



SR 3/US 41/Northside Parkway/ Cobb Parkway

**Project Number: BHFST-0001-05 (024), P.I. No.: 720125
and CSSTP-0009-00 (410), P.I. No.: 0009410
Fulton/Cobb Counties**

Value Engineering Study Report

August 2009

Design Consultant



Moreland Altobelli Associates, Inc.

Value Engineering Consultant

Lewis & Zimmerman Associates





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Re: BHFST-0001-05 (024), P.I. No. 72075
SR 3/US 41/Northside Parkway & Cobb Parkway, Fulton/Cobb Counties
and CSSTP-0009-00 (410), P.I. No. 0009410
SR 3/US 41/Northside Parkway, Fulton County
Value Engineering Study Report

Date:
August 14, 2009

Dear Mr. Sanders:

Contact:
Howard Greenfield

Lewis & Zimmerman Associates, Inc. is pleased to submit two hard copies and one electronic copy of the referenced value engineering (VE) study report documenting the study that took place on August 4 – 7, 2009. The objective of the VE effort was to identify opportunities to reduce costs and enhance the value of the project.

Phone:
301.984.9590 x 20

The VE team developed several ideas which provide opportunities to improve the value of the project for the Cumberland Community Improvement District, Cobb County, and GDOT. Of particular interest are alternatives to reduce right-of-way impacts by reducing the typical section in several ways, reducing the bridge costs and reducing the cost of several retaining walls. The team also suggests changing two of the retaining wall designs to save trees and maintain a natural buffer between the widened highway and two residential developments.

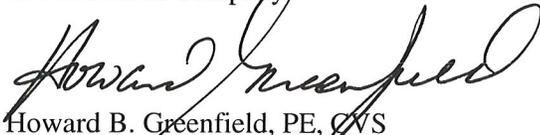
Email:
hgreenfield@lza.com

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

Our ref:
MY096702.0000

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES
an ARCADIS company



Howard B. Greenfield, PE, CVS
Vice President

Attachment

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Introduction	1
Project Description	1
Concerns and Objectives	2
Results of the Study	2
Summary of Value Engineering Alternatives	4

STUDY RESULTS

Introduction	7
Key Issues	8
Study Objectives	8
Results	8
Evaluation of Alternatives	9
Value Engineering Alternatives	10

PROJECT DESCRIPTION	98
Maps	99

VALUE ANALYSIS AND CONCLUSIONS

General	103
Preparation Effort	103
Value Engineering Workshop Effort	105
Post-Workshop Effort	108
Value Engineering Workshop Participants	109
Economic Data	111
Cost Model	112
Function Analysis	116
Creative Idea Listing and Evaluation of Ideas	119

EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. for the Cumberland Community Improvement District (CCID), Cobb County and the Georgia Department of Transportation (GDOT). The subject of the study was a two-phase project to widen SR 3/US 41 Northside Parkway and Cobb Parkway from Mount Paran Road to Northgate Drive in Fulton and Cobb Counties, BHFST-0001-05 (024), P.I. No. 720125, and CSSTP-0009-00 (410), P.I. No. 0009410. The project is being designed for Cobb County by Moreland Altobelli Associates, Inc. and was at the preliminary stage of development at the time of the VE study, August 4 – 7, 2009.

The study was conducted in GDOT Headquarters, Atlanta, Georgia by a team comprised of a highway engineer, bridge/structural engineer, construction specialist, and Certified Value Specialist team leader. The team used the following six-phase job plan to guide its deliberations.

- Information Gathering Phase
- Function Analysis Phase
- Creative Idea Generation Phase
- Evaluation/Judgment of Creative Ideas Phase
- Alternative Development Phase
- Presentation of Results Phase

PROJECT DESCRIPTION

This project widens 1.9 miles of SR 3/US 41 Northside Parkway from Mount Paran Road in Fulton County to the Chattahoochee River and Cobb Parkway from the Chattahoochee River to Paces Mill Road in Cobb County from four, undivided lanes of variable widths to a divided six-lane urban highway section in two phases. Phase I, scheduled for construction starting in late 2010, starts at Northgate Drive in Fulton County and ends at Paces Mill Road. Phase II, yet to be scheduled for construction, will go from Northgate Drive to Mount Paran Road. Appropriate right and left turn lanes are added in each direction at the following intersections:

- Northgate Drive/Town Square Road
- Chattahoochee National Recreation Area (NRA) Drive East
- Chattahoochee NRA Drive West
- Paces Mill Road/River Parkway
- Mount Paran Road
- IBM South Entrance (Relocated)/Mount Paran Church of God Entrance
- IBM North Entrance/River Green Drive
- North Parkway Square

In Phase I, the Chattahoochee River bridge will be replaced with a longer, wider bridge on a slightly higher alignment by first building a new section to the east and then demolishing the existing bridge and building the west portion. The bridge will be constructed using precast, prestressed concrete girders and a cast-in-place concrete deck, supported on cast-in-place concrete pier bents and spread footings on rock. It will carry six traffic lanes, an 8-ft-wide median, a 6-ft-wide sidewalk on the west side and a 12-ft-wide multi-use trail on the east side separated from the traffic lane by a 5-ft-wide stamped concrete strip.

There will be a 5-ft-wide sidewalk separated from the back of the curb by a 6-ft-wide planting strip that starts on the west side of the road at Mount Paran Road and moves to the east side at the Chattahoochee NRA Drive East. A 12-ft-wide, concrete multi-use trail will start on the east side at Mount Paran Road, continue over the bridge, turn down Chattahoochee NRA Drive East, turn 180 degrees and go under the Chattahoochee River Bridge and come back up Chattahoochee NRA Drive West to Cobb Parkway. It will continue along the west side of Cobb Parkway to Paces Mill Road.

Included in the project are:

- Piped storm water collection and conveyance
- Retaining walls to limit right-of-way acquisitions
- Replacement and addition of traffic signals

The estimated project costs are as follows:

<u>Project</u>	<u>Construction</u>	<u>Right of Way</u>	<u>Reimbursable Utilities</u>	<u>Total</u>
BHFST-0001-05 (024)	\$11,346,284	\$2,700,000	\$140,000	\$14,186,284
CSSTP-0009-00 (410)	<u>\$5,618,443</u>	<u>\$1,552,000</u>	<u>\$162,500</u>	<u>\$7,332,943</u>
TOTAL	\$16,964,727	\$4,252,000	\$303,500	\$21,519,227

CONCERNS AND OBJECTIVES

This project will provide additional capacity along SR 3/US 41 and preserve the efficient and safe movement of traffic through the project corridor consistent with the functional classification of an urban principal arterial. In addition, it will increase capacity and connectivity for non-automobile transportation by providing a sidewalk and multi-use path. CCID, Cobb County and GDOT desire to maintain the functionality of the project while delivering it in a cost-effective manner.

To assist in this effort, they have convened this VE study with the objective of identifying specific opportunities to reduce costs and/or enhance the functionality of the project.

RESULTS OF THE STUDY

The VE team developed 17 alternatives with opportunities to reduce project costs, two that will increase the project’s cost but save trees and maintain buffer zones between the highway and residential developments, and two design suggestions with minor cost savings or an enhancement to

the project's functionality. All of the alternatives and design suggestions are summarized on the following Summary of Potential Cost Saving table and detailed in Section Two of the report. The following highlights the alternatives with the greatest potential to impact the project.

The Chattahoochee River Bridge and the right-of-way are the two most costly items in the project representing almost 48% of the total cost. To reduce these costs, the following alternatives were generated:

- Alt. No. R-4 Narrow the shoulders of the road by narrowing the grass strips to provide 5 ft clear from the edge of the travel way to the edge of the sidewalk to save \$1,073,410
- Alt. No. R-1 Use 11-ft-wide lanes in lieu of 12-ft-wide lanes for the inside lanes of the highway to save \$416,335
- Alt. No. CG-1 Use a 24-in-wide curb and gutter section in lieu of a 30-in-wide curb and gutter section and narrow the median from 8-ft-wide to 7-ft-wide by narrowing the shy distance from the edge of the inside lane to the raised concrete median from 24 in to 18 in to save \$197,534

Implementing these three alternatives will save a combined \$1,687,279 and result in a typical section that is 8 ft narrower than the current typical section and a bridge that is 4 ft narrower. A secondary benefit of this approach is that fewer trees will have to be removed to construct the highway.

Collectively, the retaining walls represent about 14% of the project's cost. Cost reductions can be achieved by substituting soil nail walls for tie-back walls as illustrated in Alt. No. W-3 and mechanically stabilized embankment walls for tie-back walls as shown in Alt. No. W-5. Removing the concrete barrier in front of the mechanically stabilized earth walls in cut areas will also reduce costs as depicted in Alt. No. W-6.

Using asphalt concrete for the sidewalk and the multi-use path in lieu of cast-in-place concrete will substantially reduce the costs of these items as developed in Alt. Nos. S-1 and S-3.



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**

Cobb/Fulton Counties, Georgia

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
BRIDGE						
B-1	Respace the beams for the river bridge to use fewer beams and use 72 in bulb-T beams in lieu of 65 in bulb-T beams	\$2,078,903	\$1,829,862	\$249,041		\$249,041
B-2	Use plain steel reinforcing bars in lieu of epoxy coated steel reinforcing bars for the top mat of the bridge deck	\$210,240	\$169,605	\$40,635		\$40,635
B-3	Reduce the width of the stamped concrete from 5 ft to 3 ft and reduce the bridge width 2 ft	\$222,794	\$171,653	\$51,141		\$51,141
B-5	Delete the bridge deck drain system	\$101,245	\$0	\$101,245		\$101,245
WALLS						
W-3	In Phase II, use soil nail walls in lieu of tie-back walls for Wall Nos. 1, 2, 6 and 8	\$1,479,808	\$1,294,832	\$184,976		\$184,976
W-5	In Phase II, build Wall Nos. 2 and 8 as mechanically stabilized embankment walls in lieu of tie-back walls	\$292,776	\$217,887	\$74,889		\$74,889
W-6	Remove concrete barrier from in front of mechanically stabilized embankment walls in cut areas	\$109,859	\$0	\$109,859		\$109,859
W-7	In Phase I, move Wall No. 6 closer to the roadway to line up with the guard rail at each end of the wall	\$232,526	\$188,708	\$43,818		\$43,818
W-8	In Phase I, use a bin wall for Wall No. 2 in lieu of a mechanically stabilized embankment wall	\$47,518	\$0	\$47,518		\$47,518
W-10	In Phase I, use a soil nail wall in lieu of a mechanically stabilized embankment wall for Wall No. 4	\$615,523	\$704,935	(\$89,412)		(\$89,412)
W-11	In Phase I, use a soil nail wall in lieu of a mechanically stabilized embankment wall for Wall No. 1	\$386,996	\$472,703	(\$85,707)		(\$85,707)



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD <i>Cobb/Fulton Counties, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
ROADWAY						
R-1	In Phases I and II, use 11-ft-wide lanes in lieu of 12-ft-wide lanes for the inside lanes of the road	\$416,335	\$0	\$416,335		\$416,335
R-2	Minimize improvements to the roadway leading to the IBM North Entrance					
R-3	Leave right out only at the existing IBM South driveway					
R-4	In Phases I and II, narrow shoulders by narrowing grass strips; provide 5 ft clear from edge of lane to the sidewalk	\$1,083,330	\$0	\$1,083,330		\$1,083,330
SIDEWALKS						
S-1	In Phases I and II, use asphalt concrete in lieu of cast-in-place concrete for the multi-use trail	\$306,129	\$61,397	\$244,732		\$244,732
S-2	In Phases I and II, eliminate the 5 ft sidewalk	\$138,639	\$0	\$138,639		\$138,639
S-3	In Phases I and II, use asphalt concrete in lieu of cast-in-place concrete for the sidewalk	\$138,639	\$41,764	\$96,875		\$96,875
CURB AND GUTTER						
CG-1	In Phases I and II, use a 24-in-wide curb and gutter section in lieu of a 30-in-wide curb and gutter section and narrow the median from 8-ft-wide to 7-ft-wide thus narrowing the typical section by 2 ft	\$432,867	\$107,911	\$324,956		\$324,956

STUDY RESULTS

INTRODUCTION

The results of this value engineering study portray the benefits that can be realized by CCID, Cobb County, GDOT and the ultimate users. The results will directly affect the project's design and require coordination among the Cobb County, GDOT and the Moreland Altobelli project teams to determine the disposition of each alternative.

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

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

The capital cost comparisons used unit quantities contained in the project cost estimate prepared by the designers, whenever possible. If prices were not available, cost databases from GDOT and team members were consulted. Each design suggestion contains the same information as the VE alternatives, except that no cost information is included. Design suggestions are presented to bring attention to areas of the design that, in the opinion of the VE team, should be changed for reasons other than cost. Examples of these reasons may include improve traffic operations, reduce maintenance, improve constructability, improve safety, and reduce project risk. In addition, some ideas cannot be quantified in terms of cost with the design information provided; these are also presented as design suggestions and are intended to improve the quality of the project.

Each alternative or design suggestion developed is identified with an alternative number (Alt. No.) that can be tracked through the value engineering process, thus facilitating referencing among the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of Potential Cost Savings table. The Alt. No. contains one of the following letter prefixes indicating the project element being addressed:

PROJECT ELEMENT	PREFIX
Bridge	B
Walls	W
Roadway	R
Sidewalks	S
Curb and Gutter	CG
Drainage	D

Summaries of the alternatives and design suggestions are provided on the Summary of Potential Cost Savings table. The table is divided into project elements for the reviewer’s convenience and is used to divide the alternatives portion of the report. The complete documentation of the developed alternatives and design suggestions follows the Summary of Potential Cost Savings tables.

KEY ISSUES

This project will provide additional capacity along SR 3/US 41 from Mount Paran Road to Paces Mill Road and preserve the efficient and safe movement of traffic through the project corridor consistent with the functional classification of an urban principal arterial. In addition, it will increase capacity and connectivity for non-automobile transportation by providing a sidewalk and multi-use path. The multi-use path has been located to match the criteria of both Fulton and Cobb Counties. CCID, Cobb County and GDOT desire to maintain the functionality of the project while delivering it in a cost-effective manner.

STUDY OBJECTIVES

In developing and constructing the project, CCID, Cobb County and GDOT must ensure they receive the optimum value for the funds they expend. To aid in this goal, this VE session was engaged with the specific objective of identifying alternatives for change that will reduce project costs and/or enhance the functionality of the current concept.

RESULTS OF THE STUDY

The VE team developed 17 alternatives with opportunities to reduce project costs, two that will increase the project’s cost but save trees and maintain buffer zones between the highway and residential developments, and two design suggestions with minor cost savings or an enhancement to the project’s functionality. All of the alternatives and design suggestions are detailed in this section of the report. The following highlights the alternatives with the greatest potential to impact the project.

The Chattahoochee River Bridge and the right-of-way are the two most costly items in the project representing almost 48% of the total cost. To reduce these costs, the following alternatives were generated:

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Using asphalt concrete for the sidewalk and the multi-use path in lieu of cast-in-place concrete will substantially reduce the costs of these items as developed in Alt. Nos. S-1 and S-3.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

When reviewing the study results, 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 a concern about one part of it. Each area within an alternative or design suggestion that is acceptable should be considered for use in the final design, even if the entire alternative or design suggestion is not implemented. Variations of these alternatives and design suggestions by CCID, Cobb County, GDOT or the design team are encouraged.

