Georgia Department of Transportation

US 27/SR 1 – HAMILTON ROAD WIDENING

Project No. NH-017-1(20)

P.I. No. 322250

Troup County

Value Engineering Study Report

Preliminary Design Submittal

December 2007

Designer

McGee Partners, Inc.

Value Engineering Consultant

Lewis & Zimmerman Associates, Inc.

Lewis & Zimmerman Associates, Inc.
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December 12, 2007

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

re: US 27/SR 1 Hamilton Road Widening
Project No. NH-017-1(20), P.I. No. 322250, Troup County
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to submit four hard copies and one electronic copy of the referenced value engineering study report. The objective of the VE effort was to identify opportunities to enhance the value and constructability of the project and reduce right-of-way costs.

The key cost driver on the project is $35 million in new right-of-way, so decisions made on the alignment and typical section will have significant implications on the total project cost. The cost of right-of-way is nearly twice the estimated construction cost, so minor changes to the roadway section can produce major savings in cost. To achieve these savings, some flexibility may be needed in the GDOT design standards.

We appreciate the excellent participation of the GDOT staff and McGee Partners, Inc. design team throughout the VE study. Please do not hesitate to call me if you have any questions as you review this report and determine implementation.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

David A. Hamilton, PE, CVS, CCE, LEED® AP
Vice President
Certified Value Specialist No. 910506 - Life

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EXECUTIVE SUMMARY

INTRODUCTION

This report summarizes the events and results of the value engineering study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the Preliminary Design Submittal of US 27/SR 1 Hamilton Road Widening from Auburn Street on the north to SR 219 on the south. The project is located in LaGrange, Troup County. This 1.4-mile-long, two-lane corridor is in need of major improvements to increase the Level of Service (LOS) in this rapidly developing corridor. Improvements will provide for a four-lane section with at-grade and raised median. The project is being designed by McGee Partners, Inc.

The VE workshop was conducted November 27 – 30, 2007 at GDOT's 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 from local engineering firms.

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 project. The task of the VE team is to identify possible solutions, whereas the task of the owner and 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 needed project functions at the lowest total life cycle (30-year) 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 that support their construction program and reject alternatives that do not optimize their goals for the Hamilton Road Widening Project.

PROJECT DESCRIPTION

The US 27/SR 1 Hamilton Road Widening Project is a 1.4-mile-long north/south corridor located in LaGrange that consists of a two-lane urban roadway in a mixed residential and commercial area. This corridor provides a much needed north-south multi-lane facility through a growing urban area. However, the current section does not provide for sidewalks, drainage, or curb and gutter. The project extends from Auburn Street on the north to SR 219 on the south and will widen the two-lane section to four lanes using 12-ft.-wide lanes, a 20-ft. raised median, and sidewalks on both sides. A 100-ft.-wide right-of-way is currently being planned to accommodate the new section.

Two alignment options were investigated — symmetrical widening and widening to the east only. Symmetrical widening would impact a substantial number of residents on both sides of the roadway, but widening on the east only reduces the number of impacted properties nearly in half.

Some realignment will be necessary at the curve near the intersection of Tower Street, Fannin Street, and Union Street to avoid impacting the historic Epps House located in the southwest corner of the SR 1/US 27/Hamilton Road and Fannin Street intersection. Both Fannin Street and Union Street will be realigned to form a much improved four-legged intersection with traffic control. Also, a cul-de-sac will be constructed at Tower Street to reduce traffic movements and improve safety for traffic and pedestrians on this congested stretch of the mainline.

Traffic volumes along Hamilton Road are currently at 17,700 (AADT) with Design Year (2024) projections of 29,600. This project will greatly improve the LOS.

The estimated construction cost is $18.2 million with right-of-way estimated at an additional $35 million.

CONCERNS AND CONSTRAINTS

Concerns

During the presentation by the representatives from the McGee 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 $35 million, 100-ft. right-of-way cost is more than double the cost of the actual construction.
- The profile between Station 165+00 and Station 180+00 has been raised to the point that a 400-ft.-long cast-in-place concrete retaining wall is needed.
- Numerous driveways and streets still affront Hamilton Road, potentially causing safety problems from left-turning traffic.
- The 16-ft.-wide shoulders are the main driver in the width of the right-of-way.
- New cul-de-sacs at Tower Street, Keys Street, and Jarboe Street require significant new right-of-way and side street improvements.
- Sidewalks and curbs and gutters are being added to several relatively small side streets.

Constraints

The following key constraints that must be incorporated in the design were highlighted during the workshop:

- The proposed alignment is generally fixed since other corridors such as SR 219 have been investigated, but rejected, as being more costly.
- A number of side streets tend to fix the roadway profile in a number of locations.
- Traffic projections along Hamilton Road reinforce the decision for four lanes with a median.

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. Since the right-of-way costs are such a major component of the project, the VE team searched for options to reduce the impacts while providing for the needed LOS improvements to the corridor. Options such as narrower medians, shoulders, and outside traffic lanes were explored in attempts to mitigate the high cost of right-of-way. A key savings identified during the VE study was lowering the profile in the area of Union Street so that the cast-in-place concrete retaining wall could be eliminated. This change simplified access to several of the sidestreets and will streamline construction on the north end of the corridor.

A summary of the key recommendations includes:

Alignment:

- To improve safety in the corridor, the number of driveways and side streets intersecting Hamilton Road should be minimized. Streets such as Butler and Cedar Streets could be closed and provided with cul-de-sacs. Driveways on property being purchased as right-of-way should be removed and the property consolidated into larger parcels with a single entry on Hamilton Road. An extreme solution would be to divide Hamilton Road and force right-in, right-out traffic movements only. This may not be as acceptable locally, but safety issues may arise as traffic volumes increase in the corridor and accidents from left-turning vehicles begins to rise.
- Minimization of right-of-way was a key focus of the VE team. Elimination of the U-turn eyebrows assists in meeting that goal by saving more than $60,000 in property.
- Further savings in right-of-way can be achieved by eliminating the improvements to the side roads affronting Hamilton Road and Brookside Terrace. The construction cost of the sidewalks and curbs and gutters is quite modest, but the right-of-way savings exceeds $3 million. This savings represents nearly 10% of the overall cost of right-of-way for the project.

Profile:

- Construction costs can be reduced by lowering the profile of the mainline between Stations 168+00 and 181+00, eliminating the concrete retaining wall, and tying Jarboe Street back into Hamilton Road. This eliminates the need of much of the improvement to Brookside Terrace and reduces the fill quantity required for this segment. The result of these changes is a net project cost savings in excess of $400,000.
- A similar cost saving opportunity can be used on the smaller retaining wall between Stations 165+00 and 168+00 by moving the wall farther east and incorporating more cut/back slopes (2:1) and a shorter retaining wall. The resulting shorter wall can save approximately $80,000.

Section:

- To minimize the impact of right-of-way, it is recommended that the width of the shoulders on both sides of the road be reduced from 16 ft. to 10 ft. This reduces the total width of the section by 12 ft., which minimizes the right-of-way and could save more than $900,000.
- Another item that minimizes the cost impact of the right-of-way is to eliminate the 3-ft. strip of pavement between the outside lane and the gutter. Eliminating this strip on both sides of the road

saves six ft. of pavement and the associated right-of-way. To maximize safety, the travel lanes should be kept 12 ft. wide.

- Reducing the grassed area between the sidewalk and the curb from six ft. to two ft. is another means of controlling right-of-way cost.
- Another option for cost control is to use 8-ft.-wide asphalt paved multi-use trails in lieu of 5-ft.-wide concrete sidewalks. The total width of the shoulder would remain the same, at 16 ft., but the asphalt trail concept can save this project nearly $200,000.
- A more aggressive option for cost control might include using 11-ft. travel lanes in lieu of 12-ft. lanes, reducing the width of the section by four ft. and providing a net savings in the range of $500,000.
- The VE team developed two conceptual roadway sections — VE#1 and VE#2. VE#1 is an aggressive 80-ft.-wide section using 12-ft. shoulders, 11-ft. travel lanes, and a 12-ft. median. This concept could save the project approximately $2.3 million.
- VE#2 is somewhat more tempered in its approach, with an 88-ft. section, 12-ft. shoulders, 11-ft. outside lane, 12-ft. inside travel lanes, and a 14-ft. at-grade median. This concept saves approximately $1.9 million.

Construction Management:

Set aside one of the acquired real estate parcels for use by the contractor as a laydown area. If any of the full take parcels has a usable building, it may be possible for the contractor to use this space for a job office during construction.

SUMMARY OF VE ALTERNATIVES

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
ALIGNMENT (A)						
A-4	Improve safety along the alignment by closing some of the many driveways, e.g., provide rear access to areas on White Line Street. Driveways on property being purchased as right-of-way should be removed and the property consolidated into larger parcels with a single entry.	DESIGN SUGGESTION				
A-7	Close Butler Street at Hamilton Road to reduce left turns.	DESIGN SUGGESTION				
A-8	Close Cedar Street at Hamilton Road to reduce left turns.	DESIGN SUGGESTION				
A-9	Remove all three eyebrows along Hamilton Road.	$ 62,675	$ -	$ 62,675	$ -	$ 62,675
A-10	Delete sidewalks and curbs/gutters from all side roads including Brookside Terrace.	$ 3,215,785	$ -	$ 3,215,785	$ -	$ 3,215,785
A-13	Delete all nine of the right-turn lanes along Hamilton Road. This is allowable for speeds of 35mph.	$ 712,800	$ -	$ 712,800	$ -	$ 712,800
PROFILE (P)						
P-1	Lower the profile between Stations 168+00 and 181+00 and eliminate the retaining wall. Tie Jarboe Street back into Hamilton Road instead of closing, and eliminate much of the improvements to Brookside Terrace.	$ 440,187	$ -	$ 440,187	$ -	$ 440,187
P-2	Use more cut/back slope to reduce the height of the shorter retaining wall from Station 165+50 to Station 168+00. Move the wall farther east.	$ 257,400	$ 177,065	$ 80,335	$ -	$ 80,335

SUMMARY OF VE ALTERNATIVES

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

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SECTION (S)						
S-2	Eliminate the 3-ft. strip of pavement between the outside lane and the gutter. Eliminating this strip on both sides of the road saves 6 ft. of pavement and the associated right-of-way. Travel lanes would be kept 12 ft. wide.	$ 616,076	$ -	$ 616,076	$ -	$ 616,076
S-4	Reduce the shoulder width from 16 ft. to 10 ft. by eliminating the grassed area between the sidewalk and the curb. Construct the 5-ft.-wide sidewalk directly adjacent to the curb.	$ 958,500	$ -	$ 958,500	$ -	$ 958,500
S-5	Reduce the grassed shoulder width from 6 ft. to 2 ft. on both sides of the road and reduce the shoulder width from 16 ft. to 12 ft.	$ 649,000	$ -	$ 649,000	$ -	$ 649,000
S-6	Use an 8-ft.-wide asphalt paved multi-use trail in lieu of 5-ft.-wide concrete sidewalks. The total width of the shoulder would remain the same at 16 ft.	$ 485,100	$ 297,935	$ 187,165	$ -	$ 187,165
S-7	Use 11-ft. travel lanes in place of 12-ft. lanes throughout.	$ 493,520	$ -	$ 493,520	$ -	$ 493,520
S-8	Use 8 in. x 24 in. curb and gutter in lieu of 8 in. x 30 in.	$ 652,030	$ 353,760	$ 298,270	$ -	$ 298,270
S-10	Concept VE#1 is an aggressive 80-ft.-wide section using 12-ft. shoulders, 11-ft. travel lanes, and a 12-ft. median.	$ 2,745,303	$ 353,760	$ 2,391,543	$ -	$ 2,391,543
S-11	Concept VE#2 is an approach with an 88-ft. section, 12-ft. shoulders, 11-ft. outside lane, 12-ft. inside travel lanes, and a 14-ft. at-grade median.	$ 2,251,640	$ 353,760	$ 1,897,880	$ -	$ 1,897,880

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PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

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CONSTRUCTION MANAGEMENT (CM)						
CM-1	Allow the contractor to use one of the total take right-of-way parcels for a project laydown area. Available structures may be possibilities for a job office.	DESIGN SUGGESTION				
CM-3	Reduce the cost estimate quantity of concrete from 10,000 CY to 5,000 CY.	COST ESTIMATE COMMENT				

STUDY RESULTS

INTRODUCTION

The results are the major feature of the value engineering study conducted on the US 27/SR 1 Hamilton Road project since they represent the benefits that can be realized on the project by GDOT, the users of the corridor, and the McGee Partners, Inc. design team.

The engineering and construction management suggestions are presented as individual alternatives for specific change. These are 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 on roadway operations during construction. Some ideas cannot be quantified in terms of cost with the design information provided; these are also presented as design suggestions and are intended to improve the quality of the project.

The summaries of the more favorable improvements to the interchanges follow this narrative on the Summary of VE Alternatives table. The table is divided into major project elements and used to divide the results section. The complete documentation of developed VE alternatives follows the table.

RESULTS OF THE STUDY

The VE team brainstormed 30 creative 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, constructability, 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
Alignment	A
Section	S
Profile	P
Construction Management	CM

A summary of the key recommendations includes:

Alignment:

- To improve safety in the corridor, the number of driveways and side streets intersecting Hamilton Road should be minimized. Streets such as Butler and Cedar Streets could be closed and provided with cul-de-sacs. Driveways on property being purchased as right-of-way should be removed and the property consolidated into larger parcels with a single entry on Hamilton Road. An extreme solution would be to divide Hamilton Road and force right-in, right-out traffic movements only. This may not be as acceptable locally, but safety issues may arise as traffic volumes increase in the corridor and accidents from left-turning vehicles begins to rise.
- Minimization of right-of-way was a key focus of the VE team. Elimination of the U-turn eyebrows assists in meeting that goal by saving more than $60,000 in property.
- Further savings in right-of-way can be achieved by eliminating the improvements to the side roads affronting Hamilton Road and Brookside Terrace. The construction cost of the sidewalks and curbs and gutters is quite modest, but the right-of-way savings exceeds $3 million. This savings represents nearly 10% of the overall cost of right-of-way for the project.

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- Reducing the grassed area between the sidewalk and the curb from six ft. to two ft. is another means of controlling right-of-way cost.
- Another option for cost control is to use 8-ft.-wide asphalt paved multi-use trails in lieu of 5-ft.-wide concrete sidewalks. The total width of the shoulder would remain the same, at 16 ft., but the asphalt trail concept can save this project nearly $200,000.
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Construction Management:

Set aside one of the acquired real estate parcels for use by the contractor as a laydown area. If any of the full take parcels has a usable building, it may be possible for the contractor to use this space for a job office during construction.

EVALUATION OF ALTERNATIVES

Each part of an alternative or design suggestion should be considered 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 vs. Qualitative Comparisons

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

Comparison cost estimates were prepared for the original design and the alternative design using the project cost estimate or data from the GDOT cost database. A markup of 10% was added to account for project engineering and construction supervision. Right-of-way costs were assumed to be worth an average of $10 per square foot, since detailed costs for individual parcels were not available.

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 VE ALTERNATIVES

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
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A-8	Close Cedar Street at Hamilton Road to reduce left turns.	DESIGN SUGGESTION				
A-9	Remove all three eyebrows along Hamilton Road.	$ 62,675	$ -	$ 62,675	$ -	$ 62,675
A-10	Delete sidewalks and curbs/gutters from all side roads including Brookside Terrace.	$ 3,215,785	$ -	$ 3,215,785	$ -	$ 3,215,785
A-13	Delete all nine of the right-turn lanes along Hamilton Road. This is allowable for speeds of 35mph.	$ 712,800	$ -	$ 712,800	$ -	$ 712,800
PROFILE (P)						
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P-2	Use more cut/back slope to reduce the height of the shorter retaining wall from Station 165+50 to Station 168+00. Move the wall farther east.	$ 257,400	$ 177,065	$ 80,335	$ -	$ 80,335

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **A-4**

DESCRIPTION: **CLOSE DRIVEWAYS AND DEVELOP ACCESS ON WHITE LINE STREET**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN: Sketch attached)

Driveways are provided on Hamilton Road for five properties on the east side between Bell Street and Fendig Street.

ALTERNATIVE: Sketch attached)

Close off these driveways and provide access to these five properties from the back on White Line Street.

ADVANTAGES:

- Eases traffic flow
- Reduces accidents
- Reduces construction cost and schedule

DISADVANTAGES:

- Eliminates direct access to Hamilton Road

DISCUSSION:

Access to five properties from White Line Street already exists. Bob's Paint and Body Shop will be acquired. There is no reason to provide/update a driveway. In the future, this property can still be accessed from White Line Street.

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

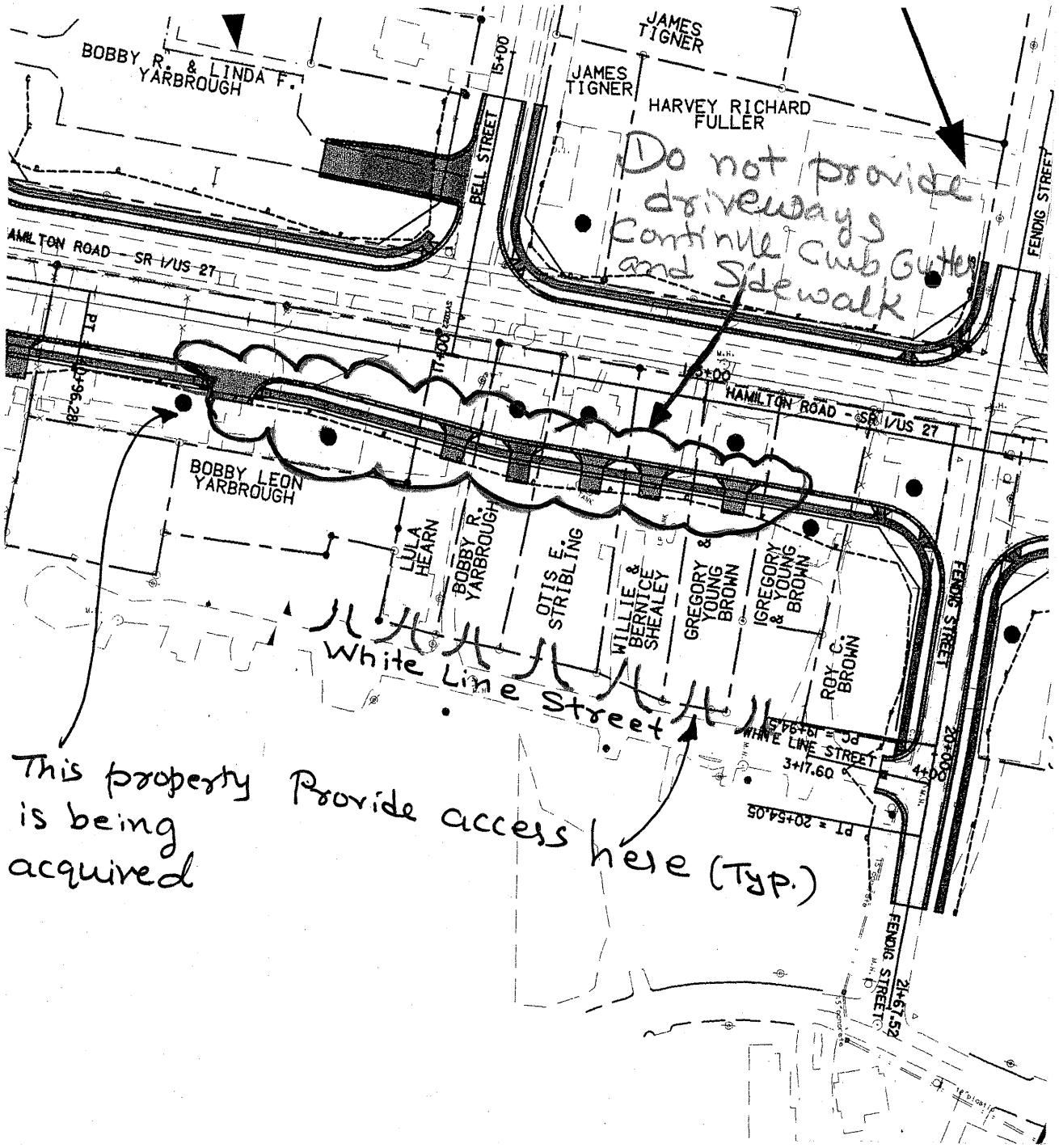
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: A-4

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☑

SHEET NO.: 2 of 2



VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **A-7**

DESCRIPTION: **CLOSE BUTLER STREET**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: Sketch attached)

Butler Street connects to Hamilton Road.

ALTERNATIVE: Sketch attached)

Close the Butler Street access to Hamilton Road and provide a cul-de-sac.

ADVANTAGES:

- Improves traffic flow
- Improves safety

DISADVANTAGES:

- Creates a minor inconvenience to the residents

DISCUSSION:

The cost to provide a cul-de-sac will be offset by savings resulting from not having to provide improvements as proposed on Bell Street. Drivers wanting to turn south on Hamilton from Butler will have to drive only 1,800 ft. ± than ½ mile.

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

SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
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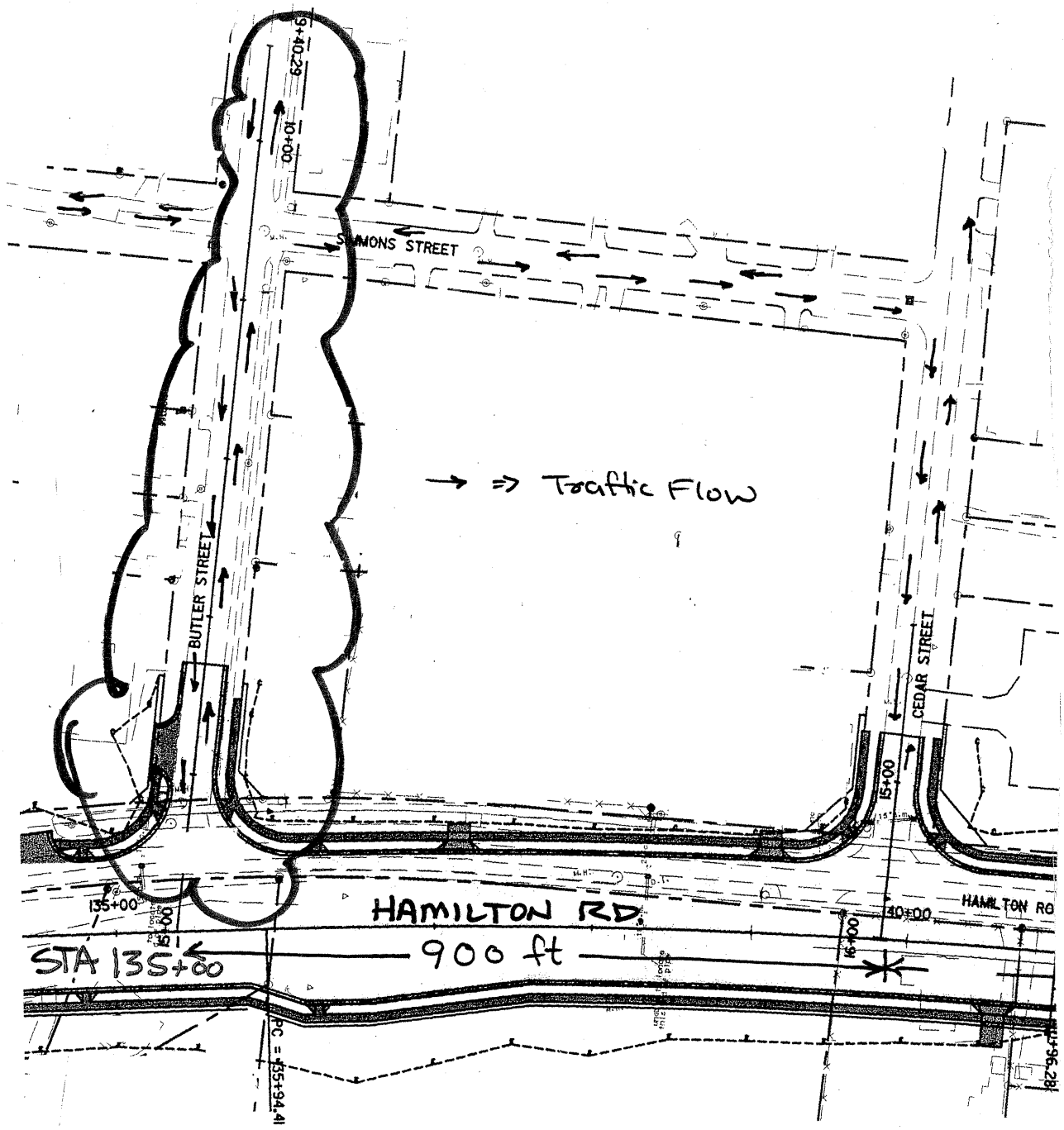
ALTERNATIVE NO.: A-7

ORIGINAL DESIGN ☒ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 3



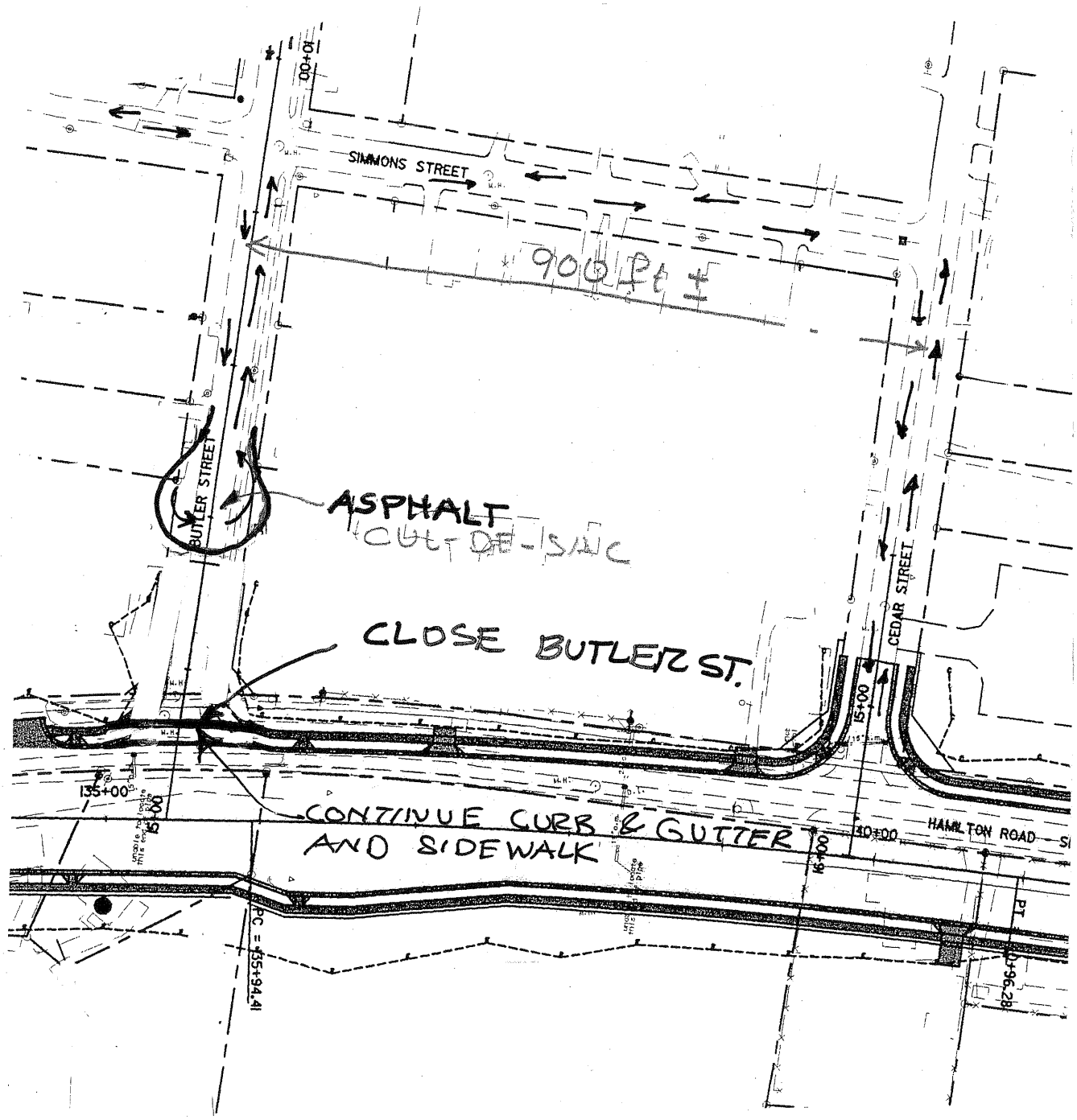
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: A-7

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐

SHEET NO.: 3 of 3



VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **A-8**

DESCRIPTION: **CLOSE CEDAR STREET**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: Sketch attached)

Cedar Street connects to Hamilton Road.

