrow requirements are greatly reduced
- Reduces paving
- Eliminates new closed drainage system

DISADVANTAGES:

- Ramp would need to be relocated in the future when and if I-75 is expanded
- Possible undesirable acceleration distance
- Improvements are deferred to a future year

DISCUSSION:

If I-75 expands in the future, the ramp can be moved at that time. By eliminating the increased taper lengths for the future I-75 expansion, and using the existing ramp pavement, construction costs are reduced.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,420,385	—	\$ 1,420,385
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 1,420,385	—	\$ 1,420,385

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: R-2

SHEET NO.: 2 of 3

Eliminate the new Ramp A alignment

From Microstation \rightarrow Paving AREA = 115,675 SF = 12,853 SY

Ramp A grading

Sta	AREA	Avg. (SF)	Avg (SY)	Vol	Cum
1050	0	172.5	19.2	319.9	319.9
-500 < 1100	345	450		-4167	4486
-250 < 1350	555	398		-4422	8908
-300 < 1650	240	206		-3433	12,341
-450 < 2100	171	209		-2322	14,663
-300 < 2400	246	261		-3383	18,046
-350 < 2750	276	410		-6833	24,879
-450 < 3200	544	512		3793	28,672
-200 < 3400	480	352		-8474	37,146
-650 < 4050	224	162		-2400	39,546
400 < 4450	100	50		-278	39,824
150 < 4600	0				
				39825	CY

Drainage - 24" RCP $\rightarrow 300 + 10 + 1250 + 20 = 1580'$

18" $\rightarrow 50'$

4 DI's

1 24" FES

COST WORKSHEET



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: R-2

DESCRIPTION: **IDEA DESCRIPTION (abbreviate if necessary to fit)**

SHEET NO.: **3** of **3**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
BORROW EXCAV.	CY	39,825	4.99	198,727			
Plain Conc. Pmnt. 12"	SY	12,853	65.61	843,285			
25mm Asph, 3"	TN	12,121	75.00	159,075			
GAB, 12"	TN	8,305	15.94	132,382			
24" RCP	LF	1,580	44.42	70,184			
18" RCP	LF	50	36.25	1,813			
24" FES	EA	1	638.42	638			
Drop Inlet	EA	4	3570.27	14,281			
*No R/W							
Subtotal				1,420,385			
Markup (%) at				-			
TOTAL				1,420,385			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **R-4**

DESCRIPTION: **DEFER ALL IMPROVEMENTS FOR RAMPS A, B, C,
 AND D UNTIL REQUIRED BY I-75 LANE WIDENING**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The roadway plan shows improvements to Ramps A, B, C, and D.

ALTERNATIVE: (Sketch attached)

Defer all improvements to Ramps A, B, C, and D until the I-75 expansion lanes are constructed. This is a no-build alternative for the ramp portion of this project.

ADVANTAGES:

- Reduces pavement and borrow
- Eliminates all drainage improvements

DISADVANTAGES:

- Defers this construction until future years
- Places a cash flow burden on future projects
- Defers right-of-way purchases until future

DISCUSSION:

If the I-75 widening does not happen within the next 20 to 25 years, this investment is not a sound investment. It becomes a sunk cost without benefit to the public. Eliminating this portion of the project would deduct the cost of the added pavement for the new tapers. Future expansion can still be accomplished by keeping the current alignment at the point where they diverge from the mainline I-75 (project the tangents after the 1st curve backwards to construct a normal length taper).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,827,706	—	\$ 1,827,706
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 1,827,706	—	\$ 1,827,706

PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: R-4

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5

Design Alternative (Typ.)
 Remove Excess widening

EXISTING ALIGNMENT

VE proposed alignment

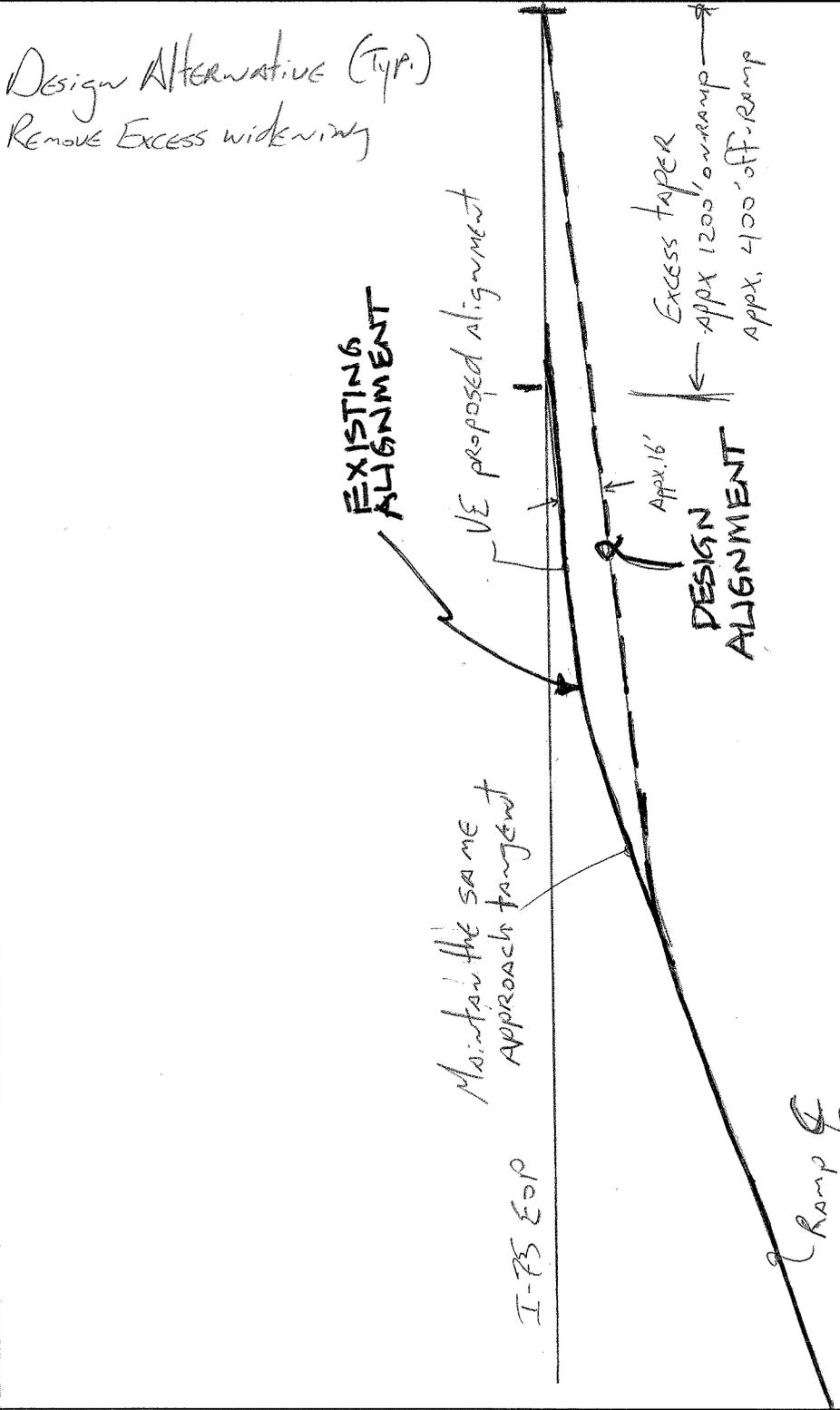
Excess taper
 appx 1200' on ramp
 appx. 400' off-ramp

DESIGN ALIGNMENT

Maintain the same
 approach tangent

I-75 EOP

Ramp E



CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: R-4

SHEET NO.: 3 of 5

AREAS OF EXCESS JORE PAVING (From Microstation)

Ramp A = 6353 sy

Ramp B = 1392 sy

Ramp C = 2578 sy

Ramp D = 4177 sy

Total Area = 14,500 sy

Grading

Ramp A (see Alt. No. R-1) - Eliminate grading from 23+00 to 34+00 in the Avg. End Area Calc

Sta	Area	Avg. (sf)	Vol (cy)
-500 < 1050	0	172.5	319
-250 < 1100	345	450	4167
-300 < 1350	555	398	4422
-450 < 1650	240	206	3433
-300 < 2100	171	209	2322
-350 < 2400	246	261	3383
-450 < 2750	276	410	6833
-200 < 3200	544	512	3793
-650 < 3400	432	352	4237
400 < 4050	224	162	2400
150 < 4450	100	50	278
4600	0		

CY Removed = 39,825
 - 21,578

18,247 cy borrow

21,578 cy

Ramp C Grading

Sta	Area	Avg SF	Vol (cy)
300 < 10+00	0	0	0
500 < 1400	0	0	0
350 < 1900	0	680	8815
300 < 22+50	1360	1423	15,811
300 < 25+50	1485	1195	13,256
300 < 28+50	900	1026	11,400
100 < 31+50	1152	894	3,311
150 < 32+50	636	318	1767
33+00	0		

Ramp C - Eliminate grading from 22+15 to 26+15

CY Removed = 54,359
 - 25,293

29,066 cy borrow

25,293

CALCULATIONS

PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: R-4

SHEET NO.: 4 of 5

Ramp D - Eliminate grading From 26+76 to 40+50

	Sta	Area	Avg (sf)	Vol (cy)		
200	26+50	74.5	125	-926	EXCAV	
	28+50	176	189	-2800	EX	<u>2328</u> EXCAV
400	32+50	201	101	-1122	EX	<u>7333</u> Embank
300	35+50	0	240	1778	Emb	
200	37+50	480	510	4722	Emb	
250	40+00	540	450	833	Emb	
50	40+50	360				

Ramp B - Eliminate grading From 25+00 to 29+00

	Sta	Area EXCAV	Area Emb	Avg (sf) Emb	Vol (cy)	
3	25+00	272	0	10	-1689 +111	<u>1804</u> EXCAV
	28+00	32	20	15		<u>167</u> Emb
1	29+00	30	10		-115 +56	

Drwg From R-2

- 24" RCP → 1580
- 18" RCP → 50'
- 4' DI's
- 1 24" FES

- 1 sed basin (Ramp D)
- Ramp B 24" RCP → 16'
- 1 24" FES

R/W Ramp A $(200 \times 45) + (120 \times (4\frac{1}{2})) + (60 \times (15\frac{1}{2})) = 12,900$ sf (perm. easmt)

B N/A

C $\rightarrow (450 \times (5\frac{1}{2})) + (700 \times (4\frac{1}{2})) = 27,700$ sf

D $\rightarrow (200 \times 16) + (300 \times 16) = 12,800$ sf

Total = 53,400 sf

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **B-1**

DESCRIPTION: **REDUCE THE SUPERSTRUCTURE DEPTH AT THE
 CREEK BRIDGE BY CONVERTING FROM A 3-SPAN TO
 4-SPAN BRIDGE WITH SHALLOWER MEMBERS**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The design is for a three-span bridge with spans of 64 ft. + 114 ft. + 46 ft. The girders are 64-ft.-long Type III prestressed concrete beams, 114-ft.-long Type IV prestressed concrete beams, and 46-ft.-long Type III beams.

ALTERNATIVE: (Sketch attached)

Change the structure to an equally spaced four-span bridge with 52-ft.-long Type I modified prestressed concrete beams.

ADVANTAGES:

- Superstructure depth is reduced by 1'-5".
- Lowers the profile
- Reduces fill requirements
- Reduces right-of-way

DISADVANTAGES:

- Some redesign of the concept will be necessary
- Additional pier in creek
- Slightly higher construction cost

DISCUSSION:

The flood elevation dictates the minimum bottom of the structure elevation. The structure depth dictates the profile elevation. If needed, the effect of an additional pier can be offset by channel modification.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 75,505	—	\$ 75,505
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 75,505	—	\$ 75,505

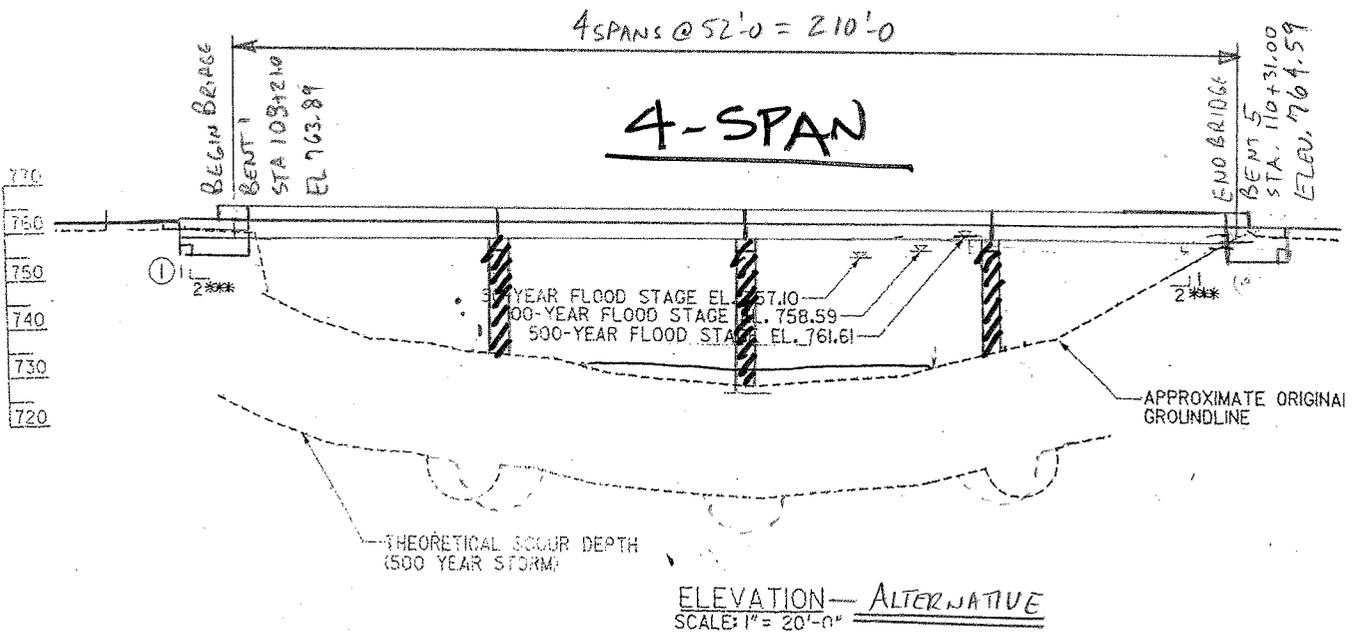
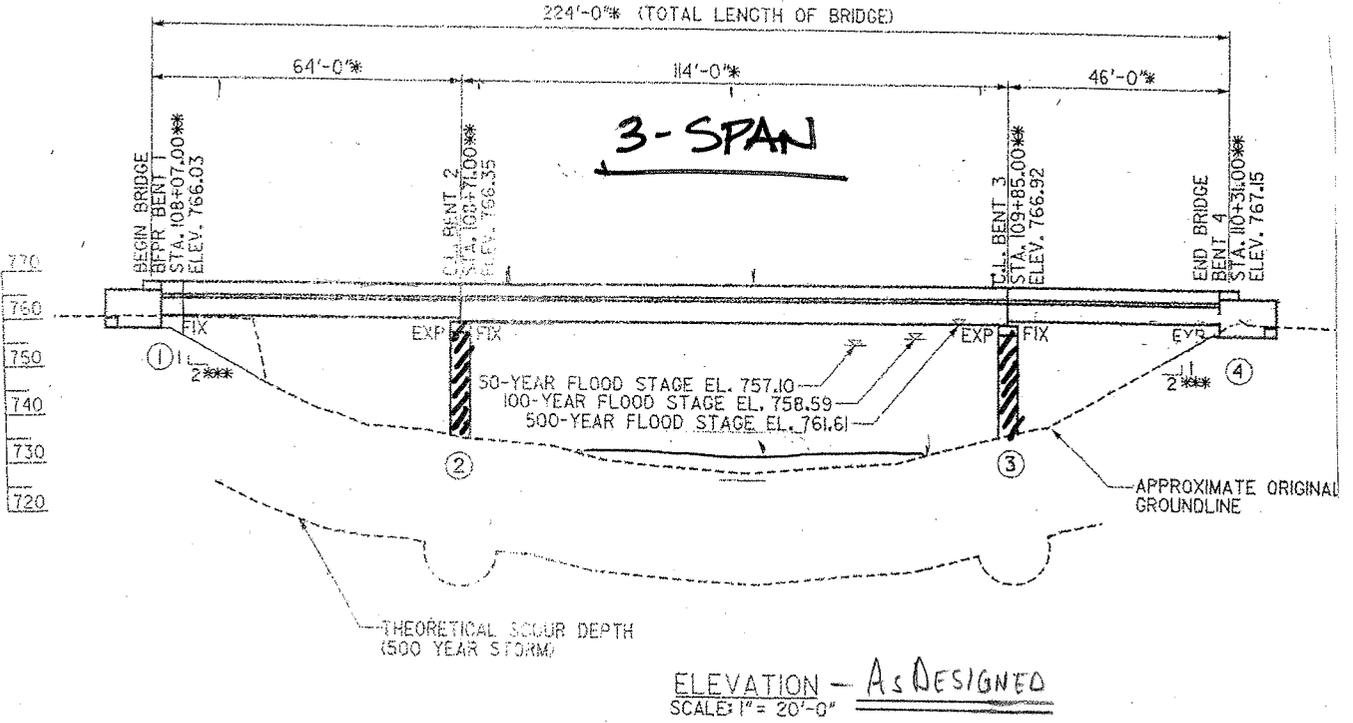


PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5





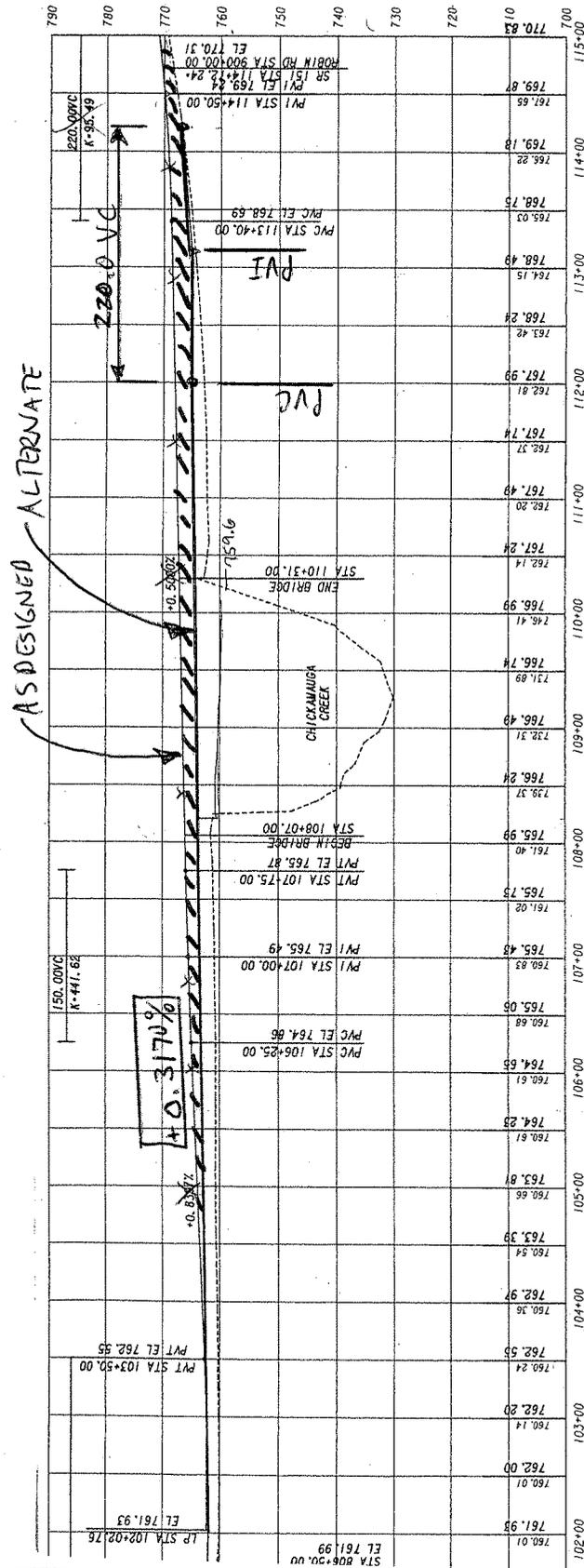
PROJECT:

SR 151 / OLD ALABAMA ROAD WIDENING
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-1

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 5



CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-1

SHEET NO.: 4 of 5

BRIDGE ELEVATIONS: 50 YR ELEV = $757.10 + 2' = 759.10$
 100 YR ELEV = $758.59 + 1' = 759.59$ ← CONTROLS

2% CROSS SLOPE = $56.87' \times 0.02 = 1.14'$

TYPE I MOD PSC = 2'-4"

COPING = 2"

SLAB = 8"

PGL ELEV. = $759.59 + 1.14' + 2.33' + 0.67' + 1.667' = 763.89$ @ BENT 1
 $[766.03 - 763.89 = 2.14' \text{ LOWER}]$

GRADE CHANGE: BENT 1 STA 108+21, ELEV. 763.89
 LP STA 102+02.76, ELEV. 761.93 > +0.3170%

BENT 5 ELEV ⇒ $763.89 + 220(0.00317) = 764.59$
 $[767.15 - 764.59 = 2.56' \text{ LOWER}]$

R/W REDUCTION: 2.14 LOWER @ 2:1 = 4.28 REDUCTION

LPT STA 105+64.83 TO 108+10.00 = $245.17' \times 4.28' = 1,049 \text{ SF}$

RT STA 107+25.0 TO 108+75.00 = $50' \times 10' = 500 \text{ SF}$
 $1,549 \text{ SF} = \underline{\underline{0.036 \text{ AC}}}$

FILL REDUCTION: STA $\begin{cases} 102+02.76 = 0.0 \\ 108+21.00 = (110' \times 2.14) + (49' + 50') 2.14 = 437 \text{ SF} \end{cases}$

AEA = $\frac{437}{2} \times 618.24 = 5,000 \text{ CY}$

STA 110+31 = $(110' \times 2.36) + (45' + 33') 2.56' = 481 \text{ SF}$

118+00 = 0

AEA = $\frac{481}{2} \times 769' = 6,850 \text{ CY}$

11,850 CY

NO REDUCTIONS IN ROADWAY:

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **B-5**

DESCRIPTION: **REUSE EXISTING I-75 BRIDGES, JACK AND WIDEN**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

Steel superstructure is to be replaced with new prestressed concrete structure (PSC).

ALTERNATIVE: (Sketch attached)

Reuse the existing I-75 bridges since they are in serviceable condition. Jack the existing bridges to meet the 17-ft. clearance requirements and widen as necessary.

ADVANTAGES:

- Reduces demolition costs and superstructure costs

DISADVANTAGES:

- Increases steel structure maintenance

DISCUSSION:

The condition of the existing structure is assumed adequate. The northbound cannot be reused due to its reverse slope. Jacking can be accomplished under live load conditions (incrementally).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,180,287	—	\$ 3,180,287
ALTERNATIVE	\$ 2,612,690	—	\$ 2,612,690
SAVINGS (Original minus Alternative)	\$ 567,597	—	\$ 567,597

SKETCHES

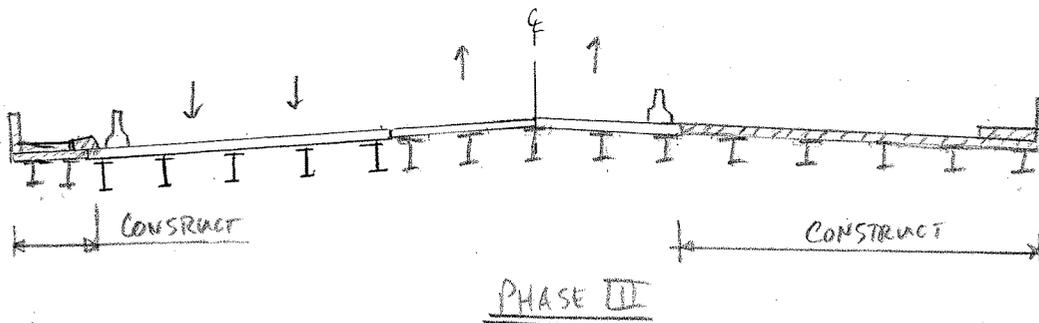
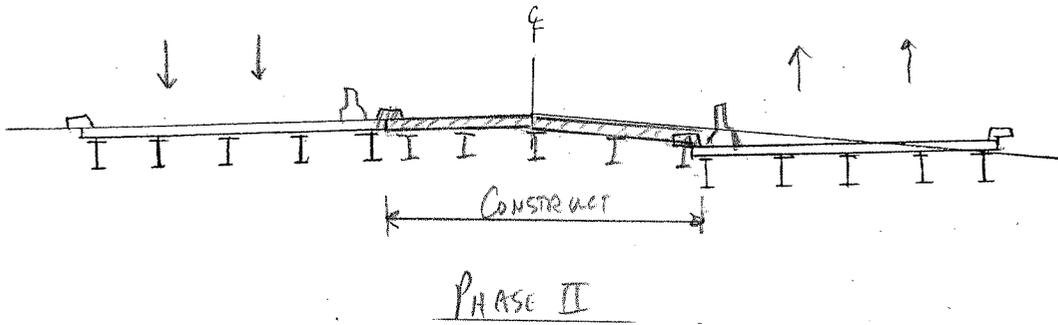
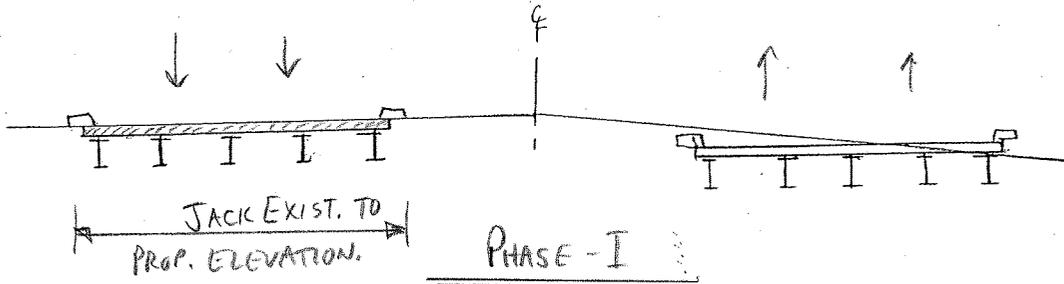


PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-5

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 3



PHASE IV - FINAL TRAFFIC ALIGNMENT

VALUE ENGINEERING ALTERNATIVE



PROJECT:	SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>	ALTERNATIVE NO.:	B-6
DESCRIPTION:	REUSE OR REHABILITATE THE EXISTING SOUTH CHICKAMAUGA CREEK BRIDGE	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)

The existing South Chickamauga Creek Bridge will be demolished and replaced with a new PSC structure.

ALTERNATIVE: (Sketch attached)

Rehabilitate the existing structure and widen in-kind.

ADVANTAGES:

- Profile does not have to be raised
- Reduces fill and right-of-way

DISADVANTAGES:

- Increases rehabilitation costs

DISCUSSION:

The specific deficiencies of the existing bridge are not known. Minor strengthening could be done efficiently. Widening would allow the profile to remain as is.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,925,440	—	\$ 1,925,440
ALTERNATIVE	\$ 1,532,446	—	\$ 1,532,446
SAVINGS (Original minus Alternative)	\$ 392,994	—	\$ 392,994

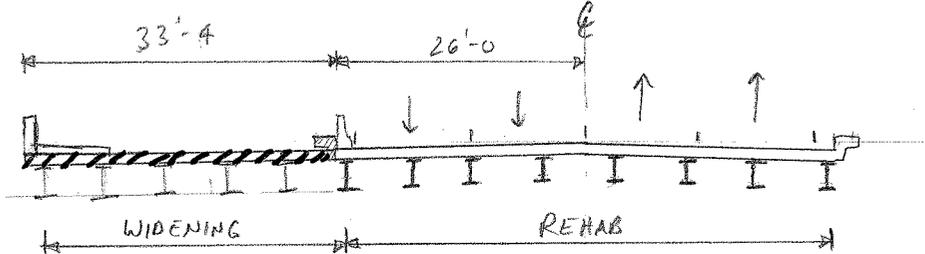


PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

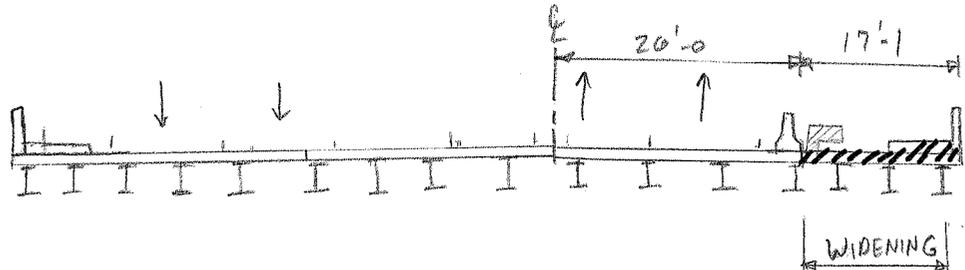
ALTERNATIVE NO.: B-6

AS DESIGNED ALTERNATIVE

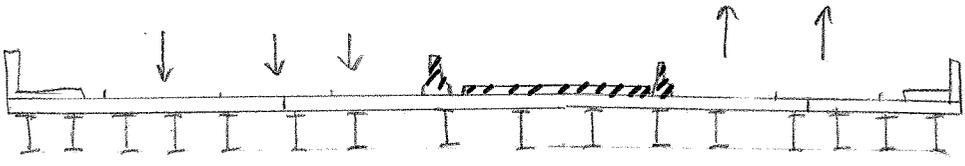
SHEET NO.: 2 of 4



PHASE I



PHASE II



PHASE III

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-6

SHEET NO.: 3 of 4

BRIDGE REHAB $\Rightarrow 52' \text{ W} \times 224' = 11,648 \text{ SF}$

BRIDGE WIDENING $\Rightarrow (33.33' + 17.05') \times 224' = 11,292 \text{ SF}$

R/W REDUCTION \Rightarrow LFT STA. 105+64.83 TO 108+10 = $245.17' \times 20' = 4,903 \text{ SF}$
 RT STA 107+25 TO 108+75 = $50' \times 10' = 500 \text{ SF}$
 $\frac{5403 \text{ SF}}{5403 \text{ SF}} \Rightarrow \underline{\underline{0.124 \text{ AC}}}$

FILL REDUCTION \Rightarrow

S-STA $\left[\begin{array}{l} 102+02.77 = 0 \\ 108+07.0 \end{array} \right] \Rightarrow (3' \times 78') + (32' \times 14') + (20' \times 10') = 842 \text{ SF}$

AEA $\Rightarrow \frac{842}{2} \times 604 = \underline{\underline{9,870 \text{ CY}}}$

N-STA $\left[\begin{array}{l} 110+31.0 \\ 118+00 \end{array} \right] \Rightarrow (3' \times 70') + (30' \times 14') + (20' \times 10') = 830 \text{ SF}$

AEA $\Rightarrow \frac{830}{2} \times 767 = \underline{\underline{11,820 \text{ CY}}}$

$\Sigma = \underline{\underline{21,690 \text{ CY}}}$

ROADWAY REDUCTION \Rightarrow

TOTAL ROADWAY LA FAYETTE TO EOP = 16,595 SF [FROM MICRO STATION DWG.]
 PROPOSED

TOTAL EXIST ROADWAY RE-USEABLE $\Rightarrow 120+27.05 - 110+31 = 996 \text{ LF}$
 $108+07 - 10457.92 = 649$
1,645 LF

EXIST WIDTH = 52'

EXIST. A = 9,505 SF

ROWY COST = 12.5 SUPER = $75 \frac{\$}{\text{ft}} \div 2000 \times 165 \text{ PSY} = 6.18$
 19 SUPER = $75 \div 1 \times 220 = 8.25$
 25 SUPER = $75 \div 2 \times 240 = 9.00$
 12" GAB = $15.94 \div 1 \times 1080 = 8.61$

32.05 \$/SY

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **B-9**

DESCRIPTION: **USE MSE WALL ABUTMENTS ON THE I-75 BRIDGE IN LIEU OF SLOPED PAVING AND ELIMINATE THE TWO END SPANS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The design for the I-75 bridge is a four-span structure with spans of 62 ft. + 108 ft. + 108 ft. + 49 ft.