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

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



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD <i>Cobb/Fulton Counties, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW ICC SAVINGS
BRIDGE						
B-1	Respace the beams for the river bridge to use fewer beams and use 72 in bulb-T beams in lieu of 65 in bulb-T beams	\$2,078,903	\$1,829,862	\$249,041		\$249,041
B-2	Use plain steel reinforcing bars in lieu of epoxy coated steel reinforcing bars for the top mat of the bridge deck	\$210,240	\$169,605	\$40,635		\$40,635
B-3	Reduce the width of the stamped concrete from 5 ft to 3 ft and reduce the bridge width 2 ft	\$222,794	\$171,653	\$51,141		\$51,141
B-5	Delete the bridge deck drain system	\$101,245	\$0	\$101,245		\$101,245
WALLS						
W-3	In Phase II, use soil nail walls in lieu of tie-back walls for Wall Nos. 1, 2, 6 and 8	\$1,479,808	\$1,294,832	\$184,976		\$184,976
W-5	In Phase II, build Wall Nos. 2 and 8 as mechanically stabilized embankment walls in lieu of tie-back walls	\$292,776	\$217,887	\$74,889		\$74,889
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W-8	In Phase I, use a bin wall for Wall No. 2 in lieu of a mechanically stabilized embankment wall	\$47,518	\$0	\$47,518		\$47,518
W-10	In Phase I, use a soil nail wall in lieu of a mechanically stabilized embankment wall for Wall No. 4	\$615,523	\$704,935	(\$89,412)		(\$89,412)
W-11	In Phase I, use a soil nail wall in lieu of a mechanically stabilized embankment wall for Wall No. 1	\$386,996	\$472,703	(\$85,707)		(\$85,707)

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **B-1**

DESCRIPTION: **RESPACE THE BEAMS FOR THE RIVER BRIDGE TO USE FEWER BEAMS; USE 72-IN-DEEP BULB-T BEAMS IN LIEU OF 65-IN-DEEP BULB-T BEAMS** SHEET NO: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The original design calls for 18, 65-in-deep Bulb-T, prestressed concrete beams spaced at 6 ft 1 in on center.

ALTERNATIVE: (Sketch attached)

Use 14, 72-in-deep Bulb-T, prestressed concrete beams spaced at 8 ft -1½ in in Stage I and 7 ft 10 in in Stage II.

ADVANTAGES:

- Fewer beams to transport and erect
- All spans have the same number of beams

DISADVANTAGES:

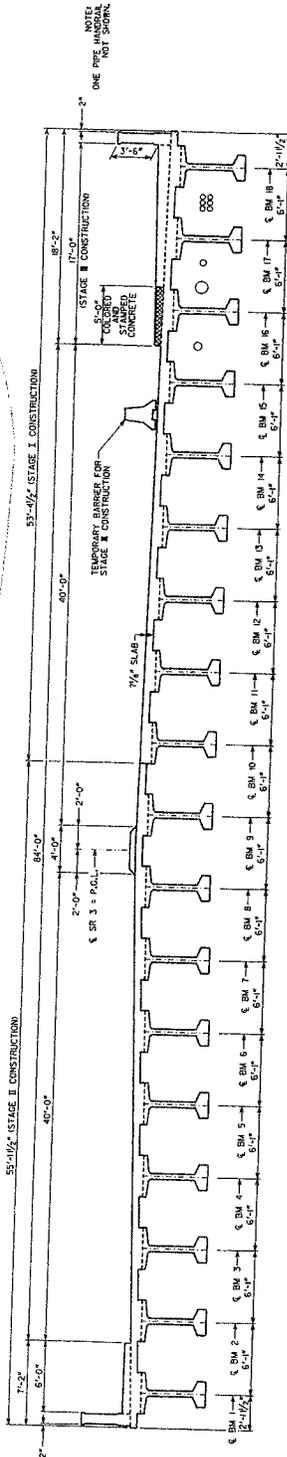
- A thicker deck is required
- Requires grade to be raised about 3 in

DISCUSSION:

The original design uses 65-in-deep Bulb-T beams. There are 18 beams in the original design while only 14 are required for the alternative design. In order to provide the required 14 ft 6 in clearance distance over the NRA Access road that goes under the bridge, it will be necessary to raise the grade of the approaches about 3 in in the vicinity of the bridge. The cost used in the estimate for the 65 in beams is the same as the cost of 63 in beams in the GDOT Item Mean Summary, so this cost was factored up to account for the additional concrete in the 65 in beam (see calculations page).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,078,903	—	\$ 2,078,903
ALTERNATIVE	\$ 1,829,862	—	\$ 1,829,862
SAVINGS	\$ 249,041	—	\$ 249,041

ALTERNATIVE
 B-1
 ORIGINAL DESIGN
 SHEET 2 OF 5





PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO
PACES MILL ROAD**
Cobb/Fulton Counties, Georgia

ALTERNATIVE NO
B-1

SHEET NO: **4 of 5**

Original Design

Beam quantity = $18[129.17+2(129.67)+139.17] = 9498$ LF

Deck thickness = 7 1/8"

Main bars #5 @ 7 1/2"

Calculate area of 65" Bulb-T to factor price from cost of 63" Bulb-T

63" Area = 713 in²

Additional area = $26(2) = 52$ in²

63" Cost = \$185.45/LF

65" cost = $185.45(765/713) = \$198.98$

Alternative Design

Beam quantity = $14[129.17+2(129.67)+139.17] = 7388$ LF

Deck thickness = 7 7/8"

Additional deck concrete = $[530(109.3333)(7.875-7.125)/12]/27 = 134$ CY

Main bars #5 @ 6 3/8"

Additional deck rebar = $2(1.043)(109.3333)[3(245)+264-3(209)-225] = 33526$ LB

Additional pavement: (25 mm superpave) assume 300 feet on each end of bridge:

Weight = $0.057(3)(600)(98)/9 = 1117$ TN

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **B-2**

DESCRIPTION: **USE PLAIN REINFORCING STEEL FOR ALL DECK BARS
 IN LIEU OF EPOXY COATED BARS FOR THE TOP MAT
 OF THE BRIDGE DECK** SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The original design specifies epoxy coated reinforcing steel for the top mat of deck steel.

ALTERNATIVE:

Use plain reinforcing steel for all reinforcing steel in the deck.

ADVANTAGES:

- Quicker bar fabrication
- Eliminates potential to mar the epoxy coating during erection thus negating most of the benefits

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Design Policy Manual specifies four conditions where epoxy coated bars must be used. This bridge does not meet any of the conditions, therefore less expensive plain bars should be used.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 210,240	—	\$ 210,240
ALTERNATIVE	\$ 169,605	—	\$ 169,605
SAVINGS	\$ 40,635	—	\$ 40,635

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **B-3**

DESCRIPTION: **REDUCE STAMPED CONCRETE WIDTH ON MULTI-USE PATH FROM 5 FT TO 3 FT; REDUCE THE BRIDGE WIDTH BY THE SAME 2 FT** SHEET NO. **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The original design calls for a 2 ft gutter and 5 ft of stamped, colored concrete between the edge of travel way and the multi-use path on the Chattahoochee River Bridge.

ALTERNATIVE: (Sketch attached)

Provide a 2 ft gutter and 3 ft of stamped, colored concrete between the edge of travel way and the multi-use path. Reduce the overall bridge width by 2 ft.

ADVANTAGES:

- Reduces bridge construction
- Reduces long-term bridge maintenance cost

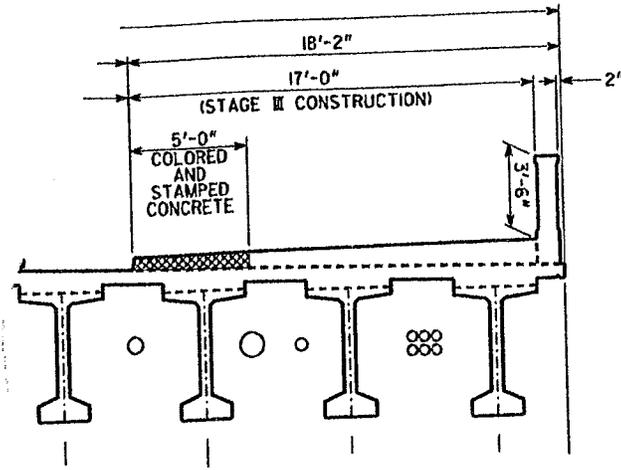
DISADVANTAGES:

- Reduces amount of streetscape

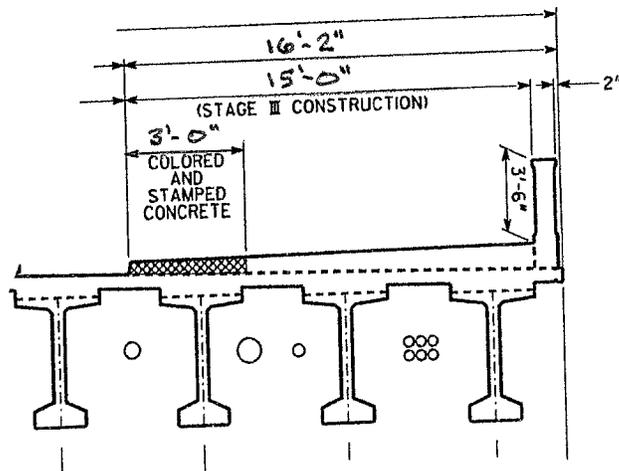
DISCUSSION:

ADA requirements call for 5 ft (desirable) between a multi-use path and the edge of a travel way. The original design provides 7 ft. The alternative design provides 5 ft to reduce bridge costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 222,794	—	\$ 222,794
ALTERNATIVE	\$ 171,653	—	\$ 171,653
SAVINGS	\$ 51,141	—	\$ 51,141



ORIGINAL DESIGN



ALTERNATIVE DESIGN

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO
PACES MILL ROAD**
Cobb/Fulton Counties, Georgia

ALTERNATIVE NO

B-3

SHEET NO

3 of 4

Original Design

$$\text{Sidewalk Area} = [.5(6+12.125)/12](17) - .5(.5)(1/12) = 12.82 \text{ SF/FT}$$

$$\text{Deck Area} = 2(7.5/12) = 1.25 \text{ SF/FT}$$

$$\text{Volume} = 530(12.82+1.25)/27 = 276.2 \text{ CY}$$

Alternative Design

$$\text{Sidewalk Area} = [.5(6+11.375)/12](15) - .5(.5)(1/12) = 10.84 \text{ SF/FT}$$

$$\text{Volume} = 530(10.84)/27 = 212.8 \text{ CY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **B-5**

DESCRIPTION: **OMIT DECK DRAIN SYSTEM ON BRIDGE** SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

The original design calls for a deck drain system on the Chattahoochee River Bridge.

ALTERNATIVE:

Omit the deck drain system.

ADVANTAGES:

- Reduces cost
- Simplifies bridge construction
- Eliminates maintenance

DISADVANTAGES:

- Possibility of increased gutter spread

DISCUSSION:

Typically, Georgia DOT does not provide deck drainage systems for stream crossing bridges. There is no reason to provide one on this bridge. Four-in-diameter deck scuppers should be provided at 10 ft centers as is typical for GDOT bridges. The cost used is the cost for a deck drain system from the GDOT Item Mean Summary.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 101,245	—	\$ 101,245
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 101,245	—	\$ 101,245

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **W-3**

DESCRIPTION: **USE SOIL NAIL WALLS IN LIEU OF TIE-BACK WALLS** SHEET NO.: **1 of 2**
FOR WALL NOS. 1, 2, 6, AND 8 IN PHASE II

ORIGINAL DESIGN:

The original design calls for tie-back walls for parts of Wall Nos. 1, 2, 6, and 8 in Phase II.

ALTERNATIVE:

Use soil nail walls for the tie-back portions of the above walls.

ADVANTAGES:

- Provides the same function at a lower cost
- Simplifies construction

DISADVANTAGES:

- None apparent

DISCUSSION:

Soil nail walls provide the same level of structural capacity as tie-back walls at a reduced cost. Since the nails do not have to be tensioned, construction is simplified. There are no costs in the GDOT Item Mean Summary for soil nail walls. In the cost estimate for this project, mechanically stabilized embankment (MSE) walls are estimated at about \$43/SF, and tie-back (permanently anchored) walls are estimated at \$55/SF. This is low. The Bridge Design Office provided a unit cost of \$80/SF for tie-back walls and \$70/SF for soil nail walls. Those values are used for this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,479,808	—	\$ 1,479,808
ALTERNATIVE	\$ 1,294,832	—	\$ 1,294,832
SAVINGS	\$ 184,976	—	\$ 184,976

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **W-5**

DESCRIPTION: **IN PHASE II, BUILD THE TIE-BACK PORTIONS OF WALL NOS. 2 AND 8 AS MECHANICALLY STABILIZED EMBANKMENT WALLS** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

In Phase II, Wall Nos. 2 and 8 are to be constructed as Type 2 side barrier in portions and as tie-back walls for the remainder.

ALTERNATIVE:

Construct the tie-back portions of these walls as mechanically stabilized embankment (MSE) walls.

ADVANTAGES:

- Provides the same function at a lower cost
- Simplifies construction
- Reduces construction time

DISADVANTAGES:

- None apparent

DISCUSSION:

Both of these walls are fill walls, which are very difficult to construct as tie-back walls. Since these walls are located on the east side of US 41, they are on the widened side. Construction of MSE walls will be very simple, quick and economical at these locations. The project estimate uses \$55/SF for tie-back walls. This is low. The Bridge Design Office provided a unit cost of \$80/SF for tie-back walls. This value is used for this alternative.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 292,776	—	\$ 292,776
ALTERNATIVE	\$ 217,887	—	\$ 217,887
SAVINGS	\$ 74,889	—	\$ 74,889



PROJECT

**SR 3/US 41 FROM MOUNT PARAN ROAD TO
PACES MILL ROAD**
Cobb/Fulton Counties, Georgia

ALTERNATIVE NO

W-5

SHEET NO

2 of 3

Original Design

Wall No. 2 1700 SF tie-back wall

Wall No. 8 1627 SF tie-back wall

Alternative Design

Wall No. 2

1700 SF MSE Wall Face 10-20 FT Ht

Type V Barrier 140-50 = 90 LF

Wall No. 8

1627 SF MSE Wall Face 10-20 FT Ht

Type V Barrier 298-50-50 = 198 LF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **W-6**

DESCRIPTION: **DELETE THE CONCRETE TRAFFIC BARRIER IN FRONT OF THE MECHANICALLY STABILIZED EMBANKMENT WALLS** SHEET NO.: **1 of 7**

ORIGINAL DESIGN: (Sketch attached)

Phase I retaining Wall Nos. 1, 2, 4 and 5 have cast-in-place concrete barriers, Type 7W, along the bottom of the wall.

ALTERNATIVE: (Sketch attached)

Delete these barriers.