ALTERNATIVE: Sketch attached)

Close Cedar Street's connection to Hamilton Road and provide a cul-de-sac.

ADVANTAGES:

- Improves traffic flow and safety on Hamilton Road

DISADVANTAGES:

- Creates a minor inconvenience to drivers on Cedar Street

DISCUSSION:

The cost to provide a cul-de-sac will be offset by savings resulting from not having to provide improvements as proposed on Cedar Street. The costs to continue curb, gutter and sidewalk would be insignificant.

Drivers wanting to turn north on Hamilton Road from Cedar Street will have to proceed about 1,800 ft.±, which is less than ½ mile.

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

SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
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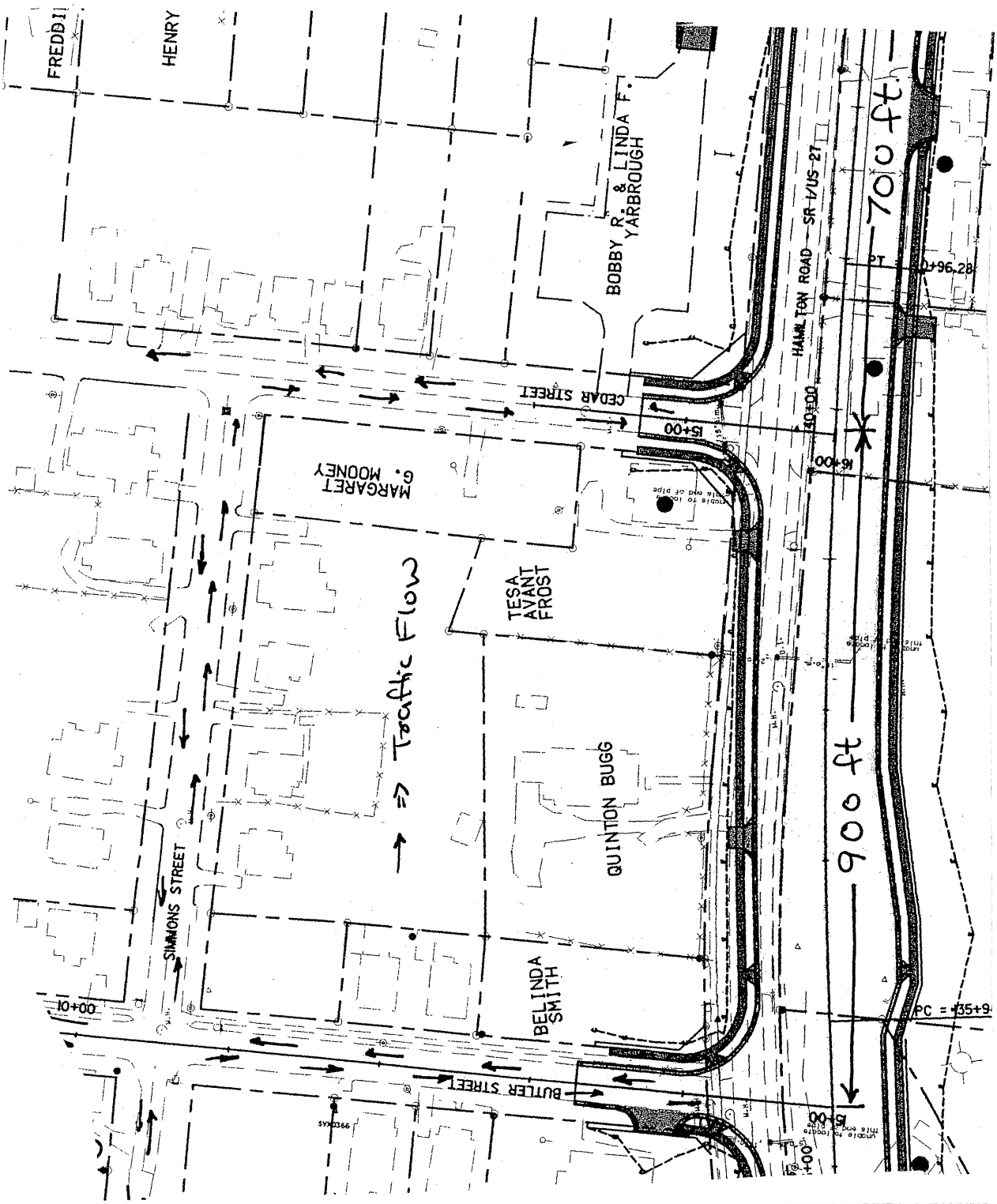
ALTERNATIVE NO.: A-8

ORIGINAL DESIGN ☒ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 3

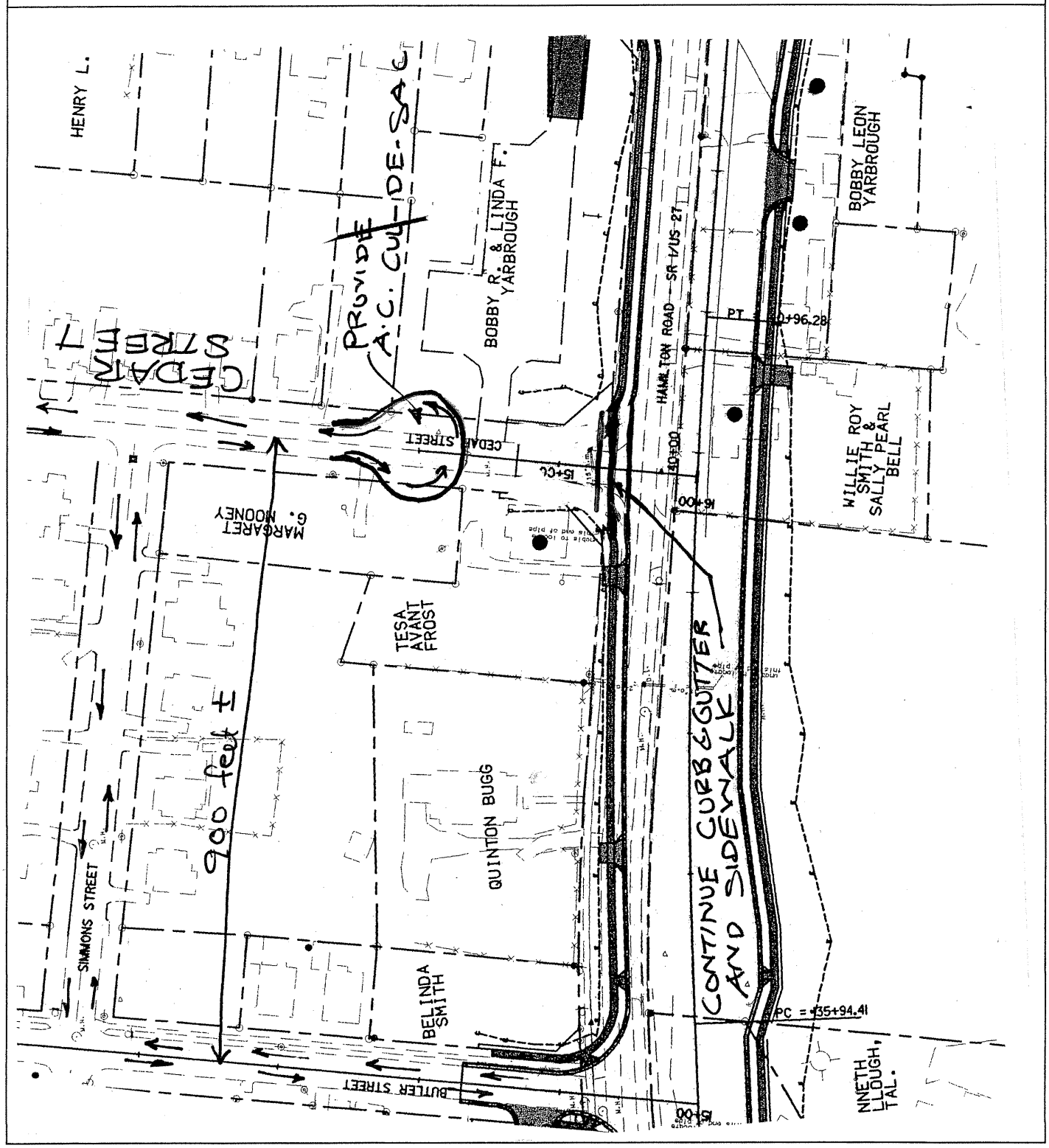


SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: A-8

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐ SHEET NO.: 3 of 3



VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING** ALTERNATIVE NO.: **A-9**
Troup County, Georgia

DESCRIPTION: **REMOVE ALL THREE EYEBROWS** SHEET NO.: **1 of 9**

ORIGINAL DESIGN:

Eyebrows are provided on Hamilton Road opposite Webster Street, Edgewood Avenue and Butler Street.

ALTERNATIVE:

Remove the eyebrows on Hamilton Road opposite Webster Street, Edgewood Avenue and Butler Street. Continue curb, gutter and sidewalk.

ADVANTAGES:

- Maintains continuity in pavement, curb, gutter and sidewalk
- Reduces cost and construction schedule

DISADVANTAGES:

- None apparent

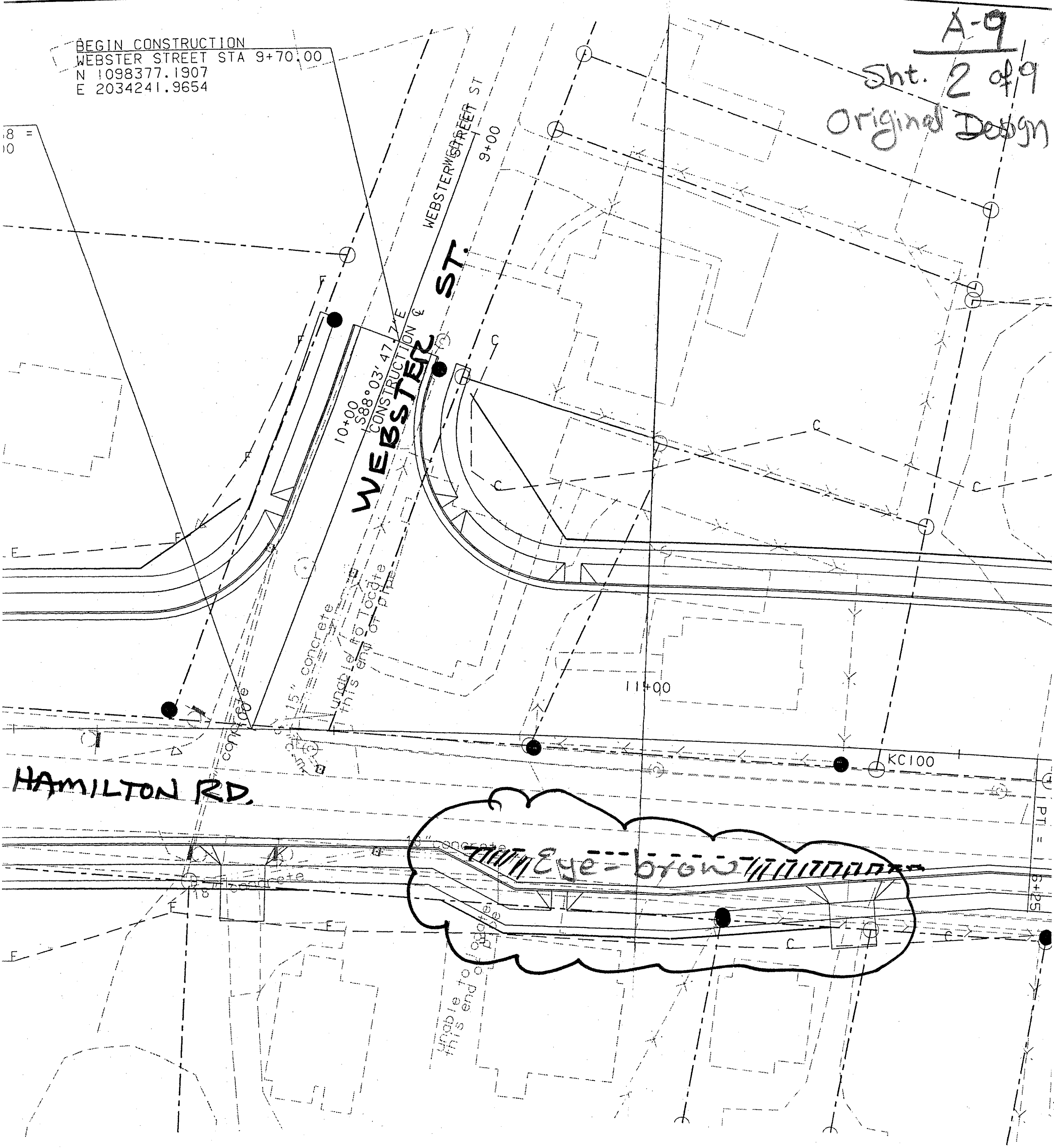
DISCUSSION:

Not including the gutter width, the regular pavement width at all three locations is 80 ft. This is enough for the vehicle to make a 90° turn on Hamilton Road from the side street. It also saves having to acquire right-of-way from adjoining properties.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 62,675	—	$ 62,675
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 62,675	—	$ 62,675

STATE	PROJECT NU
GA	NH-017-1

TIME$$$ PRF
$$PENTABLE$$



REVISION DATES

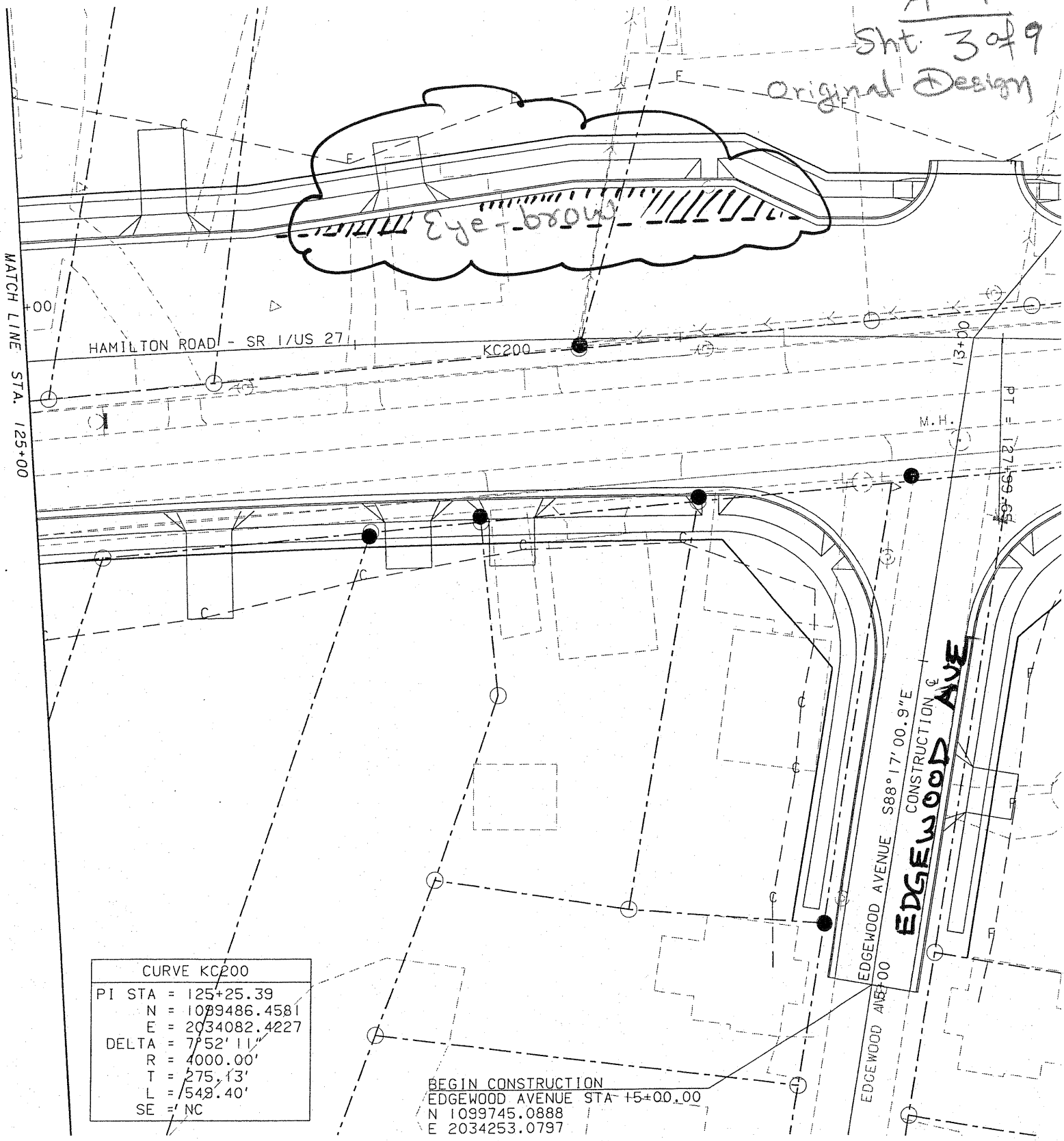
DE
OFFICE

Inc.

SCALE IN FEET
0 20 40 80

SR 1
TROUP

A-9
Sht 3 of 9
Original Design



CURVE KC200
PI STA = 125+25.39
N = 1099486.4581
E = 2034082.4227
DELTA = 7°52'11"
R = 4000.00'
T = 275.13'
L = 549.40'
SE = NC

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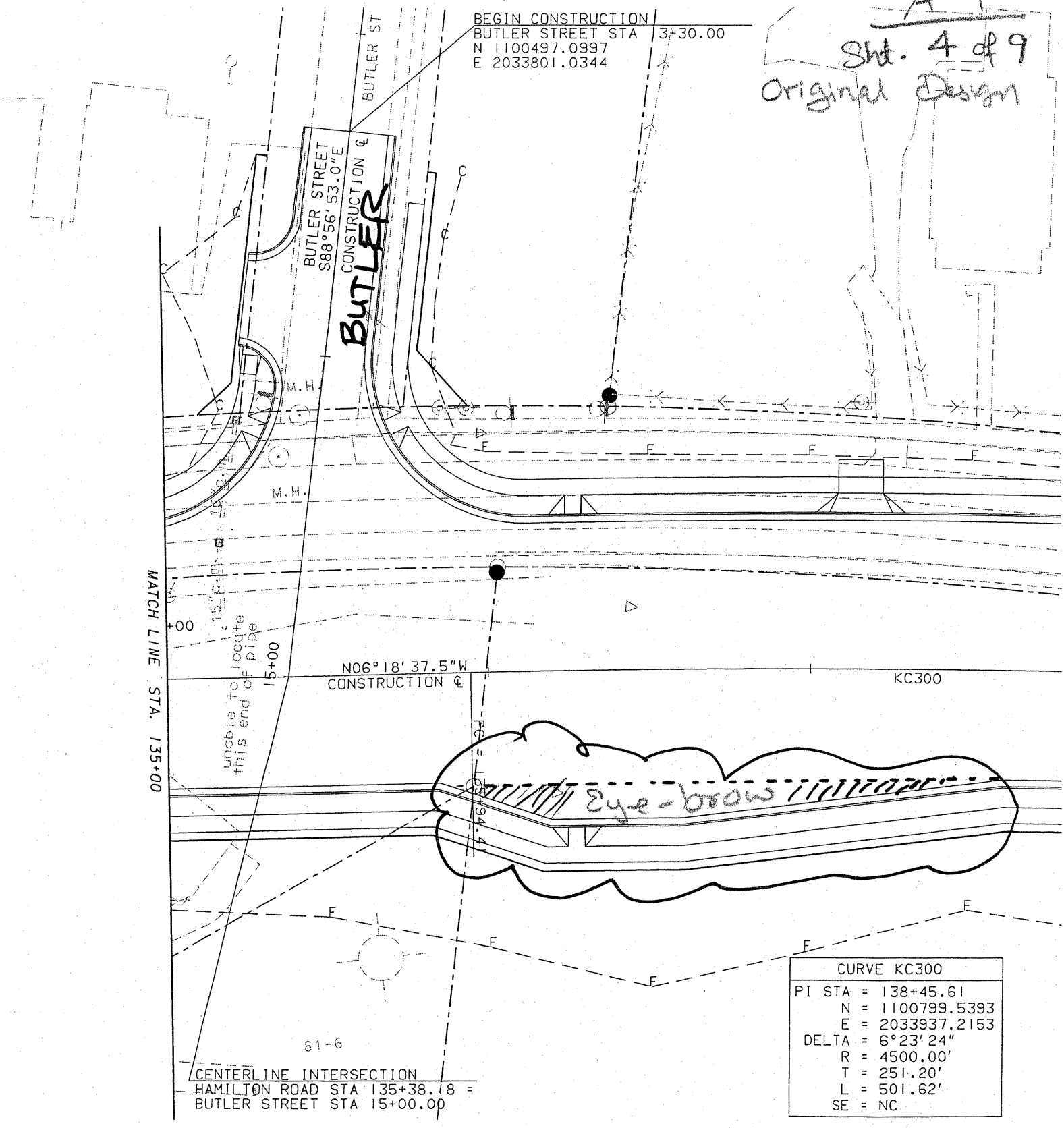
A-9
Sht. 4 of 9
Original Design



CURVE KC300	
PI STA	= 138+45.61
N	= 1100799.5393
E	= 2033937.2153
DELTA	= 6°23'24"
R	= 4500.00'
T	= 251.20'
L	= 501.62'
SE	= NC