ALTERNATIVE: (Sketch attached)

Use MSE wall abutments and eliminate the 62-ft. and 49-ft. end spans. Shorten the bridge accordingly to a two-span bridge of 108 ft. + 108 ft.

ADVANTAGES:

- Reduces the amount of superstructure
- Reduces cut/excavation
- Eliminates the two end spans of the bridge

DISADVANTAGES:

- Some redesign of the concept will be necessary

DISCUSSION:

MSE wall abutments are commonly used to shorten the total length of aerial structures and help to minimize the cost of the bridge.

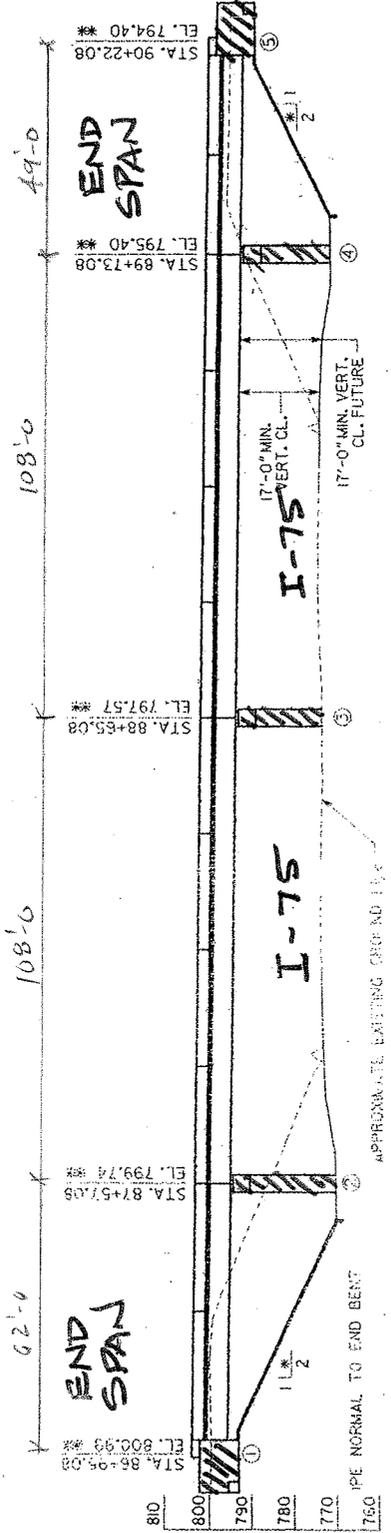
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,030,362	—	\$ 3,030,362
ALTERNATIVE	\$ 2,324,289	—	\$ 2,324,289
SAVINGS (Original minus Alternative)	\$ 706,073	—	\$ 706,073

PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

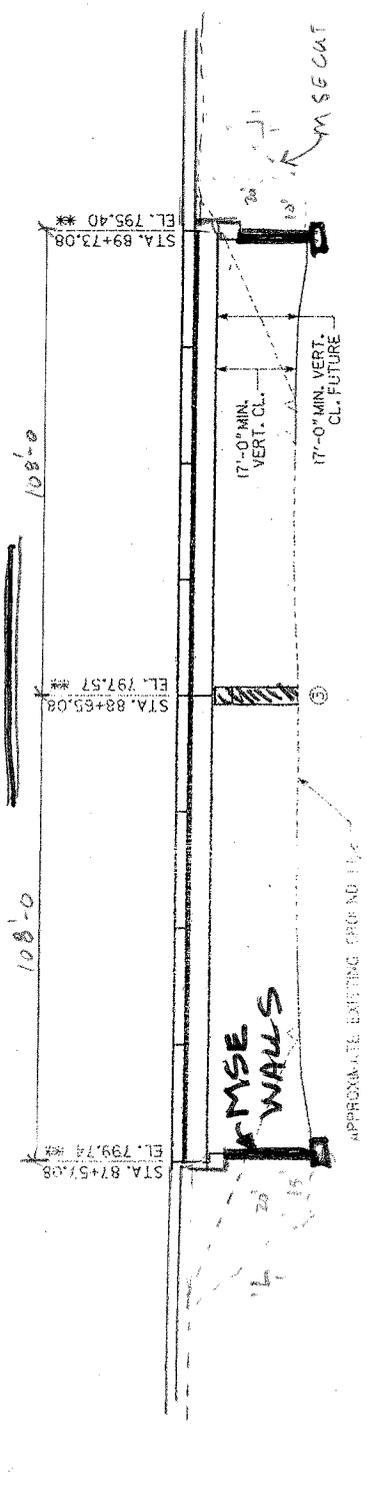
ALTERNATIVE NO.: **B-9**

AS DESIGNED ALTERNATIVE

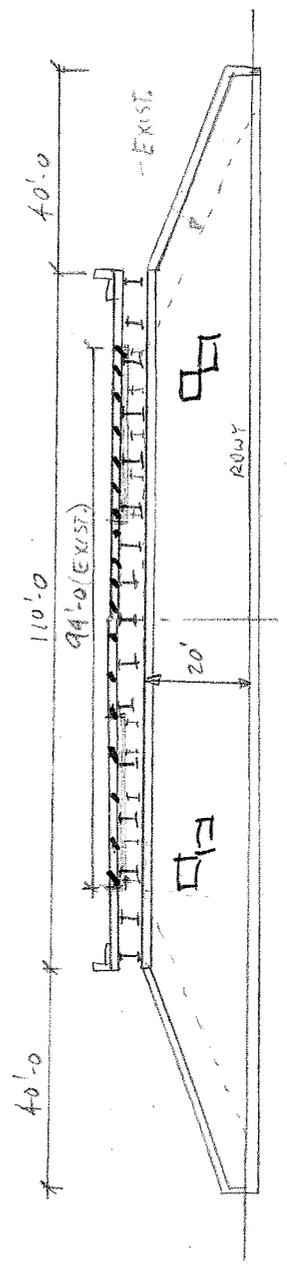
SHEET NO.: **2** of **4**



ELEVATION
 SCALE: 1" = 20'-0"
AS-DESIGNED



ELEVATION
 SCALE: 1" = 20'-0"
ALTERNATIVE



MSE SECTION

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-9

SHEET NO.: 3 of 4

BRIDGE \Rightarrow ORIGINAL = $110.42' \times 327' = 36,107 \text{ SF}$
 REVISED = $110.42' \times 216' = 23,850 \text{ SF}$ [2,256 SF REDUCTION]

MSE WALL $\Rightarrow [(22' \times 110') + (22' \times 40')] \times 2 = 6,600 \text{ SF}$

EXCAVATION \Rightarrow ORIGINAL $\Rightarrow (94' + 40') \times \left[\left(\overset{L}{35'} \times \overset{D}{30'} \right) + \left(\overset{L}{45'} \times \overset{D}{25'} \right) \right] \left(\frac{1}{2} \right) = 10,795 \text{ CY}$

MSE $\Rightarrow (94' + 40') \times \left[\left(\overset{L}{15'} \times \overset{D}{20'} \right) + \left(\overset{L}{25'} \times \overset{D}{25'} \times \frac{1}{2} \right) + \left(\overset{L}{10'} \times \overset{D}{20'} \right) + \left(\overset{L}{20'} \times \overset{D}{20'} \times \frac{1}{2} \right) + \left(\overset{L}{15'} \times \overset{D}{30'} \times \frac{1}{2} \right) + \left(\overset{L}{20'} \times \overset{D}{40'} \times \frac{1}{2} \right) \right] \left(\frac{1}{2} \right) = 8,127 \text{ CY}$

BACKFILL \Rightarrow MSE = 5,025 CY

ADD'L WIDTH $\Rightarrow [(4' \times 40' \times 2) \times 50'] \times 2 \left(\frac{1}{2} \right) = 1,185 \text{ CY}$

$\Sigma = 6,210 \text{ CY FILL}$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>	ALTERNATIVE NO.:	B-10
DESCRIPTION:	REDUCE THE MEDIAN WIDTH OF THE CREEK BRIDGE FROM 20 FT. TO 14 FT. TO MATCH THE TYPICAL SECTION	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)

The roadway plan shows a 20-ft. median section from STA 106+00 to STA 120+27 (US 41).

ALTERNATIVE: (Sketch attached)

Reduce the median width from 20 ft. to 14 ft. to match the typical section dimensions. The reduction of 6 ft. can be taken as 3 ft. on each side of the centerline.

ADVANTAGES:

- Reduction in pavement
- Saves 6-ft. width of right-of-way
- Consistent roadway section

DISADVANTAGES:

- None apparent

DISCUSSION:

The 20-ft.-wide median is not required in this section, which is a striped flush median or through lane.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 207,498	—	\$ 207,498
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 207,498	—	\$ 207,498



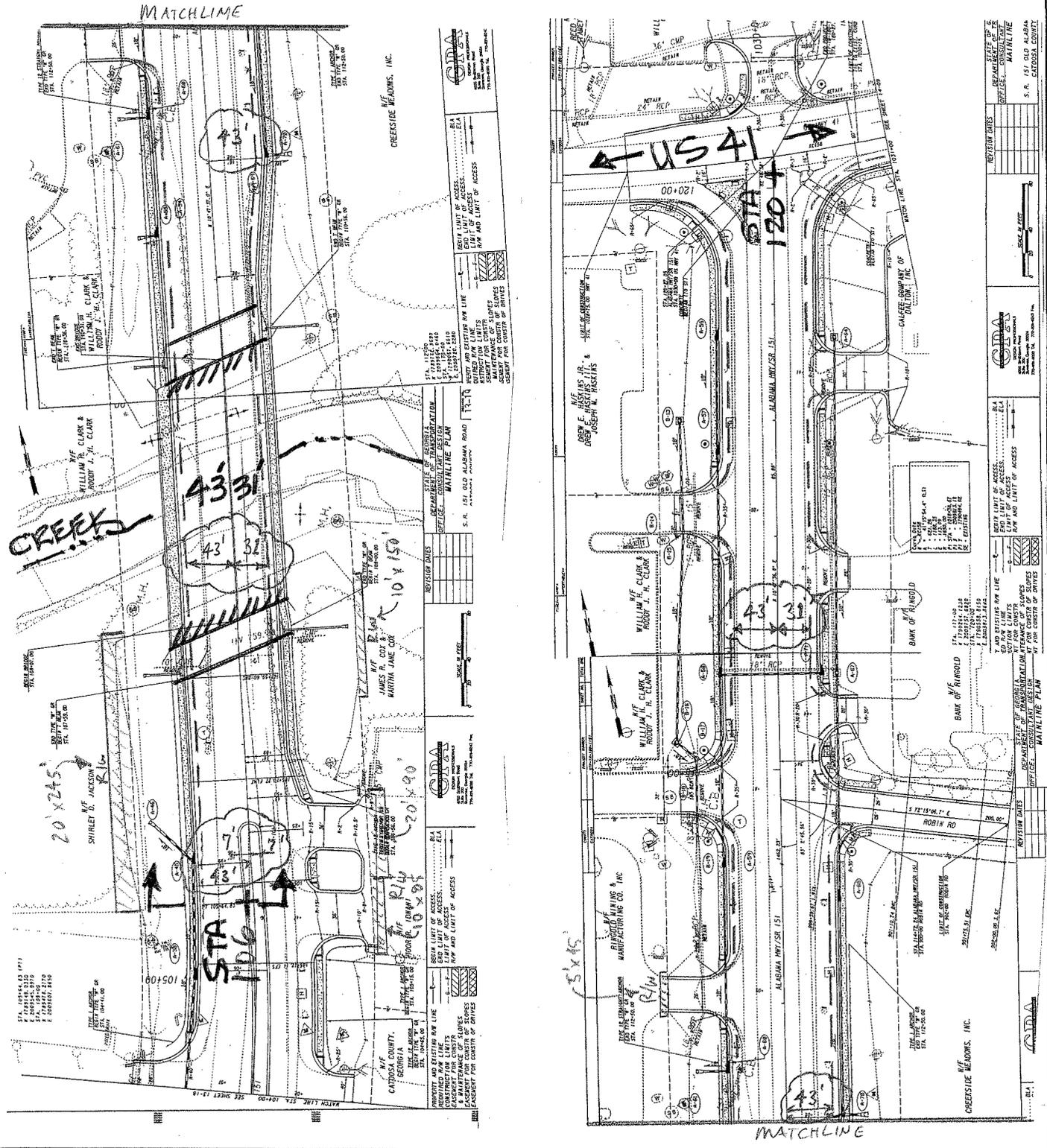
PROJECT:

SR 151 / OLD ALABAMA ROAD WIDENING
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-10

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: B-10

SHEET NO.: 3 of 4

R/W REDUCTION $\Rightarrow (3' \times 245') + (10' \times 150') = 2,235 \text{ SF} = \underline{0.051 \text{ AC RES.}}$
 $(3' \times 90') + (3' \times 85') = 525 \text{ SF} = \underline{0.012 \text{ AC Com}}$

FILL REDUCTION \Rightarrow

S-STA. 106+00 = 0
 108+07 = $(3' \times 6') + (1.5' \times 45') + (1.5' \times 50') = 160 \text{ SF}$
 $AEA = \left(\frac{160}{2}\right) 207' = \underline{615 \text{ CY}}$

N-STA 110+31 = $(3' \times 6') + (1.5' \times 35') + (1.5' \times 45') = 138 \text{ SF}$
 119+50 = 0
 $AEA = \left(\frac{138}{2}\right) 919' = \underline{4,690 \text{ CY}}$
 $\Sigma = \underline{5,305}$

ROADWAY REDUCTION \Rightarrow

S-STA $\Rightarrow 108+07 - 106+00 = 207'$
 N-STA $\Rightarrow 120+27 - 110+31 = \underline{996'}$
 $E = 1203' \times 6' \text{ WIDTH} = \underline{8025 \text{ Y}}$

BRIDGE REDUCTION \Rightarrow

$224' \times 6' = \underline{1,344 \text{ SF}}$



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
CONSTRUCTION MANAGEMENT (CM)						
CM-1	Shift the alignment of Old Alabama Road entirely to the east and construct the project in two stages in lieu of four. Purchase right-of-way on the east side only.	\$ 5,629,328	\$ 2,577,996	\$ 3,051,332		\$ 3,051,332
CM-2	Incorporate the "Economic Price Adjustment" clause into the bid documents (Federal Acquisition Regulation Part 16) to share the risk of possible price escalation of materials such as asphalt, fuel, steel, and concrete.	DESIGN SUGGESTION				
CM-4	Add a line item to the project estimate for demolition of the two existing bridges. Demo cost could be \$40/sf on each bridge for a total cost of \$1M.	DESIGN SUGGESTION				
CM-6/7	Temporarily close Old Alabama Road at Chickamauga Creek to allow faster construction of the new bridge. Use local surface streets to temporarily detour traffic around the site. Construct the bridge in 4 months in lieu of 8 months.	\$ 300,000		\$ 300,000		\$ 300,000

VALUE ENGINEERING ALTERNATIVE



PROJECT:	SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>	ALTERNATIVE NO.:	CM-1
DESCRIPTION:	SHIFT THE ALIGNMENT OF OLD ALABAMA ROAD ENTIRELY TO THE EAST AND CONSTRUCT IN TWO STAGES IN LIEU OF FOUR	SHEET NO.:	1 of 9

ORIGINAL DESIGN: (Sketch attached)

The expansion of Old Alabama Road requires new right-of-way on both the east and west sides of the road. A four-stage construction program is proposed.