ADVANTAGES:

- Eliminates an unnecessary construction item
- Saves construction time

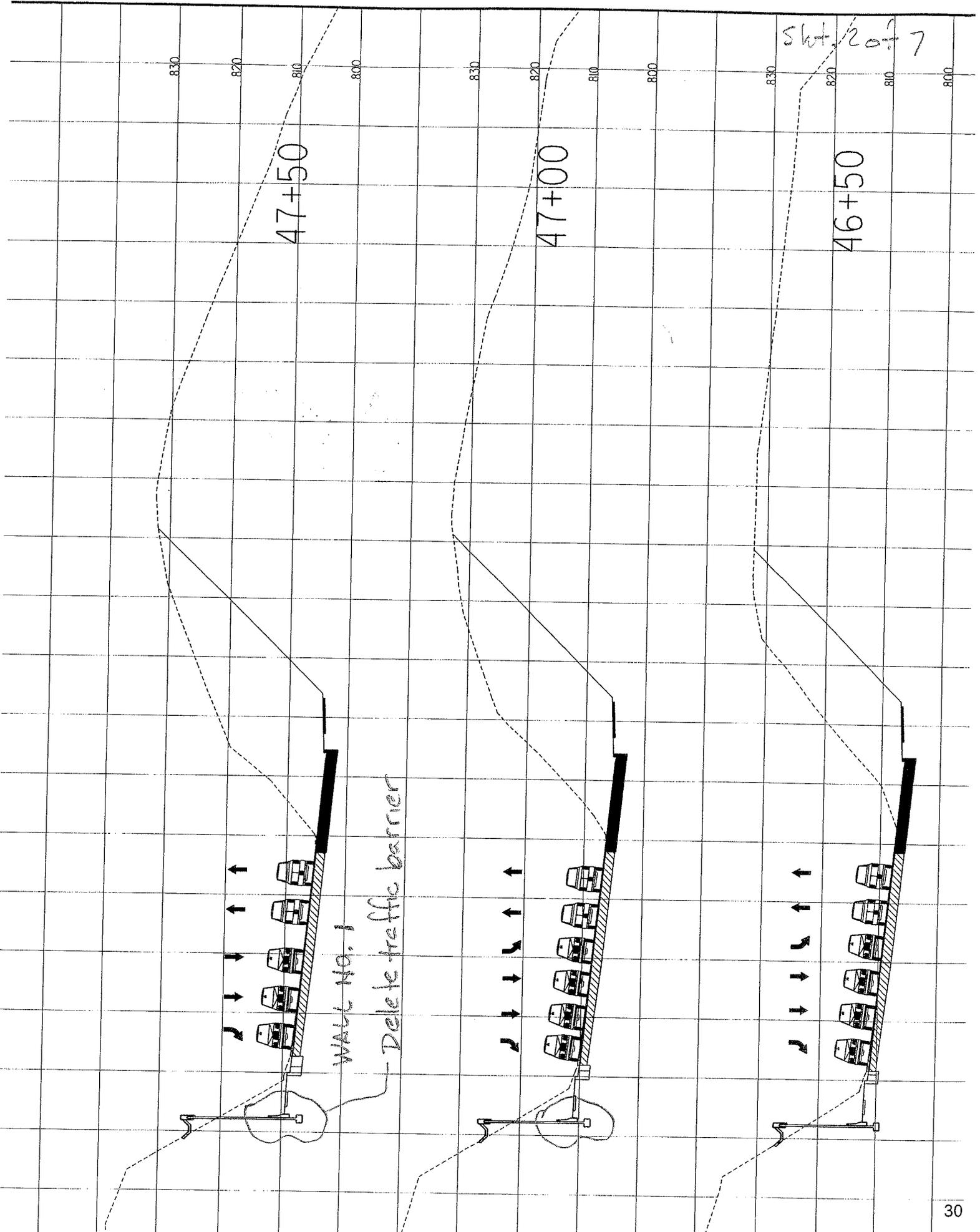
DISADVANTAGES:

- If a vehicle skips over the curb it could hit the wall and cause some damage

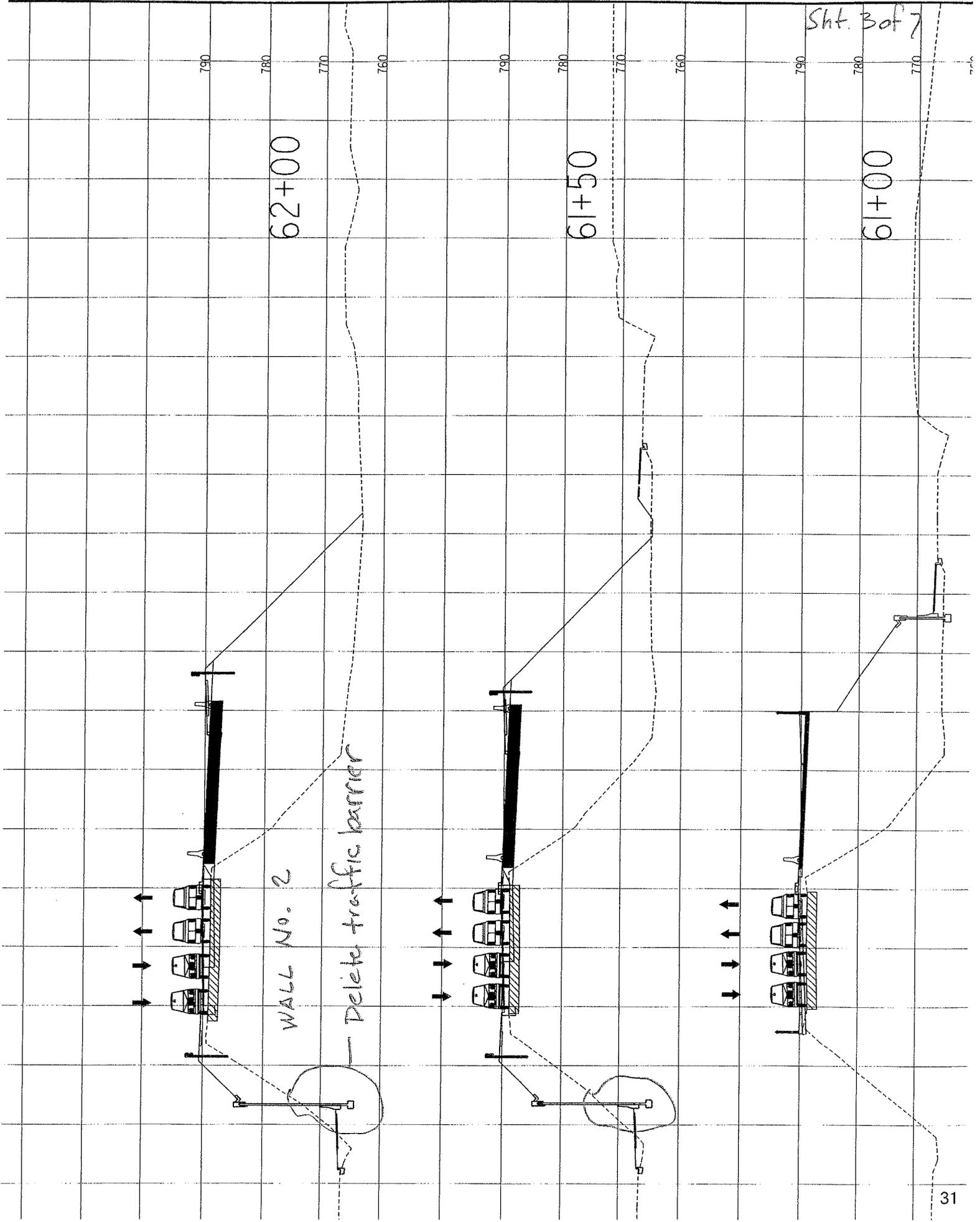
DISCUSSION:

These barriers are being installed to protect a mechanically stabilized embankment wall that is set back from the road about 16 ft. There is a curb at the edge of the roadway and a 16 ft clear zone that will keep most vehicles from getting to the wall. The extra wall protection adds to the project's cost while providing little functionality.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 109,859	—	\$ 109,859
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 109,859	—	\$ 109,859



Sht. 3 of 7



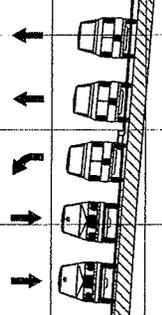
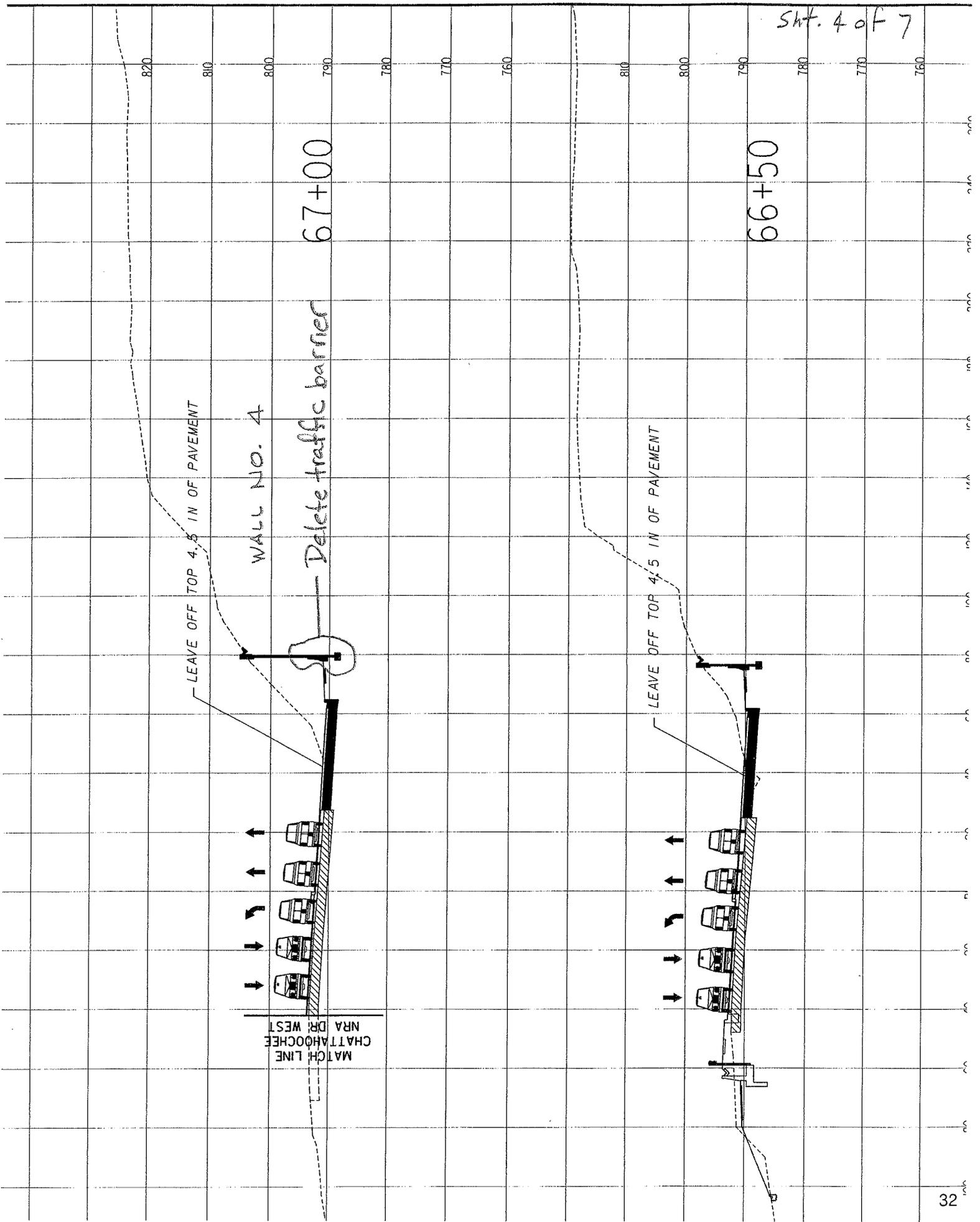
62+00

61+50

61+00

WALL No. 2

Delete traffic barrier



MATCH LINE
CHATTAHOOCHEE
NRA DR WEST

LEAVE OFF TOP 4.5 IN OF PAVEMENT

WALL NO. 4

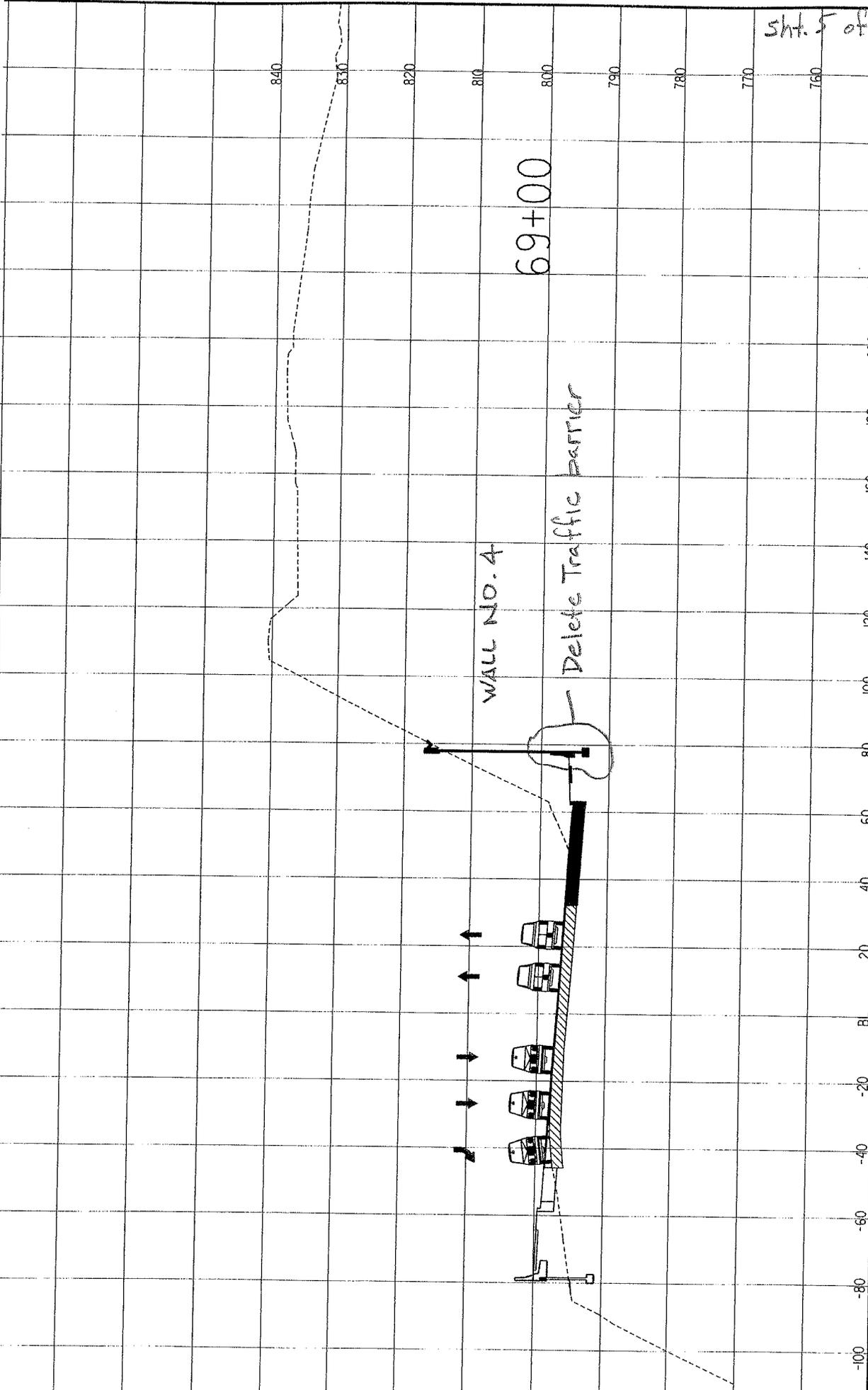
Delete traffic barrier

67+00

LEAVE OFF TOP 4.5 IN OF PAVEMENT

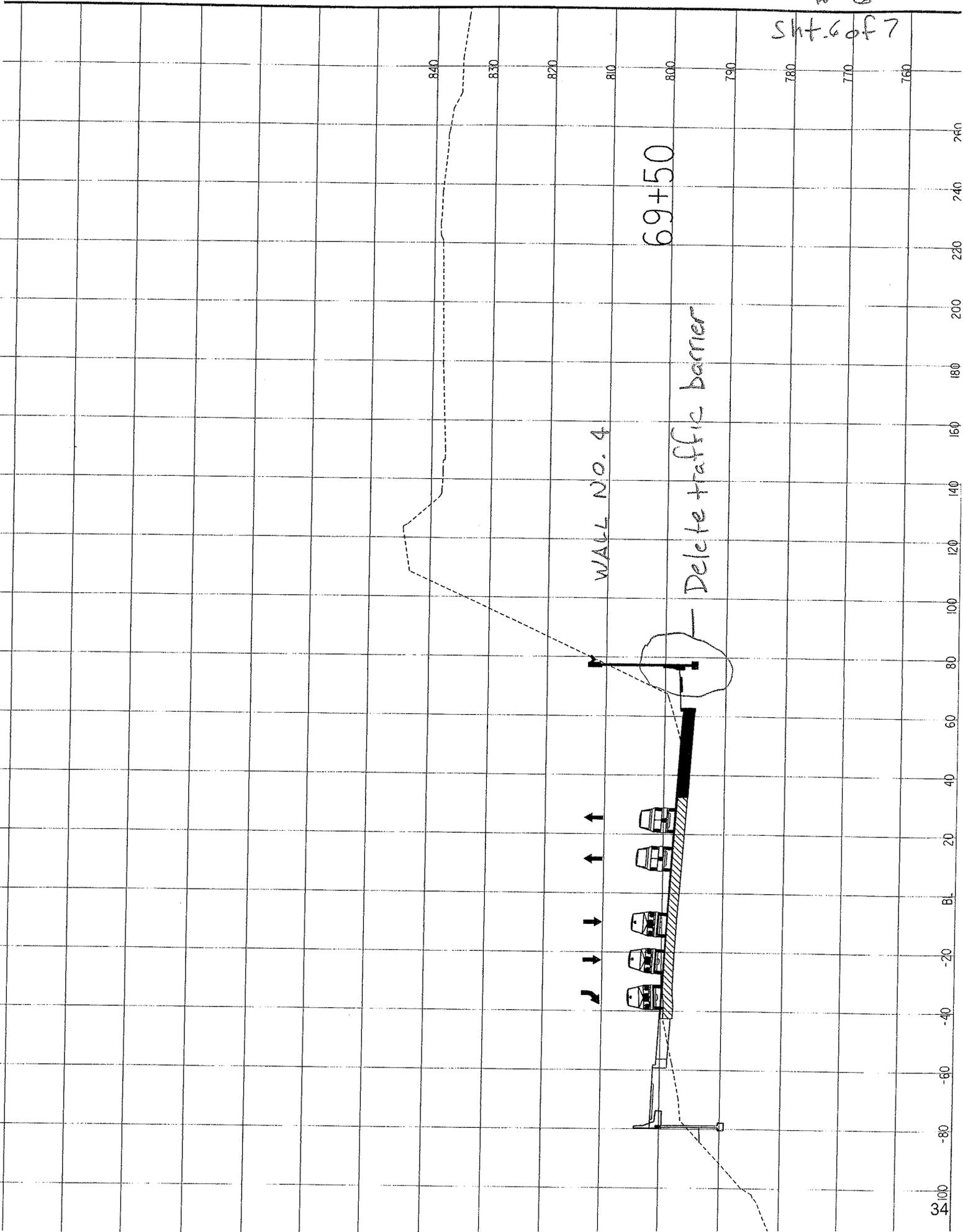
66+50

SH. 5 of 7



<p>SCALE: HOR : 1 inch = 20 feet VERT: 1 inch = 10 feet</p>	<p>REVISION DATES</p> <table border="1"> <tr><td> </td><td> </td></tr> </table>																				
<p>STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION</p> <p>OFFICE: CROSS SECTIONS CONSTRUCTION STAGING</p> <p>STAGE 1 NORTHSIDE PKWY. (SR3/US41)</p>	<p>DRAWING NO. 19-42</p>																				