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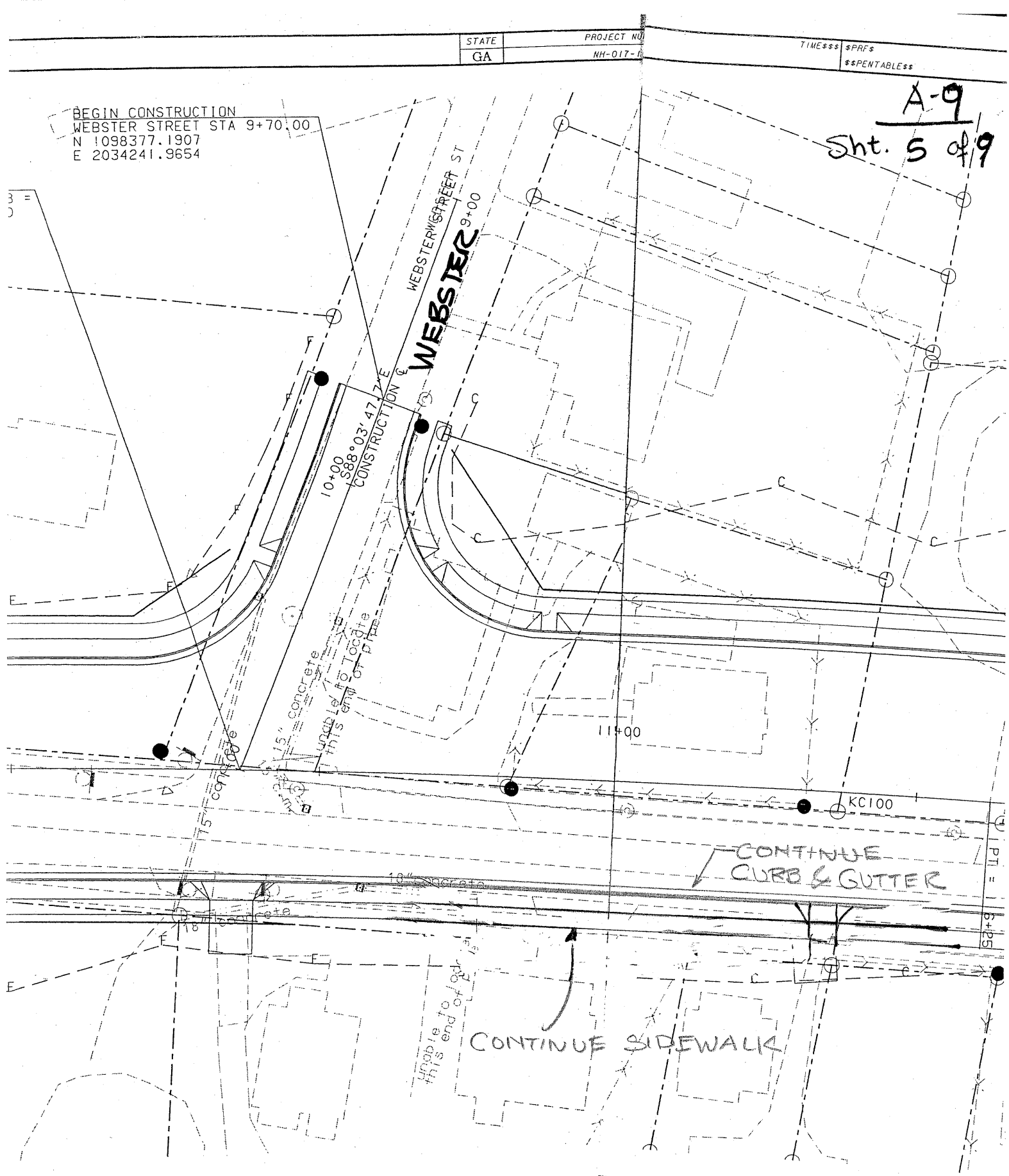
STATE	PROJECT NO
GA	NH-017-

TIME$$$ PRF $$PENTABLE$$

A-9
Sht. 5 of 9



REVISION DATES		

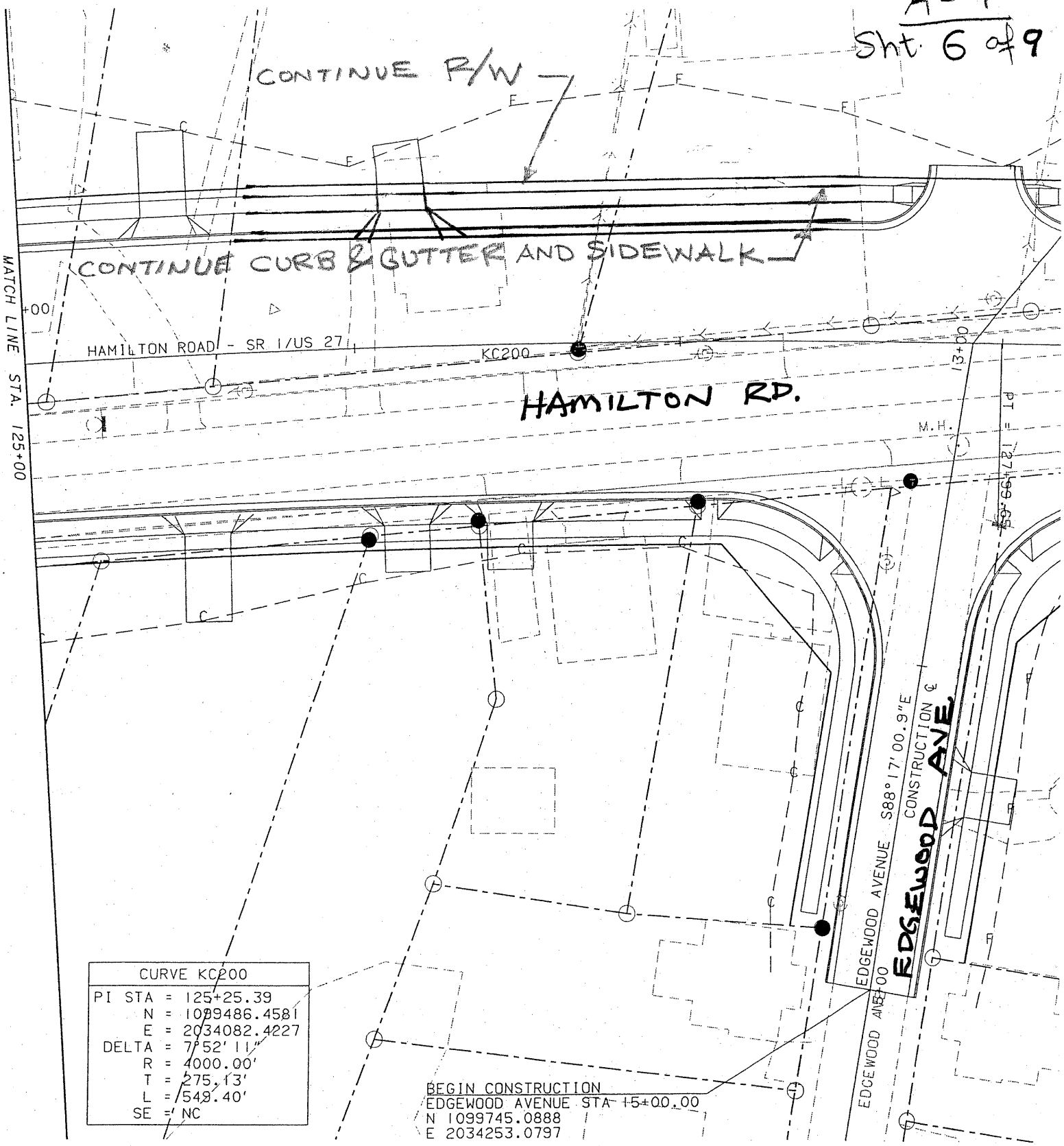
DE
OFFICI

SR 1/
TROUF

nc.

SCALE IN FEET
0 20 40 80

A-9
Sht 6 of 9



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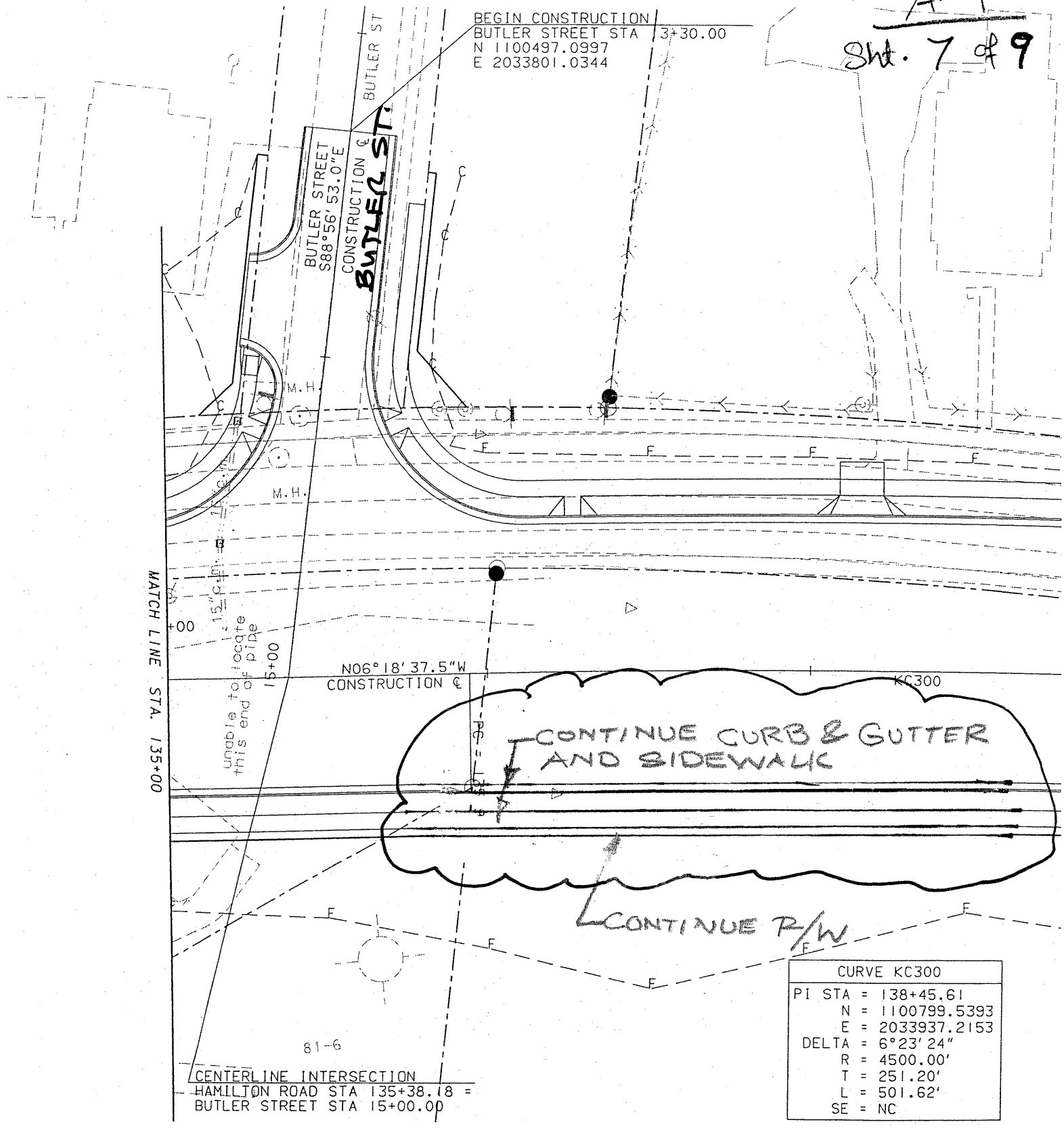
A-9
Sht. 7 of 9



CURVE KC300	
PI STA	= 138+45.61
N	= 1100799.5393
E	= 2033937.2153
DELTA	= 6°23'24"
R	= 4500.00'
T	= 251.20'
L	= 501.62'
SE	= NC

GEORGIA
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CALCULATIONS

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: A-9

SHEET NO.: 8 of 9

Eye-brow Pavement:

$3\left[\frac{1}{2}\times 12\times 100 + 12\times 50 + \frac{1}{2}\times 12\times 25\right] = 4{,}050$ sf
or 450 SY

(A) $\frac{165\ lbs}{SY} \times \frac{Ton}{2000\ lbs} \times \frac{\$65.79}{Ton} = \$5.43/SY$

(B) $\frac{220\ lbs}{SY} \times \frac{Ton}{2000\ lbs} \times \frac{\$63.21}{Ton} = \$6.95/SY$

(C) $\frac{660\ lbs}{SY} \times \frac{Ton}{2000\ lbs} \times \frac{\$63.99}{Ton} = \$21.12/SY$

(D) 10" GAB $(0.83')$ $\times \frac{9\ sf}{SY} \times \frac{0.076\ Ton}{cf} \times \frac{\$19.98}{Ton} = \frac{\$11.39}{SY}$

Total: $\$5.43 + \$6.95 + \$21.12 + \$11.39 = \$44.89/SY$

Including cost of Tack Coat, the cost of full-depth pavement is roughly $45 per square yard.

Assume about $10/sf for R/W cost

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: A-9

DESCRIPTION:

SHEET NO.: 9 of 9

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
A.C. Pavement	SY	450	45	20,250			
10 % markup				2,025			
Sub-total				22,275			
R/W Cost	SY	4,050	10	40,500			
Subtotal							
Markup (%) at							
TOTAL				62,675			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **A-10**

DESCRIPTION: **ELIMINATE ALL SIDEWALKS, CURBS AND GUTTERS FROM SIDE ROADS SUCH AS BROOKSIDE TERRACE**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The design includes 30-in. curb and gutter and 5-ft.-wide concrete sidewalks on the side roads.

ALTERNATIVE:

Eliminate all curb and gutter and concrete sidewalks on the side roads.

ADVANTAGES:

- Reduces costs significantly
- Reduces construction schedule

DISADVANTAGES:

- Loses a perceived amenity

DISCUSSION:

The State of Georgia does not own the side roads, so it is under no obligation to provide curb and gutter and sidewalk on the side roads. It does not add any significant benefit to the drivers of SR 1/US 27.

Substantial acreage of right-of-way will not have to be acquired.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 3,215,785	—	$ 3,215,785
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 3,215,785	—	$ 3,215,785

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: A-10

DESCRIPTION:

SHEET NO.: 2 of 2

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
30" Curb & Gutter	LF	11,700	19.04	222,768			
Concrete Sidewalk	SY	6,500	33.67	218,855			
(5'×11,700)/9							
Sub-total:				441,623			
10% Const. Markup				44,162			
				485,785			
R/W	SF	273,000	10	2,730,000			
Subtotal							
Markup (%) at							
TOTAL				3,215,785			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **A-13**

DESCRIPTION: **ELIMINATE ALL RIGHT-TURN LANES ON HAMILTON ROAD**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The alignment along Hamilton Road currently has nine right-turn lanes.

ALTERNATIVE:

Eliminate all nine of the right-turn lanes along Hamilton Road.

ADVANTAGES:

- Reduces right-of-way cost
- Reduces construction costs

DISADVANTAGES:

- Requires further analysis of traffic volumes

DISCUSSION:

Eliminating the right-turn lanes is allowable for speeds of 35 mph.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 712,800	—	$ 712,800
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 712,800	—	$ 712,800

CALCULATIONS

PROJECT:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	ALTERNATIVE NO.:	**A-13**
DESCRIPTION:	**ELIMINATE ALL RIGHT-TURN LANES ON HAMILTON ROAD**	SHEET NO.:	**2 of 3**

Cost savings for elimination of the right-turn lanes is as follows:

RIGHT-OF-WAY SAVINGS = 9 lanes x 300 ft. x 12 ft. wide x $10/SF = $324,000

CONSTRUCTION SAVINGS = 9 lanes x 300 ft. x 12 ft. wide x $10/sf construction cost = $324,000

COST WORKSHEET

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **A-13**

DESCRIPTION: **ELIMINATE ALL NINE OF THE RIGHT-TURN LANES ON HAMILTON ROAD**

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
Right-of-way cost - 9 right-turn lanes	LS			324,000			
Construction cost - 9 lanes	LS			324,000			
Subtotal				648,000			
Markup (%) at 10.00%				64,800			
TOTAL				712,800			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	ALTERNATIVE NO.:	**P-1/ A-1**
DESCRIPTION:	**LOWER THE PROFILE BETWEEN STATIONS 168+00 AND 181+00 AND ELIMINATE THE RETAINING WALL; TIE JARBOE STREET BACK INTO HAMILTON ROAD**	SHEET NO.:	**1 of 8**

ORIGINAL DESIGN: (Sketch attached)

The present design profile grade for Hamilton Road is in a high fill section from Stations 173+00 to 179+00, therefore requiring a "fill" retaining wall to reduce right-of-way impacts.

ALTERNATIVE: (Sketch attached)

Alternative Number (Alt. No.) P-1 – Lower the profile grade from approximately Station 168+00 to 181+00 to eliminate the need for a fill retaining wall.

Alt. No. A-1 – Lowering the provided grade would also allow tying Jarboe Street directly into Hamilton Road/ US 1/SR 27.

ADVANTAGES:

- Reduces construction costs
- Eliminates retaining wall
- Reduces the amount of required roadway embankment
- Maintains existing access to Jarboe Road
- Improves the grade for Union Street

DISADVANTAGES:

- Steepens grade but still meets 35 mph

DISCUSSION:

The present Hamilton Road profile requires a long "fill" retaining wall from Stations 173+00 to 179+00. The present design profile grade prohibits the existing access to Jarboe Street since Hamilton Road would be too high.

The alternative profile lower grade eliminates the need for a retaining wall and accommodates a profile to keep the existing access to Jarboe Street. The alternative would lower the construction costs by eliminating retaining wall #2, and the need to build Brookside Terrace extension.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 440,187	—	$ 440,187
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 440,187	—	$ 440,187

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: P-1/A-1

SHEET NO.: 2 of 8

Original/Cast-in place wall with barrier Wall. #65/sf

$\left[\frac{(3'+12')}{2}\times 100'\right]+\left[\frac{(12'+8')}{2}\times 100'\right]+\left[\frac{(8'+12')}{2}\times 50'\right]+$

$\left[\frac{(12'+10')}{2}\times 100'\right]+\left[\frac{(10'+3')}{2}\times 100'\right]+\left[\frac{(3'+8')}{2}\times 100\right]+\left[\frac{(8-3)}{2}\times 100'\right]=$

$= 5{,}100$ SF use #65/sf

Original Earthwork for the higher profile grade. The Earth work is basically the same as far as saving under the Alternate design. One side of Hamilton Rd is in a Fill (Embankment) and the other side would be in a cut with the Alternate profile

Original Cost to build Brookside Ext. Extension (new Road under Original Design)

Pavement section: $\frac{24'\times 260'}{9} = 694$ S.Y. @ #45/SY (see A-9)

Curb & gutter: 600 L.F.

Drainage: 2 Catch Basins & Approximately 200 L.F. of 18" storm Dr pipe

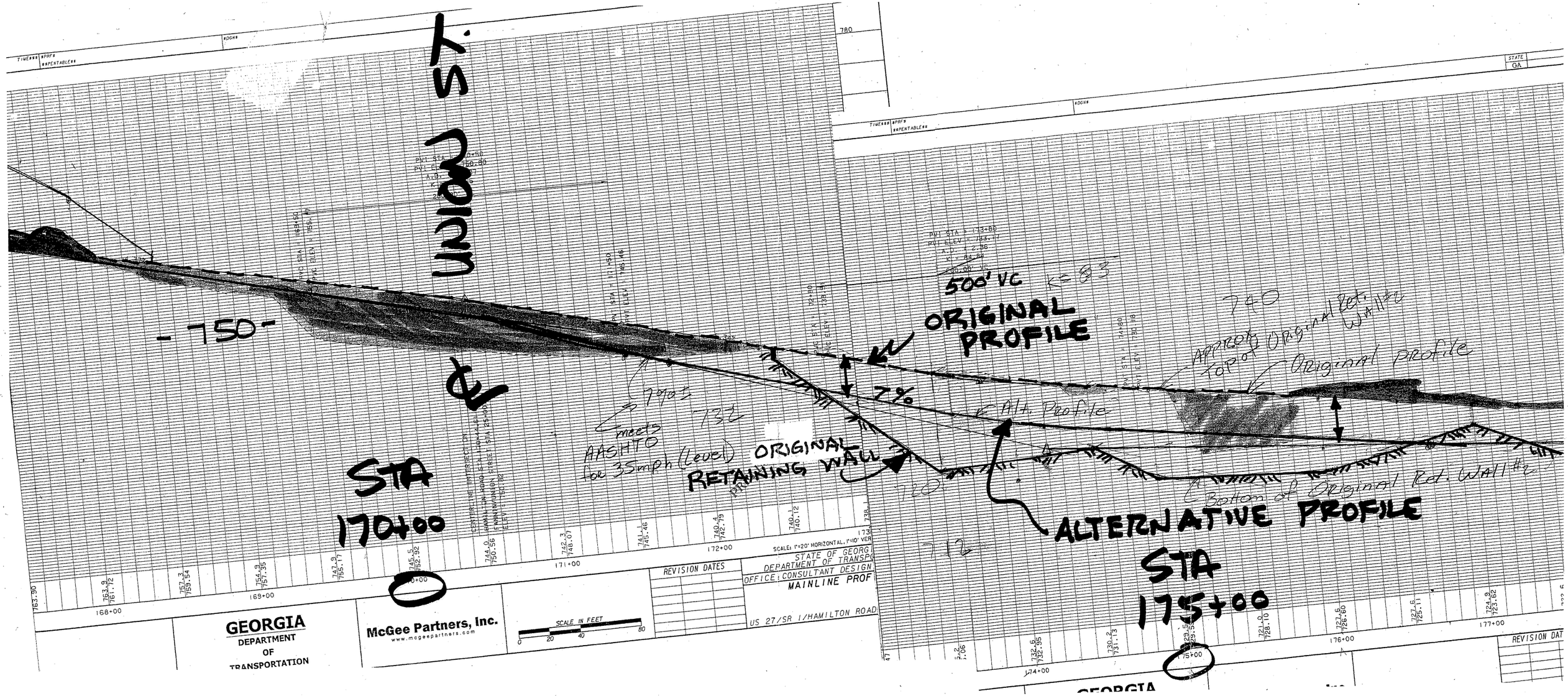
Sidewalk: $\frac{600'\times 5'}{9} = 334$ S.Y.

SKETCH

PROJECT:	**US 27 / SR 1 HAMILTON ROAD WIDENING** *Project No. NH-017-1(20), Troup County, Georgia* ***Preliminary Submittal***	ALTERNATIVE NO.: P-1/A-1
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐	BOTH ☒ SHEET NO.: of

NOTES:
- DELETE RETAINING WALL
- LOWER PROFILE

P-1/A-1
3 of 8



Profile 1/2

SKETCH

PROJECT:	**US 27 / SR 1 HAMILTON ROAD WIDENING** *Project No. NH-017-1(20), Troup County, Georgia* ***Preliminary Submittal***	ALTERNATIVE NO.: P-1/A-1
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐	BOTH ☒ SHEET NO.: **of**

P-1/A-1 4 of 8

LOWER PROFILE

2% SLOPE

ORIGINAL RETAINING WALL

STA 180+00

STA 185+00

PRELIMINARY

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REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: CONSULTANT DESIGN
MAINLINE PROFILE
US 27/SR 1/HAMILTON ROAD

SCALE: 1"=20' HORIZONTAL, 1"=10' VERTICAL

Profile 2/2

P-1/A-1
5 of 8

STA 175+00

STA 180+00

ELIMINATE RETAINING WALL

FILL

FILL

Const. Limits for Alternate Profile

Construction limits for Alternate Profile

tie-in under Alternate Design.

HAMILTON RD - SR 1/US 27

MATCH LINE STA. 21+50

MATCH LINE STA. 23+50

PRELIMINARY

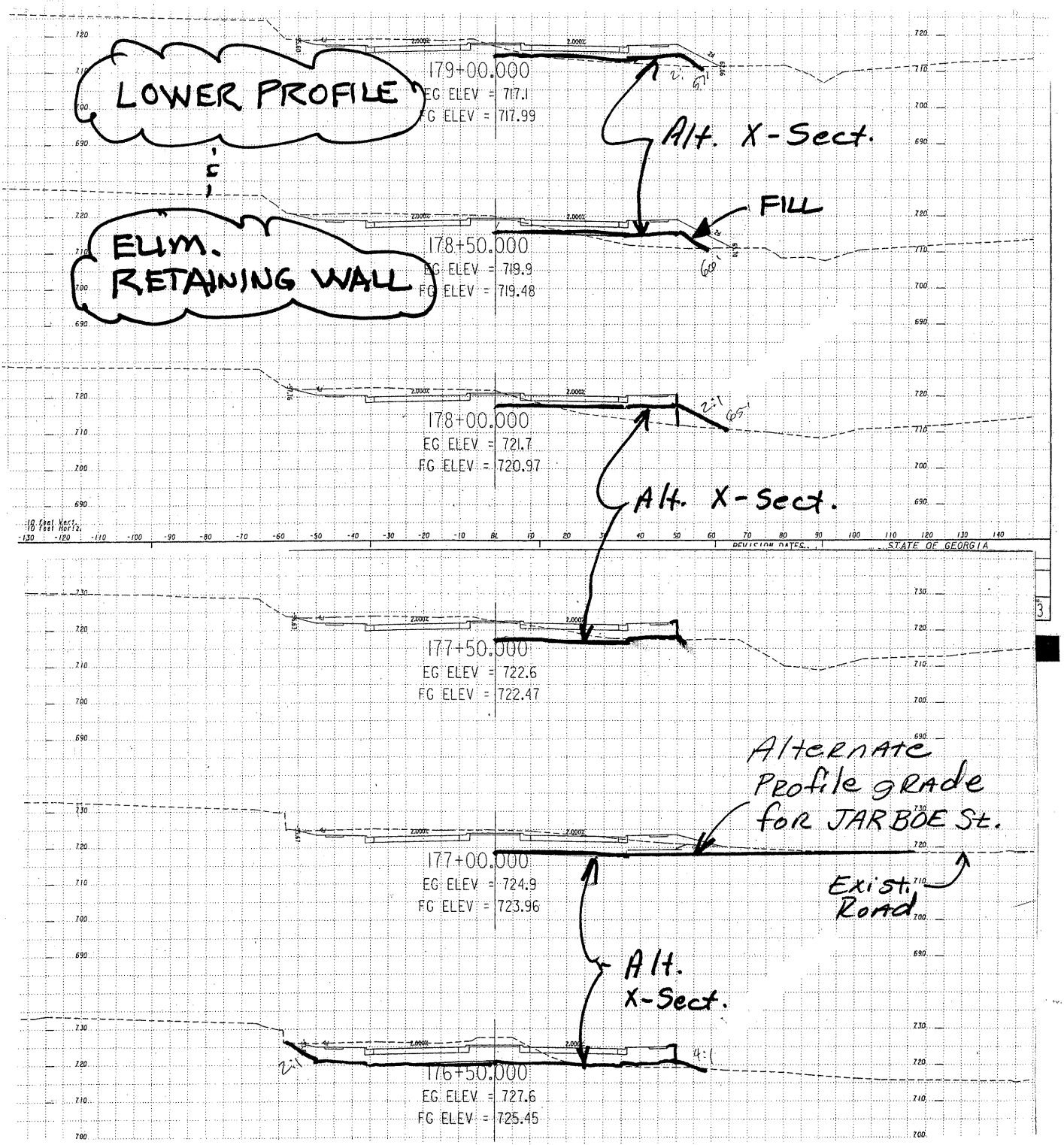
JARBOE ST.