ALTERNATIVE: (Sketch attached)

Place all of the expansion of Old Alabama Road on the east side of the road. This will reduce the number of parcels impacted even though the total takes may be larger. Since all of the construction is taking place in an unobstructed area on the east side of the road, the contractor can complete the work in two stages in lieu of four.

ADVANTAGES:

- Simplifies construction
- Less maintenance of traffic required
- Impacts half as many property owners
- Reduces construction schedule

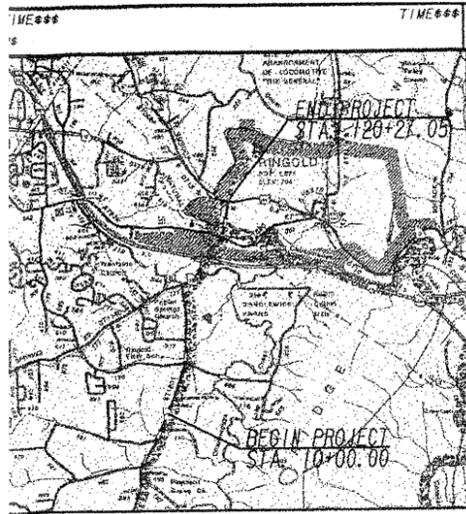
DISADVANTAGES:

- The alignment will need to be redesigned

DISCUSSION:

Right-of-way costs may slightly increase due to the extent of the impact upon each property owner and the potential for damages. However, the construction will be streamlined and maintenance of traffic costs will be greatly reduced. This concept should be evaluated, considering the advantages of asymmetrical widening and the associated reduction in the number of parcels of right-of-way involved.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 5,629,328	—	\$ 5,629,328
ALTERNATIVE	\$ 2,577,996	—	\$ 2,577,996
SAVINGS (Original minus Alternative)	\$ 3,051,331	—	\$ 3,051,331



LOCATION SKETCH

DESIGN DATA:
 OFFICE A. D. T. : 30,300 (2008)
 OFFICE A. D. T. : 45,000 (2028)
 SECTIONAL DIST. : 50/50
 TRUCKS : 6 %
 HR. TRUCKS : 7 %
 DESIGN : 45 MPH (SR 151) AND 70 MPH (I-75)

THIS PROJECT IS LOCATED 100 PERCENT IN CATOOSA COUNTY.
 THIS PROJECT IS LOCATED 100 PERCENT
 WITHIN CONGRESSIONAL DISTRICT 5 SECTION 2
 AND LOT(S) : 132, 167 AND 168
 HORIZONTAL DATUM : NAD 83 / HARN 94
 GEORGIA COORDINATE SYSTEM :
 VERTICAL DATUM : NAVD 88
 PROJECT DESIGNATION : FULL OVERSIGHT

NOTE: ALL WORK TO BE DONE IN ACCORDANCE WITH THE DEPARTMENT OF TRANSPORTATION OF GEORGIA STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF ROADS AND BRIDGES, CURRENT EDITION, AND SUPPLEMENTS THERETO, AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION.

DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

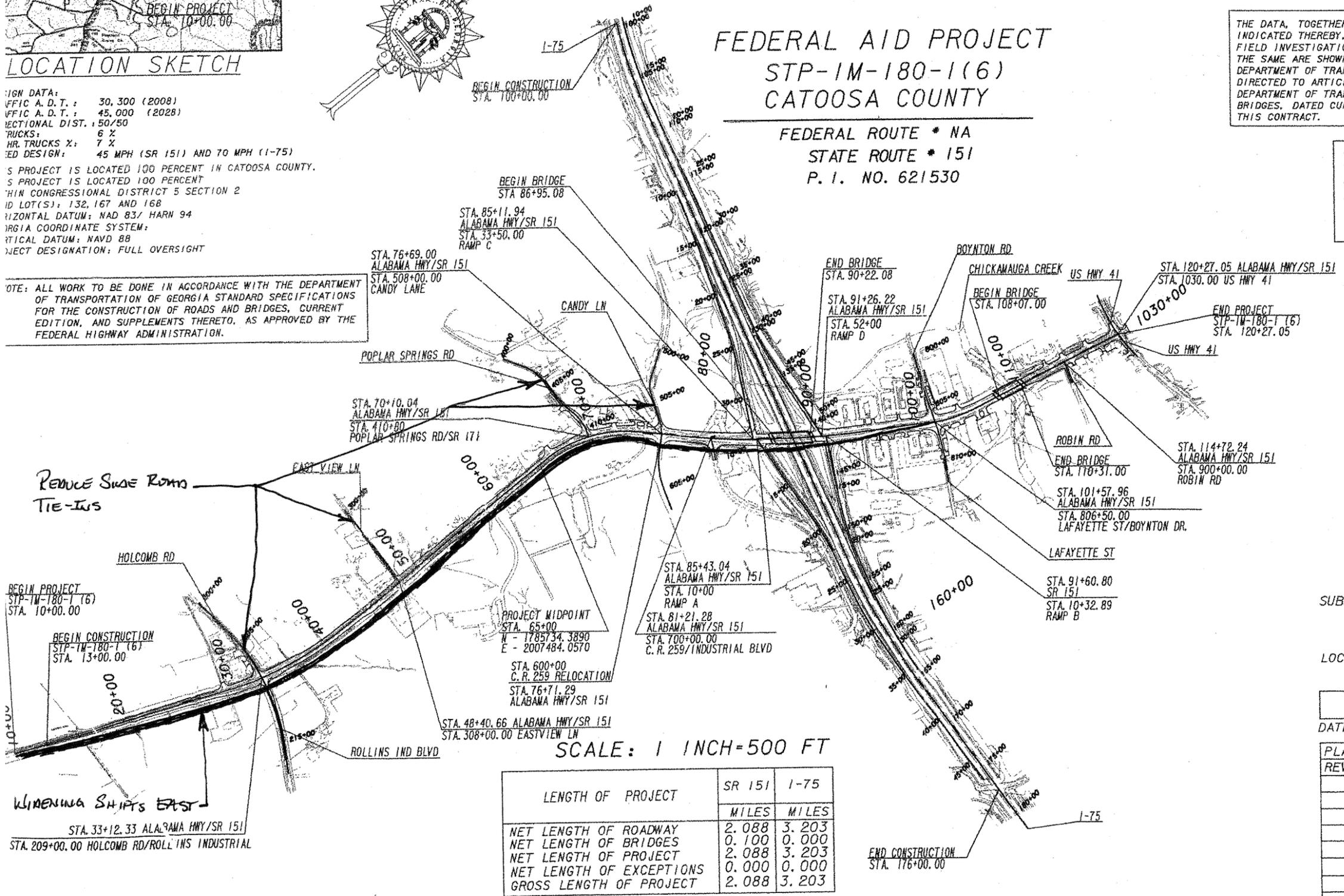
PLAN AND PROFILE OF PROPOSED SR 151/OLD ALABAMA ROAD WIDENING & RECONSTRUCTION

FEDERAL AID PROJECT
STP-1M-180-1(6)
CATOOSA COUNTY

FEDERAL ROUTE * NA
STATE ROUTE * 151
P. I. NO. 621530

THE DATA, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY, WHETHER BY DRAWINGS OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT OF TRANSPORTATION IN ANY WAY. THE ATTENTION OF BIDDER IS SPECIFICALLY DIRECTED TO ARTICLES 102.04, 102.05, AND 104.03 OF THE STANDARD SPECIFICATIONS OF THE DEPARTMENT OF TRANSPORTATION, STATE OF GEORGIA, FOR THE CONSTRUCTION OF ROADS AND BRIDGES, DATED CURRENT EDITION AND ANY MODIFICATION THEROF, WHICH WILL BE A PART OF THIS CONTRACT.

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



DESIGN PROFESSIONALS
 4000 Smithtown Road
 Suite 200
 Suwanee, Georgia 30024
 770-831-9000 Tel. 770-831-9243 Fax.

SUBMITTED BY: _____
 STATE PROGRAM DELIVERY AND CONSULTANT DESIGN ENGINEER

LOCATION AND DESIGN APPROVAL DATE: _____

DATE _____ CHIEF ENGINEER _____

PLANS COMPLETED	- -
REVISIONS	

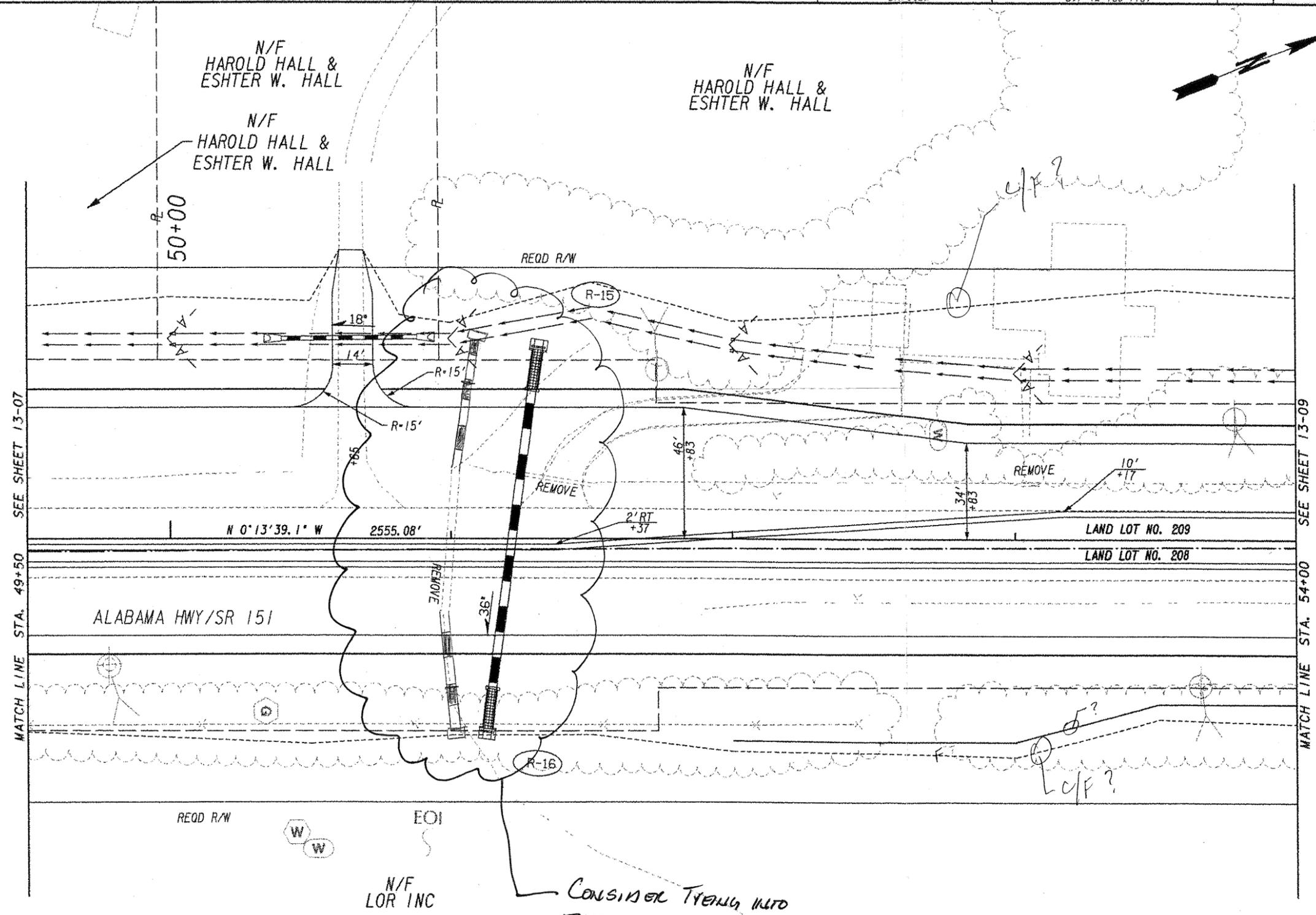
SCALE: 1 INCH=500 FT

LENGTH OF PROJECT	SR 151	I-75
	MILES	MILES
NET LENGTH OF ROADWAY	2.088	3.203
NET LENGTH OF BRIDGES	0.100	0.000
NET LENGTH OF PROJECT	2.088	3.203
NET LENGTH OF EXCEPTIONS	0.000	0.000
GROSS LENGTH OF PROJECT	2.088	3.203

FUNCTIONAL CLASSIFICATION: RURAL & URBAN MINOR ARTERIAL

cm-1
2-25-9

DATE/TIME*** #USER#	TIME*** #PRF#	#DGN#	COUNTY CATOOSA	PROJECT NUMBER STP-1W-180-1(16)	SHEET NO.	TOTAL SHEETS
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SEE SHEET 13-07
MATCH LINE STA. 49+50

SEE SHEET 13-09
MATCH LINE STA. 54+00

STA. 50+00.00
N 1784234.4010
E 2007490.0150
STA. 53+00.00
N 1784534.3990
E 2007488.8230

PROPERTY AND EXISTING R/W LINE	
REQUIRED R/W LINE	
CONSTRUCTION LIMITS	
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	