MA
Mereland Allebelli
Associates, Inc.
2211 Beaver Run Road
Sufile 150
Norcross, Georgia 30071
Telephone (770) 863-5945



WALL NO. 4

69+50

Delete traffic barrier

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **W-7**

DESCRIPTION: **IN PHASE I, MOVE WALL NO. 6 CLOSER TO THE ROADWAY AND ALIGN IT WITH THE GUARD RAIL ON BOTH ENDS** SHEET NO.: **1 of 8**

ORIGINAL DESIGN: (Sketch attached)

Phase I, Wall No. 6 is placed about 28 ft behind the edge of the curb. A guard rail is placed two ft behind the sidewalk leaving about 12 ft of space between the guardrail and the wall.

ALTERNATIVE: (Sketch attached)

Move the wall to line up with the guard rail on either end.

ADVANTAGES:

- Shortens the wall and reduces its cost
- Reduces the fill requirements

DISADVANTAGES:

- None apparent

DISCUSSION:

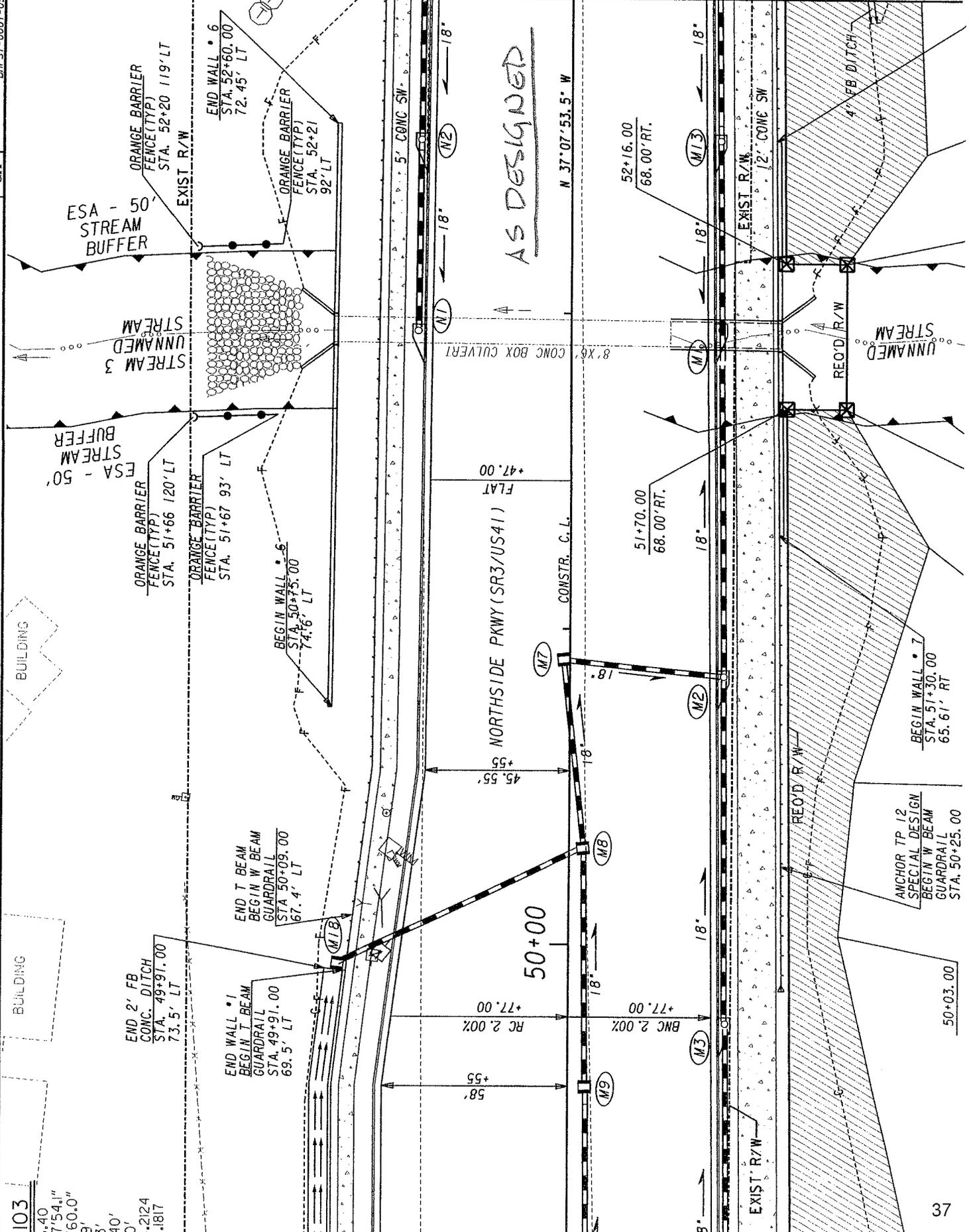
Moving the wall closer to the road to line up with the guard rail at either end of the wall reduces the length and height of the wall to be constructed, thus saving costs. The area between the guard rail and wall parapet serves no identifiable purpose. This may also reduce the load on the existing box culvert which needs to remain in place.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 232,526	—	\$ 232,526
ALTERNATIVE	\$ 188,708	—	\$ 188,708
SAVINGS	\$ 43,818	—	\$ 43,818

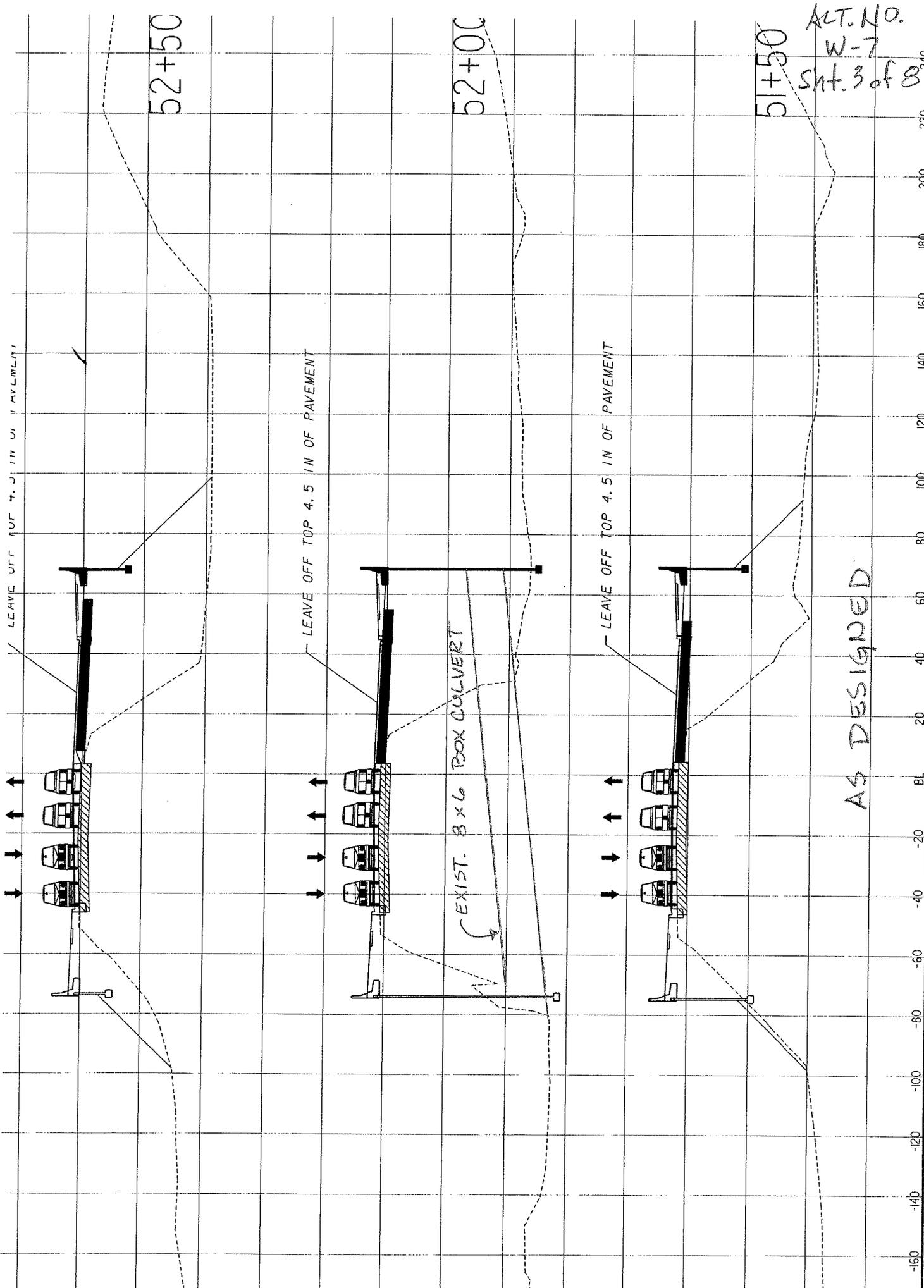


MATCHLINE STA. 53+00.00
 SEE DWG. 13-03

ALT. NO.
 W-7
 Sht. 2 of 8



AS DESIGNED



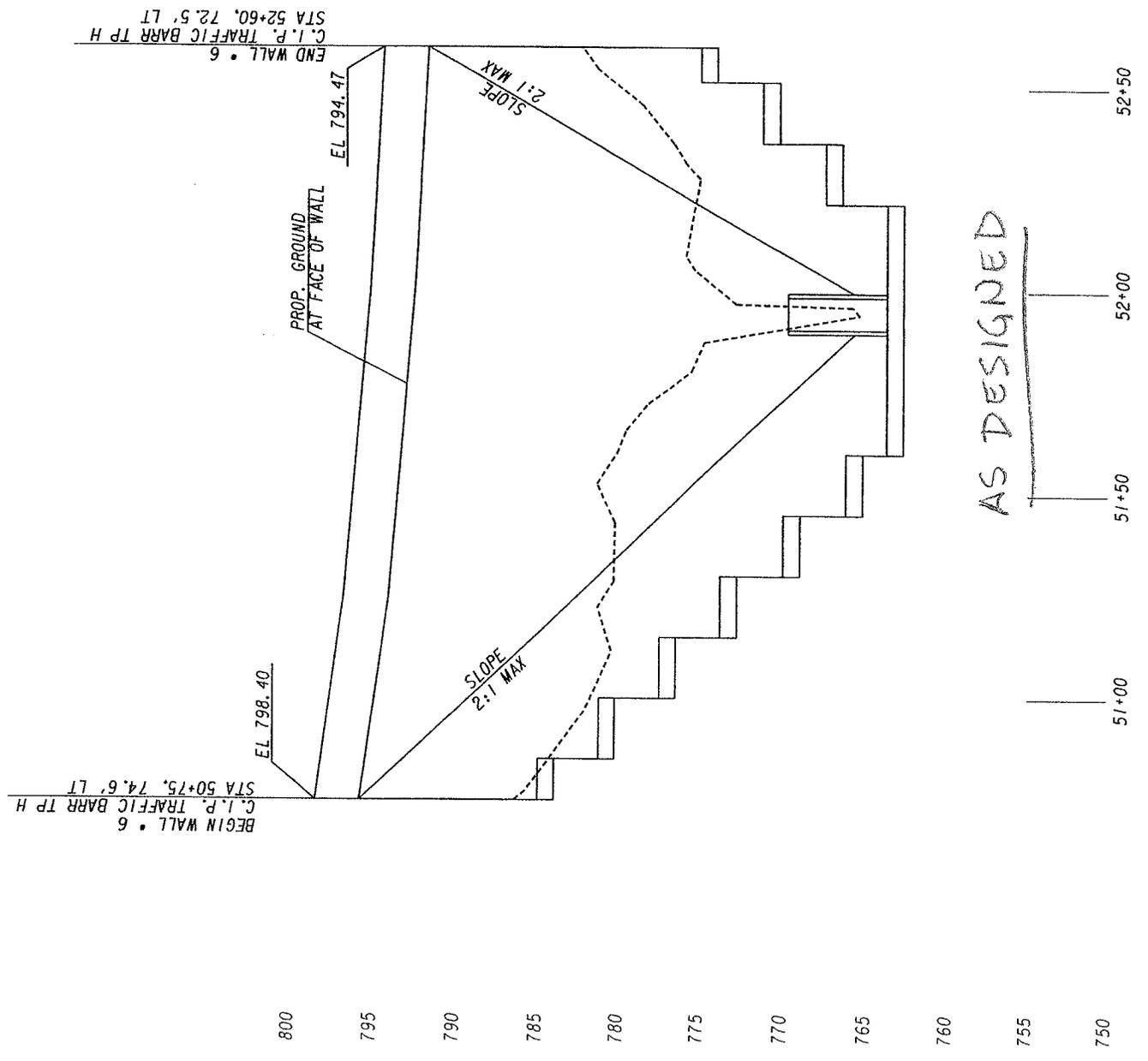
ALT. NO.
W-7
Sht. 3 of 8

STATE OF GEOI	240
DEPARTMENT OF TRAN.	220
OFFICE:	200
REVISION DATES	180
	160
	140
	120
	100
	80
	60
	40
	20
	BL
	-20
	-40
	-60
	-80
	-100
	-120
	-140
	-160