ALTERNATIVE

P-1/A-1

SKETCH

PROJECT:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	ALTERNATIVE NO.: **P-1/A-1**
ORIGINAL DESIGN ☐	ALTERNATIVE DESIGN ☐ BOTH ☐	SHEET NO.: **6 of 8**



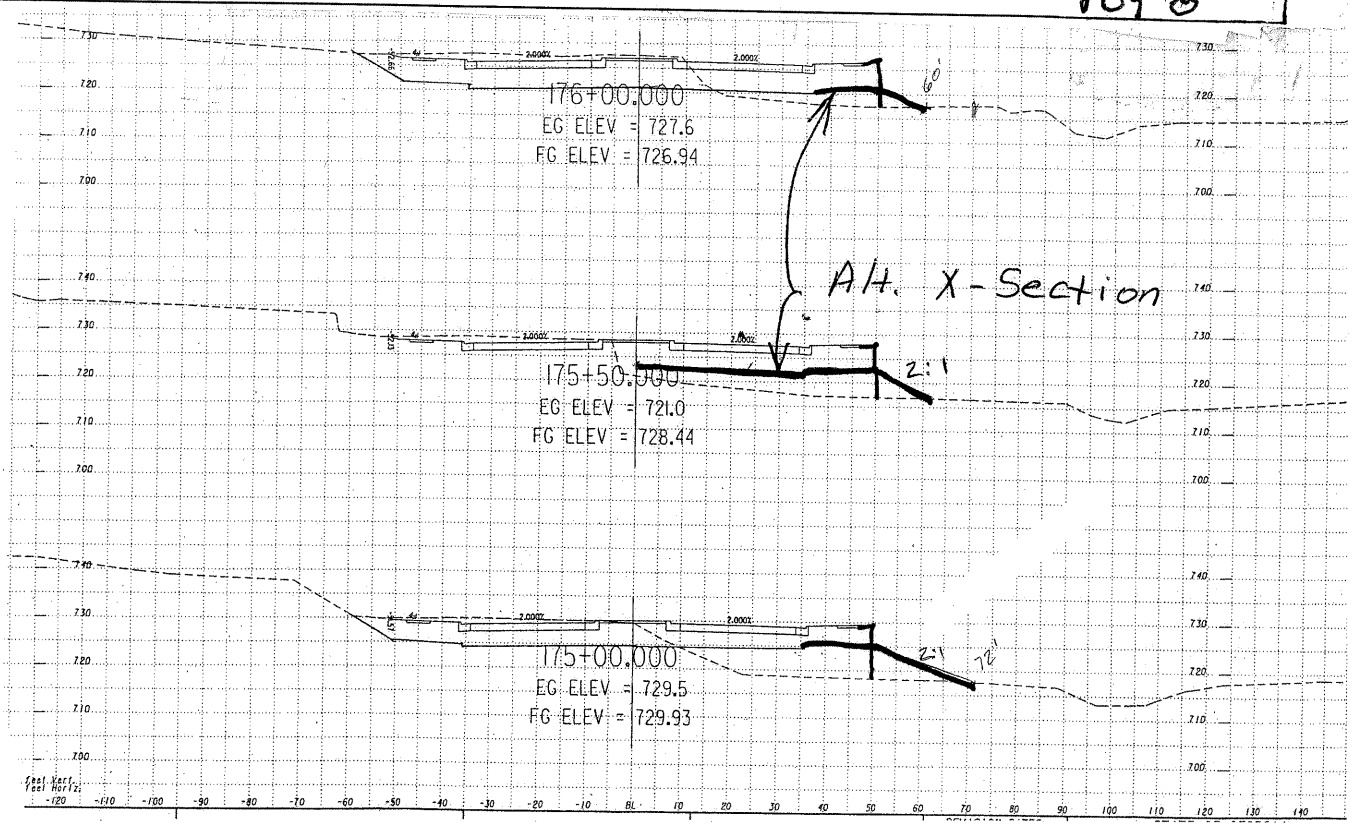
SKETCH

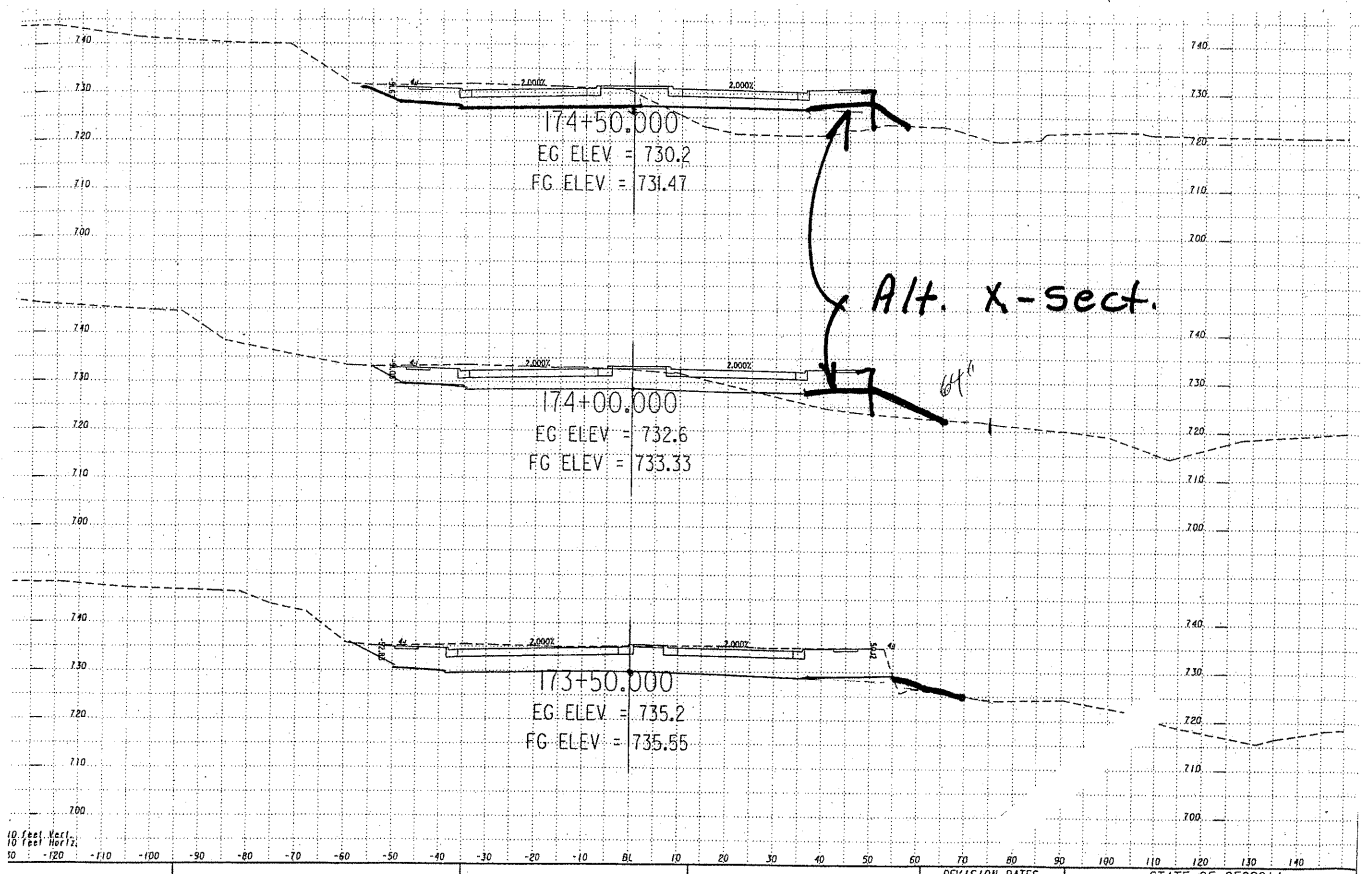
PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troupe County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: P-1/A-1

ORIGINAL DESIGN ☑ ALTERNATIVE DESIGN ☐ BOTH ☒

SHEET NO.: 7 of 8





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SCALE IN FEET

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: CONSULTANT DESIGN
EARTHWORK CROSS SECTIONS

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troupe County, Georgia

ALTERNATIVE NO.: P-1/A-1

DESCRIPTION:

SHEET NO.: 8 of 8

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Original Cost (Saved with Alt.)							
Retain Wall #2	SF	5100	$65	$331,500		0	
Pavement for Backside Terrace Extension	SY	694	$45	$31,230			
Sidewalk	SY	334	$33.67	$11,246			
Drainage							
Curb & Gutter	LF	6000	$19.04	$11,424			
Catch Basin	EA	2	$2784	$5,570			
18" St. Dr. Pipe	LF	200	$46	$9,200			
Construction Subtotal				$400,170			
Subtotal				$400,170			
Constr. **Markup** (%) at 10%				$40,017			
TOTAL				$440,187			

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	ALTERNATIVE NO.:	**P-2**
DESCRIPTION:	**USE MORE CUT/BACK SLOPE TO REDUCE HEIGHT OF WALL #1 FROM STATION 165+50 TO STATION 168+00**	SHEET NO.:	**1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The present design profiles a "cut" retaining wall to eliminate the back slope from Station 165+50 to Station 168+00.

ALTERNATIVE: (Sketch attached)

Use a cut/back slope (2:1) with a berm to reduce the height of the retaining wall. (See x-Sections).

ADVANTAGES:

- Reduces construction costs
- Uses remnant parcels
- Accelerates construction

DISADVANTAGES:

- Increases right-of-way
- Increases excavation

DISCUSSION:

The original design proposes a 14-ft.-high "cut" retaining wall in lieu of 2:1 back slopes to reduce right-of-way impacts.

This alternative proposes to use both a 2:1 back slope and retaining wall on a berm to reduce the height of the retaining wall. Even though this design offsets the retaining wall more, most of the wall would be located on "remnant" parcels. This design requires slightly more right-of-way (1,000 SF) and excavation (800 CY). However, the savings in the retaining wall height would reduce the construction cost by at least $80,000 and most likely more due to reduced construction time.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 257,400	—	$ 257,400
ALTERNATIVE	$ 177,065	—	$ 177,065
SAVINGS (Original minus Alternative)	$ 80,335	—	$ 80,335

P-2
2 of 5

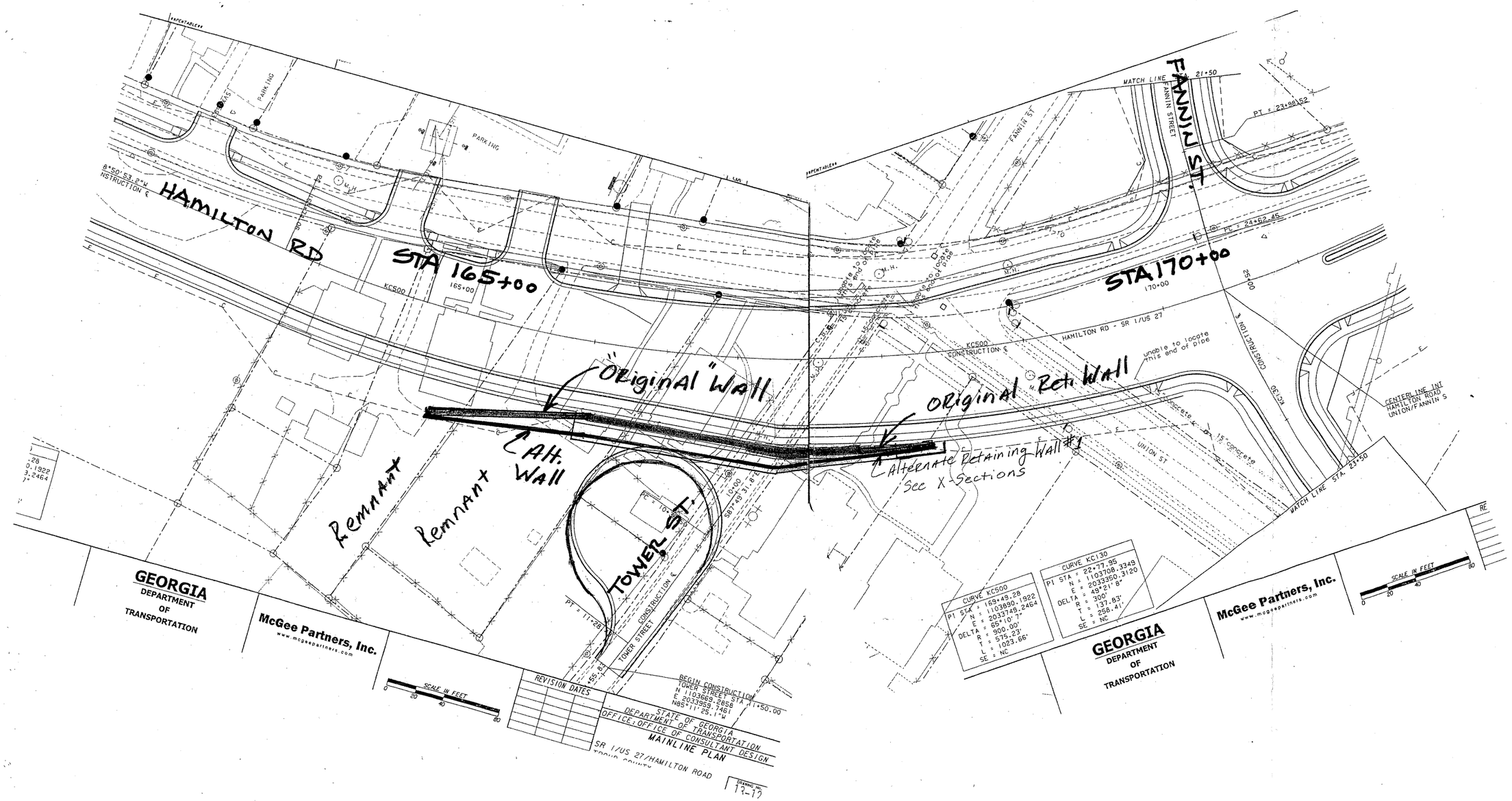
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: P-2

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒

SHEET NO.: 2 of 5

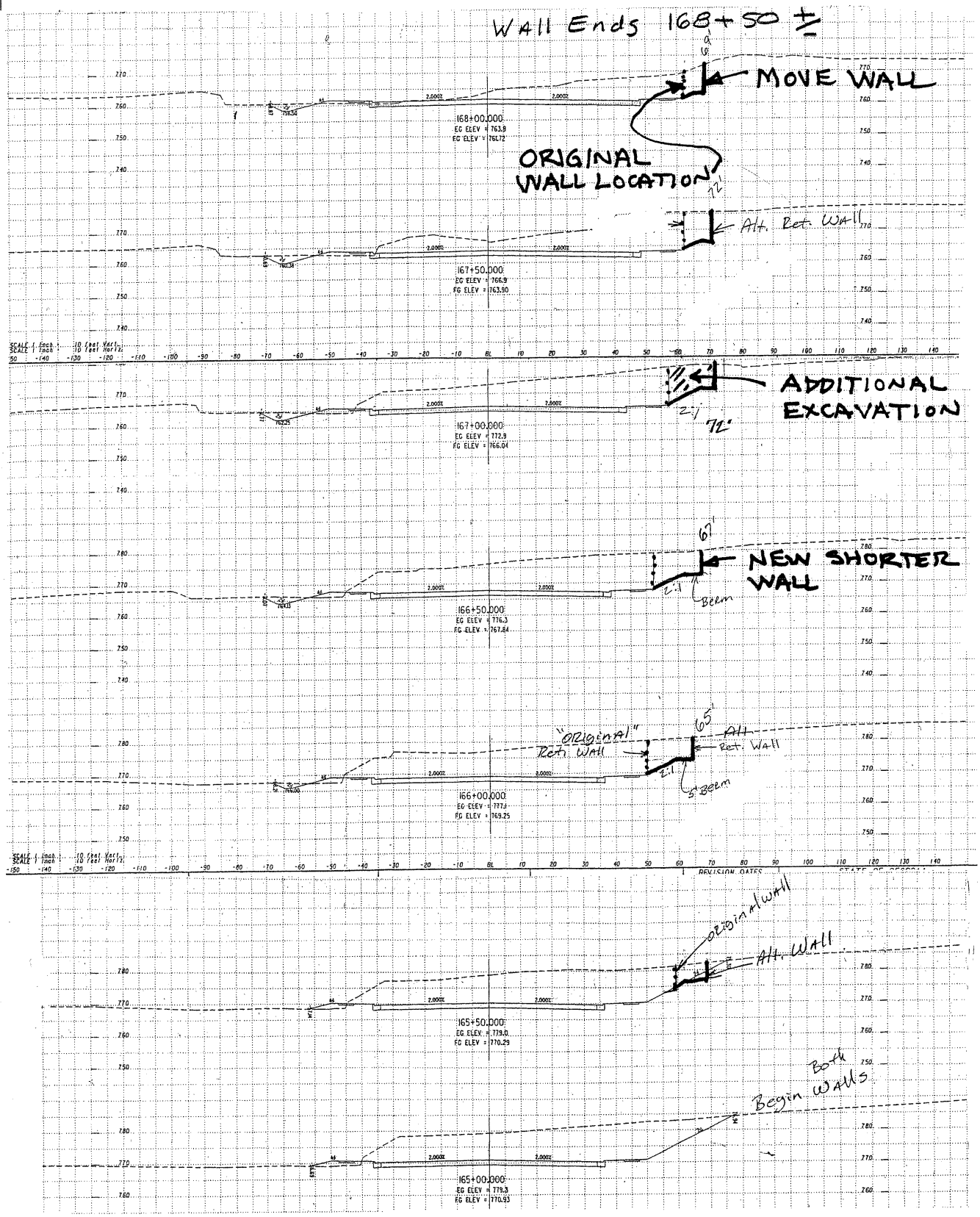


SKETCH

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **P-2**

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☒ SHEET NO.: **3 of 5**



CALCULATIONS

PROJECT:	**US 27 / SR 1 HAMILTON ROAD WIDENING** *Project No. NH-017-1(20), Troup County, Georgia* ***Preliminary Submittal***	ALTERNATIVE NO.:	P-2
		SHEET NO.:	4 of 5

Original Retaining Wall Cost

$$\left[\left(\frac{4+12'}{2}\right)\times 100'\right] + \left[12' \times 50'\right] + \left[\left(\frac{12'+14'}{2}\right)\times 50'\right] + (14'\times 50') +$$

$$\left[\left(\frac{14'+8'}{2}\right)\times 50'\right] + \left[\left(\frac{4'+8'}{2}\right)\times 50'\right] = 3,600 \text{ s.f.}$$

@ 65/s.f.

Alt. Retaining Wall

$$\left[\left(\frac{3'+5'}{2'}\right)\times 50'\right] + \left[\left(\frac{5'+7'}{2}\right)\times 50'\right] + (7'\times 100) + \left[\left(\frac{7'+9'}{2}\right)\times 50'\right]$$

$$+ (9'\times 50') + \left[\left(\frac{9'}{2}\right)\times 50'\right] = 2,275$$

$$\frac{12'\times 6'\,300}{27} = 800 \text{ cy} \times \$5/\text{cy} = 4,000$$

Add'l R/W for Alt. Ret. wall Most of the R/W need for Alt. Retaining wall would be on Parcel that would require complete R/W "takes" under the present (Original) design

100'x10' = 1,000 SF x $10 SF = $10,000

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: D-2

DESCRIPTION:

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Retain. Wall	SF	3600	65	234,000			
Alt. Design							
Retain Wall	SF				2275	$65	$147,875
Add'l Excav	CY				800	$5	$4,000
				Constr. Subtotal			$151,875
(Add'l R/W (Land only)	SF				1000	$10	$10,000
						↑	
						includes mkup	
R/W							$10,000 (incl. mkup)
Constr. Subtotal				234,000			$151,875
Markup (%) at 10%				23,400	Constr. Markup 10%		15,190
TOTAL				257,400			177,065

SUMMARY OF VE ALTERNATIVES

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
SECTION (S)						
S-2	Eliminate the 3-ft. strip of pavement between the outside lane and the gutter. Eliminating this strip on both sides of the road saves 6 ft. of pavement and the associated right-of-way. Travel lanes would be kept 12 ft. wide.	$ 616,076	$ -	$ 616,076	$ -	$ 616,076
S-4	Reduce the shoulder width from 16 ft. to 10 ft. by eliminating the grassed area between the sidewalk and the curb. Construct the 5-ft.-wide sidewalk directly adjacent to the curb.	$ 958,500	$ -	$ 958,500	$ -	$ 958,500
S-5	Reduce the grassed shoulder width from 6 ft. to 2 ft. on both sides of the road and reduce the shoulder width from 16 ft. to 12 ft.	$ 649,000	$ -	$ 649,000	$ -	$ 649,000
S-6	Use an 8-ft.-wide asphalt paved multi-use trail in lieu of 5-ft.-wide concrete sidewalks. The total width of the shoulder would remain the same at 16 ft.	$ 485,100	$ 297,935	$ 187,165	$ -	$ 187,165
S-7	Use 11-ft. travel lanes in place of 12-ft. lanes throughout.	$ 493,520	$ -	$ 493,520	$ -	$ 493,520
S-8	Use 8 in. x 24 in. curb and gutter in lieu of 8 in. x 30 in.	$ 652,030	$ 353,760	$ 298,270	$ -	$ 298,270
S-10	Concept VE#1 is an aggressive 80-ft.-wide section using 12-ft. shoulders, 11-ft. travel lanes, and a 12-ft. median.	$ 2,745,303	$ 353,760	$ 2,391,543	$ -	$ 2,391,543
S-11	Concept VE#2 is an approach with an 88-ft. section, 12-ft. shoulders, 11-ft. outside lane, 12-ft. inside travel lanes, and a 14-ft. at-grade median.	$ 2,251,640	$ 353,760	$ 1,897,880	$ -	$ 1,897,880

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-2**

DESCRIPTION: **DELETE 3 FT. OF PAVEMENT (OUTSIDE CURB LANE) IN EACH DIRECTION, BUT MAINTAIN 12-FT. TRAVEL LANES**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The current design includes 3 ft. of full-depth pavement next to the outside curb lane in both directions.

ALTERNATIVE: (Sketch attached)

Eliminate the 3 ft. of full-depth pavement next to the outside curb lane in both directions.