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

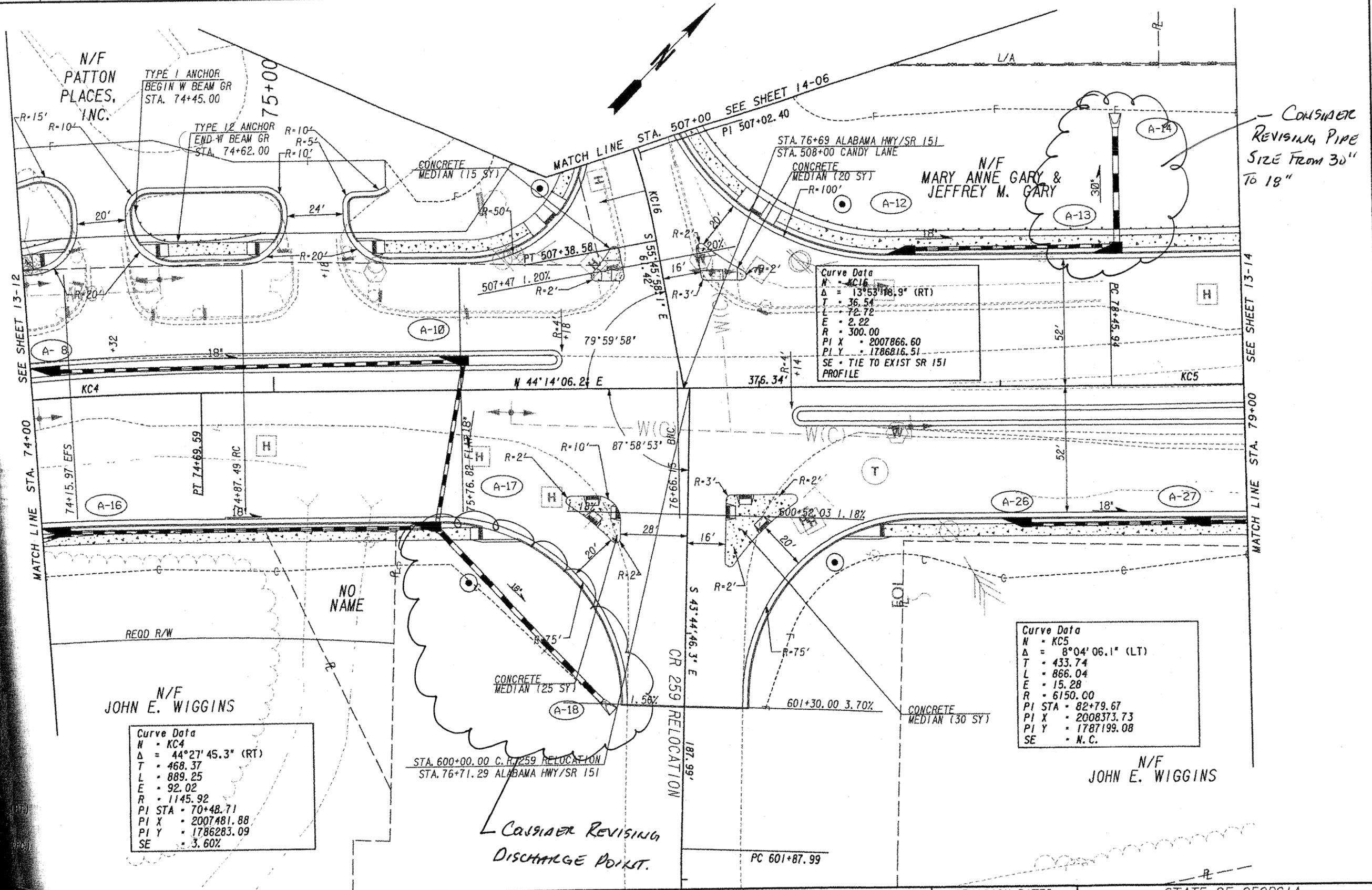
CPA
CLARK PATTERSON ASSOCIATES
DESIGN PROFESSIONALS
4000 Smithtown Road
Suite 200

SCALE IN FEET

REVISION DATES	

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

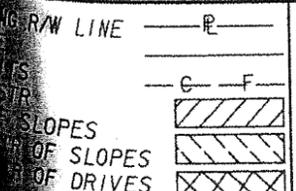
cm-1
4 of 9



Curve Data
 N - KC4
 Δ = 44°27'45.3" (RT)
 T = 468.37
 L = 889.25
 E = 92.02
 R = 1145.92
 PI STA = 70+48.71
 PI X = 2007481.88
 PI Y = 1786283.09
 SE = 3.60%

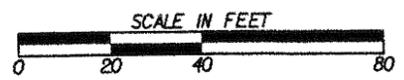
Curve Data
 N - KC16
 Δ = 13°53'18.9" (RT)
 T = 36.54
 L = 72.72
 E = 2.22
 R = 300.00
 PI X = 2007866.60
 PI Y = 1786816.51
 SE = TIE TO EXIST SR 151
 PROFILE

Curve Data
 N - KC5
 Δ = 8°04'06.1" (LT)
 T = 433.74
 L = 866.04
 E = 15.28
 R = 6150.00
 PI STA = 82+79.67
 PI X = 2008373.73
 PI Y = 1787199.08
 SE = N.C.



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

CPA
 CLARK PATTERSON ASSOCIATES
 DESIGN PROFESSIONALS
 4000 Smithtown Road
 Suite 200
 Suwanee, Georgia 30024
 770-831-9000 Tel. 770-831-9243 Fax.



REVISION DATES

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 OFFICE: CONSULTANT DESIGN
MAINLINE PLAN
 S.R. 151 OLD ALABAMA ROAD
 CATOOSA COUNTY

DRAWING No.
13-13

COST WORKSHEET



ROADWAY

PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia
 ALIGNMENT SHIFT / ASYMMETRICAL DESIGN EAST
 DESCRIPTION: **IDEA DESCRIPTION (abbreviate if necessary to fit)**

ALTERNATIVE NO.: **CM-1**
 SHEET NO.: **5** of **9**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
402-3112-19MM ASPH	TL				2370	75	177,750. ⁰⁰
402-3113-12.5MM ASPH	TL				1778	75	133,350. ⁰⁰
402-3121-25MM ASPH	TL				4740	75	355,500. ⁰⁰
310-1101 GAB	TL	11,062.00	15.94	176,328.28	11,062.00	15.94	176,328.28
500-3101-CL CONC.	CY	28	509.29	14,260.12	28	509.29	14,260.12
511-1000-REINF. STEEL	LB	3,784	0.86	3,254.24	3,784	0.86	3,254.24
550-1180-18" STRM DRAIN	LF				50	36.25	1,812.50
550-1360-36" STRM DRAIN	LF				48	66.20	3,177.60
PROPOSED EAST SIDE ALTERNATIVE					TOTAL \$865,432.74 ✓		
310-1101 - GAB	TL	11,693.47	15.94	186,393.91			
402-3121-25MM ASPH	TL	5040. ⁰⁰	75. ⁰⁰	378,000. ²⁸			
ORIGINAL WEST SIDE					TOTAL = \$301,038.55		
REDUCTION OF SIDE ROWS					(INCLUDES MARK UPS)		
		1,875' x 800' LF = 1,500,000			- 301,038.55		
					= \$1,198,961.45		
Subtotal							
Markup (%) at							
TOTAL							

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: CM-1

SHEET NO.: 6 of 9

SHIFT ALIGNMENT TO THE EAST AND CONSTRUCT IN TWO STAGES

BEG. STA. 10+00 TO STA. 86+95.08 - TOTAL LENGTH = 7,695.08 LF

MARK-UP 3.47
 R.O.W

$$\begin{aligned} 1\frac{1}{2}'' \text{ E-TOP} &= 7,695.08' \times 24' = 184,681.92 \text{ SF/9} \\ &= \underline{20,520.21 \text{ SY}} \end{aligned}$$

ASPH. 110 ^{lbs}/_{SY.IN}
 GAB 110 ^{lbs}/_{FT³}

$$\begin{aligned} \text{TNS} &= 20,520.21 (165 \frac{\text{lbs}}{\text{SY.IN}}) \div 2000 = 1,692.91 \text{ TNS} \\ &\quad \times .05 (\text{MARK UP}) \\ &= \underline{84.65 \text{ TNS}} + 1,692.91 = \underline{1,777.56 \text{ TNS}} \end{aligned}$$

$$\begin{aligned} 2'' \text{ B BINDER} &= 7,695.08' \times 24' = 184,681.92 / 9 \\ &= 20,520.21 \text{ SY} \end{aligned}$$

$$\text{TNS} = 20,520.21 (220 \frac{\text{lbs}}{\text{SY.IN}}) \div 2000 = 2,257.22 \text{ TNS}$$

$$\begin{aligned} &\quad \times .05 (\text{MARK-UP}) \\ &= \underline{112.86 \text{ TNS}} + 2,257.22 = \underline{2,370.08 \text{ TNS}} \end{aligned}$$

$$\begin{aligned} 4'' \text{ A-BASE} &= 7,695.08' \times 24' = 184,681.92 / 9 \\ &= 20,520.21 \text{ SY} \end{aligned}$$

$$\text{TNS} = 20,520.21 (440 \frac{\text{lbs}}{\text{SY.IN}}) \div 2000 = 4,514.40 \text{ TNS}$$

$$\begin{aligned} &\quad \times .05 (\text{MARK UP}) \\ &= \underline{225.72 \text{ TNS}} + 4,514.40 = \underline{4,740.12 \text{ TNS}} \end{aligned}$$

G.A.B

$$\begin{aligned} 12'' \text{ INSTALLED} & \quad 7,695.08' \times 25' = 192,377.00 \text{ SF} \times 1' / 27 \\ &= \underline{7,125.07 \text{ CY}} \end{aligned}$$

$$\text{TNS} = 192,377.00 (115 \frac{\text{lbs}}{\text{CFT}}) \div 2000 = 11,061.67 \text{ TNS}$$

THE EARTHWORK WILL BALANCE OUT DUE TO SHIFTS

BOX CULVERT - TRIPLE 6.5' x 3' USE x 6' x 3' BOX CULVERT

REDUCTION OF QUANTITIES 11 LF

Des. No. 1

$$189.2 \times 20 \text{ LF} = \underline{3,784.40} \text{ REINF. STEEL (LBS)} \times 0.86 = \underline{\$3,254.24}$$

$$1.354 \text{ CY} \times 20 \text{ LF} = \underline{27.08} \text{ CY CONG. (CY)} \times 509.29 = \underline{\$14,260.12}$$

TIE 36" RCP - R-16 & R-15 INTO EXISTING 36" RCP @ STA. 51+22

57 LF - 36" RCP
 REDUCED PIPE LENGTH
 48 LF

REVISE PIPE SIZE STRUCTURES A-13 TO A-14 REDUCE 30" TO 18" RCP - 50 LF

36" STAIN DRAIN - 66.20 x 48' = 3,177.60
 18" " " - 36.25 x 50' = 1,812.50
\$4,990.10

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: CM-1

ALIGNMENT ~~SHIFT~~ EAST AND CONSTRUCT LANES IN TWO STAGES

SHEET NO.: 7 of 9

G.A. B REDUCTION

$$G.A. B = 115 \text{ lbs/CF}$$

STA. 13+00 TO STA. 86+95.08 - LENGTH = 7,395.08

$$AREA: 7,395.08 \times 25 = 184,877.00 \text{ SF} \times 1' \text{ DEPTH}$$

$$= 184,877.00 \text{ CF} \checkmark$$

$$TMS = 184,877.00 \text{ CF} \left(\frac{115 \text{ lbs/CF}}{2000} \right) \div 2000$$

$$= 10,630.428 \text{ TMS} \cdot 10\%$$

$$= 1,063.043$$

$$\underline{11,693.47 \text{ TMS} \checkmark}$$

A-BASE REDUCTION - STA. 13+00 - STA. 32+00 - LENGTH 1,900.00

$$A = 15' \times 1900 \text{ LF} = 28,500.00 \text{ SF} \div 9 = \underline{3,166.67 \text{ SY} \checkmark}$$

STA. 32+00 - STA. 36+00

$$A = \left(\frac{46' + 48'}{2} \right) 400' = 18,800.00 \text{ SF} \div 9 = \underline{2,088.89 \text{ SY} \checkmark}$$

$$A = \left(\frac{45' + 21' + 35'}{3} \right) 4,300' \text{ STA. } 36+00 - 79+00 = 149,040.67 \text{ SF} \div 9$$

$$= \underline{16,560.07 \text{ SY} \checkmark}$$

$$\text{TOTAL SY} = \underline{21,818.52} \times 440 \text{ lbs/SY} \div 2000 = 4800.07 \text{ TMS} \times .05 = 240.00 \text{ TMS}$$

$$\text{TOTAL TMS} = 4800 + 240.00$$

$$= \underline{5040.00 \text{ TMS}}$$

SIDE ROADS REDUCTION

TOTAL LENGTH FOR HOLCOMB, EAST VIEW, POPULAR SPANGLIS ROAD, CANDY LANE

$$\text{LENGTH} = 1,875 \times 800.00 \text{ LF}$$

$$= \underline{1,500,000}$$

COST WORKSHEET



RIGHT-OF-WAY

PROJECT:	SR 151 / OLD ALABAMA ROAD WIDENING Project No. STP-IM-180-1(6), Catoosa County, Georgia	ALTERNATIVE NO.: CM-1
DESCRIPTION:	ALIGNMENT SHIFT / ASYMMETRICAL DESIGN EAST IDEA DESCRIPTION (abbreviate if necessary to fit)	SHEET NO.: 8 of 9

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
RIGHT-OF-WAY ESTM (E)	ACS	7.522	65,000	489,927.84			
COMMERCIAL PROPERTIES							
BJB ELECTRIC	A = 435 LF x 50 LF = 21,750 SF		\$10.40				
				= \$226,200.00			
ARP-GOLD-ALA HIGHWAY LLC	A = 1361.00 x		\$10.40	= \$14,154.40			
RELOCATION PROPERTY							
JERRY HAWTHORNE	A = 150.50' x 135'			= 20,317 SF (10.40)			
				= \$211,302.00			
COST FOR ALIGNMENT SHIFT EAST				940,603.84 x 3.47			
				= \$3,263,895.32			
RIGHT-OF-WAY ESTM (W)							
REDUCTION							
COMMERCIAL PROPERTY AREAS		A _r = 36,820 x	\$10.40	=			382,928.00
RESIDENTIAL PROPERTIES		A _r = 1.421 ACS x	65,000				92,360.87
2-RELOCATIONS							105,000.00
							580,288.87
							+ 3.47
							\$2,013,602.38
PROJECT SAVINGS				3,263,895.32			
				- 2,013,602.38			
NET				\$1,250,292.94			
Subtotal							
Markup (%) at		3.47					
TOTAL							

CALCULATIONS



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. **STP-IM-180-1(6)**, Catoosa County, Georgia

ALTERNATIVE NO.: **CM-1**

SHEET NO.: **9** of **9**

SHIFT ALIGNMENT TO THE EAST AND CONSTRUCT IN TWO STAGES

RIGHT-OF-WAY ESTIMATE (EAST SIDE S.R. 151)

R.O.W. MARK UP 3.47

$$A = 7,395.08 \text{ FT} \times 50 \text{ FT}$$

$$= 369,754.00 \text{ FT}^2 \div 43,560 \text{ FT}^2$$

$$= 8.488 \text{ ACS} - 0.966 = 7.522 \text{ ACS} \times 65,000 = \underline{\$488,947.84}$$

TOTAL ROW COST EAST + CONSTRUCTION

$$940,603.84 (3.47) = \underline{\$3,263,895.32}$$

$$1,500,000.00$$

$$865,432.74$$

$$\underline{\$5,629,328.06}$$

MAJOR IMPACTS TO COMMERCIAL PROPERTIES

- BJB ELECTRIC AREA = 435 LF x 50 LF = 21,750 SF (\$10.40 SF) = \$226,200.00

- ARP-GOLD-ALABAMA HIGHWAY LLC = $A_1 = \frac{1}{2}(11) \cdot 92 \text{ LF} + A_2 = \left(\frac{20+10}{2}\right) \cdot 57' = 855.00 \text{ SF} = 1361.00 \text{ SF}$
 $= 506 \text{ SF}$

RELOCATION PROPERTY

- JERRY E. HAWTHORNE

$$A = 150.50 \times 135.00 = 20,317.50 \text{ SF} (\$10.40)$$

$$= \underline{\$211,302.00}$$

R.O.W. $1361.00 \times \$10.40 = \underline{\$14,154.40}$

RIGHT-OF-WAY RELOCATION COST (WEST WEST SIDE S.R. 151)