SCALE:
HOR : 1 inch = 20 feet

AS DESIGNED

ALT. NO.
W-7
Sht. 4 of 8



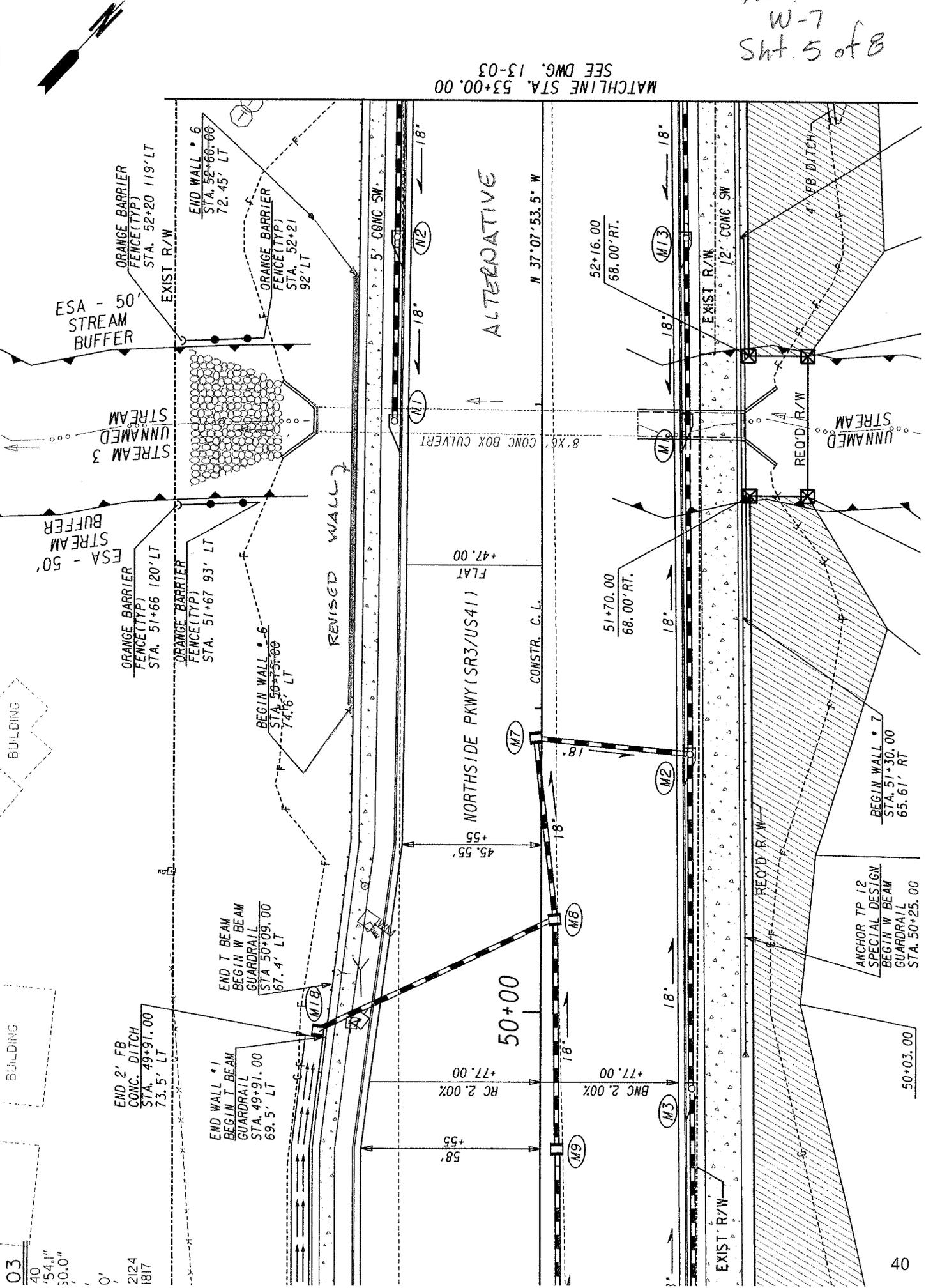
SDGNS

DESIGNER
SPECIALIST

ACT NO.
W-7
Sht. 5 of 8

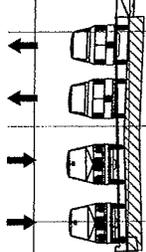
MATCHLINE STA. 53+00.00
SEE DWG. 13-03

PROJECT NUMBER	BHST-0001-0510241
STATE	GA
DATE	
SCALE	



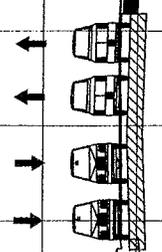
03
40
54.1"
50.0"
0'
2124
1817

LEAVE OFF TOP 4.5 IN OF PAVEMENT



52+50

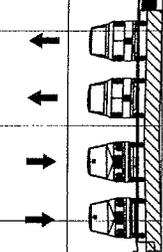
LEAVE OFF TOP 4.5 IN OF PAVEMENT



EXIST. 8 X 6 BOX CULVERT

52+00

LEAVE OFF TOP 4.5 IN OF PAVEMENT



51+50

ALTERNATIVE

ACT. NO
W-7
Sht. 6 of 8

STATE OF GEOI
DEPARTMENT OF TRAN
OFFICE: **CONCC CENT**

REVISION DATES	

SCALE:
HOR : 1 inch = 20 feet

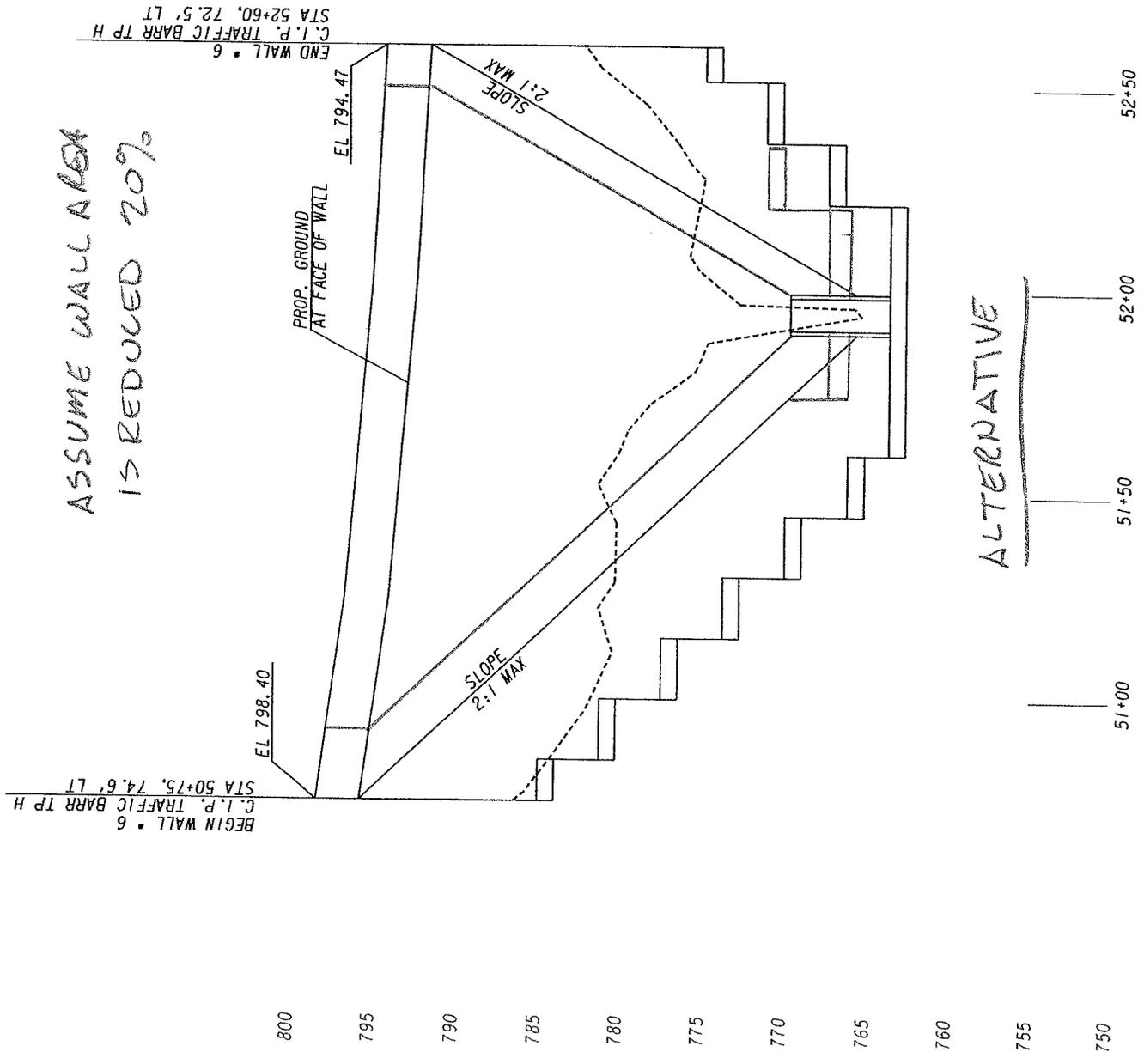
Moreland Altobelli
Associates, Inc.



ALT. NO.
W-7
Sht. 7 of 8

STATE
GA

ASSUME WALL AREA
IS REDUCED 20%



EDGNS

RESSE SPRFS
SSEPTABLES

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **W-8**

DESCRIPTION: **IN PHASE I, USE A BIN-TYPE WALL FOR THE MECHANICALLY STABILIZED EMBANKMENT WALL NO. 2** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The original design shows Phase I Wall No. 2 to be a mechanically stabilized embankment (MSE) wall with Type 6 side barrier at each end.

ALTERNATIVE: (Sketch attached)

Use a precast concrete bin type wall in lieu of the MSE portions of the wall at this site.

ADVANTAGES:

- Quicker construction
- Less excavation required
- Reduces cost

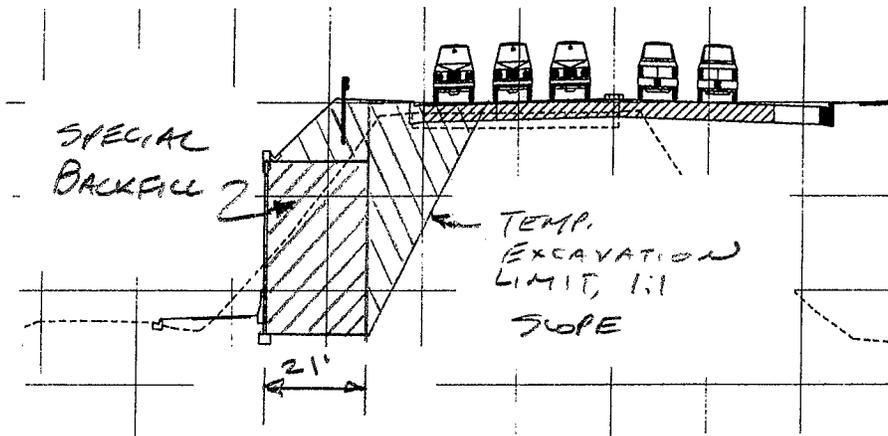
DISADVANTAGES:

- Difficulty in procuring precast elements

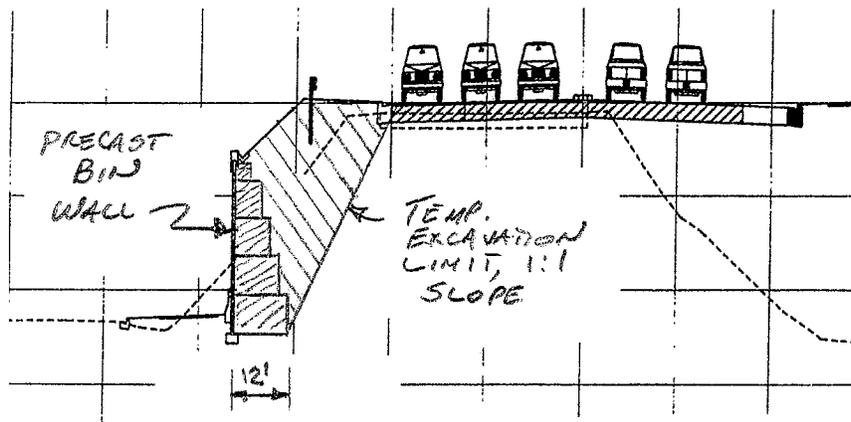
DISCUSSION:

This wall is between the mainline and Chattahoochee NRA Drive West. As such, material will have to be excavated to construct the wall, and some existing pavement will also have to be removed. The soil reinforcements for an MSE wall will be approximately 20 ft long at the highest point of the wall. A bin wall for that height would have a bottom unit with a base width of about 12 ft. This will result in considerably less excavation and pavement removal to construct this wall. Although bin walls were fairly common in Georgia in the past, they are not as common now in transportation projects, so obtaining the units may be problematic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 47,518	—	\$ 47,518
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 47,518	—	\$ 47,518



ORIGINAL DESIGN



ALTERNATIVE DESIGN

CALCULATIONS



PROJECT **SR 3/US 41 FROM MOUNT PARAN ROAD TO
PACES MILL ROAD
Cobb/Fulton Counties, Georgia**

ALTERNATIVE NO **W-8**

SHEET NO **3 of 4**

Additional excavation required for MSE wall equals the difference in special backfill width and bin width times the height times the square root of 2.

Station	Width Diff.	Height	Area	Volume	Add'l Pavement Removed	Pav't Area
61+50	9'	23'	293		9'	
				554		50
62+00	9'	24'	305		9'	
				534		47
62+50	8'	24'	272		8'	
				493		44
63+00	8'	23'	260		8'	
				471		44
63+50	8'	22'	249		8'	
				490		36
64+00	9'	22'	280		5'	
				480		28
64+50	8'	21'	238		5'	
				376		14
65+00	7'	17'	168		0'	
				266		0
65+50	7'	12'	119		0'	
Totals				3664 CY		263 SY

Assume the cost of the MSE panels and special backfill equals the cost of the precast bins and special backfill. Cost difference is made up of additional excavation and pavement replacement. Since the additional excavation will be moved twice (taken out and put back later), the unit price will be twice the excavation cost, so \$8/CY will be used.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **W-10**

DESCRIPTION: **IN PHASE I, USE A SOIL NAIL WALL FOR WALL NO. 4 IN LIEU OF A MECHANICALLY STABILIZED EMBANKMENT WALL** SHEET NO.: **1 of 9**

ORIGINAL DESIGN: (Sketch attached)

A mechanically stabilized embankment (MSE) wall is designed for the Phase I, Wall No. 4 in a cut area. This necessitates cutting back the existing ground to install the wall and then replacing the cut area with new backfill.

ALTERNATIVE: (Sketch attached)

Use a soil nail wall for Wall No. 4.

ADVANTAGES:

- Saves trees along a residential area
- Easier to construct because less ground is disturbed
- Avoids having a large excavation followed by a large backfilling operation, thus saves construction time
- Requires a permanent underground easement in lieu of a permanent ground easement

DISADVANTAGES:

- Adds costs

DISCUSSION:

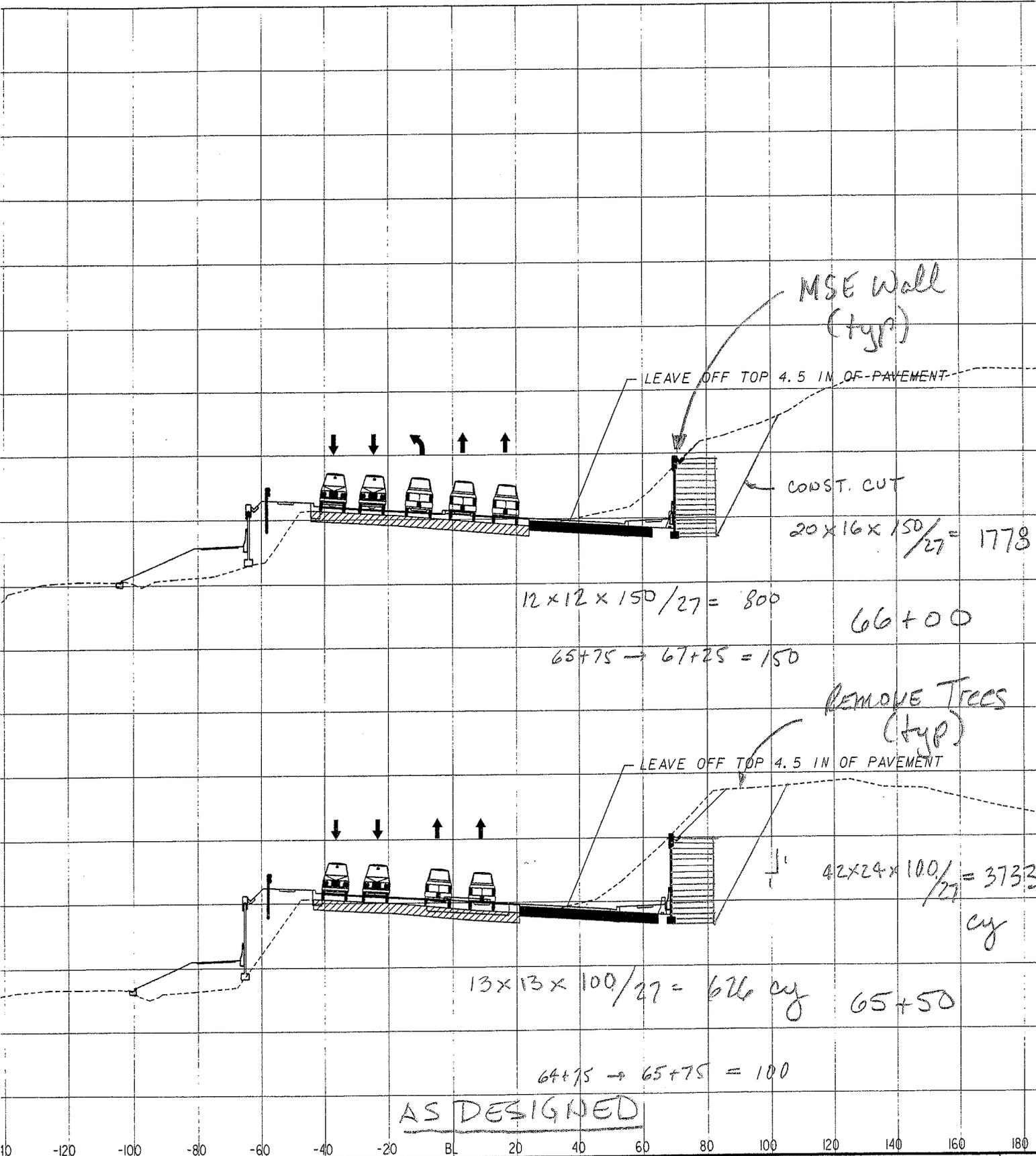
This alternative is being presented because in order to construct the MSE wall, a treed hillside separating SR 3/US 41 from an apartment complex will have to be removed and replaced with a grassed hillside. This will eliminate the natural buffer between the residences and the road allowing noise to migrate toward the residences. Construction of the soil nail wall will only require removal of some of the trees at the bottom of the hill, thus retaining most of the buffer.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 615,523	—	\$ 615,523
ALTERNATIVE	\$ 704,935	—	\$ 704,935
SAVINGS	\$ (89,412)	—	\$ (89,412)