ADVANTAGES:

- Reduces costs
- Accelerates construction

DISADVANTAGES:

- Limits future scope of bike lane

DISCUSSION:

From Station 185+60 onward, no 3 ft. of additional pavement width is provided unless bike lanes are planned in the future. Savings in construction and right-of-way costs should be achieved by eliminating 6 ft. (3 ft. + 3 ft.) of pavement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 616,076	—	$ 616,076
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 616,076	—	$ 616,076

SKETCH

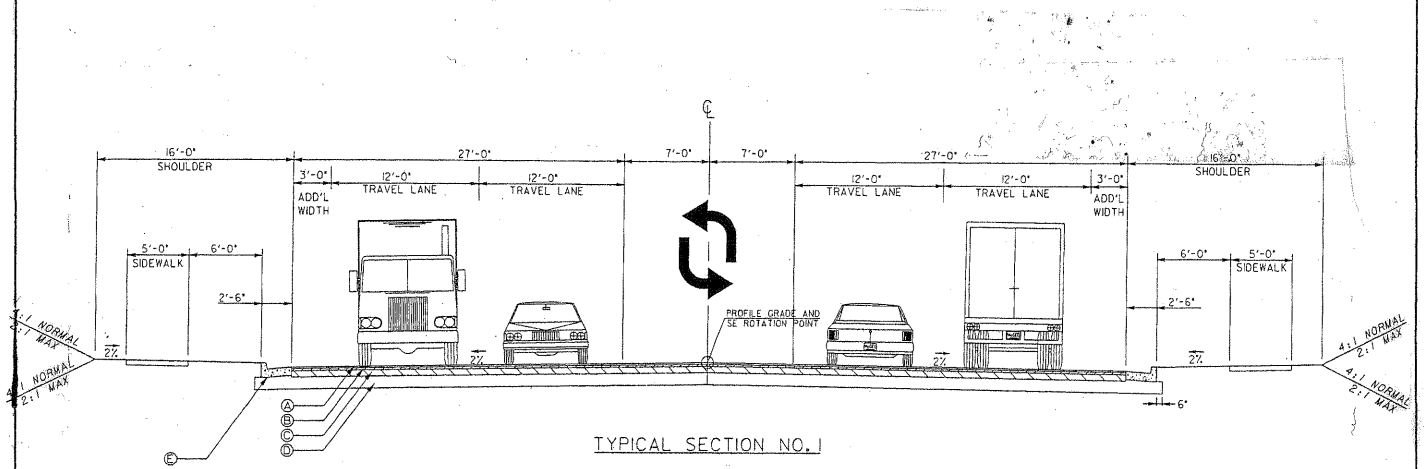
PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-2

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 3

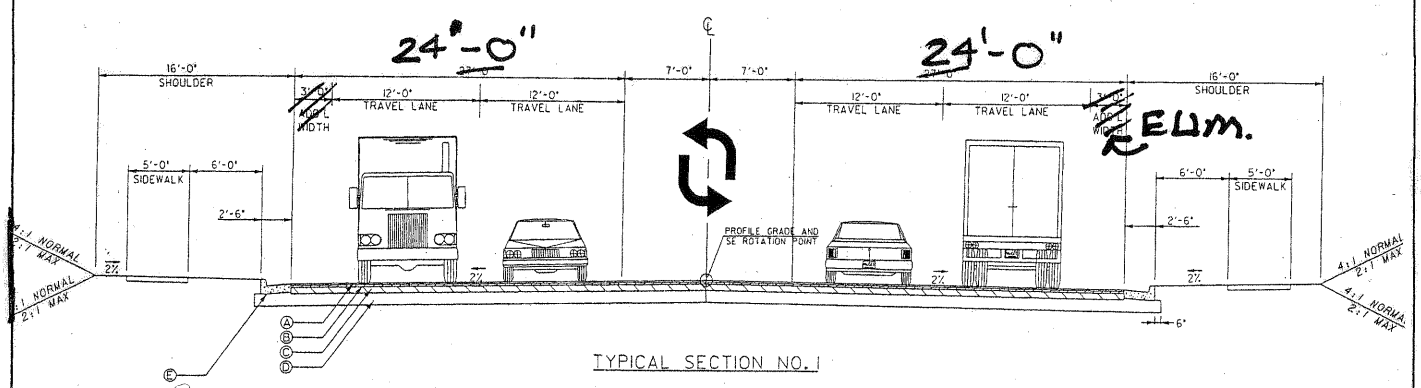
ORIGINAL DESIGN:



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00

ALTERNATIVE DESIGN:



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-2

DESCRIPTION:

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
171+19.23 - 106+00							
+							
185+60 - 184+54.79							
= 6,624.44'							
A.C. Pavement	SY	4,416.3	45	198,733			
6,624.44 x (3'+3')/9							
10 % Markup				19,873			
Construction Cost				218,606			
R/W Cost	SF	39,747	10	397,470			
6,624.44 x (3'+3')							
Subtotal							
Markup (%) at							
TOTAL				616,076			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-4**

DESCRIPTION: **REDUCE SHOULDER FROM 16 FT. TO 10 FT. AND ELIMINATE 6-FT. GRASSED SHOULDER; CONSTRUCT SIDEWALK NEXT TO CURB**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A 6-ft.-wide grassed shoulder is proposed between a 5-ft.-wide concrete sidewalk and curb, making the total shoulder width 16 ft.

ALTERNATIVE: (Sketch attached)

Eliminate the 6-ft.-wide grassed shoulder from both sides of the road. Reduce the shoulder width on each side of the road to 10 ft. by constructing a 5-ft.-wide sidewalk next to the curb.

ADVANTAGES:

- Reduces right-of-way costs
- Accelerates construction
- Reduces maintenance cost

DISADVANTAGES:

- Perceived safety loss because sidewalk is next to the curb

DISCUSSION:

Six ft. of grass between the sidewalk and curb creates perpetual maintenance. It is best not to provide such a strip and save money by reducing the right-of-way requirement.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 958,500	—	$ 958,500
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 958,500	—	$ 958,500

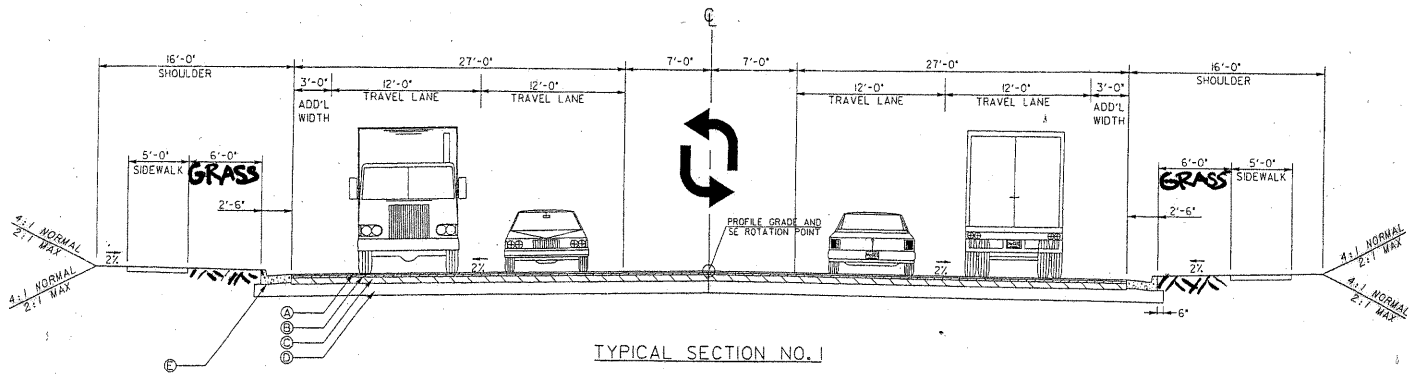
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-4

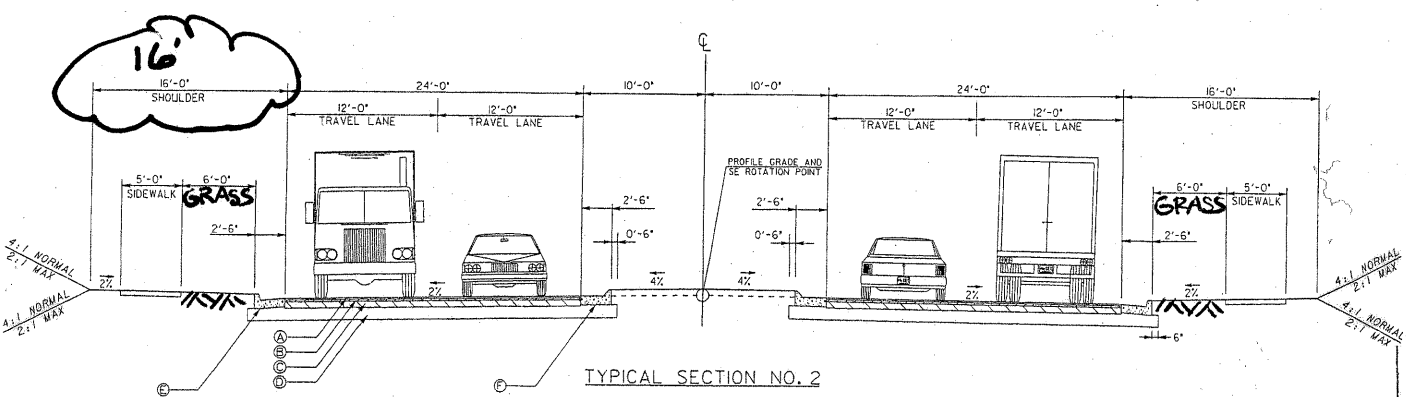
ORIGINAL DESIGN ☑ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 4



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

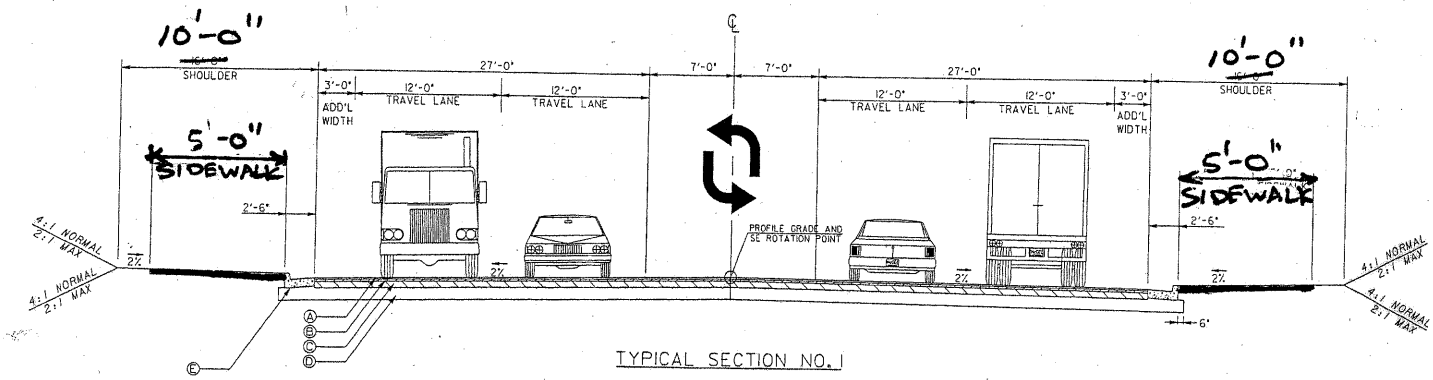
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-4

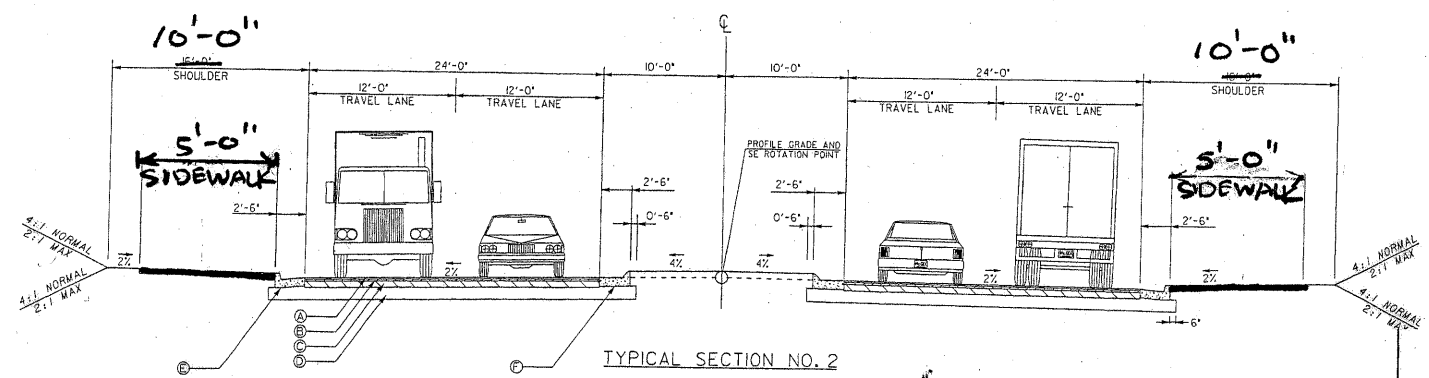
ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☑ BOTH ☐

SHEET NO.: 3 of 4



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-4

DESCRIPTION:

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
(185+60 - 106+00)12							
= 95,520 sf							
or 2.193 ac							
Permanent Grassing	AC	2.193	1,023.43	2,240			
Fertilizer	LS			760			
Sub-Total				3,000			
10% Mark-up				300			
				3,300			
R/W Cost	SF	95,520	10.00	955,200			
Subtotal							
Markup (%) at							
TOTAL				958,500			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-5**

DESCRIPTION: **REDUCE GRASSED SHOULDER WIDTH FROM 6 FT. TO 2 FT. ON BOTH SIDES OF THE ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A 6-ft.-wide grassed shoulder is proposed on both sides of the road between the concrete sidewalk and the curb on both sides of Hamilton Road.

ALTERNATIVE: (Sketch attached)

Reduce the width of the grassed shoulder on both sides of Hamilton Road from 6 ft. to 2 ft. between the 5-ft.-wide concrete sidewalk and 30-in. curb and gutter.

ADVANTAGES:

- Reduces costs in right-of-way
- Accelerates construction
- Reduces maintenance cost

DISADVANTAGES:

- None apparent

DISCUSSION:

A width of 6 ft. between the sidewalk and the curb seems excessive. By reducing this width to 2 ft., pedestrian safety is not compromised.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 649,000	—	$ 649,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 649,000	—	$ 649,000

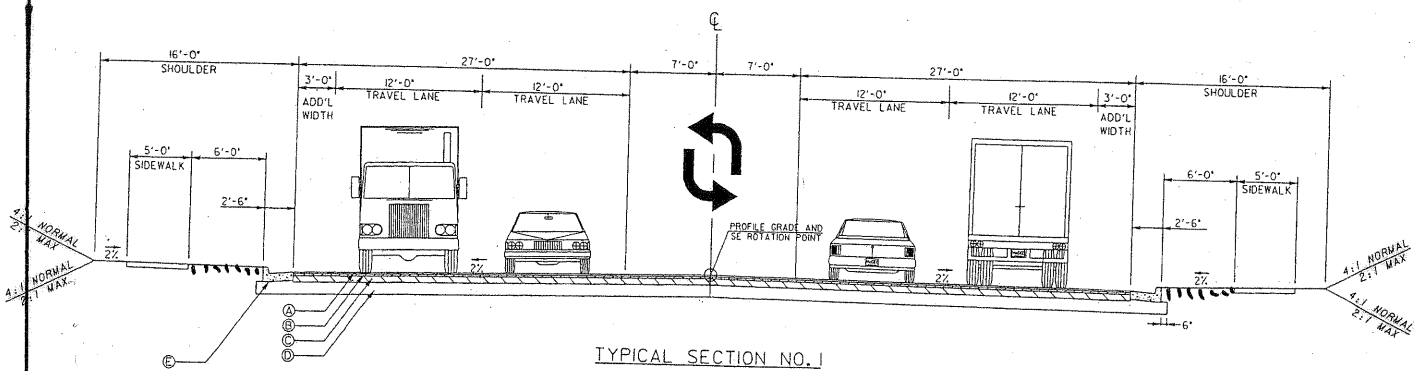
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-5

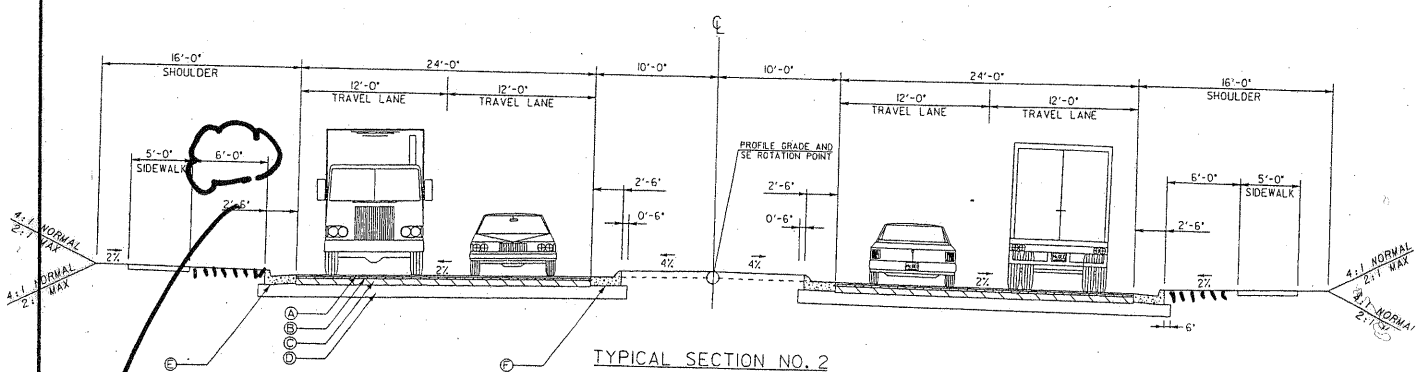
ORIGINAL DESIGN ☑ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 4



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

REDUCE 6' GRASSED AREA TO 2'.

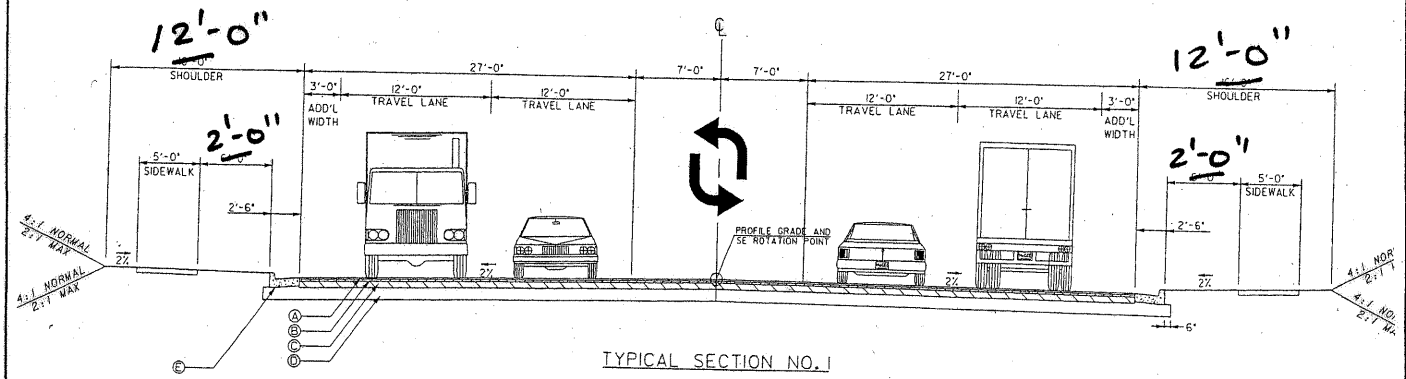
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-5

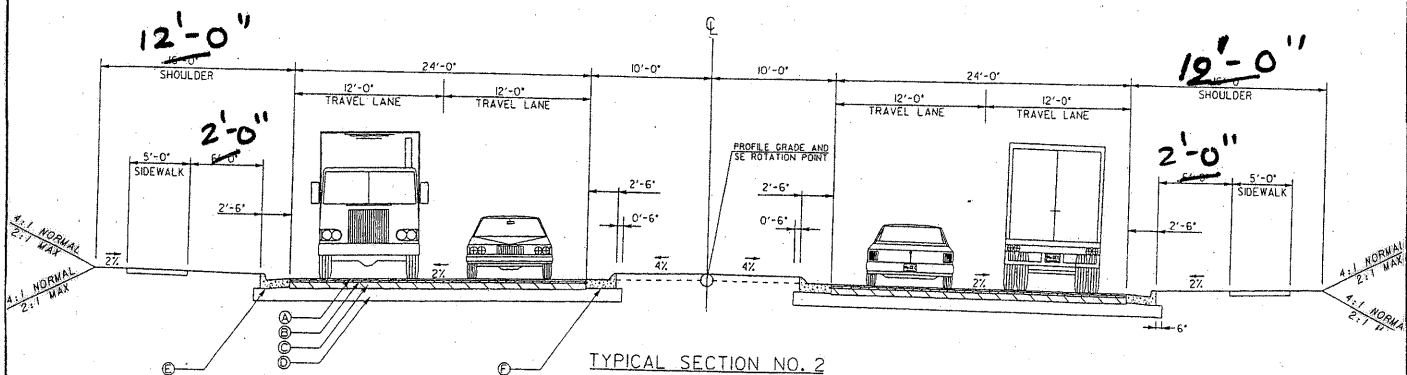
ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☑ BOTH ☐

SHEET NO.: 3 of 4



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-5

DESCRIPTION:

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
(185+60 – 106+00) 8 = 63,680 sf or 1.465 ac							
Permanent Grassing	AC	1.465	1,023.43	1,500			
Fertilizer	LS			500			
Sub. total				2,000			
10 % markup				200			
				2,200			
R/W Cost	SF	63,680	10.00	636,800			
Subtotal							
Markup (%) at							
TOTAL				649,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-6**

DESCRIPTION: **REDUCE GRASSED SHOULDER WIDTH TO 3 FT. AND ELIMINATE THE CONCRETE SIDEWALK IN FAVOR OF 8-FT.-WIDE ASPHALT CONSTRUCTED MULTI-USE TRAIL**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

A 5-ft.-wide concrete sidewalk and 6-ft.-wide grassed shoulder are proposed on both sides of Hamilton Road.

ALTERNATIVE: (Sketch attached)

Reduce the width of the grassed shoulder from 6 ft. to 3 ft. on both sides of Hamilton Road. Instead of providing a 5-ft.-wide concrete sidewalk, provide an 8-ft.-wide multi-use asphalt trail.

ADVANTAGES:

- Reduces costs
- Reduces maintenance cost
- Multi-use path is bicycle-friendly

DISADVANTAGES:

- Affects aesthetics

DISCUSSION:

Constructing an 8-ft.-wide asphalt multi-use trail saves money and provides an avenue for bicyclists. A 3-ft.-wide grassed shoulder between the multi-use trail and curb is plenty of space for pedestrian safety.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 485,100	—	$ 485,100
ALTERNATIVE	$ 297,935	—	$ 297,935
SAVINGS (Original minus Alternative)	$ 187,165	—	$ 187,165

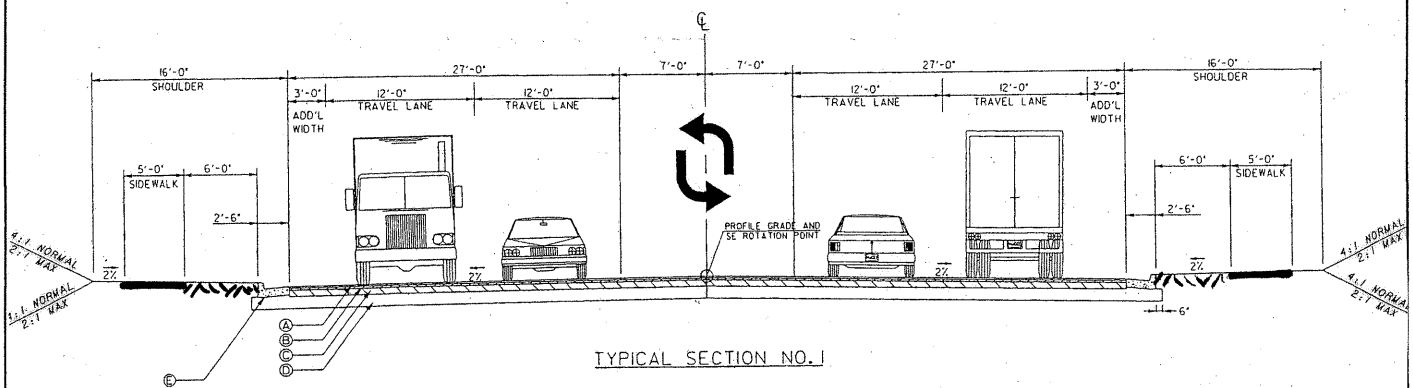
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-6

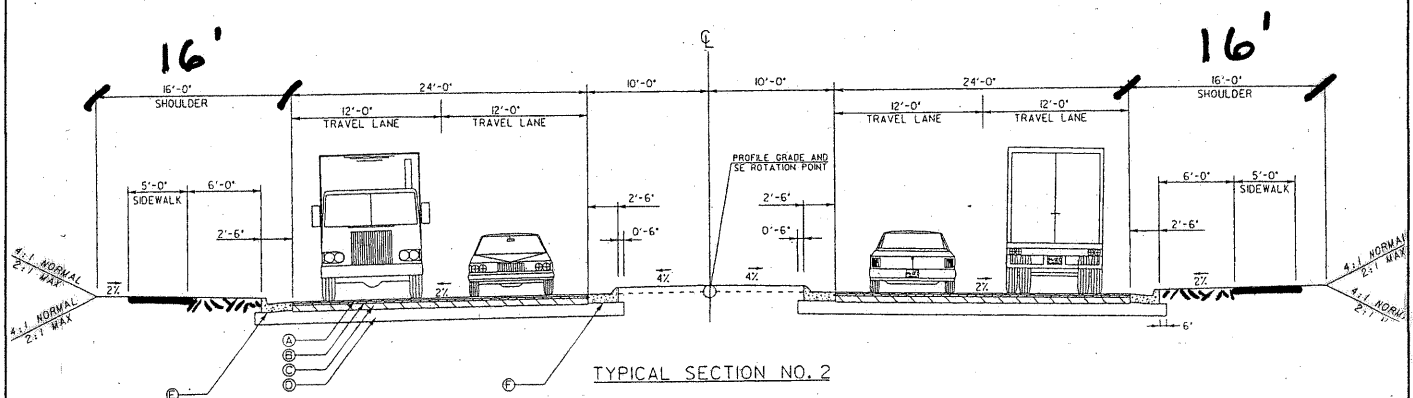
ORIGINAL DESIGN ☑ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 5