Sta. 13+00 - Sta. 30+00

$$A = 1,700 \text{ LF} \times 15'$$

$$= 25,500.00 \text{ SF} \div 43,560 = 0.585$$

$$= \$65,000 \times 0.585 = \underline{\$38,050.96}$$

Sta. 30+00 - Sta. 31+69.00

$$A_2 = 169' \times 40' = 6,760.00 \text{ SF} \times \$10.40$$

$$= \underline{\$70,304.00}$$

Sta. 31+00 - Sta. 34+00

Sta. 34+00 - Sta. 38+60

$$A = 460' \times 38' = 17,480.00 \text{ SF} / 43,560$$

$$= 0.401 (\$65,000)$$

$$= \underline{\$26,083.56}$$

Sta. 38+60 - 48+26

$$A = 14' \times 966' = 13,524 \text{ SF} / 43,560 \text{ SF/AC}$$

$$= 0.31 \text{ ACS (65K)}$$

$$= \underline{20,180.44}$$

RIGHT-OF-WAY

Sta. 49+21 - Sta. 50+89.50 (RESIDENTIAL)

$$A = 168.50 \text{ FT} \times 32' = 5,392.00 \text{ SF} / 43,560$$

$$= 0.124 \text{ ACS} \times \$65,000$$

$$\text{Sta. } 50+89 - \text{Sta. } 60+24 = \underline{\$8,043.90}$$

2- Total TAKES @ \$105,000

Sta. 60+24 - 64+50

$$A = 426.00 \text{ FT} \times 30 \text{ FT} = 12,780 \text{ FT}^2 (\$10.40)$$

$$= \underline{\$132,912.00}$$

Sta. 60+24 - Sta. 65+22

$$A = 498.00 \text{ LF} \times 20' = 9,960 \text{ SF} (\$10.40)$$

$$= \underline{\$103,584}$$

Sta. 70+92 - 75+80

$$A = 15' \times 488' = 7,320 \text{ SF} (\$10.40) = \underline{\$76,128.00}$$

Total R.O.W. Cost Along H₁ + CONSTRUCTION

$$\underline{\$500,288,288} \times 3.47 = \underline{2,013,602.381} \checkmark$$

$$+ 564,394.19$$

NET SAVINGS \$1,250,292.94 \$2,577,996.57

VALUE ENGINEERING ALTERNATIVE



PROJECT:	SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>	ALTERNATIVE NO.:	CM-2
DESCRIPTION:	INCORPORATE THE ECONOMIC PRICE ADJUSTMENT CLAUSE INTO THE RFP (FEDERAL ACQUISITION REGULATION PART 16).	SHEET NO.:	1 of 1

ORIGINAL DESIGN:

Contractors are required to bid on materials whose prices may be extremely volatile. Example of these products include asphalt, fuel, copper, concrete, and steel. Commonly, the contractors must add a contingency to their bids to account for the possibility of price increases from these products. Sometimes they need this contingency, and other times they do not. If they do not use this contingency, they pocket money as extra profit.

ALTERNATIVE:

The Federal Acquisition Regulation (FAR) provides for price adjustments in fixed-price contracts for both upward and downward revision of the stated contract price upon the occurrence of specified contingencies. This option can be particularly effective in reducing costs related to significant contingencies included in design-builder's proposals during times of market volatility (including doubts about market stability and/or labor conditions).

ADVANTAGES:

- Reduces contractor risk
- Reduces unnecessary contractor contingencies
- Risk shared by all parties

DISADVANTAGES:

- Additional paperwork
- Prices of several items must be monitored

DISCUSSION:

Potential offerors are keenly aware of the volatility of the market and consequently must be somewhat pessimistic in pricing projects in today's dollars for construction to commence in subsequent years. Incorporating FAR part 16.203 into the RFP, which shares the risk of significant price swings between the government and the design-builder, helps mitigate the risk of predicting future costs. This, in turn, reduces the premium paid by the government for substantial price escalation projections. The Engineering News-Record (ENR) and the Associated General Contractors' (AGC) chief economist recently provided a breakdown of the percentage changes in construction costs (at 1-month, 3-month, and 12-month intervals), which reflect major price increases throughout the industry.

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

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **CM-4**

DESCRIPTION: **INCLUDE BRIDGE DEMOLITION COST IN THE PROJECT COST ESTIMATE**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The current project cost estimate does not include a line item for demolition of the two I-75 bridges or the Chickamauga Creek Bridge.

ALTERNATIVE:

Add a line item to the project cost estimate for demolition of the three existing bridges. Demolition cost for these bridges is approximately \$40/SF or a total cost increase to the project estimate of approximately \$1.0M

I-75 Bridge NB = 7,848 SF
 I-75 Bridge SB = 7,848 SF
 Creek Bridge = 11,640 SF

ADVANTAGES:

- Improves the accuracy of the cost estimate

DISADVANTAGES:

- Need to modify the project cost estimate
- Increases the project cost by \$1.0M

DISCUSSION:

The cost of demolition can be a substantial expense to a project and should be included in all financial planning.

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

CALCULATIONS

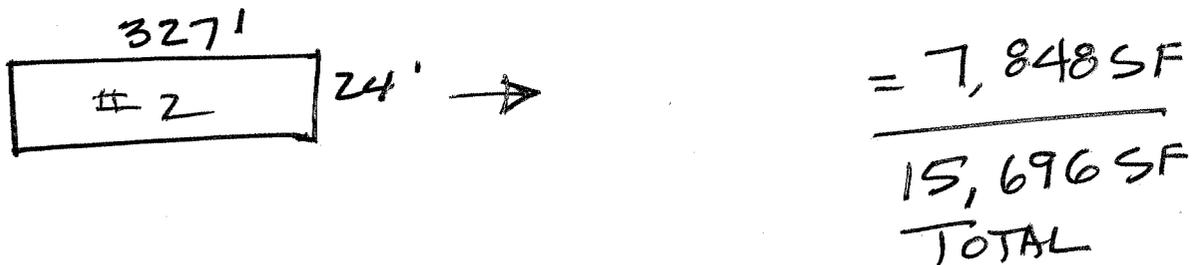
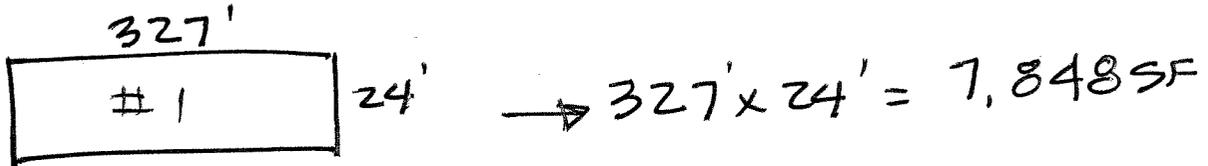


PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia

ALTERNATIVE NO.: **CM-4**

SHEET NO.: **2 of 2**

I-75 BRIDGE



DEMO COST

$$\# 40/SF \times 15,696 SF = \underline{\underline{\$ 627,840}}$$

CREEK BRIDGE

$$AREA = 224' \times 52' \text{ WIDE} = 11,640 SF$$

$$DEMO COST = 11,640 SF \times 40 = \underline{\underline{\$ 465,920}}$$

$$TOTAL DEMO = \$ 1,093,760$$

SAY \$1M ✓

VALUE ENGINEERING ALTERNATIVE



PROJECT:	SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>	ALTERNATIVE NO.:	CM-6
DESCRIPTION:	TEMPORARILY CLOSE OLD ALABAMA ROAD AT CHICKAMAUGA CREEK TO ALLOW FASTER CONSTRUCTION OF THE NEW BRIDGE. USE LOCAL SURFACE STREETS TO DETOUR TRAFFIC	SHEET NO.:	1 of 1

ORIGINAL DESIGN:

The design proposes four stages of construction to demolish the existing Chickamauga Creek bridge and construct it while maintaining a minimum of two lanes of continuous traffic.

ALTERNATIVE:

Close Old Alabama Road to traffic at Chickamauga Creek to allow for continuous construction of the new bridge. Local traffic could be detoured to local roads to access Ringgold or I-75. As a backup, construction signage could also inform traffic of the closure at the bridge and route them to Exit 345 or Exit 350.

ADVANTAGES:

- Substantial savings in construction schedule
- Greater efficiency in construction
- Better production rates
- No stoppages in construction
- Better access to the site

DISADVANTAGES:

- Temporarily less convenient
- Requires detour to reach SR 41 or I-75
- Staging plan needs revision

DISCUSSION:

Allowing a contractor to work unencumbered greatly enhances his productivity and will allow the bridge to be built in approximately four months versus eight months for the four-stage program. Many drivers prefer to have a short duration detour rather than an extended period of lane shifting, noise, dust, and disruption. Calculating the net cost impact of this method upon the total job is difficult without the preparation of a detailed CPM schedule, but savings could easily be in excess of \$300,000.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 300,000	—	\$ 300,000
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 300,000	—	\$ 300,000

PROJECT DESCRIPTION

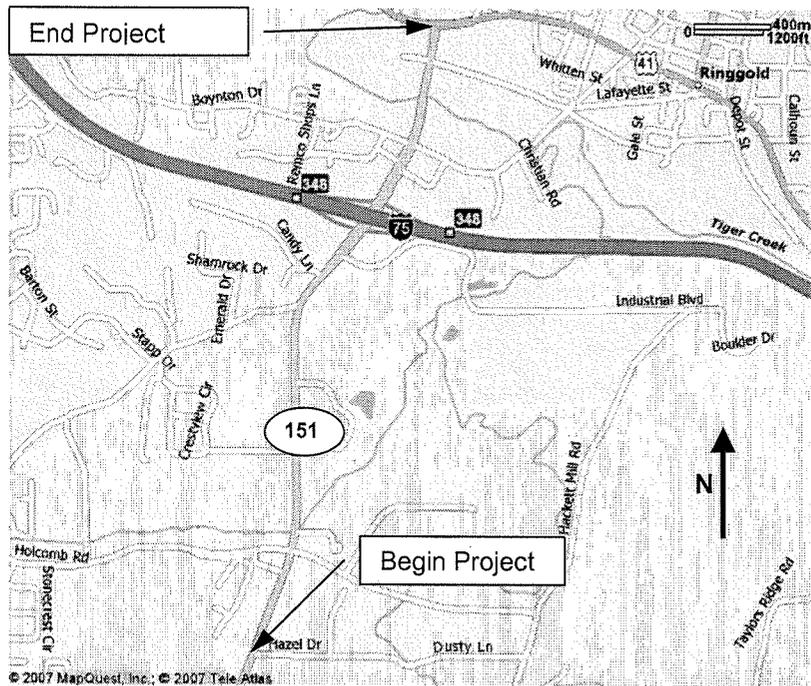
PURPOSE AND NEED

This project will provide local and through traffic along SR 151/Old Alabama Road with a facility that will adequately serve current and future travel demands and provide the public with a safer driving environment. The SR 151 improvements are part of the Chattanooga Urban Area Transportation Study and involve the multi-lanes of this primarily north-south corridor in north Georgia near the City of Ringgold.

PROJECT DESCRIPTION

The project is located near the Georgia/Tennessee border at Exit 348 on Interstate 75 in Catoosa County, and has an approximate length of 2 miles beginning near Hazel Drive on the south and ending at US 41 (Dixie Highway) on the north. The project includes a new bridge over I-75 and the South Chickamauga Creek. The bridge over I-75 will be raised to meet the 17-ft. clearance requirement and length requirements to accommodate future I-75 lanes. The I-75 bridge will be 327-ft.-long x 110-ft.-wide. The bridge over Chickamauga Creek is being raised five ft. to allow adequate stream flow during flood conditions and will be 224 ft. long x 102 ft. wide. Both structures are planned with new drilled caisson foundations, concrete girders, and concrete deck. The alignment will provide for four 12-ft. lanes and a 24-ft. wide raised concrete median with curb and gutter on both sides. Additional right-of-way will be purchased both on the east and west sides of SR 151 to allow for the wider road cross-section. The majority of the profile south of I-75 matches the existing elevations of SR 151, but that section north of I-75 near the new Chickamauga Creek Bridge will be raised up to 5 ft. to accommodate the new flood elevation requirement.

Project traffic analysis along SR 151 is based upon a Base Year (2008) ADT of 15,150 and a Design Year (2028) of 22,500, which reflects the significant growth currently taking place in the area. Truck volumes are also higher than average along this corridor due mainly to the large number of industries located south of I-75 but using SR 151 as their main business access. Improvements will also be made to all four ramps on the Exit 348 interchange to improve sight distance and acceleration/ deceleration distances. The four ramps will have a single 12-ft.-wide lane with a maximum slope of 4%. The VE study focused upon reducing the 130,000 CY of borrow required for the job, streamlining the four-stage construction program and minimizing the right-of-way requirements. The total project cost at the preliminary engineering phase is estimated at \$40M.



VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

This section describes the value analysis procedures used during the value engineering study on the SR 151 Widening Project. It is followed by separate narratives and conclusions concerning:

- Value Engineering Workshop Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Model
- Function Analysis (Project Purpose and Need)
- Creative Idea Listing and Judgment of Ideas

A systematic approach was used in the VE study and the key procedures involved were organized into three distinct parts: 1) pre-study preparation, 2) VE orientation meeting and workshop, and 3) post-study. A task flow diagram outlining 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 and gathering necessary project documents from the Clark Patterson design team. Information relating to alternative analysis and phasing is also very important, as it tends to drive the construction methods. Information relating to the preliminary cost estimate prepared by Clark Patterson was used as the basis for the comparison/analysis during the VE study.

VALUE ENGINEERING WORKSHOP EFFORT

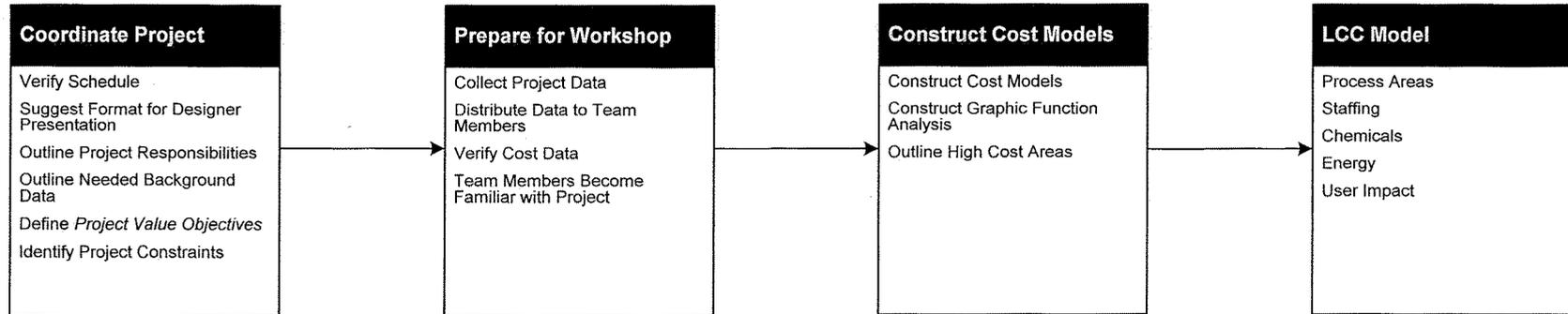
The VE workshop effort consisted of a 30-hour workshop beginning with an orientation meeting on June 12, 2007 and the final VE presentation on June 15, 2007. During the workshop, the VE job plan was followed in compliance with FHWA and GDOT guidelines for VE studies. The job plan guided the search for alternatives to mitigate or eliminate high cost drivers and potential risk elements. It included six phases:

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

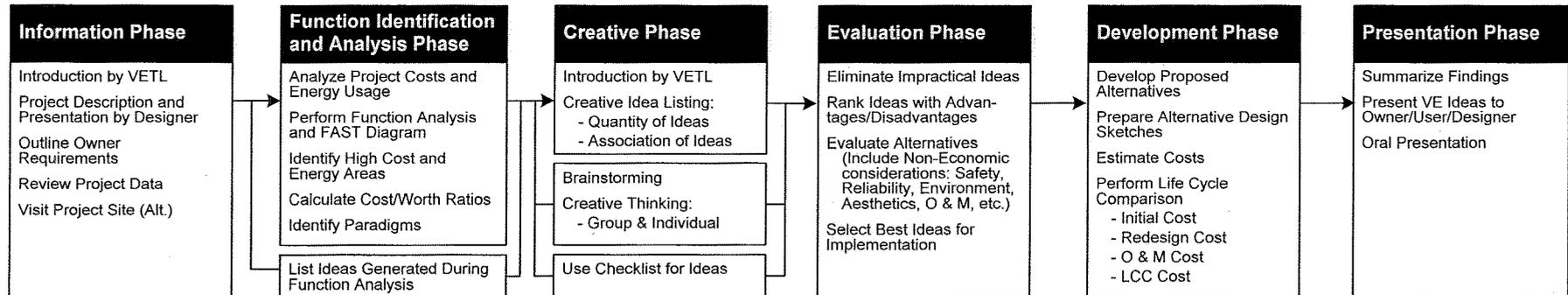


Value Engineering Study Task Flow Diagram

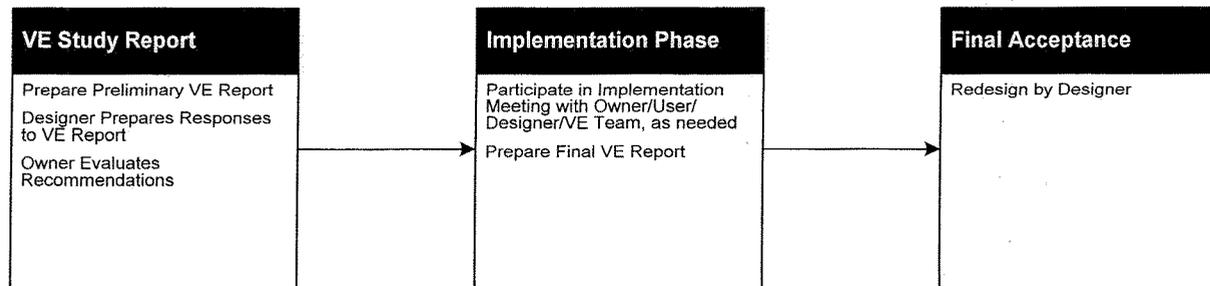
Preparation Effort



Workshop Effort



Post-Workshop Effort



Information Phase

At the beginning of the study, the decisions that have influenced the project design and proposed construction methods had to be reviewed and understood. For this reason, the Clark Patterson design team presented information about the project to the VE team on the first day of the VE workshop. Following the presentation meeting, the VE team spent the remainder of the first day reviewing the project documents, discussing the project purpose and need, and identifying the key elements of the project. Throughout the study, the following documents were used to establish guidelines for action and for determining cost implications for the various alternatives:

- Approved Concept Report, dated August 16, 2006
- Original Concept Report, dated February 9, 1998
- Preliminary Right of Way Cost Estimate, dated May 8, 2007, prepared by GDOT
- Preliminary Project Drawings – Plan and Profile, dated April 2008, prepared by Clark Patterson Associates
- Preliminary Cost Estimate, dated April 9, 2008, prepared by Clark Patterson Associates

Function Analysis and Identification Phase

This VE study phase involved the analysis of the project's functions and the creation and listing of ideas. Function Analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. These elements add cost to the final product, but have a relatively low worth to the basic function. This creates a high cost-to-worth ratio and the VE team targets these areas for value improvement. GDOT design criteria was compared to the as designed drawings for general conformance of the typical section.

Creative Phase

The VE team generated as many ideas as possible to provide the necessary functions within the highway project at a lower total life cycle cost, or to improve the quality of the project. Methods to improve on the maintenance of traffic plan were also discussed. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and free association of ideas. Creative idea worksheets were organized by project elements.

Evaluation Phase

During this phase of the workshop, the VE team judged the ideas generated during the creative phase in comparison to project objectives established by GDOT. The team evaluated each of the VE ideas for feasibility and incorporation into the project. 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 which represented the greatest potential for cost savings or improvement to the project were then developed further to be presented during the presentation phase.

To assist the team in ranking the creative ideas, each of the criteria were discussed, and the following criteria definitions were developed in the project purpose and need.

- Construction Costs – The initial costs of materials was considered.
- Safety – Safety was a factor in all decision making.
- Level of Service – The projected LOS must be achieved to meet the purpose and need.

- Impact Upon Trucks – There is a high percentage of trucks in the area.
- Life Cycle Costs – The cost of operating and maintaining the highway is extremely important. These costs would include labor and materials over the next 30 years.
- Right-of-Way Costs – It is important to minimize right-of-way purchase if possible.

The VE team would have liked to have developed all of the ideas that were generated, but time constraints limited the number of ideas that could be developed. Therefore, each idea was compared with the present design concept in terms of how well it met the design criteria. Advantages and disadvantages were discussed and the ideas were rated on a scale of 1-5, with the best ideas rated 5. Ideas rated 4 or higher were generally developed into written VE alternatives.

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 an 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. Analysis also compared each new alternative with others presented in the design report. The VE alternatives and comparisons are included in the Study Results section.

Presentation Phase

The last phase of the VE team's workshop was to present the recommendations. The presentation was held on June 15, 2007 and included personnel from GDOT and the design consultant team. During the meeting, a summary listing of the VE study Alternatives and Design Suggestions was distributed to give the attendees an executive summary of the proposals and the key findings of the VE team.

POST STUDY PROCEDURES

The post-study portion of the VE study includes the preparation of this report. Personnel from the GDOT and the design team will 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. LZA is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

Implementation Phase

Following distribution of the VE report and collection of written comments from all parties, a VE implementation phase meeting is typically scheduled. At this time, each VE alternative will be considered, discussed, and a final disposition made. During this process, a VE alternative may be accepted as written, rejected for cause, modified to improve the idea, or in some cases, the idea may need further study to establish its merits.

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will facilitate a 30-hour value engineering (VE) study on the Preliminary Submittal of the SR 151 / Old Alabama Road Widening Project, Catoosa County, Georgia. The Georgia Department of Transportation (GDOT) and the Clark Patterson Associates design team will be available to formally present the project at the beginning of the workshop; attend a presentation of the VE alternatives at the conclusion of the VE study; and be available to answer questions during the VE study effort.

The VE study will follow the outline described below and be conducted June 12 - 15, 2007 at the offices of:

GDOT
2 Capital Square, SW
Atlanta, Georgia 30334-9003
Conference Room 264

The point-of-contact is Ms. Lisa Meyers, GDOT Value Engineering Coordinator, who may be reached at 404-651-7468.

VE STUDY AGENDA

Tuesday, June 12, 2007

8:00 am - 9:00 am **General Introduction of all Parties and review of the VE Process**

9:00 am – 12:00 noon **Owner's/Designer's Presentation**

GDOT and the design consultants will present information concerning the project including, but not limited to: the Purpose and Need for the project, rationale for design; criteria for specific areas of study, project constraints and the reasons for design decisions.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 2:00 pm **Information Phase**

The VE team will continue their familiarization with the cost models and project data for each area of study. The cost models will be refined, as necessary. The VE team will define the function of each project element or system in the cost model, select the primary or basic functions, and determine the worth, or least cost, to provide the function. Cost/worth or value index ratios will be calculated, and high cost/low worth areas for study identified. In addition, the VE team will continue defining the function of each element/system to gain a thorough understanding of the projects' Purpose and Need.

2:00 pm – 3:00 pm **Function Analysis**

The team will identify all project functions required to meet the established purpose and need. Functions will be identified as to basic, required secondary, secondary, or project goals.

3:00 pm - 5:00 pm **Speculation Phase**

The VE 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.

Wednesday, June 13, 2007

8:00 am - 10:00 am **Speculation Phase (cont.)**

The VE team will continue the brainstorming exercise to capture ideas to improve the project in terms of initial and life cycle cost, technical aspects, schedule, and constructibility issues.

10:00 am – 12:00 noon **Analysis Phase**

The VE team will analyze the ideas listed in the creative phase and select the best ideas for further development.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Development Phase**

VE team will develop creative ideas into alternate design solutions. Initial and life cycle cost estimates comparing original and proposed alternatives will be prepared. Selected alternatives for change will be developed and supported with sketches, calculations and written substantiation.

Thursday, June 14, 2007

8:00 am – 12:00 noon **Development Phase (cont.)**

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Development Phase (cont.)**

Upon completion of the Development Phase, the VE team leader will prepare the summary worksheets based on the alternatives developed by the VE team. The summary worksheets form the basis of the informal oral presentation to be made to GDOT, local representatives, and the Clark Patterson Associates design team representatives. The team will review all documentation and prepare for the presentation.

Friday, June 15, 2007

8:00 am - 9:00 am **Development Phase (cont.)**

9:00 am – 12:00 noon **Presentation Phase**

Upon completion of the Development Phase, the VE team leader will prepare the summary worksheets based on the alternatives developed by the VE team. The summary worksheets form the basis of the informal oral presentation to be made to GDOT, local representatives, and the Clark Patterson Associates design team representatives. The team will review all documentation and prepare for the presentation.

Noon - Adjourn

POST-STUDY PHASE

Upon completion of the value engineering study, the VE team leader will prepare the Value Engineering Study Report and submit it to GDOT. The report will include the following material:

- Project description and design concept of project
- Cost models and graphic function analysis worksheets
- Value engineering alternatives: original design and proposed alternatives, including sketches, design calculations and initial and life cycle estimates
- Potential contract savings (capital construction and life cycle costs)

GDOT and the design team will independently review the VE alternatives and classify them as accepted, accepted with modifications, needs further study, or rejected—accompanied by the reasons for rejection. A meeting with all stakeholders will then be convened to decide which VE alternatives to implement.

VE TEAM MEMBERS

David Hamilton, PE, CVS, CCE, LEED ^{AP}	VE Team Leader/Civil	Lewis & Zimmerman Assoc.
Ty Denning, PE	Highway Design Engineer	ARCADIS G&M, Inc.
Larry Prescott, PE	Structural Engineer	HNTB Corporation
Harley Griffen, PE	Construction Engineer	Delon Hampton & Assoc.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE Team was organized by GDOT and Lewis & Zimmerman Associates, Inc. to provide specific expertise on the unique project elements involved. Team members consisted of a multidisciplinary group with professional design experience and a working knowledge of highway and bridge design, construction, environmental permitting, and VE procedures. Members of the team consisted of the following professionals:

VE Team

David A. Hamilton, PE, CVS, CCE	VE Team Leader/Civil	Lewis & Zimmerman Assoc., Inc.
Ty Denning, PE	Highway Design Engineer	ARCADIS
Harley Griffin, PE	Construction Engineer	Delon Hampton
Larry Prescott, PE	Bridge Engineer	HNTB

Project Designer

Adolfo Guzman, PE	Project Manager	Clark Patterson Associates
Jennifer Michniewicz, PE	Project Engineer	Clark Patterson Associates

GDOT

Lisa Myers	VE Coordinator	GDOT
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DESIGNER'S PRESENTATION

An overview of the project was presented on Tuesday June 12, 2007, by the Clark Patterson Associates design team. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team "up-to-speed" regarding the overall project specifics including traffic projections, accident history, bridge design elements, construction phasing, local permitting issues, and estimated project cost. Additionally, the meeting afforded the design staff the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention. An attendance list for the meeting is attached.

VALUE ENGINEERING TEAM'S PRESENTATION

A VE presentation was conducted on Friday, June 15, 2007 to review the VE alternatives with the GDOT staff and the Clark Patterson Associates design team. The attendees received a copy of the Presentation Outline and Summary of Potential Cost Savings. An attendance list for the meeting is attached.

VE PRESENTATION



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
 Project No. STP-IM-180-1(6), Catoosa County, Georgia
 Preliminary Submittal - Value Engineering Study

DATE: 15 JUNE 2007

NAME & E-MAIL (please print)	ORGANIZATION/TITLE	PHONE/FAX
David Hamilton, PE, CVS, CCE, LEED ^{AP} em dahamilton@lza.com	Lewis & Zimmerman Associates, Inc. VE Team Leader/Civil	ph 253-925-8741 mob 253-229-7703 fx 253-925-8791
Lisa Myers em lisa.myers@dot.state.ga.us	GDOT – Engineering Services Design Review Engineering Manager	ph 404-651-7468 mob fx 404-463-6131
LARRY PRESCOTT, PE em L.PRESCOTT@HNTB.COM	HNTB VE-STRUCT.	ph 404-946-5743 mob 404-558-9627 fx
HARLEY G. GRIFFIN em hggriffine@delonhampton.com	DELON HAMPTON & ASSOC. CHARTERED PROJECT MANAGER VE STUDY - CONSTR. MGMT	ph 404-524-8030 mob fx 404-524-2575
RON WISHON em ron.wishon@dot.state.ga.us	GDOT- ENG. SRVCS. ASSIST. PROJECT REV. ENG.	ph 404-651-7470 mob fx 404-463-6131
BRIAN SUMMERS em brian.summers@dot.state.ga.us	GPAT ENG. SRVCS. PROJECT REVIEW PMGR	ph mob fx
Tyler Denning em Tyler.Denning@arcadis-us.com	Arcadis / VE team member Roadway	ph 770-431-8666 mob 404-245-7272 fx
Tom Hodge em tom.hodge@dot.state.ga.us	GDOT/OCD	ph 404-656-5397 mob fx
em		ph mob fx
em		ph mob fx

ECONOMIC DATA

Economic criteria used for evaluation were developed by the VE team with information gathered from the Federal Office of Management & Budget. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for the planning project period and interest rates are based on the following parameters:

Year of Analysis:	2007
Construction Dollars Based Upon:	2007
Economic Planning Life:	30 years starting in 2009
Bond (Discount) Rate:	3.1%
Inflation/Escalation Rate:	0.0%
Net Discount Rate:	3.1%
Uniform Present Worth (UPW) Factor:	19.3495
Cost of Power/Electricity (Average without Demand Charge)	\$0.10/kwh
Cost of Labor (\$/hr)	\$60/hr

Schedule of Work

The project is planned to begin construction in 2009 and be completed in 2011. The project should be completed within a 24-month construction duration depending upon award date, shop drawing approval, and material availability.

Total Present Worth

Discussions during the VE Workshop included impacts of the 30-year present worth cost for major elements.

VE Alternatives Mark-up

Cost estimates were prepared for each of the VE alternatives using unit prices contained in the project cost estimate prepared by Clark Patterson Associates. The unit prices contained in the estimate are considered to include all contractor mark-ups, mobilization, overhead, and profit.

COST MODEL

The SR 151 project will greatly improve capacity along the alignment in the area south of the City of Ringgold while improving safety and reducing accidents in the corridor. To achieve these benefits, a considerable investment in the infrastructure is required, including construction of the four-lane section, two bridges, and acquisition of the needed right-of-way. The total cost of the project is estimated at approximately \$40M including the right-of-way.

Project Cost

The data used to analyze costs by design element are presented on the Cost Histogram table. To gain an overview of the total project cost, the Pareto Analysis was prepared. This table presents total project costs by roadway element.

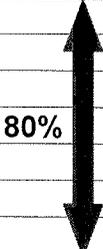
From the cost models, the following areas showed potential for further discussion and value improvement.