ALT. NO.
W-10
Sht. 2 of 9

SDGHS

STATE	
GA	



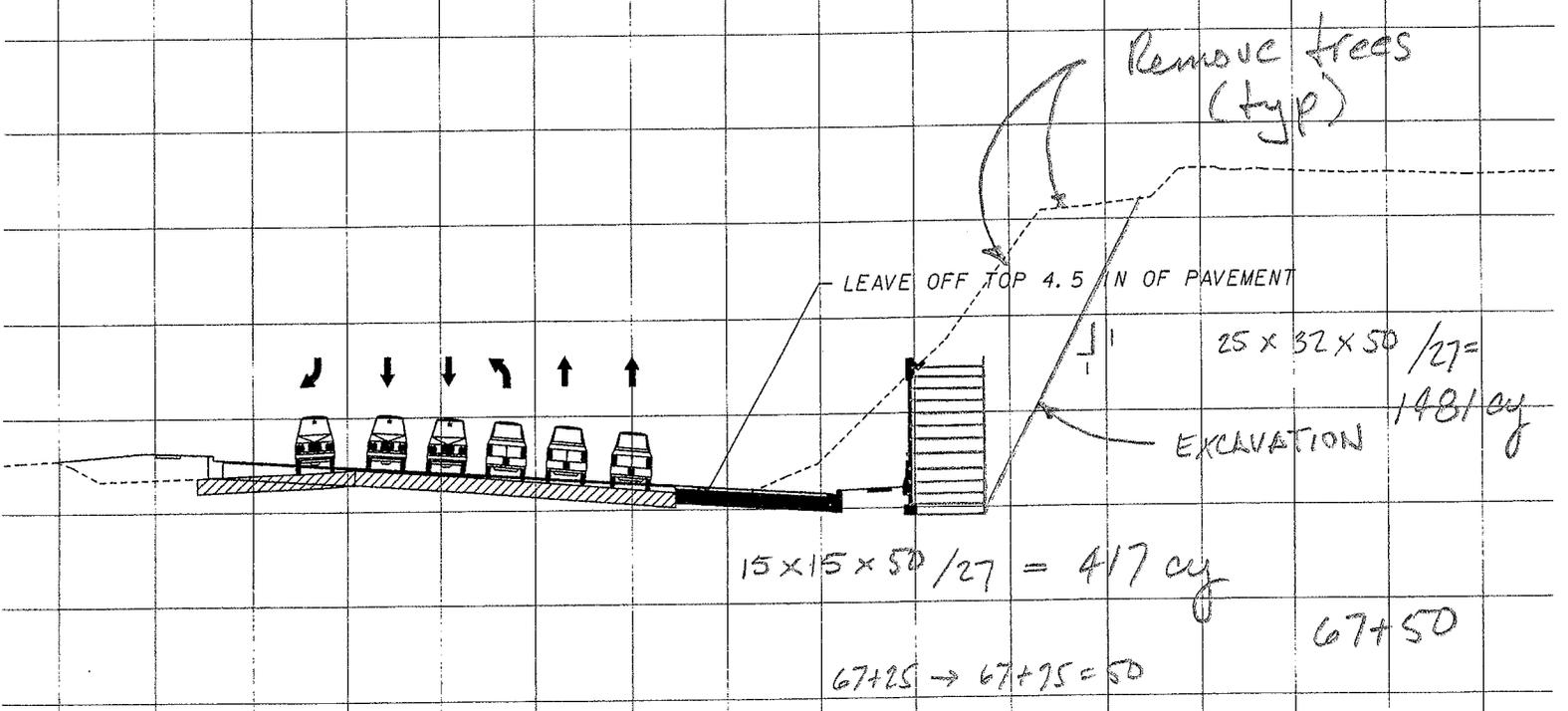
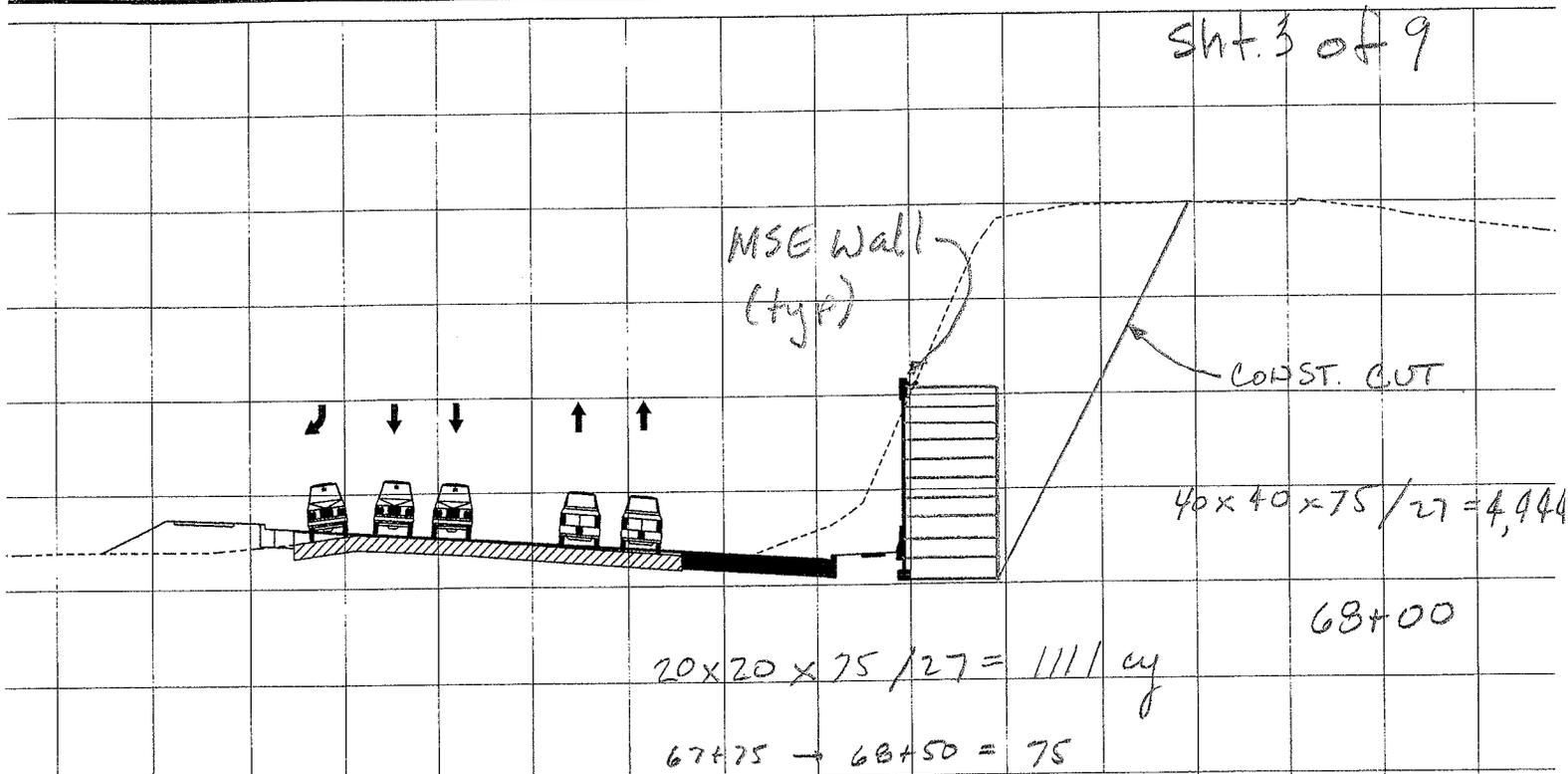
AS DESIGNED

10 -120 -100 -80 -60 -40 -20 BL 20 40 60 80 100 120 140 160 180

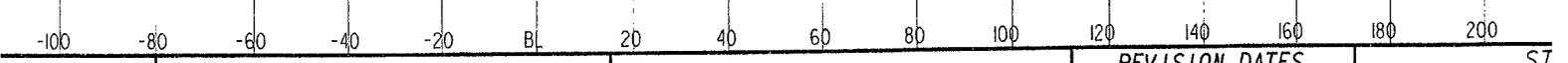
SCALE:

REVISION DATES

Sh. 3 of 9



AS DESIGNED



REVISION DATES	

ALT. NO.
W-10
Sht. 4 of 9

WALL NO. 4

MSE Wall
(typ)

Const. Cut

$$45 \times 45 \times 75 / 27 = 5625 \text{ cu yd}$$

69+00

$$23 \times 23 \times 75 / 27 = 1469 \text{ cu yd}$$

$$68+50 \rightarrow 69+25 = 75$$

Remove trees
(typ)

Const. Cut

$$34 \times 43 \times 50 / 27 = 2707 \text{ cu yd}$$

69+50

$$18 \times 18 \times 50 / 27 = 600 \text{ cu yd}$$

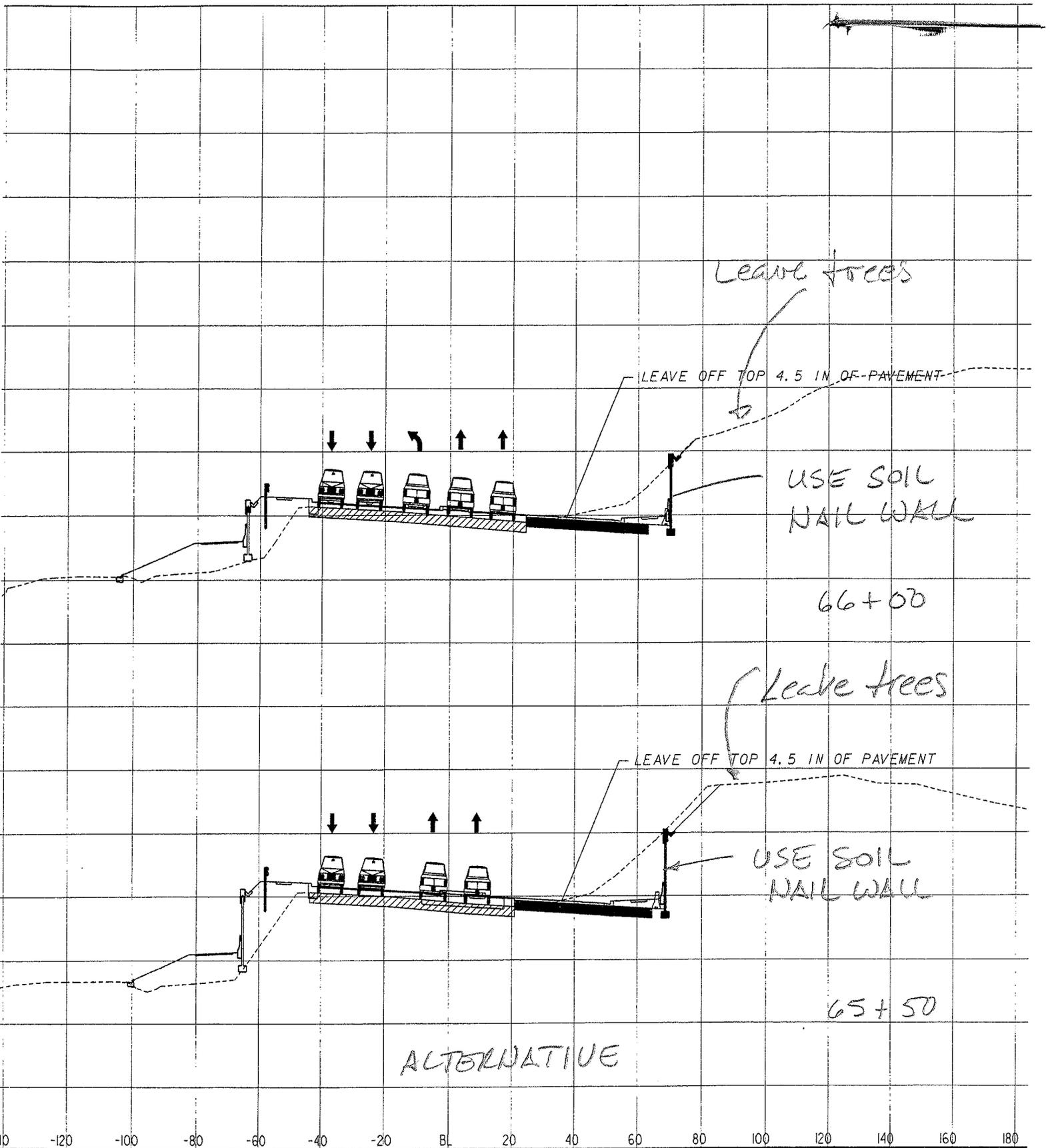
$$69+25 \rightarrow 69+75 = 50$$

AS DESIGNED

ALT NO.
W-10
Sht. 6 of 9

SDGWS

STATE	
GA	



ALTERNATIVE

ALT. NO.
W-10
Sht 7 of 9

leave trees

use soil nail wall

69+00

leave trees

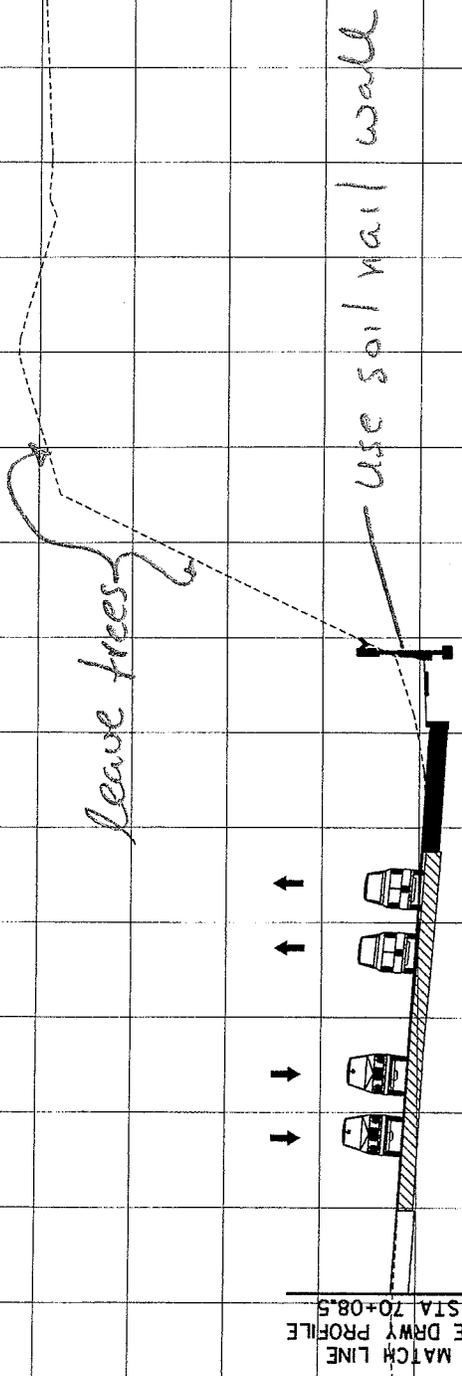
use soil nail wall

69+50

ALTERNATIVE

ACT. NO.
W-10
Sht 9 of 9

70+00



leave trees

use soil nail wall

↑ ↑ ↓ ↓

MATCH LINE
SEE DRAWY PROFILE
STA 70+08.5

ALTERNATIVE

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **W-11**

DESCRIPTION: **IN PHASE I, USE SOIL NAIL WALL FOR WALL NO. 1 IN LIEU OF A MECHANICALLY STABILIZED EMBANKMENT WALL** SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

A mechanically stabilized embankment (MSE) wall is designed for the Phase I, Wall No. 1 in a cut area. This necessitates cutting back the existing ground to install the wall and then replacing the cut area with new backfill.