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

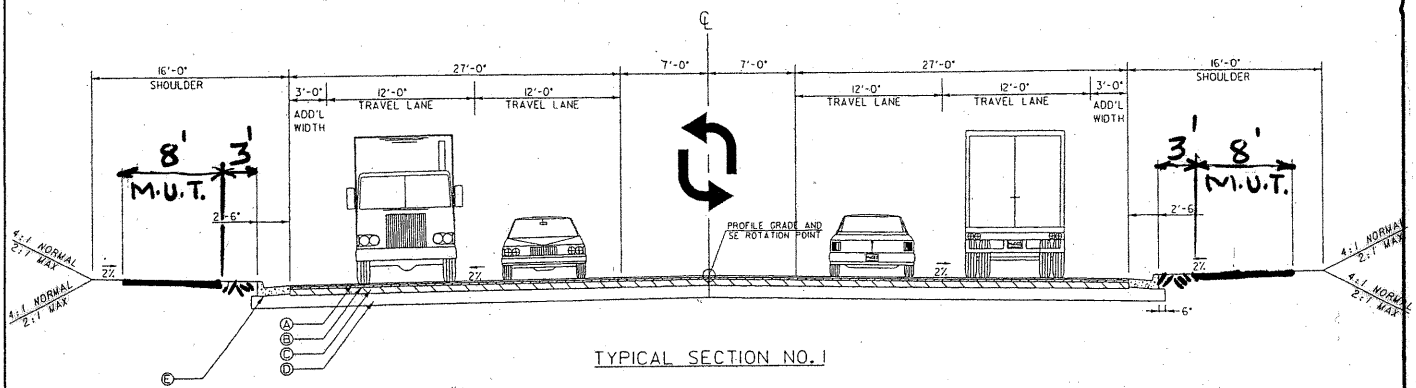
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-6

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐

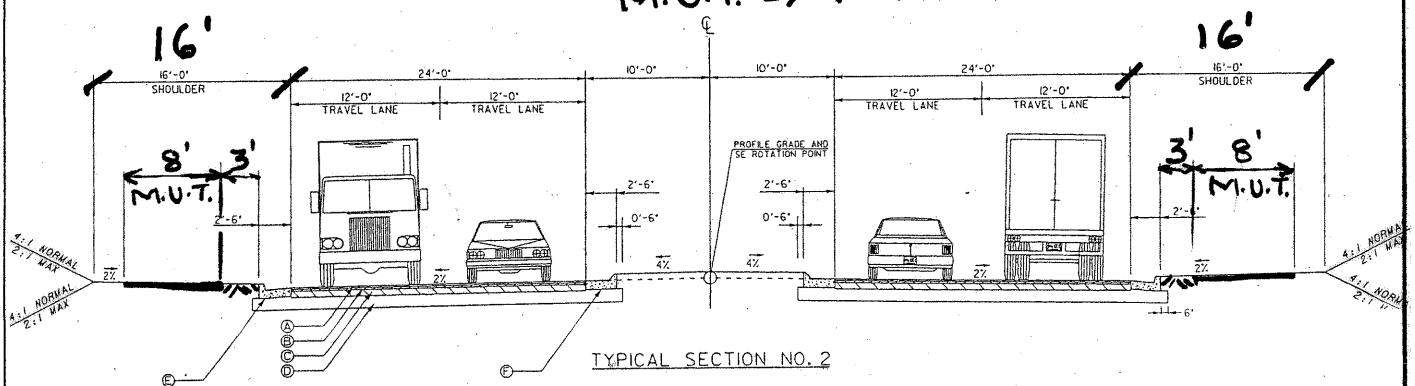
SHEET NO.: 3 of 5



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00

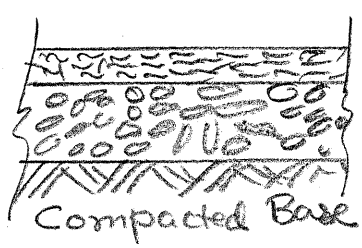
M.U.T. ⇒ Multi Use Trail



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

M.U.T. Section



CALCULATIONS

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-6

SHEET NO.: 4 of 5

Total length of sidewalk (or the alternative A.C. multi use trail) on both sides of Hamilton Road as well as side roads is $\frac{12,985 \times 9}{5} = 23,373$ ft.

The square yard of multiuse trail is: $\frac{23,373 \times 8}{9} = 20,776$

The acreage of 3' wide shoulder is: $\frac{23,373 \times 3}{43,560} = 1.61$

and 6' wide shoulder = 3.22 ac.

19 mm Superpave 2" thick @ 220 lbs/SY →

$\frac{20,776 \times 220}{2,000} = 2,285$ tons

4" G.A.B. @ 0.076 tons/cf →

$20,776 \times 9 \times \frac{4}{12} \times 0.076 = 6,233$ tons

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-6

DESCRIPTION:

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Concrete Sidewalk	SY	12,985	33.67	437,230			
6' Grassed Shoulder	AC	3.22	1,023.43	3,295			
Fertilizer	LS			475			
				441,000			
Multi-Use Trail							
19 mm Superpave	T				2,285	63.21	144,435
4" G.A.B.	T				6,233	19.98	124,535
3' Grassed Shoulder	AC				1.61	1,023.43	1,648
Fertilizer	LS						232
Subtotal				441,000			270,850
Markup (%) at 10 %				44,100			27,085
TOTAL				485,100			297,935

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-7**

DESCRIPTION: **USE 11-FT. TRAVEL LANES IN PLACE OF 12-FT. LANES THROUGHOUT**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

Two 12-ft. through lanes are provided in both directions of Hamilton Road.

ALTERNATIVE: (Sketch attached)

Provide two 11-ft. through lanes in both directions on Hamilton Road.

ADVANTAGES:

- Reduces construction cost
- Accelerates construction
- Reduces right-of-way cost

DISADVANTAGES:

- None apparent

DISCUSSION:

Eleven-foot lanes exist on freeways in metropolitan Atlanta. This has not caused any safety issues. For Hamilton Road, the inside lane is either next to 14 ft. or 20-ft. wide medians. The outside lane is either next to 3 ft. of additional pavement or a 30-in. curb and gutter. In all cases, existing width provides additional safety.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 493,520	—	$ 493,520
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 493,520	—	$ 493,520

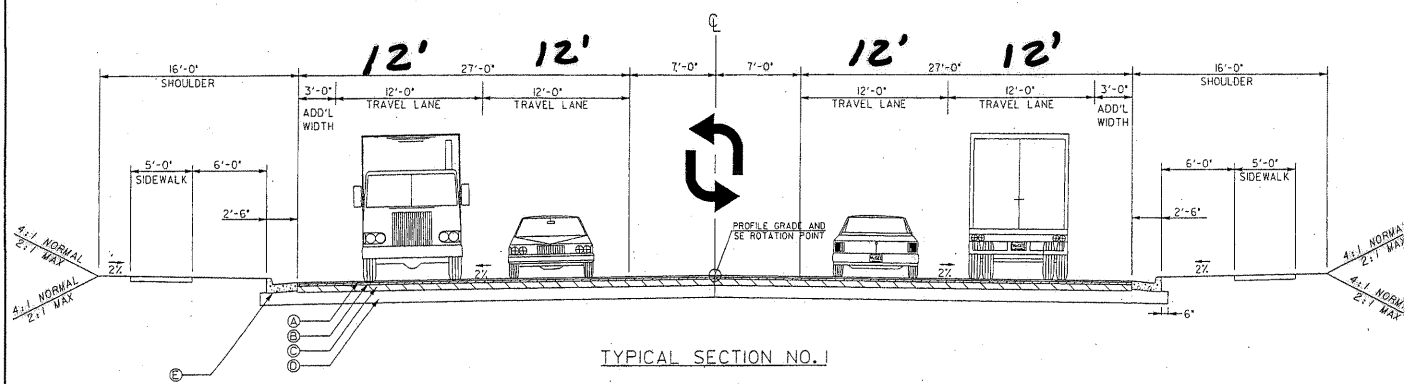
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-7

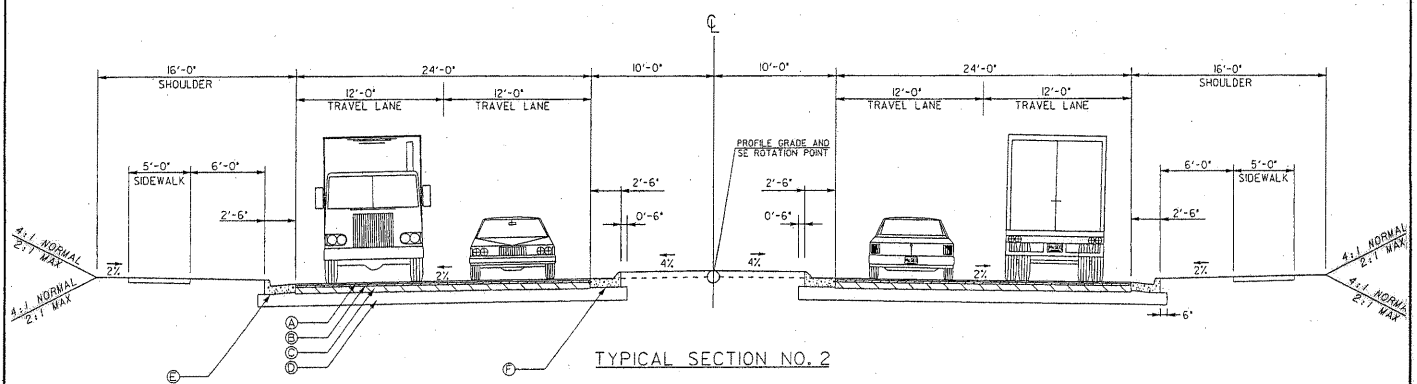
ORIGINAL DESIGN ☑ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 5



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

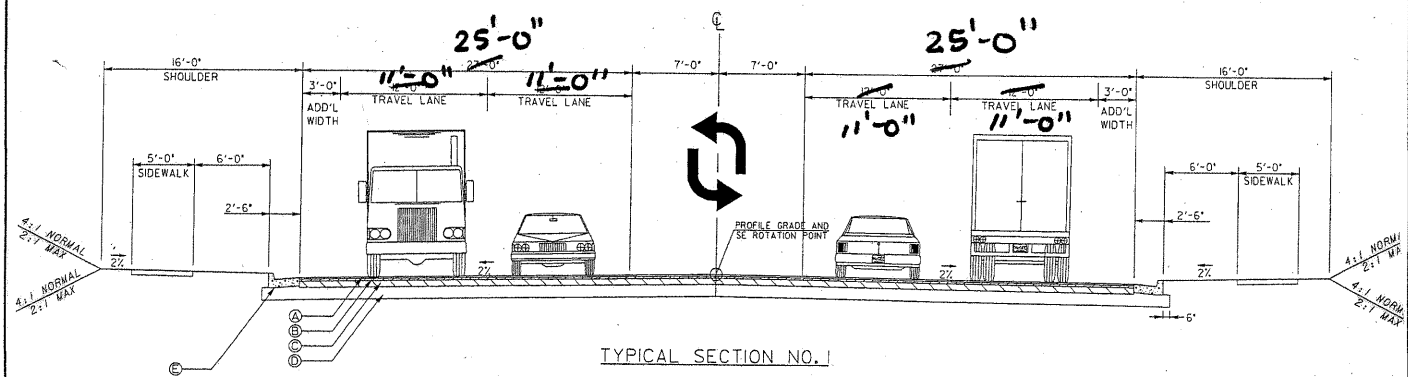
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-7

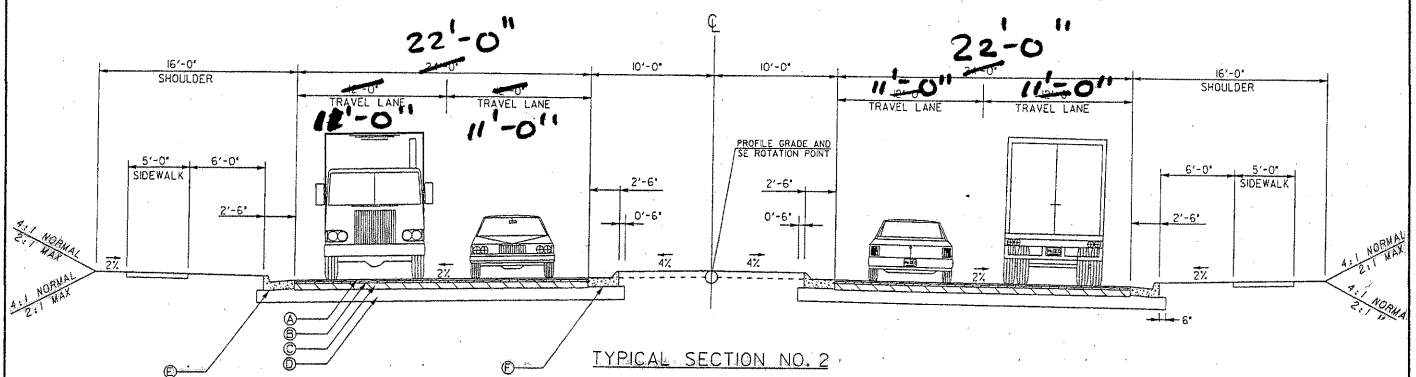
ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐

SHEET NO.: 3 of 5



TYPICAL SECTION NO. 1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2

STA 171+19.23 TO STA 184+54.79

NOTE:
SAVES 4 FT OF PAVEMENT
" 4 FT OF ROW

CALCULATIONS

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-7

SHEET NO.: 4 of 5

Total Pavement length:

185+60 - 106+00 = 7,960'

Total Pavement width saved:

4 (12' - 11') = 4'

Total square yard of pavement saved:

7,960 x 4/9 = 3,537.7̇

Total Square feet of R/W saved:

7,960 x 4 = 31,840

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-7

DESCRIPTION:

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
A.C. Pavement	SY	3,537.7	45.00	159,200			
10% Markup	SF			15,920			
Sub-total:				175,120			
R/W Cost	SF	31,840	10.00	318,400			
Subtotal							
Markup (%) at							
TOTAL				493,520			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-8**

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

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The original design uses 8 in. x 30 in. curb and gutter throughout the project.

ALTERNATIVE: (Sketch attached)

Use 8 in. x 24 in. curb and gutter throughout the project.

ADVANTAGES:

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

DISADVANTAGES:

- Reduces offset between travelway and face of curb
- Reduces gutter capacity

DISCUSSION:

The current design uses 8 in. x 30 in. curb and gutter. It would be a cost savings for both construction and right-of-way acquisition to use a reduced 8 in. x 24 in. curb and gutter. Most local governments in Georgia use 8 in. x 24 in. and many other states use 8 in. x 24 in. curb and gutter to reduce roadway costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 652,030	—	$ 652,030
ALTERNATIVE	$ 353,760	—	$ 353,760
SAVINGS (Original minus Alternative)	$ 298,270	—	$ 298,270

CALCULATIONS

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-8

SHEET NO.: 2 of 3

8"x24": use $12/LF from GDOT Item Means Summary.

8"x30": use $19/LF from Project Cost Estimate.

R/W (Savings) or add'l R/W for 8"x30" section

30" - 24" = 6" = .5'

(along 20' median section) .5' x 4 lines of c&s = 2'

from STA 171+19 to 184+55

along 14' median 2 lines of c&s

.5' x 2 Lines of c&s = 1'

STA 106+00 to STA 171+19

R/W = (1,336' x 2') + (6,519' x 1') = 9,191 SF

$10/SF (includes R/W markup)

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-8

DESCRIPTION:

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
Add'l Cost for Original or "As-Designed" Typ Section	SF	9,191	$10/SF (Includes mkup)	91,910			
8" x 30" c&g	L.F.	26,800	$19/LF	$509200			
8" x 24" c&g	L.F.				26800	$12/LF	$321,600
R/W (Includes Markup)				$91,910			
Construction Subtotal				$509,200			$321,600
Markup (%) at 10% Construction				$50,920			$32,160
TOTAL				$652,030			$353,760

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-10**

DESCRIPTION: **MINIMIZE DIMENSIONS FOR REDUCED TYPICAL SECTION.**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current typical section uses all desirable dimensions for lanes, median, and shoulders.

ALTERNATIVE: (Sketch attached)

Use acceptable minimum dimensions for a "bare bones" typical section to reduce impacts including 11-ft. lanes, 12-ft. median lane, 12-ft. shoulders, and 2-ft. curb and gutter.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way cost
- Reduces right-of-way impacts

DISADVANTAGES:

- Implies reduced safety
- Requires exceptions and/or variances

DISCUSSION:

The alternative "bare bones typical section "A" is proposed to reduce construction and right-of-way costs, especially since the right-of-way is the highest cost item.

The alternative lane width of 11 ft. is not without precedent, especially on low-speed urban projects. The 8 in. x 24 in. curb and gutter is used on most local urban roads in Georgia and many other states. This alternative eliminates the extra 3 ft. in each direction.

The alternative "A" type section would be 80 ft. shoulder-to-shoulder.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 2,745,303	—	$ 2,745,303
ALTERNATIVE	$ 353,760	—	$ 353,760
SAVINGS (Original minus Alternative)	$ 2,391,543	—	$ 2,391,543

SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

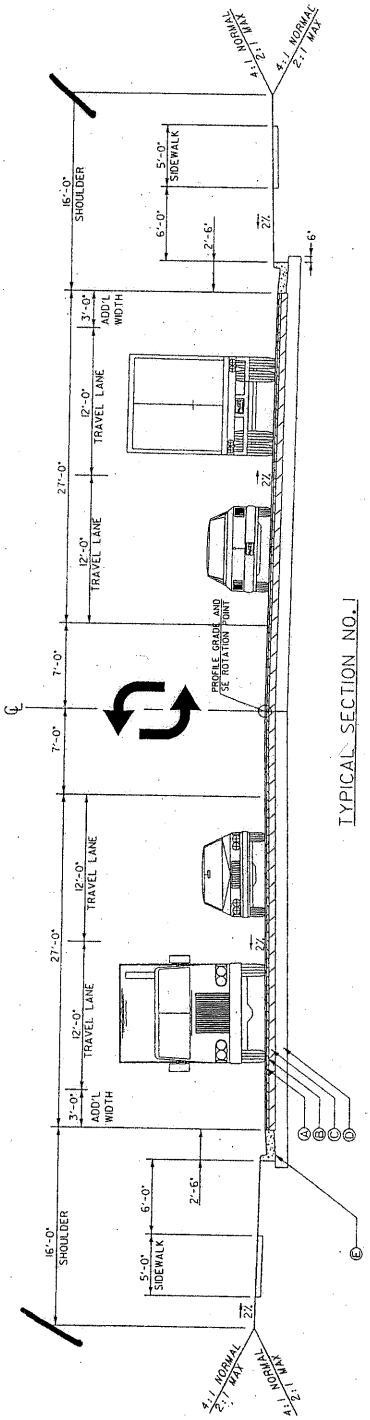
ALTERNATIVE NO.: S-10

ORIGINAL DESIGN ☒ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 5

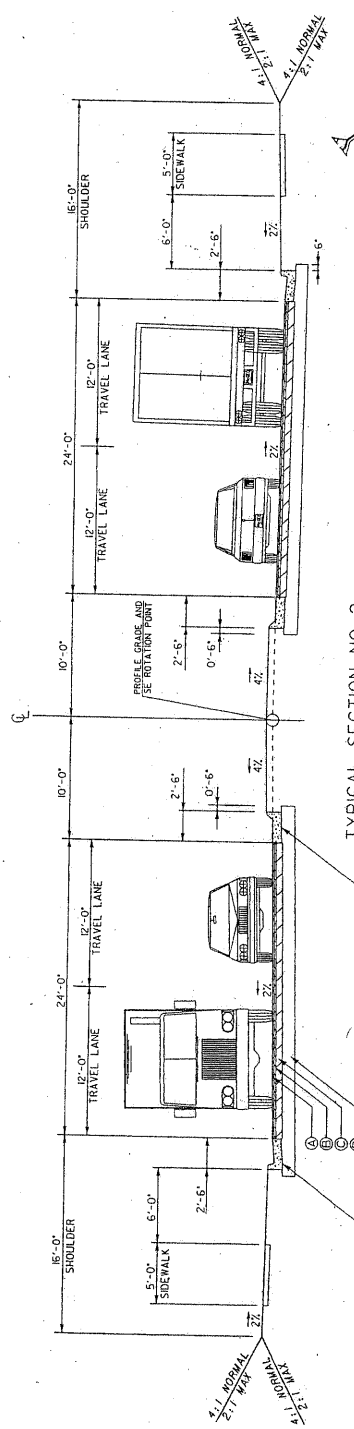
"As - Designed"

100FT. SECTION



TYPICAL SECTION NO.1

STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO.2

STA 171+19.23 TO STA 184+54.79

PRELIMINARY

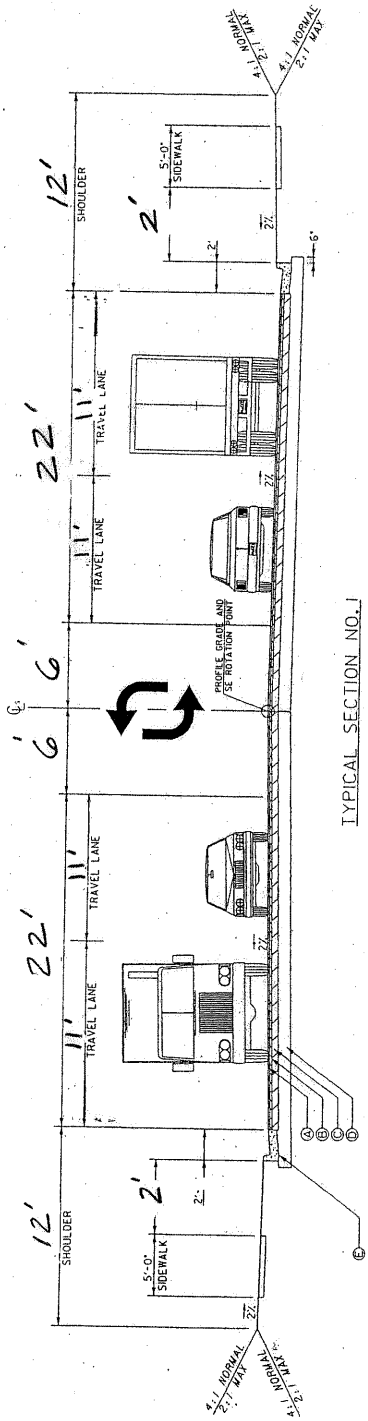
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

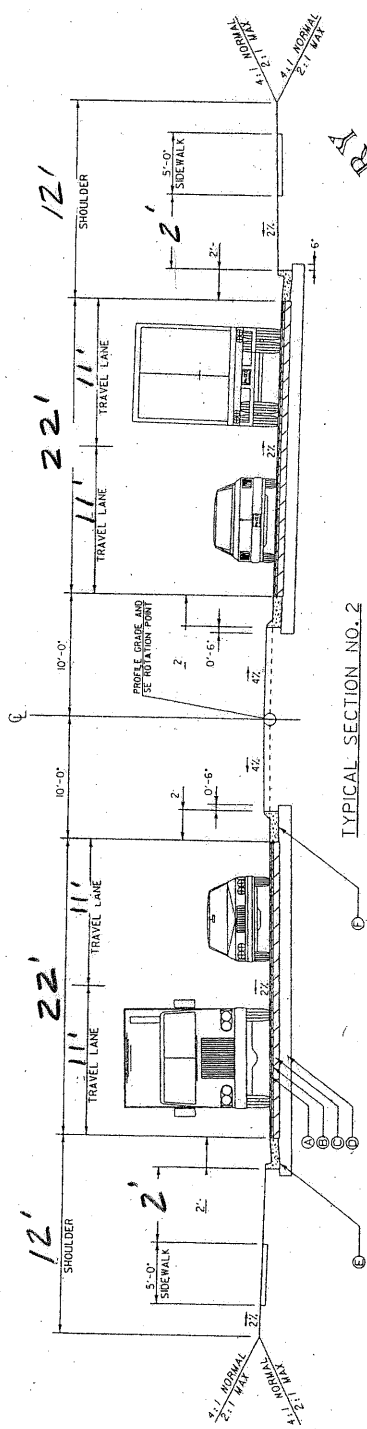
ALTERNATIVE NO.: S-10

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐ SHEET NO.: 3 of 5

VE Alternate "1" Typical Section



TYPICAL SECTION NO. 1
STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2
STA 171+19.23 TO STA 184+54.79

PRELIMINARY

N.T.S.

CALCULATIONS

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: S-10

SHEET NO.: 4 of 5

Original extra costs for "As designed" Typical Section over the Alt. ("Bare Bones") Typ. Section.

(Pavement Section) SAVE 4' (on 4 EA. 11' ft Lanes) thru the whole project
SAVE 2' (on 12' median versus 14') to Station 170+00 ±
SAVE 6' (on eliminating 3' EXTRA width in each direction)

Pavement Savings: $\left(\frac{4' \times 1.46\,mi. \times 5{,}280'/mi.}{9\,SF/SY}\right) + \left(\frac{(2'+6') \times 6{,}400'}{9\,SF/SY}\right) = 9{,}116\,SY$

→ Assume 10 EA (X-drains) @ 20 L.F shorter = 200 L.F savings

Savings on Curb & Gutter
8"x30" "As designed" ($19.00/LF) versus 8"x24" 2 Alt. ($12.00/LF) ← from GDOT Item Means Summary

$19.00/LF − $12.00/LF = $7/LF (Add'l cost for "As designed" or savings)

"As-designed" Typ. Section 100' width slope to slope
"Alternate A" Typ. Section 80' width slope to slope
Savings of 20' use 20'/100' = 20% of Lumpsum (Savings)
Large construction items such as: Grading complete, Permanent Erosion Control; and Temporary Erosion Control.
Also 20's savings on drainage X-drains.