<i>Roadway Section</i>	<i>Bridges</i>
<ul style="list-style-type: none"> • Minimize right-of-way if possible • 24 ft. median to 10 ft. or 12 ft. 	<ul style="list-style-type: none"> • Jack and rebuild the I-75 Bridge • Jack and rebuild the Chickamauga Creek Bridge
<i>Profile</i>	<i>Construction Management</i>
<ul style="list-style-type: none"> • Lower, reduce borrow requirements • Increase max. slope from 4% to 6% 	<ul style="list-style-type: none"> • Minimize temporary pavement • Minimize right-of-way escalation • Add cost for bridge demo
<i>Maintenance of Traffic</i>	<i>Ramps to I-75</i>
<ul style="list-style-type: none"> • Reduce from four stages to two • Rebuild the existing bridges 	<ul style="list-style-type: none"> • Relocate ramps to minimize borrow • Consider trumpet ramps

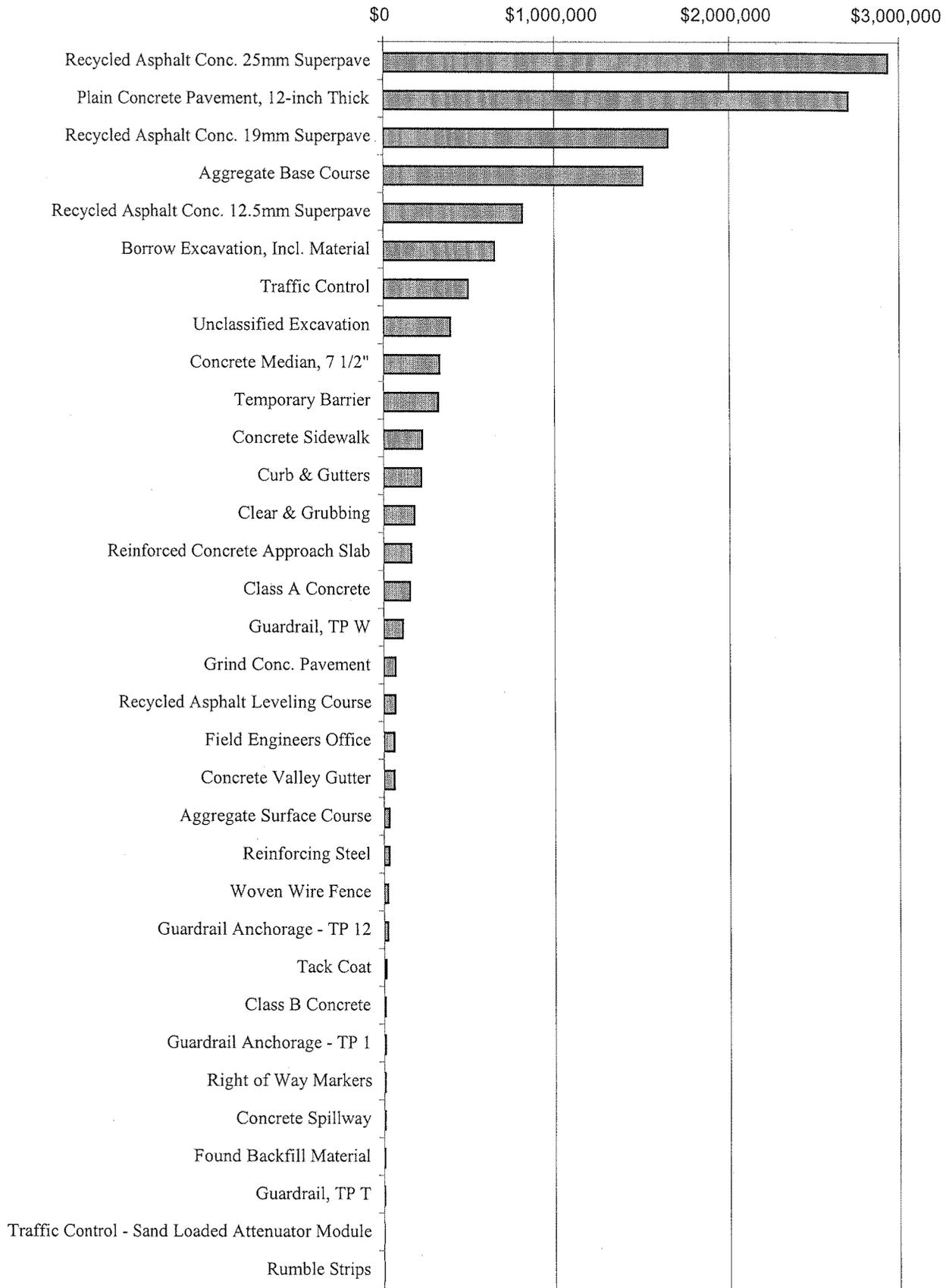
COST HISTOGRAM



PROJECT: SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>			
ROADWAY ONLY	COST	PERCENT	CUM. PERCENT
Recycled Asphalt Conc. 25mm Superpave	2,936,250	22.08%	22.08%
Plain Concrete Pavement, 12-inch Thick	2,704,444	20.34%	42.42%
Recycled Asphalt Conc. 19mm Superpave	1,646,250	12.38%	54.80%
Aggregate Base Course	1,503,142	11.30%	66.10%
Recycled Asphalt Conc. 12.5mm Superpave	818,250	6.15%	72.26%
Borrow Excavation, Incl. Material	656,309	4.94%	77.19%
Traffic Control	500,000	3.76%	80.95%
Unclassified Excavation	392,770	2.95%	83.91%
Concrete Median, 7 1/2"	327,475	2.46%	86.37%
Temporary Barrier	319,760	2.40%	88.77%
Concrete Sidewalk	224,550	1.69%	90.46%
Curb & Gutters	219,406	1.65%	92.11%
Clear & Grubbing	180,000	1.35%	93.46%
Reinforced Concrete Approach Slab	162,997	1.23%	94.69%
Class A Concrete	155,333	1.17%	95.86%
Guardrail, TP W	113,529	0.85%	96.71%
Grind Conc. Pavement	69,938	0.53%	97.24%
Recycled Asphalt Leveling Course	67,446	0.51%	97.75%
Field Engineers Office	63,074	0.47%	98.22%
Concrete Valley Gutter	63,034	0.47%	98.69%
Aggregate Surface Course	33,620	0.25%	98.95%
Reinforcing Steel	32,739	0.25%	99.19%
Woven Wire Fence	24,463	0.18%	99.38%
Guardrail Anchorage - TP 12	23,975	0.18%	99.56%
Tack Coat	13,068	0.10%	99.66%
Class B Concrete	8,715	0.07%	99.72%
Guardrail Anchorage - TP 1	7,675	0.06%	99.78%
Right of Way Markers	7,531	0.06%	99.84%
Concrete Spillway	7,108	0.05%	99.89%
Found Backfill Material	6,135	0.05%	99.93%
Guardrail, TP T	4,177	0.03%	99.97%
Traffic Control - Sand Loaded Attenuator Module	2,557	0.02%	99.99%
Rumble Strips	1,920	0.01%	100.00%
<i>Construction and Right of Way Subtotal</i>	<i>13,297,640</i>	<i>100.00%</i>	
	0		
TOTAL CONSTRUCTION & RIGHT OF WAY	\$ 13,297,640	Comp Markup:	



14775 LF



FUNCTION ANALYSIS

Function Analysis of the SR 151 project was performed to: (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic function(s), and (4) identify other public goals through the corridor. A Random Function Analysis Worksheet for the project elements is attached. Function Analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. These support elements add cost to the final product, but may have a relatively low worth to the basic function. This creates a high cost-to-worth ratio.

The Function Analysis sheet includes a verb and noun function definition of the element and the VE team's identification of basic or secondary functions. This exercise stimulated the VE team members to think in terms of the areas in which to channel their creative idea development.

The key issues that evolved from the Function Analysis session were the concurrence of the project needs and purpose. The basic function of the project is to "Increase LOS." Eliminating the congested traffic conditions will greatly improve safety, reduce delays in the corridor, and help to meet other required project goals. Placing the median in the roadway will be a great help in reducing the many uncontrolled left turns which are currently taking place on the north end of the alignment near many of the commercial properties.

Other key functions are presented on the Random Function Analysis form.

The goals as established for the project appear consistent with the functions identified by the VE team. Therefore, the Function Analysis justifies the project need and purpose and will greatly improve driving conditions along this corridor. However, there are still a great many driveways fronting SR 151 on the north end of the alignment near the Chickamauga Creek Bridge, and some reduction in these uncontrolled entrances may be necessary to minimize accidents.

Further, it is recommended that value be added to the project for landscaping and overhead lighting. This will improve the aesthetics of the corridor and improve safety during night time conditions.

RANDOM FUNCTION ANALYSIS



PROJECT: SR 151 – OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>		SHEET NO.: 1 of 1	
DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
Total Project Purpose and Need	Improve	LOS	B
	Accommodate	Development	G
	Move	Cars	HO
	Reduce	Accidents	G
	Increase	Capacity	RS
	Allow	Movements	RS
	Meet	Standards	G
	Improve	Intersections	RS
	Control	Traffic	RS
	Accommodate	Trucks	S
	Relocate	Utilities	S
	Control	Budget	G
	Meet	Schedule	G
	Protect	Environment	RS
	Minimize	R/W	G
	Manage	Drainage	RS
	Manage	Construction	RS
	Control	Traffic	RS
	Maximize	Safety	HO
	Span	I-75	RS
	Span	Creek	RS
Raise bridge over creek to accept full flood conditions	Prevent	Backwater	G
Existing bridges are over 40 yrs. old and need of replacement	Renew	Infrastructure	HO
	Accommodate	I-75 Growth	S
Include future lane width expansion on I-75	Lengthen	Bridge	RS
	Encourage	Development	HO

Function defined as: Action Verb	Kind: B = Basic	HO = Higher Order
Measurable Noun	S = Secondary	LO = Lower Order
	RS = Required Secondary	G = Goal

CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the creative phase, numerous ideas, alternative proposals and/or recommendations were generated for the SR 151 project using conventional brainstorming techniques as recorded on the following pages.

The creative session yielded a total of 42 ideas for further consideration by the team. These ideas were grouped into the following categories with letter prefixes to identify the area of study:

CATEGORY	PREFIX
General/Scope	G
Typical Section	S
Alignment	A
Bridges	B
Ramps	R
Construction Management	CM

These ideas were discussed between the VE team members to identify the advantages/disadvantages of each. The VE team compared each of the ideas with the as-designed solution determining whether it improved value, was equal in value, or lessened the value of the presented solution in terms of capital cost, schedule, functionality/safety, maintainability, durability and life cycle costs.

To assist the team in ranking the creative ideas, each of the criteria were discussed, and the following criteria definitions were considered from the statement of project need as presented by GDOT on the first day of the VE study.

- Construction Cost – The initial cost of the material is important and should be considered.
- Safety – Safety is very important and must control in all decision making.
- Level of Service – The projected LOS must be achieved to meet the purpose and need.
- Impact Upon Trucks – There is a high percentage of trucks in the area.
- Life Cycle Costs – The costs of operating and maintaining the highway is extremely important. These costs would include labor and materials over the next 30 years.
- Right-of-way Costs – It is important to minimize right-of-way purchase if possible.

The ideas were ranked on a qualitative scale of 1 (poor) to 5 (excellent) on how well the VE team believed the idea met the project purpose and need criteria shown above. The higher rated ideas, with scores of 4 or 5, were developed into formal alternatives and included in the Study Report. When this is not the case, an idea was combined with another related idea or discarded, as a result of additional research, which indicated the concept as not being cost-effective or technically feasible. Some ideas were judged to have minimal cost impacts on the project but provided enhancements in the form of improved safety, accident reduction, constructability or potential to save unknown or

hidden costs. These were given the designation "DS" which indicates a design suggestion. This designation is also used when an idea increases cost resulting from improving the functionality of the project or system, and is deemed by the VE team to be of significant value to the owner or designer.

All readers are encouraged to review the Creative Idea Listing and Evaluation worksheets since they may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING



PROJECT:	SR 151 / OLD ALABAMA ROAD WIDENING <i>Project No. STP-IM-180-1(6), Catoosa County, Georgia</i>	SHEET NO.:	1 of 3
NO.	IDEA DESCRIPTION	RATING	
GENERAL/SCOPE (G)			
G-1	Stop the north end of the project at STA 100+00 (Lafayette) instead of US 41	5	
G-2	Reduce the length of improvement on the side streets	4	
G-3	Add a signal at Holcomb Road (STA 33+00)	DS	
G-4	Integrate all traffic lights to improve traffic flow. Add fiber optic line	DS	
G-5	Add some overhead lighting to key intersections like I-75	DS	
G-6	Traffic volumes appear very high; research traffic volume numbers and recheck if needed	DS	
ALIGNMENT (A)			
A-1	Close SR 151 on the north side of I-75 and re-route traffic permanently	Drop	
A-2	Close the I-75 Exit 348 permanently. Use the other two available exits	Drop	
A-3	Eliminate the south end of the project. Start the project at STA 25 in lieu of STA 13	5	
TYPICAL SECTION (C)			
C-1	Add curb and gutter only to Old Alabama; reduce the width of the right-of-way	5	
C-2	Add curb and gutter and sidewalks on both sides	4	
C-3	Reduce the cross-section from 4 lanes to 3 lanes south of I-75	4	
C-4	Reduce the median from 24 ft. to 10 ft. on the Chickamauga Creek Bridge only	See B-10	
C-5	Eliminate the median on the Chickamauga Creek Bridge	3	
C-6	Eliminate the I-75 Bridge	Drop	
C-7	Reduce thickness of the aggregate base from 12 in. to 10 in.	DS	
C-8	Off-set the cross-section; purchase additional right-of-way only on the east side of SR 151	See CM-1	
C-9	Use a grass/landscaped median in lieu of pavement	4	
C-10	Use a 3-lane section south of Poplar Lane	5	

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

CREATIVE IDEA LISTING



PROJECT: **SR 151 / OLD ALABAMA ROAD WIDENING**
Project No. STP-IM-180-1(6), Catoosa County, Georgia

SHEET NO.: **2 of 3**

NO.	IDEA DESCRIPTION	RATING
RAMPS (R)		
R-1	Ramp C; realign to reuse the existing ramp; reduce the fill requirements and right-of-way	4
R-2	Ramp A; realign to reuse the existing ramp; reduce fill and right-of-way requirements	5
R-3	Ramps A and B; Increase the slope from 4% to 6%	3
R-4	Reduce the taper length; ignore the I-75 future lane option	5
R-5	Eliminate Ramp A; use trumpet on SW corner, combine with Ramp C	3
R-6	Use Candy Lane as the ramp for Ramp A	3
R-7	Move Ramp C to I-75 profile and go under SR 151; use Candy Lane for ramp	4
BRIDGES (B)		
B-1	Use shallower beam, say 36 in. instead of 54 in. deep concrete beams	5
B-2	Use 2 bridges on I-75 in lieu of one	2
B-3	Re-use the existing substructure on the I-75 bridge	2
B-4	Use steel bridges in lieu of concrete	2
B-5	Re-use the two existing I-75 bridges; jack the sections 12 in.; build new bridge section in the center	4
B-6	Re-use/rehab the Chickamauga Creek Bridge instead of replacing. Leave it at the lower height	5
B-7	Rehab and jack the Chickamauga Creek Bridge 5 ft. higher	Drop
B-8	Remove the skew on the new I-75 bridge	4
B-9	Use MSE wall abutments in lieu of sloped fill	4
B-10	Reduce the median width on the Chickamauga Creek Bridge only from 20 ft. to 14 ft.	5
CONSTRUCTION MANAGEMENT (CM)		
CM-1	Construct the project by moving new lanes to the east side; construct in two stages instead of four	5
CM-2	Share the risk with the contractor on price sensitive materials such as asphalt, fuel, copper, steel, etc	DS
CM-3	Award the bid based upon "Best Value Selection" process in lieu of low bid	DS

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