ALTERNATIVE: (Sketch attached)

Use a soil nail wall for Wall No. 1.

ADVANTAGES:

- Saves trees along a residential area
- Easier to construct because less ground is disturbed
- Avoids having a large excavation followed by a large backfilling operation, thus saves construction time
- Requires a permanent underground easement in lieu of a permanent ground easement

DISADVANTAGES:

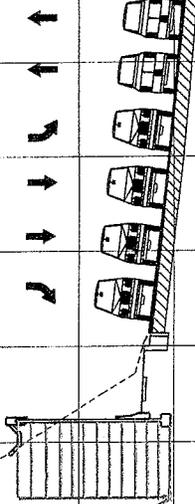
- Adds costs

DISCUSSION:

This alternative is being presented because in order to construct the MSE wall, a treed hillside separating SR 3/US 41 from a subdivision of single family homes will have to be removed and replaced with a grassed hillside. This will eliminate the natural buffer between the residences and the road allowing noise to migrate toward the residences. Construction of the soil nail wall will only require removal of some of the trees at the bottom of the hill, thus retaining most of the buffer.

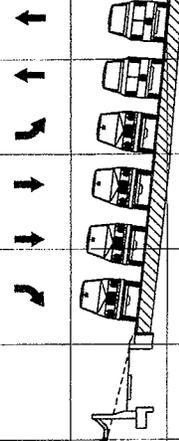
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 386,996	—	\$ 386,996
ALTERNATIVE	\$ 472,703	—	\$ 472,703
SAVINGS	\$ (85,707)	—	\$ (85,707)

take out trees



$28 \times 25 \times 50 / 27 = 1296 \text{ cu yd}$
 $16 \times 16 \times 50 / 27 = 474 \text{ cu yd}$

$45 + 75 \rightarrow 46 + 25 = 50'$



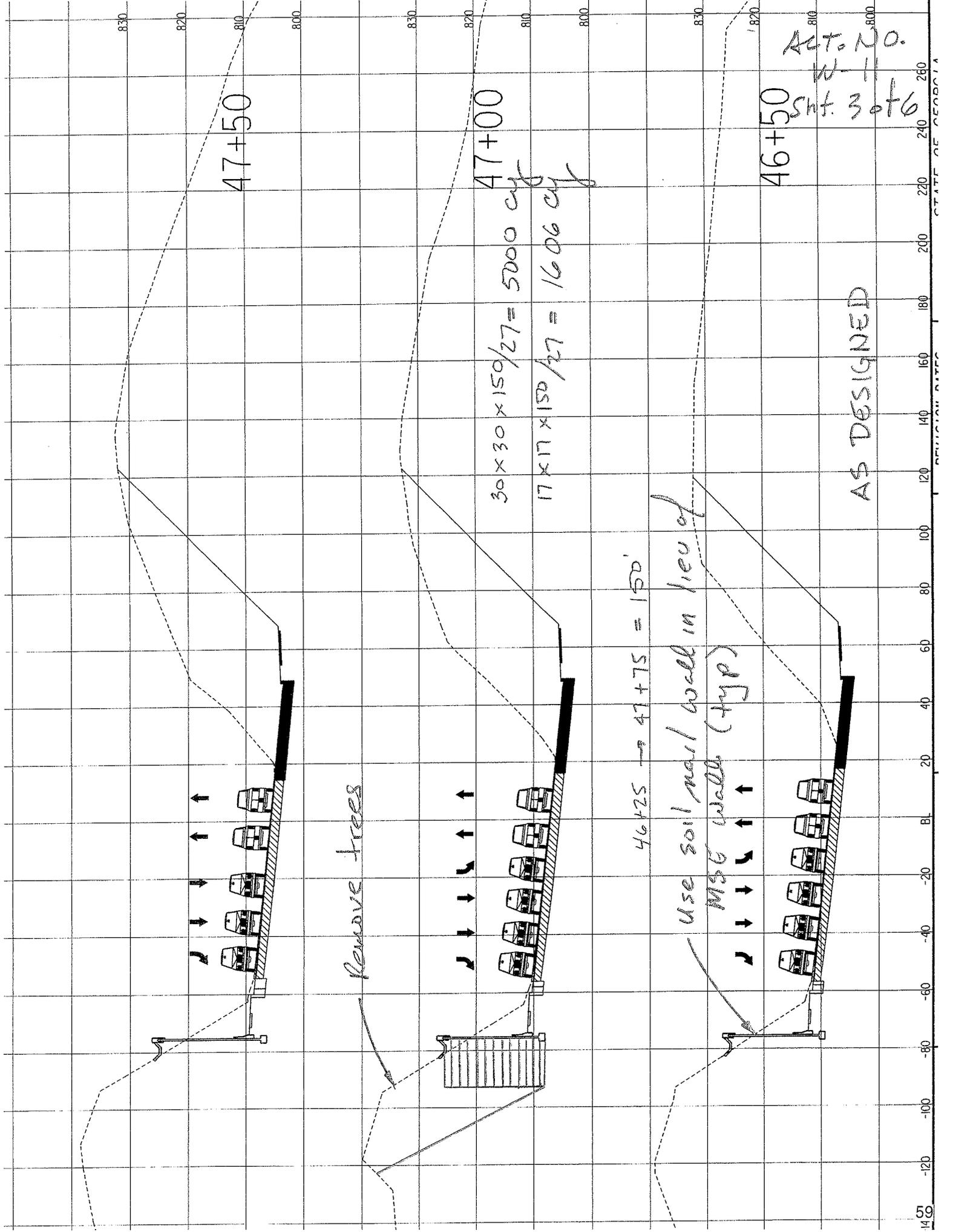
45+50

45+00

ACT. NO.
W-11
Sht. 2 of 6

AS DESIGNED

44+50



47+50

47+00

46+50

$30 \times 30 \times 150 / 27 = 5000 \text{ cu}$
 $17 \times 17 \times 150 / 27 = 1606 \text{ cu}$

46+25 → 47+75 = 150'

use soil nail wall in lieu of
 MSE walls (typ)

Remove trees

Act. No.
 W-11
 Sht. 3 of 6

AS DESIGNED

EXCAVATION	SELECT BACKFILL	NET BACKFILL
2593	1200	
5000	1606	
1296	474	
1556	726	
<u>10,445 cy</u>	<u>4006 cy = 6439</u>	

take out trees

47+75 → 48+75 = 100

Use soil/nail wall in lieu of MSE wall (typ)

48+50

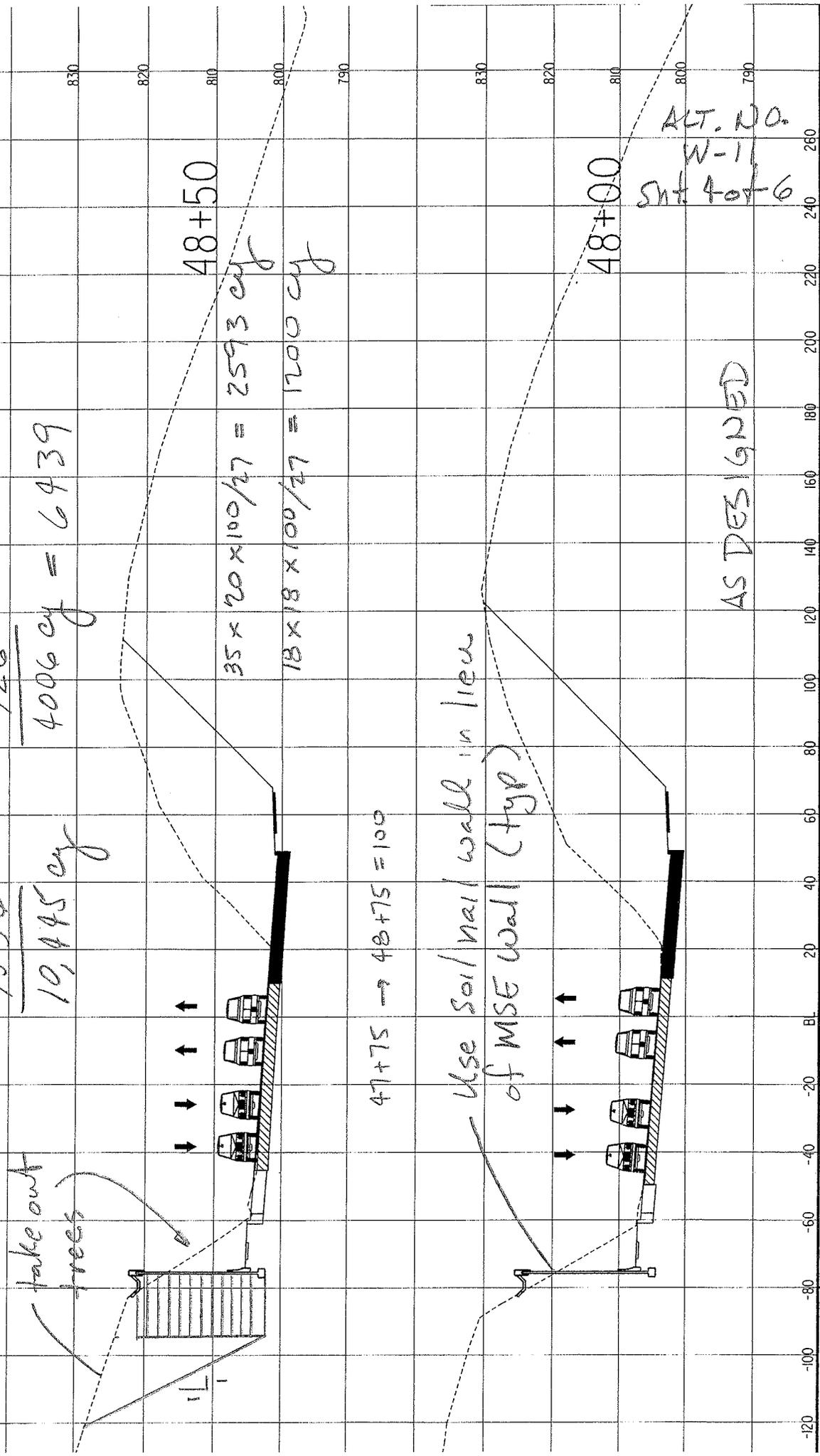
35 x 20 x 100 / 27 = 2593 cy

18 x 18 x 100 / 27 = 1200 cy

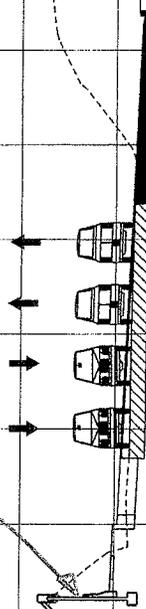
48+00

ALT. NO. W-11
Sht 4 of 6

AS DESIGNED

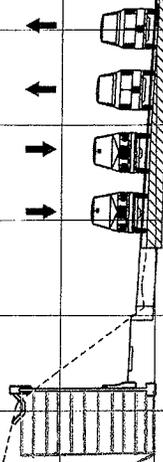


Use Soil Nail Wall in lieu of MSE wall (typ.)



49+50

Take out trees (typ)



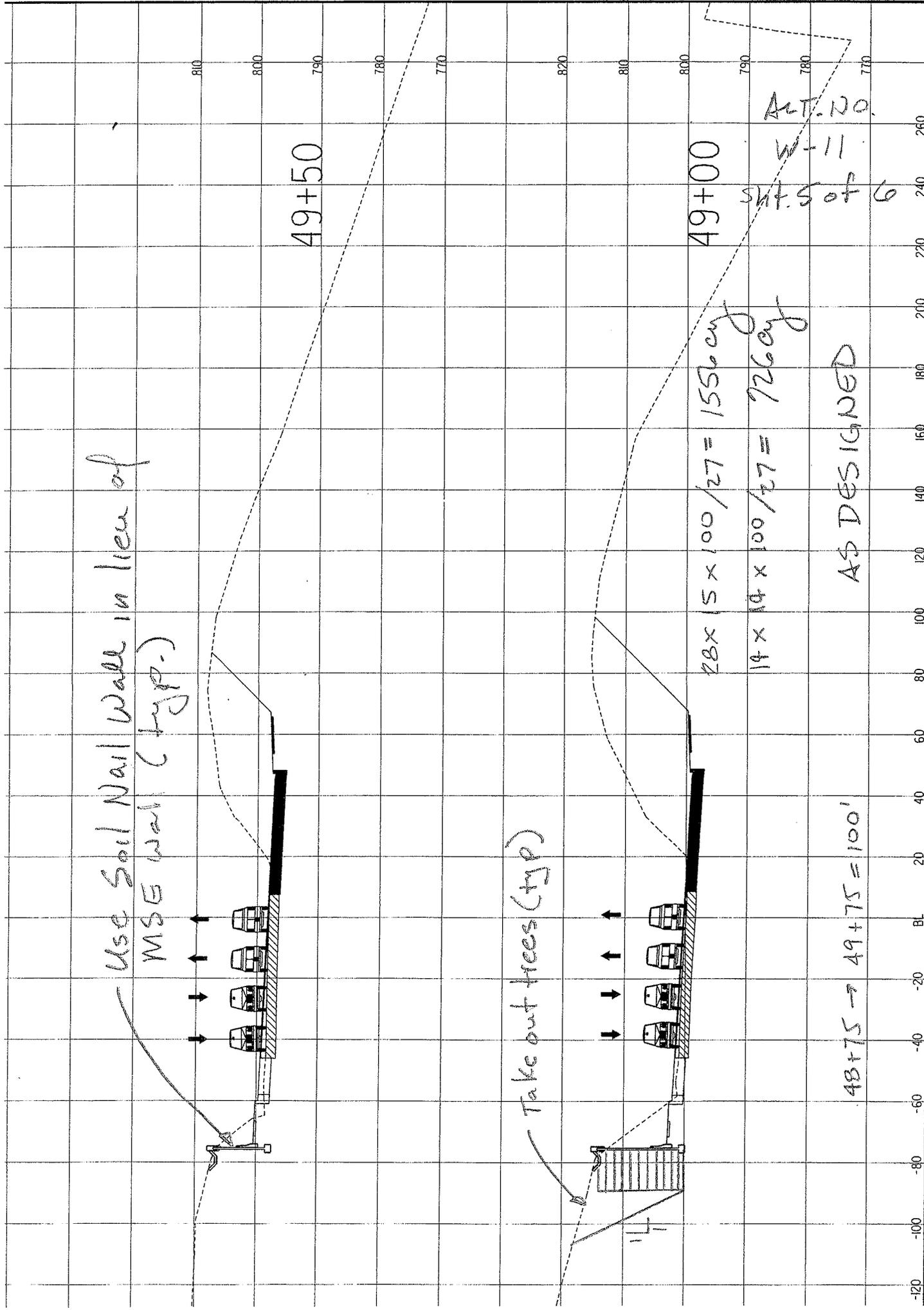
49+00

28 x 15 x 100 / 27 = 1556 cu ft
 14 x 14 x 100 / 27 = 726 cu ft

AS DESIGNED

48+75 → 49+75 = 100'

ACT. NO.
 W-11
 Sht. 5 of 6



REVISION DATES

SCALE: HOR : 1 inch = 20 feet

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 OFFICE:

CROSS SECTIONS

Moreland Altabelli
 Associates, Inc.
 2211 Beaver Run Road





SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD <i>Cobb/Fulton Counties, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
ROADWAY						
R-1	In Phases I and II, use 11-ft-wide lanes in lieu of 12-ft-wide lanes for the inside lanes of the road	\$416,335	\$0	\$416,335		\$416,335
R-2	Minimize improvements to the roadway leading to the IBM North Entrance					
R-3	Leave right out only at the existing IBM South driveway					
R-4	In Phases I and II, narrow shoulders by narrowing grass strips; provide 5 ft clear from edge of lane to the sidewalk	\$1,083,330	\$0	\$1,083,330		\$1,083,330
SIDEWALKS						
S-1	In Phases I and II, use asphalt concrete in lieu of cast-in-place concrete for the multi-use trail	\$306,129	\$61,397	\$244,732		\$244,732
S-2	In Phases I and II, eliminate the 5 ft sidewalk	\$138,639	\$0	\$138,639		\$138,639
S-3	In Phases I and II, use asphalt concrete in lieu of cast-in-place concrete for the sidewalk	\$138,639	\$41,764	\$96,875		\$96,875
CURB AND GUTTER						
CG-1	In Phases I and II, use a 24-in-wide curb and gutter section in lieu of a 30-in-wide curb and gutter section and narrow the median from 8-ft-wide to 7-ft-wide thus narrowing the typical section by 2 ft	\$432,867	\$107,911	\$324,956		\$324,956

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **R-1**

DESCRIPTION: **USE 11-FT-WIDE INSIDE LANES IN LIEU OF 12-FT-WIDE LANES IN EACH DIRECTION** SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The current design uses 12-ft-wide lanes for all of the travel lanes.