R/W Also Save 20' of R/W. 20' x 1.46 mi x 5,280'/mi. =
= 154,176 SF (Use $10/SF (includes markup))

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-10

DESCRIPTION:

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Original design							
Extra Cost over							
Alt. "A" Typical							
Pavement Section	SY	9116	$45/SY	$410,220			
SAUings: 8"x24"							
" 8"x30" Curb&Gutter	LF	26,800	$19/LF	$509,200			
VS 8"x24" " "	LF				26,800	$12/LF	$321,600
Add'l x-dr Pipe	LF	200	$50/LF	$10,000			
Grading Compl.	L.S.	20%	$486,050	$97,210			
see Calculation							
Peermanent Eros Control	total	20%	$90,518	$18,100			
Temp Eros Control	total	20%	$246,984	$49,400			
		Constr. subtotal		$1,094,130			
Add'l R/W Required							
for "As-designed"							
over Alt. "A" design	SF	154176	$10/SF	$1,541,760			
			incl. R/W markup				
(incl mkup) R/W total				$1,541,760			
Construction Subtotal				$1,094,130			$321,600
Markup (%) at 10% (Construction)				$109,413			$ 32,160
TOTAL				$2,745,303			$353,760

VALUE ENGINEERING ALTERNATIVE

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALTERNATIVE NO.: **S-11**

DESCRIPTION: **MINIMIZE DIMENSIONS FOR REDUCED TYPICAL SECTION**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current typical section uses all desirable dimensions for lanes, median, and shoulders.

ALTERNATIVE: (Sketch attached)

Use acceptable minimum dimensions for a reduced typical section but maintain the desirable 14-ft. flushed median and 12-ft. inside lanes. Also use 8 in. x 24 in. curb and gutter in lieu of 8 in. x 30 in.

ADVANTAGES:

- Reduces construction cost
- Reduces right-of-way cost
- Reduces right-of-way impacts

DISADVANTAGES:

- Implies reduced safety
- Requires exceptions and/or variances

DISCUSSION:

The alternative "bare bones typical section "B" is proposed to reduce construction and right-of-way costs, especially since the right-of-way is the highest cost item. This alternate reduces the shoulders to 12 ft. and the outside lanes to 11 ft. and eliminates the extra 3 ft. of pavement in each direction (future median).

The alternative "B" type section would be 84 ft. shoulder-to-shoulder.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 2,251,640	—	$ 2,251,640
ALTERNATIVE	$ 353,760	—	$ 353,760
SAVINGS (Original minus Alternative)	$ 1,897,880	—	$ 1,897,880

SKETCH

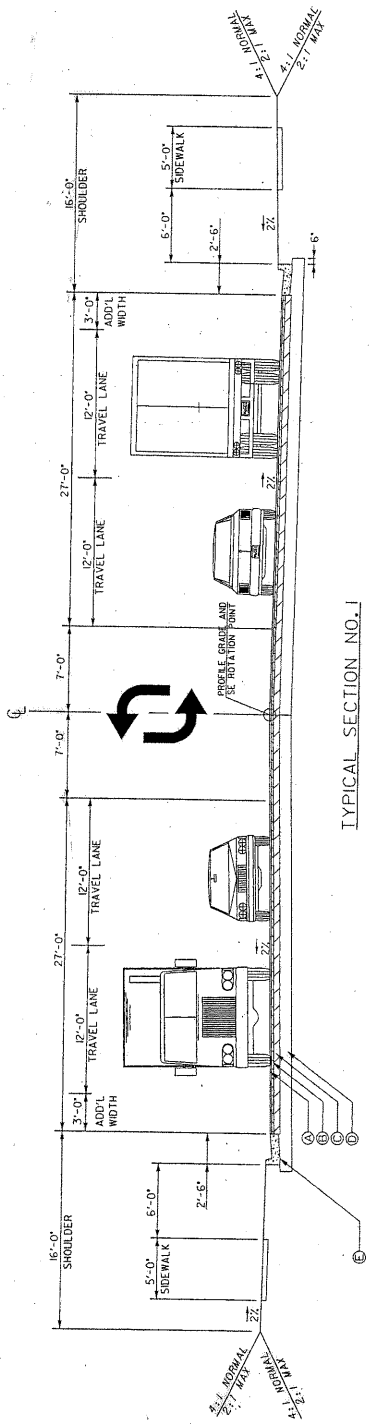
PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: S-1P

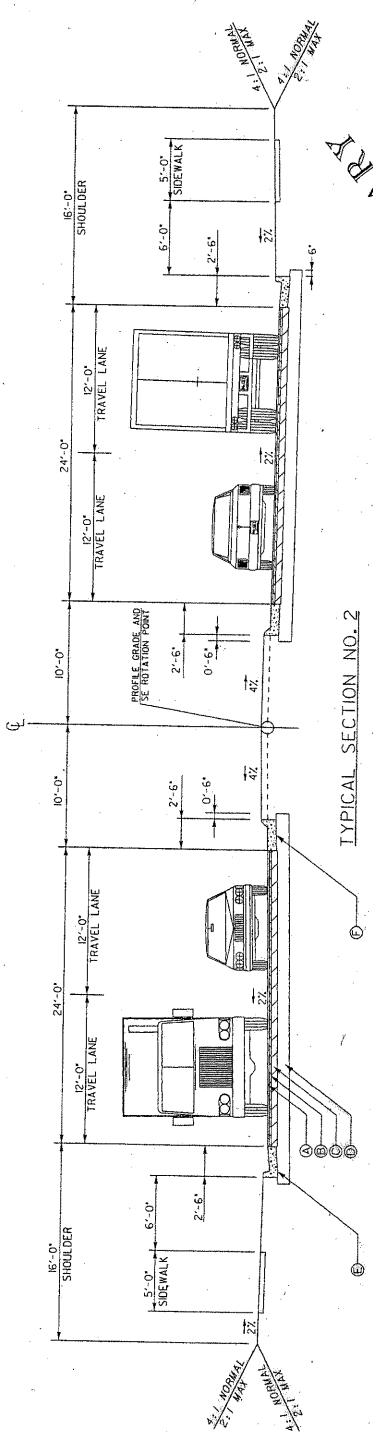
ORIGINAL DESIGN ☒ ALTERNATIVE DESIGN ☐ BOTH ☐

SHEET NO.: 2 of 5

"As- Designed"



TYPICAL SECTION NO. 1
STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2
STA 171+19.23 TO STA 184+54.79

PRELIMINARY

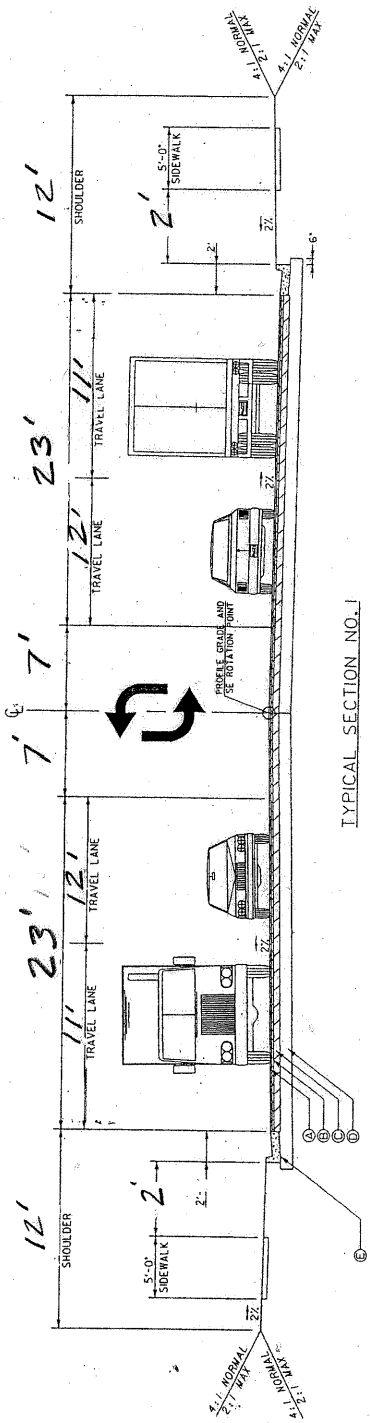
SKETCH

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

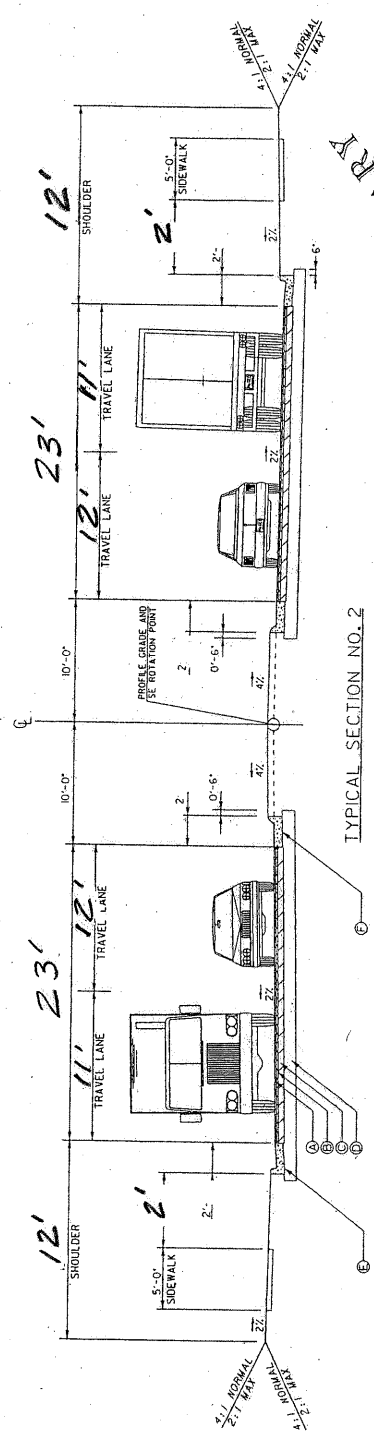
ALTERNATIVE NO.: S11

ORIGINAL DESIGN ☐ ALTERNATIVE DESIGN ☒ BOTH ☐ SHEET NO.: 3 of 5

VE Alternate "2" Typical Section



TYPICAL SECTION NO. 1
STA 106+00.00 TO STA 171+19.23
STA 184+54.79 TO STA 185+60.00



TYPICAL SECTION NO. 2
STA 171+19.23 TO STA 184+54.79

PRELIMINARY

CALCULATIONS

PROJECT:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	ALTERNATIVE NO.: S-11
		SHEET NO.: 4 of 5

Original extra costs for "As-designed" Typical Section over the Alt. "B" Reduced Typ Section.

SAVE 2' (on EACH outside 11' Lanes)

SAVE 6' (eliminate extra 3' in each direction) to STA 170+00

Pavement Savings $\left(\frac{2' \times 1.46 \text{ mi.} \times 5{,}280'/\text{mi}}{9 \text{ SF/SY}}\right) + \left(\frac{6' \times 6{,}400}{9 \text{ SF/SY}}\right) = 6{,}194 \text{ SY}$

$= 6{,}194$ SY

Assume 10 EA (x-drains) @ 16 L.F. shorter = 160 L.F. Pipe Savings

Savings on Curb & Gutter: 8"x24" vs. 8"x30"

"As-designed" Typical Section 100' width shldr to shldr

Alternate "B" Typical Section 84' width shldr to shldr

Savings of 16' use $\frac{16'}{100'} = 16\%$

Use 16% for (Savings) or Add'l cost for "as designed" Typ. over Alt. "B" Typical Section. for Large construction items such as: Grading Complete Permanent Erosion Control; and Temporary Erosion Control

R/W (SAVE) or Add'l R/W for "As-designed" Typ. Section (100') over Alternate "B" Typical Section (84')

$16' \times 1.46 \text{ mi.} \times 5{,}280'/\text{mi} = 123{,}340$ SF

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: S-11

DESCRIPTION:

SHEET NO.: 5 of 5

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Original design							
Extra Cost for							
"As-Designed" over							
Alt. "B" Typical							
Pavement Section Savings	SY	6149	$45/SY	$276,705			
8"x30" Curb & gutter	LF	26,800	$19/LF	$509,200			
US 8"x24" " "	LF				26800	$12	$321,600
Add'l x-drain pipe	LF	160	$50/LF	$8,000			
Grading Complete	LS	16%	$486,050	$77,768			
Permanent Eros. Control (Seed)		16%	$90,518	$14,482			
Temp. Eros Control	TOTAL	16%	$246,984	$39,517			
		Construction Subtotal		$925,672			
Add'l R/W Required for "As-designed" over Alt "B" Typical	SF	123,340	$10/SF	$1,233,400			
(include Markup) R/W total				$1,233,400			
Construction Subtotal				$925,672			$321,600
Markup (%) at 10% Construction				$92,568			$32,160
TOTAL				$2,251,640			$353,760

SUMMARY OF VE ALTERNATIVES

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
CONSTRUCTION MANAGEMENT (CM)						
CM-1	Allow the contractor to use one of the total take right-of-way parcels for a project laydown area. Available structures may be possibilities for a job office.	DESIGN SUGGESTION				
CM-3	Reduce the cost estimate quantity of concrete from 10,000 CY to 5,000 CY.	COST ESTIMATE COMMENT				

VALUE ENGINEERING ALTERNATIVE

PROJECT:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	ALTERNATIVE NO.:	**CM-1/ CM-2**
DESCRIPTION:	**PROVIDE A LAY-DOWN AREA FOR CONTRACTOR'S OFFICE AND MACHINERY**	SHEET NO.:	**1 of 1**

ORIGINAL DESIGN:

No lay-down area is suggested where the contractor can mobilize its office, equipment and machinery at the beginning and during the construction.

ALTERNATIVE:

A number of right-of-way parcels will be acquired to widen Hamilton Road. Buildings on these parcels will be demolished. It is suggested that some of the bigger parcels like the one at the beginning of the project at Station 110+00 (Foster's Body Shop) be used as the contractor's office and lay-down area for machinery.

At the other end of the project, the parcel at Station 185+00 would be a good location for the same purpose. The parcels between Stations 140+00 and 146+00 provide a central location to establish a construction office, equipment and machinery and associated personnel.

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:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	ALTERNATIVE NO.:	**CM-3**
DESCRIPTION:	**REDUCE AMOUNT OF "A" CONCRETE FROM 10,000 CY TO 50,000 CY**	SHEET NO.:	**1 of 3**

ORIGINAL DESIGN:

The present design and more specifically the cost estimate quantities call for 10,000 cubic yards (cy) of Class "A" concrete.

ALTERNATIVE:

Reduce the amount of Class "A" concrete to 5,000 cy.

ADVANTAGES:

- Provides a more realistic construction cost estimate

DISADVANTAGES:

- None apparent

DISCUSSION:

The present cost estimate quantity of Class "A" (10,000 cy) appears to be high and results in $6,300,000 of the construction cost.

Upon reviewing the proposed retaining walls and existing possible concrete box culverts, it is estimated that the Class "A" concrete would be much less, at 5,000 CY at the most.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 6,608,470	—	$ 6,608,470
ALTERNATIVE	$ 3,304,235	—	$ 3,304,235
SAVINGS (Original minus Alternative)	$ 3,304,235	—	$ 3,304,235

CALCULATIONS

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: CM-3

SHEET NO.: 2 of 3

Original: 10,000 cy of Class "A" Concrete
Alternate: 5,000 cy of Class "A" Concrete
Use: $600.77/cy ← from project cost estimate

COST WORKSHEET

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING**
Project No. NH-017-1(20), Troup County, Georgia

ALTERNATIVE NO.: CM-3

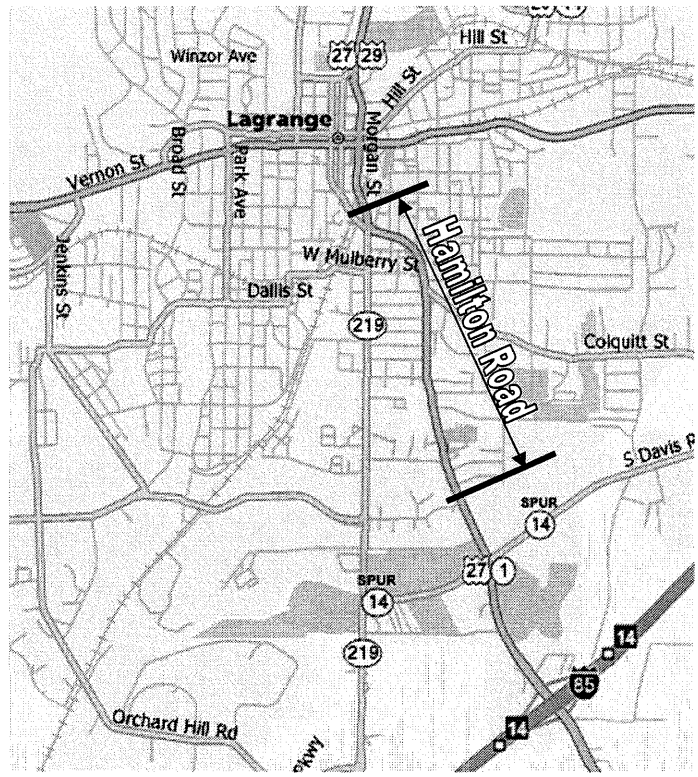
DESCRIPTION:

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
Original Class "A" Conc.	cy	10,000	$600.77	$6,007,700			
Alt. CM-3 Class "A" Conc	cy				5,000	600.77	$3,003,850
Construction Subtotal				$6,007,700			$3,003,850
Markup (%) at 10%				600,770			$300,385
TOTAL				$6,608,470			$3,304,235

PROJECT DESCRIPTION

The US 27/SR 1 Hamilton Road Widening project is a 1.4-mile-long corridor located in LaGrange, Georgia, which currently consists of a two-lane urban roadway in a mixed residential and commercial area. The project extends from Auburn Street on the north to SR 219 on the south and will widen the two-lane section to four lanes using 12-ft. lanes, a 20-ft. raised median, and sidewalks on both sides. The corridor provides a much needed north-south multi-lane facility through a growing urban area. Two alignment options were investigated, symmetrical widening and widening only to the east. Symmetrical widening would impact a substantial number of residents on both sides of the roadway, but widening only on the east reduces the number of impacted properties nearly in half.



Some realignment will be necessary at the curve near the intersection of Tower Street, Fannin Street, and Union Street to avoid impacting the historic Epps House located in the southwest corner of the SR 1/US 27/Hamilton Road and Fannin Street intersection. Both Fannin Street and Union Street will be realigned to form a four-legged intersection with traffic control. Also, a cul-de-sac will be constructed at Tower Street to reduce traffic movements and improve safety for traffic and pedestrians on this congested stretch of the mainline.

Traffic volumes along Hamilton Road are currently at 17,700 with Design Year (2024) projections of 29,600. This project will greatly improve the Level of Service along the mainline while providing full sidewalks.

The estimated construction cost is $18.2 million, with right-of-way estimated at an additional $35 million.

VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

This section describes the procedures used during the value engineering study on the US 27/SR 1 Hamilton Road Widening Project. It is followed by separate narratives and conclusions concerning:

- Value Engineering Study 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 that outlines each of the procedures included in the VE study is attached for reference.

PREPARATION EFFORT

Pre-study preparation for the VE effort consisted of scheduling study participants and tasks and gathering necessary project documents from the McGee Partners 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 McGee 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 November 27, 2007 and the final VE team presentation on November 30, 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 includes six phases:

- Information Phase (including function analysis, discussions of project purpose and need)
- Speculation Phase
- Analysis Phase
- Development Phase
- Presentation Phase
- Implementation Phase

Value Engineering Study Task Flow Diagram

Pre-workshop Effort (Week Prior to Study)

Plan VE Study

- Obtain Project Documents
- Verify VE Schedule and Agenda
- Suggest Format for Designer Presentation
- Outline Project Responsibilities
- Establish Owners Performance and Acceptance Requirements
- Conduct Coordination Meeting
- Identify Project Constraints

Prepare for Workshop

Distribute Documents to Team Members; Drawings, Specifications, Cost Estimates, Design Criteria, Site Conditions, Utilities, Operation & Maintenance Issues.

Team Members Become Familiar with Project

Prepare Cost, LCC, & Energy Models

Team Leader Reviews Cost Estimate and Prepares:

- Cost Models
- Pareto Models
- Identify High Cost Areas
- Life Cycle Costs

Workshop Effort (3 - 5 Days)

Information Phase

VETL Opens Workshop

Identifies schedule, objectives, and report format.

- Designer Gives Project Presentation
- Discuss Owner Requirements
- Review Project Data
- Identify Objectives of Study
- Conduct Site Visit

Information Phase

- Review Cost, LCC, and Energy Models
- Perform Function Analysis/FAST Diagram
- Calculate Cost/Worth of Each Function
- Identify Areas of High Cost/Low Value

List Ideas Generated During Function Analysis

Speculation Phase

Generate a List of Ideas to Meet Required Functions

VETL Introduces Creative Thinking Seek:

- Quantity of Ideas
- Association of Ideas
- Brainstorm Project
- Do Creative Thinking
- Group Thinking
- Individual Thinking
- Examine Project Functionally

Analysis Phase

Evaluate Each of the Ideas Against Functional Requirements

Screen Out Less Promising Ideas

- Rank Ideas
- List Advantages
- Disadvantages
- Potential for Acceptance

Develop Best Ideas

Development Phase

Develop Proposed Alternatives

Prepare Sketches
Cost Estimates

Perform Life Cycle Cost Comparison

- Initial Cost
- O&M Cost
- LCC Cost

Consult with Owner

Ensure Concept is Valid
Verify Assumptions

Presentation Phase

Summarize Findings

Meet with Owner, User, Designer

Provide Written Alternatives for Preliminary Review by Owner and Consultants

Present Each VE Alternative For Consideration

Post-Workshop Effort (Follow-on Schedule)

Implementation Phase

Prepare Draft VE Report Within 2-Weeks
Include All Back-up Information of Study

- Methodology of the Analysis
- Summary of Recommendations
- Details of Estimated Costs and Life Cycle Costs
- Submit Report to Owner and Designer

Owner's Review Board

Owner Makes Final Decisions

- Accept
- Reject
- Further Study
- Modify

Record all Meeting Minutes

Final VE Report

Prepare Final VE Report With Results. Include Summary of Accepted Alternatives.

Revise Capital and LCC Costs as Necessary

List Reasons for Rejection of any Alternatives
Submit Final VE Report

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 McGee 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:

- Preliminary Design Submittal - Plan and Profile of the US 27/ SR 1 Hamilton Road Widening, dated November 2007, prepared by McGee Partners, Inc.
- Revised Project Concept Report, dated July 16, 2002, prepared by GDOT
- Revised Project Concept Report, dated May 14, 1998, prepared by GDOT
- Project Concept Report, dated December 13, 1991, prepared by GDOT
- Project Cost Estimate Report, dated October 25, 2007, prepared by McGee Partners, Inc.
- Environmental Commitments/Requirements, dated August 3, 2007, prepared by GDOT
- Traffic Counts, prepared by Grice & Associates, dated November 2007

Function Identification and Analysis Phase

This VE study phase involves 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 were compared to the as designed drawings for general conformance of the typical section.

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

The VE team would have liked to develop all 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 of 5 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 a descriptive evaluation of the advantages and disadvantages of the proposed alternatives. Each alternative was written with a brief narrative to compare the original design to the proposed change. Sketches and design calculations, where appropriate, were also prepared in this part of the study. 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 November 30, 2007 and included personnel from GDOT and representatives from the McGee design team. During the meeting, a handout was distributed that included a summary listing of the VE study Alternatives and Design Suggestions. These documents were presented 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 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 Design Submittal of the US 27/SR 1 Hamilton Road Widening, Troup County, Georgia. The Georgia Department of Transportation (GDOT) project management staff and the McGee Partners, Inc. 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 November 27 - 30, 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, November 27, 2007

8:00 am - 9:00 am **VE Team Members Review Documents**

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.

Tuesday, November 27, 2007 (Continued)

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, November 28, 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, November 29, 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 McGee Partners design team representatives. The team will review all documentation and prepare for the presentation.

Friday, November 30, 2007

8:00 am - 9:00 am **Development Phase and Preparation for Presentation**

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 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 McGee Partners 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®	VE Team Leader/Civil	Lewis & Zimmerman Assoc.
Joe Leoni, PE	Highway Design Engineer	ARCADIS
Paresh Parikh, PE	Construction Engineer	Delon Hampton

VALUE ENGINEERING WORKSHOP PARTICIPANTS

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

VE Team		
Joe Leoni, PE	Highway Design Engineer	ARCADIS U.S., Inc.
Paresh Parikh, PE	Construction Engineer	Delon Hampton
David Hamilton, PE, CVS, LEED® AP	VE Team Leader/Civil	Lewis & Zimmerman
Project Designer		
Laury Jill Hodges, PE	Project Manager	McGee Partners, Inc.
GDOT		
Lisa Myers	VE Coordinator	GDOT
Robert Reid, PE	Project Manager	GDOT

DESIGNER'S PRESENTATION

An overview of the project was presented on Tuesday, November 27, 2007 by the McGee Partners 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, drainage 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, November 30, 2007 to review the VE alternatives with the GDOT project management and design staff. The attendees received a copy of the Presentation Outline, and Summary of Potential Cost Savings. An attendance list for the meeting is attached.

VE STUDY SIGN-IN SHEET

Project No.: NH-017-1(20) County: Troup PI No.: 322250 Date: 11/26-29/07

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
Lisa L. Myers	00244168	Engineering Services	404-651-7468	lisa.myers@dot.state.ga.us
DANE HAMILTON		LEWIS & ZIMMERMAN	253.925.8741	DAHAMILTON @ LZA.COM
Emmanuella Myrthil	00841437	DOT/ OEL	404.699.6967	emmanuella.myrthil@dot.state.ga.us
Laura Rish	00901402	GDOT/OEL	404-699-4439	Laura.Rish@...
Jill Hodges		McGeePartners	770-938-6400	jhodges@mcgeepartners.com
LOWELL JAMES	00732208	OFFICE OF CONSULTANT DES.	4-656-5464	LOWELL.JAMES@DOT.STATE@DOT.sbfa.gov
Paresh J. Parikh		Delon Hampton & Associa	4)524-8030	pparikh@delonhampton.com
Cynthia Burney	00335140	GDOT / TO	4-635-8149	cynthia.burney@dot...
Joe Leoni		ARCADIS	7-431-8666	Joe.Leoni@ARCADIS-US.com
ROBERT REID		GDOT / OCD	6-5397	ROBERT.REID@DOT-STATE-GA.US
STANLEY HILL	00232993	GDOT/ OCD	6-6109	Stanley.Hill@dot.state.ga.us
Babs Abubakari	00274429	GDOT/ OCD	3-6133	Babs.abubakari@dot

VE PRESENTATION

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING PROJECT**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal - Value Engineering Study

DATE: **30 NOVEMBER 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
Jill Hodges em jhodges@mcgeepartners.com	McGee Partners	ph 7709386400 mob fx 770 938 6333
Greg Ramsey em gramsey@mcgeepartners.com	McGee Partners	ph 770-938-6400 mob fx 770-938-6333
Paresh J. Parikh em pparikh@delonhampton	Delon Hampton & Associates, Chartered	ph (404) 419-8434 mob fx (404) 524-2575
Joe Leoni em JLeoni@ARCADIS-US.com	ARCADIS Roadway QA/QC Engr.	ph 7-431-8666 mob fx 7-435-2666
Stanley Hill em Stanley.Hill@dot.state.ga.us	GADOT / OCD	ph 4-656-6109 mob fx
Ron Wishon em ron.wishon@dot.state.ga.us	GDOT ENG. SRVCS	ph 404-651-7470 mob fx
Robert Reid em ROBERT.REID@DOT.STATE.GA.US	GDOT / OCD	ph 4(656-5397 mob fx
Lowell James em lowell.james@DOT.STATE.GA.US	GDOT / OCD	ph 4(656-5404 mob fx

VE PRESENTATION

PROJECT: **US 27 / SR 1 HAMILTON ROAD WIDENING PROJECT**
Project No. NH-017-1(20), Troup County, Georgia
Preliminary Submittal - Value Engineering Study

DATE: **30 NOVEMBER 2007**

NAME & E-MAIL (please print)	ORGANIZATION/TITLE	PHONE/FAX
Tommy Crochet em tcrochet@mcgeepartners.com	McGee Partners	ph 770-938-6400 mob fx
em		ph mob fx
em		ph mob fx
em		ph mob fx
em		ph mob fx
em		ph mob fx
em		ph mob fx
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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 2008
Bond (Discount) Rate:	3.1%
Inflation/Escalation Rate:	0.0% (Constant dollar method)
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

Right-of-way is scheduled to be complete in 2009, with construction beginning in 2010. 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 study included impacts of 30-year present worth cost for major elements, however, no life cycle calculations were completed.

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 the GDOT design team. The unit prices contained in the estimate are considered to include all contractor mark-ups, mobilization, overhead, and profit. A markup of 10% was added to account for engineering and construction services.

COST MODEL

The US 27/SR 1 Hamilton Road Widening Project will greatly improve safety and capacity along the alignment in LaGrange while reducing accidents caused by deficiencies in the corridor. To achieve these benefits, a considerable investment in the infrastructure is required, including construction of a four-lane section, raised median, signalized intersections, addition of sidewalks, and acquisition of the needed right-of-way. The total construction cost of the project is estimated at approximately $18 million, plus right-of-way in the amount of $35 million. Since the cost of right-of-way is approximately twice the cost of the required construction, the total width of the section must be reviewed carefully to ensure proper investments are made.

The data used to analyze costs by design element are presented on the attached Cost Histogram table. To gain an overview of the total project cost, a 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:

Roadway Section

- Minimize right-of-way if possible
- Consider multi-use path
- Consider 88-ft. section in lieu of 100 ft.

Profile

- Lower profile at Station 175+00
- Lower profile at Stations 132 thru 140
- Use shorter retaining wall – re-grade

Drainage

- Review scope of box culverts

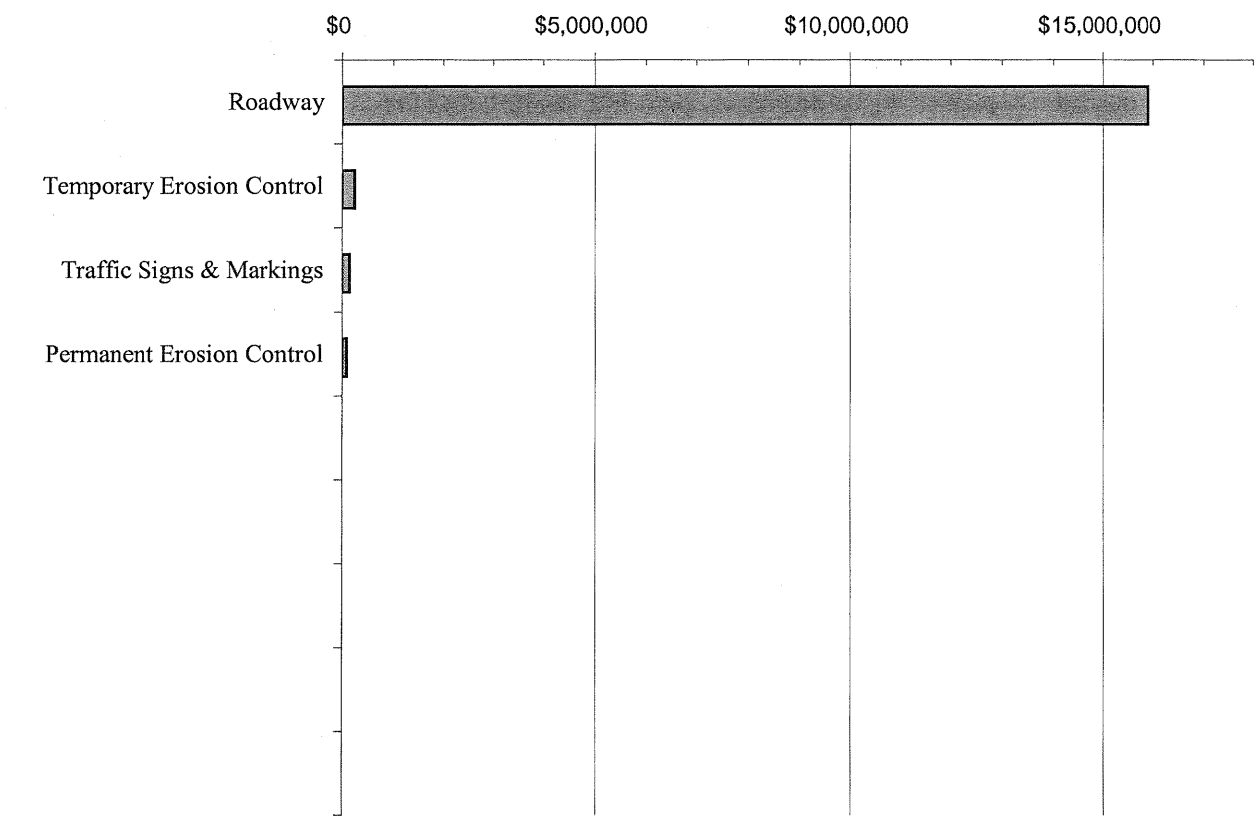
Construction Management

- Bid job as one large contract
- Reduce estimate for CIP concrete
- Reduce amount of right-of-way needed

COST HISTOGRAM

PROJECT: **US 27/SR 1 - HAMILTON ROAD WIDENING**
Troup County, Georgia

TOTAL PROJECT		COST	PERCENT	CUM. PERCENT
Roadway	80%	15,887,287	97.06%	97.06%
Temporary Erosion Control		246,983	1.51%	98.57%
Traffic Signs & Markings		143,198	0.87%	99.45%
Permanent Erosion Control		90,518	0.55%	100.00%
Construction and Right of Way Subtotal		***16,367,986***	100.00%	
E&C Rate (Applied to construction cost only)	10.00%	1,636,799		
Right of Way		35,189,000		
Reimbursable Utilities		46,200		
TOTAL CONSTRUCTION & RIGHT-OF-WAY		**$ 53,239,985**	Comp Markup:	



COST HISTOGRAM

PROJECT: **US 27/SR 1 - HAMILTON ROAD WIDENING**
Troup County, Georgia

ROADWAY ONLY	COST	PERCENT	CUM. PERCENT
Class A Concrete	6,320,101	39.78%	39.78%
Recycled Asphalt 25mm Superpave	1,862,109	11.72%	51.50%
Gr. Aggregate Base Course	1,088,910	6.85%	58.36%
Traffic Control	681,511	4.29%	62.65%
Recycled Asphalt 19mm Superpave	611,241	3.85%	66.49%
Reinforcing Steel	524,896	3.30%	69.80%
Concrete Curb & Gutter, 8 in x 30 in	510,272	3.21%	73.01%
Concrete Median	508,885	3.20%	76.21%
Recycled Asphalt 12.5mm Superpave	487,504	3.07%	79.28%
Grading Complete	486,050	3.06%	82.34%
Traffic Signal Installation	465,000	2.93%	85.27%
Concrete Sidewalk	437,230	2.75%	88.02%
Catch Basins, GP 1	361,976	2.28%	90.30%
Storm Drain Pipe - 18 in	348,790	2.20%	92.49%
Storm Drain Pipe - 24 in	333,525	2.10%	94.59%
Mill Asphalt Concrete Pavement	161,005	1.01%	95.60%
Precast Concrete Barrier Median	150,000	0.94%	96.55%
Found Backfill Material	103,725	0.65%	97.20%
Field Engineers Office	76,830	0.48%	97.69%
Concrete Valley Gutter, 6 in	72,231	0.45%	98.14%
Drop Inlets	71,776	0.45%	98.59%
Right of way Markers	32,845	0.21%	98.80%
Driveway Concrete	31,830	0.20%	99.00%
Galv. Steel Pipe Handrail	28,447	0.18%	99.18%
Catch Basins, GP 1, Additional Depth	27,120	0.17%	99.35%
Storm Drain Pipe - 48 in	25,447	0.16%	99.51%
Flared End Section - 24 in Storm	25,000	0.16%	99.67%
Storm Drain Pipe - 36 in	17,358	0.11%	99.78%
Recycled Asphalt Concrete Leveling Course	13,010	0.08%	99.86%
Guardrail, TP W	9,143	0.06%	99.91%
Bitum Tack Coat	8,380	0.05%	99.97%
Flared End Section - 18 in Storm	2,689	0.02%	99.98%
Guardrail Anchorage, TP 12	1,802	0.01%	100.00%
Guardrail Anchorage, TP 1	635	0.00%	100.00%
Construction Cost Only	***$ 15,887,273***	100.00%	
TOTAL CONSTRUCTION COST ONLY		Comp Markup:	

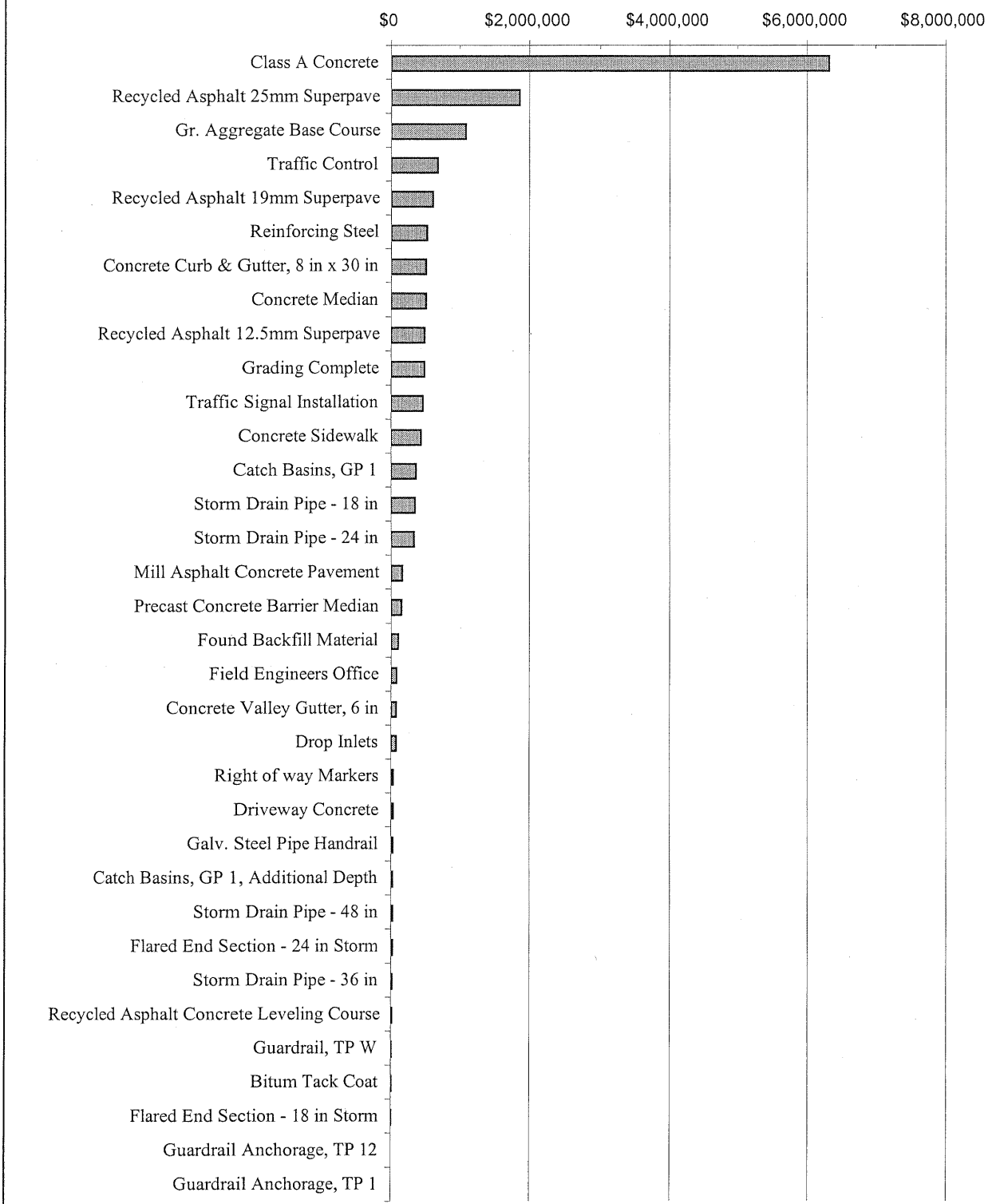
80%

COST HISTOGRAM

PROJECT: **US 27/SR 1 - HAMILTON ROAD WIDENING**
Troup County, Georgia

ROADWAY ONLY

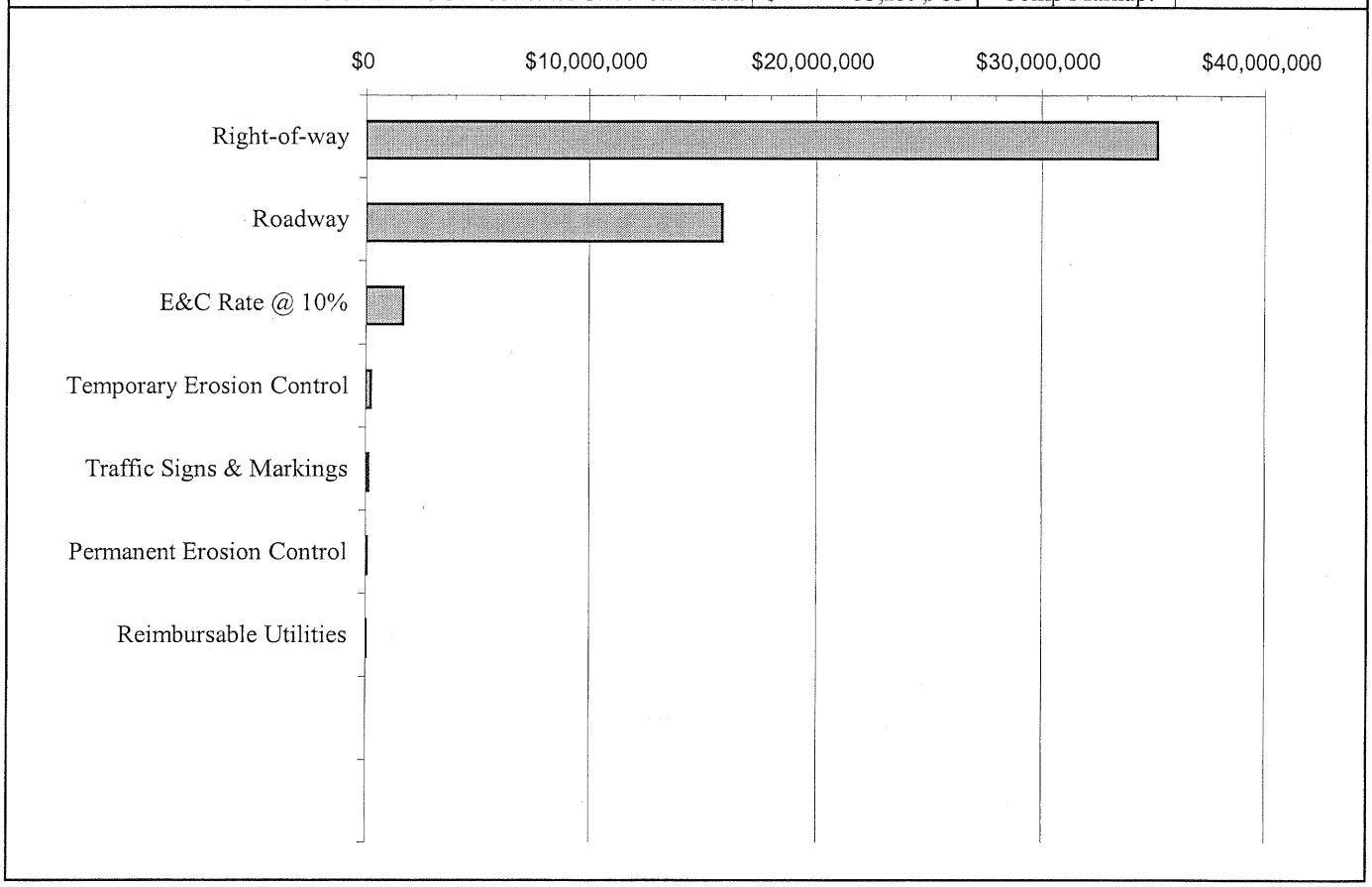
	COST	PERCENT	CUM. PERCENT



COST HISTOGRAM

PROJECT: **US 27/SR 1 - HAMILTON ROAD WIDENING**
Troup County, Georgia

TOTAL PROJECT with Right-of-way		COST	PERCENT	CUM. PERCENT
Right-of-way	80%	35,189,000	66.10%	66.10%
Roadway		15,887,287	29.84%	95.94%
E&C Rate @ 10%		1,636,799	3.07%	99.01%
Temporary Erosion Control		246,983	0.46%	99.47%
Traffic Signs & Markings		143,198	0.27%	99.74%
Permanent Erosion Control		90,518	0.17%	99.91%
Reimbursable Utilities		46,200	0.09%	100.00%
Construction and Right of Way Subtotal		***$ 53,239,985***	100.00%	
TOTAL CONSTRUCTION & RIGHT-OF-WAY		**$ 53,239,985**	Comp Markup:	



FUNCTION ANALYSIS

Function Analysis of the US 27/SR 1 Hamilton Road Widening Project was prepared to understand the project purpose and need, define the requirements for each project element, ensure a complete and thorough understanding by the VE team of the basic function(s), and identify other public goals through the corridor. Random Function Analysis Worksheets for the project elements are 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 sheets include 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 Capacity," and "Improve LOS." Adding turn lanes, redesigning the intersections, and improving the sight stopping distance will greatly improve safety, reduce delays in the corridor, and help to meet other required project goals. Limiting access to the road by terminating side street access at Tower Street, Keys Street, and Jarobe Street will be a great help in reducing uncontrolled left turns.

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

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. This project will be a marked improvement in the aesthetics of the corridor and provides added functionality for pedestrians in the area.

RANDOM FUNCTION ANALYSIS

PROJECT: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

SHEET NO.: **1 of 1**

DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
Total Project Purpose and Need	**Improve**	**LOS**	**B**
	Accommodate	Growth	G
	Move	Cars	HO
	Reduce	Accidents	G
	Increase	**Capacity**	**B**
	Allow	Movements	RS
	Meet	Standards	G
	Improve	Intersections	RS
	Control	Traffic	RS
	Improve	Geometrics	RS
	Relocate	Utilities	RS
	Control	Budget	G
	Meet	Schedule	G
	Protect	Environment	RS
	Minimize	R/W Takes	G
	Manage	Drainage	RS
	Satisfy	Stakeholders	G
	Control	Traffic	RS
	Maximize	Safety	G
	Maintain	Access	RS
	Balance	Cut/Fill	G
	Improve	Corridor	G
	Protect	Historical	G
	Eliminate	Exceptions	RS
	Cross	Streams	RS
	Connect	Corridors	G

Function defined as: Action Verb, Measurable Noun

Kind: B = Basic; S = Secondary; RS = Required Secondary; HO = Higher Order; LO = Lower Order; G = Goal

CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the creative phase, numerous ideas, alternative proposals and/or recommendations were generated for the US 27/SR 1 Hamilton Road Widening Project using conventional brainstorming techniques as recorded on the following pages.

The creative session yielded a total of 30 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
Alignment	A
Section	S
Profile	P
Construction Management	CM

The 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 developed 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 all decision making.
- Level of Service – The projected LOS must be achieved to meet the design year projections.
- Impact Upon Trucks – There is a reasonably 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 Cost – It is important to minimize right-of-way costs 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 then developed into formal alternatives and included in the study report. 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.

Typically, all ideas rated 4 or 5 were developed by the VE team 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. 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: **US 27/SR 1 HAMILTON ROAD WIDENING**
Troup County, Georgia

SHEET NO.: **1 of 2**

NO.	IDEA DESCRIPTION	RATING
ALIGNMENT (A)		
A-1	Eliminate Brookside Terrace and Extension; tie directly into Hamilton Road	See P-1
A-2	Review and shorten the side roads if possible	DS
A-3	Close access to some of the side roads and driveways to improve safety	DS
A-4	Close driveways; develop access on the backs of local properties	4
A-5	Add frontage roads to minimize local access to Hamilton Road	Drop
A-6	Design Hamilton Road as a divided roadway with limited access	1
A-7	Close Butler Street	3
A-8	Close Cedar Street	4
A-9	Remove all eyebrows	4
A-10	Eliminate all sidewalks, curbs and gutters on secondary side roads	5
A-11	Use a one-way couple	Drop
A-12	Delete some deceleration lanes	2
A-13	Eliminate all nine of the right-turn lanes along Hamilton Road	5
PROFILE (P)		
P-1	Reduce and adjust the profile between Stations 168+00 and 181+00 (wall #1)	5
P-2	Use more cut slopes in lieu of retaining wall at Stations 165+00 to 168+00 (wall #2)	5
P-3	Lower the profile between Stations 132+00 and 140+00 by 2 ft.	3
P-4	Use a 2-story viaduct concept to minimize right-of-way cost	2
SECTION (S)		
S-1	Use a 4-lane section in lieu of 5-lane	Drop
S-2	Delete 3 ft. of pavement in each direction on the outside lane	4
S-3	Revise the cul-de-sac at Tower Street and shorten the height of the retaining wall	2
S-4	Eliminate the 6-ft. grassed shoulder; move the sidewalk next to the curb	4
S-5	Reduce the grassed shoulder from 6 ft. to 2 ft.	5
S-6	Reduce the grassed shoulder to 3 ft.; convert the sidewalk to an 8-ft. asphalt path	5
S-7	Use 11-ft. traffic lanes in lieu of 12-ft.	4
S-8	Use 24-in. gutters in lieu of 30-in. gutters	5
S-9	Use 12-ft. at-grade median	3

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:	**US 27/SR 1 HAMILTON ROAD WIDENING** *Troup County, Georgia*	SHEET NO.:	**2 of 2**

NO.	IDEA DESCRIPTION	RATING
SECTION (S) (continued)		
S-10	Modify the section to a width of 80 ft. (VE Option A)	4
S-11	Modify the section to a width of 88 ft. (VE Option B)	5
CONSTRUCTION MANAGEMENT (CM)		
CM-1	Provide a laydown area for the contractor to simplify operation	DS
CM-2	Use one of the old buildings being purchased along Hamilton Road for a construction office	DS
CM-3	Reduce the estimate for cast-in-place concrete from 10,000 CY to 5,000 CY	DS

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