ALTERNATIVE:

Use 11-ft-wide inside travel lanes.

ADVANTAGES:

- Reduces construction costs
- Reduces right-of-way cost
- Reduces pavement area and long-term maintenance
- Reduces amount of storm water runoff

DISADVANTAGES:

- One narrower lane in each direction

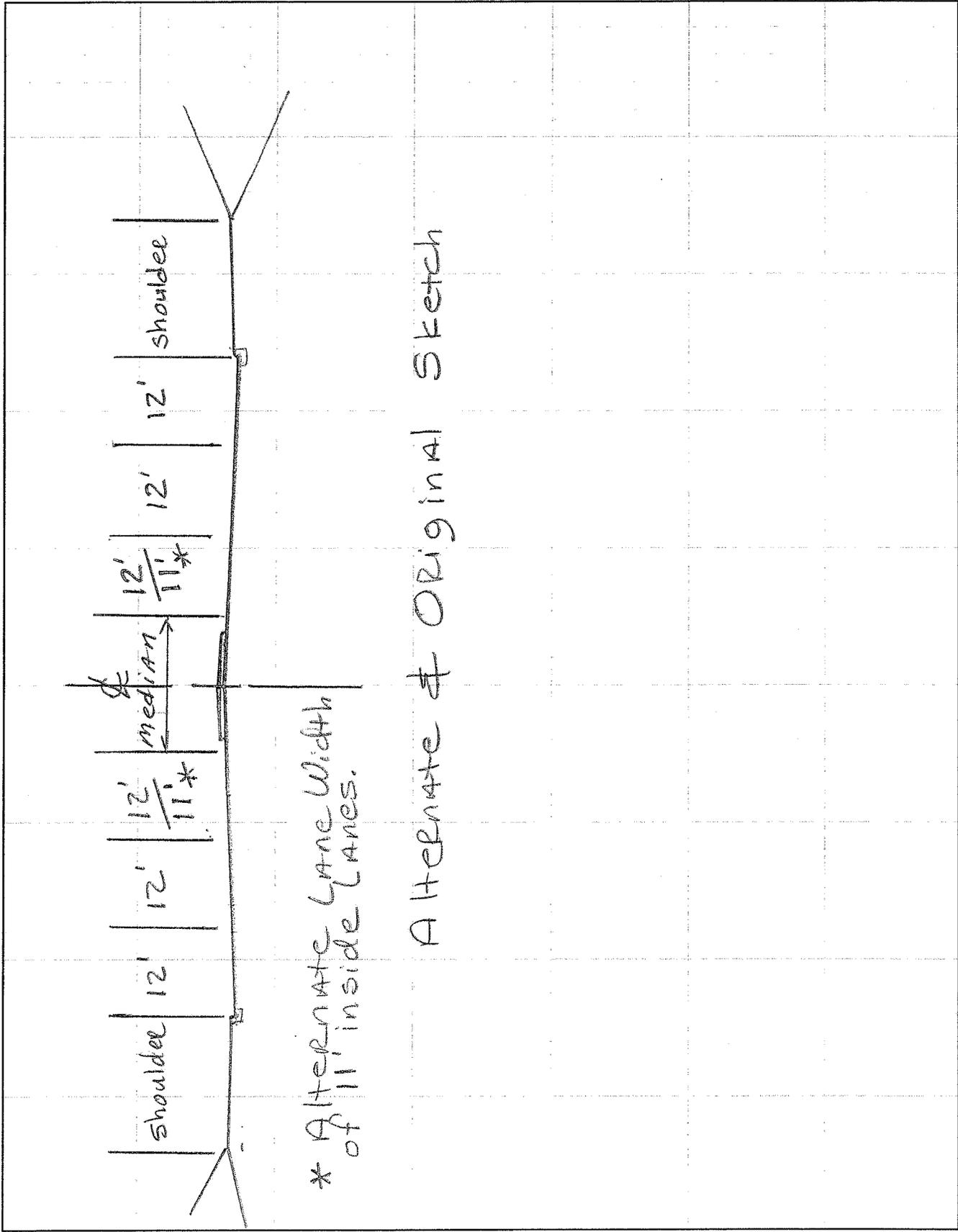
DISCUSSION:

Since there will be three travel lanes in each direction and a 2 ft gutter distance to the raised concrete median, it is recommended to use an 11-ft-wide inside travel lane in each direction. It is important to note that the truck percentage is 4%, which is not high and the majority of trucks will use the outside lane. Since the right-of-way is being acquired to only the roadway shoulder point (easement for slopes), the reduction in right-of-way width is included in the "cost comparison."

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 306,129	—	\$ 306,129
ALTERNATIVE	\$ 61,397	—	\$ 61,397
SAVINGS	\$ 244,732	—	\$ 244,732

SUBJECT: Sketch
Alt. R-1
Phase 1 & 2

BY: _____ DATE: _____
 CHKD: _____ DATE: _____



CALCULATIONS



PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD
Fulton/Cobb Counties, Georgia

ALT. NO.:

R-1

Phase 1 & 2

SHEET NO.: 3 of 5

Full Depth Pavement Unit Cost

$$(12.5 \text{ mm}) \frac{165 \text{ lbs/sy}}{2000\#} \times \frac{\text{T}}{\text{T}} \times \frac{\$63.46}{\text{T}} = \$5.24/\text{sy}$$

$$(19 \text{ mm}) \frac{330 \text{ lbs/sy}}{2000\#} \times \frac{\text{T}}{\text{T}} \times \frac{\$68.49}{\text{T}} = \$11.30/\text{sy}$$

$$(25 \text{ mm}) \frac{880 \text{ lbs/sy}}{2000\#} \times \frac{\text{T}}{\text{T}} \times \frac{\$59.88}{\text{T}} = \$26.35/\text{sy}$$

$$(10" \text{ GAB}) \frac{2.833' \times 9 \text{ sf}}{\text{sy}} \times \frac{.074 \text{ T}}{\text{cf}} \times \frac{\$17.85}{\text{T}} = \$9.91/\text{sy}$$

$$\text{— (Full Depth) Total} = \underline{\underline{\$52.80/\text{sy}}}$$

Overlay Pavement Unit Cost

$$(12.5 \text{ mm}) \frac{165 \text{ lbs/sy}}{2000\#} \times \frac{\text{T}}{\text{T}} \times \frac{\$63.46}{\text{T}} = \$5.24/\text{sy}$$

$$(19 \text{ mm}) \frac{220 \text{ lbs/sy}}{2000\#} \times \frac{\text{T}}{\text{T}} \times \frac{\$68.49}{\text{T}} = \$7.53/\text{sy}$$

$$\text{(Leveling)} \frac{110 \text{ lbs/sy}}{(1" \text{ Avg.})} \times \frac{\text{T}}{2000\#} \times \frac{\$69.52}{\text{T}} = \$3.83/\text{sy}$$

$$\text{OVERLAY} = \underline{\underline{\$16.60/\text{sy}}}$$

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**
 Fulton/Cobb Counties, Georgia

ALT. NO.:

Phase 1 & 2

R-1

SHEET NO.: 4 of 5

Full-Depth Pavement Area Saved: $(12'-11") \times 2$

$$\frac{(2' \times 0.601 \text{ mi.} \times 5,280' / \text{mi.})}{9 \text{ sf/sy}} = 705 \text{ s.y. (Phase 2)}$$

$$\frac{(2' \times 0.421 \text{ mi.} \times 5,280' / \text{mi.})}{9 \text{ sf/sy}} = 494 \text{ s.y. (Phase 1)}$$

R/W Saved:

$$2' \times 2800' = 5,600 \text{ s.f. (Phase 2)}$$

Use light Commercial: \$10/sf (from GDOT)

$$2' \times 2521' = 5,042 \text{ s.f. (Phase 1)}$$

Use weighted R/W unit price:

$$\underset{\uparrow 11\%}{(0.11)} (\$25.00/\text{sf}) + \underset{\uparrow 89\%}{(0.89)} (\$10.00/\text{sf}) = \$11.65/\text{sf}$$

Bridge Unit = \$103/sf based on GDOT

$$\text{Project cost estimate } \frac{\$5,968,000}{(109.33' \times 530')} = \$103/\text{sf}$$

$$530' \times 2' = 1,060 \text{ s.f.}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **R-2**

DESCRIPTION: **MINIMIZE IMPROVEMENTS TO THE ROADWAY AT THE** SHEET NO **1 of 1**
IBM NORTH ENTRANCE

ORIGINAL DESIGN:

Improvements to the roadway at the IBM North Entrance extend approximately 200 ft along the road.

ALTERNATIVE:

Make only the improvements that are necessary adjacent to SR 3/US 41.

ADVANTAGES:

- Reduces cost
- Reduces construction time
- Reduces impact to school roadway

DISADVANTAGES:

- None apparent

DISCUSSION:

The work on the IBM North Entrance roadway extends about 200 ft from SR 3/US 41. There is no reason to carry the work that far. Only the work that is necessary for the project should be done. This may be limited to shortening the median on the IBM North Entrance roadway.

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

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **R-3**

DESCRIPTION: **LEAVE THE RIGHT-OUT EXIT AT THE EXISTING IBM SOUTH ENTRANCE** SHEET NO. **1 of 2**

ORIGINAL DESIGN:

The IBM South Entrance road is completely relocated to the south.

ALTERNATIVE: (Sketch attached)

Leave a right-out exit from the existing IBM South Entrance.

ADVANTAGES:

- Provides additional access to SR 3/US 41 from the IBM complex
- Reduces travel time for traffic from the north end of the IBM Complex

DISADVANTAGES:

- Must provide a curb and gutter on the left side of the right-out driveway

DISCUSSION:

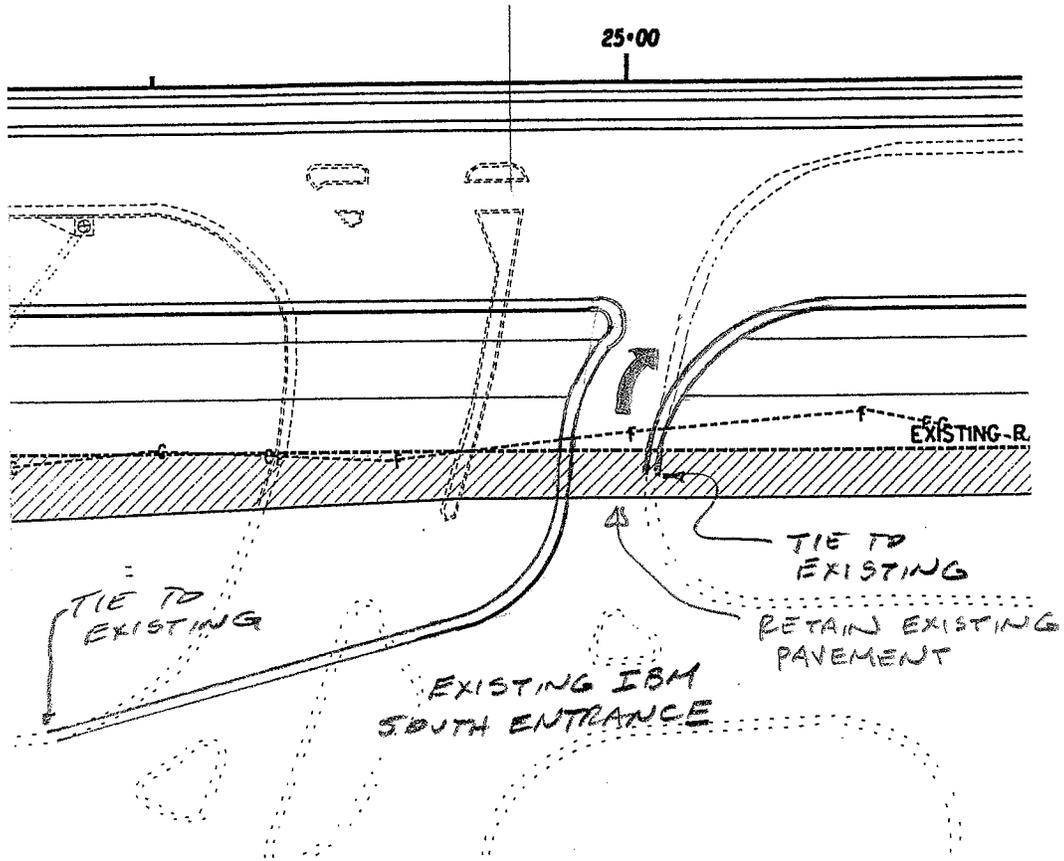
Since the pavement already exists, leaving a right-out exit at the existing IBM South Entrance will be inexpensive. Curb and gutter will be needed on the left side of the right-out exit. Leaving the exit will reduce travel distance for people exiting from the north end of the IBM complex. It will also reduce the number of right turns through the new intersection.

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

ALTERNATIVE NO.

R-3

SHEET 2 OF 2



ALTERNATIVE DESIGN

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **R-4**

DESCRIPTION: **FOR PHASES I AND II, NARROW THE SHOULDERS BY NARROWING THE GRASS STRIPS; PROVIDE 5 FT FROM THE EDGE OF LANE TO THE EDGE OF SIDEWALK OR MULTI-USE TRAIL** SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current design uses 16-ft-wide and 22-ft-wide shoulders with a 6-ft-wide grass strip between the sidewalk or multi-use trail and the back of curb.

ALTERNATIVE:

Narrow the grass strip to 2½-ft-wide to provide a 5 ft offset from the edge of travel lane to the (2½ ft curb and gutter and 2½ ft grass = 5 ft) sidewalk or multi-use trail. This would narrow the sidewalk shoulder to 12½ ft and the multi-use trail shoulder to 18½ ft.

ADVANTAGES:

- Reduces construction costs
- Reduces right-of-way cost
- Reduces amount of grass area to maintain

DISADVANTAGES:

- Would “jog” around a few valley gutter driveways
- Reduces amount of streetscapes

DISCUSSION:

The AASHTO bicycle/pedestrian manual, GDOT Design Manual and ADA require a 5 ft offset from the edge of the travel lane to the sidewalk or multi-use trail, which Alt. No. R-4 would provide. The current design provides an 8½ ft offset which could be narrowed by 3½ ft to still provide the required 5 ft offset. This alternative would save seven ft of right-of-way and excavation.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,083,330	—	\$ 1,083,330
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 1,083,330	—	\$ 1,083,330

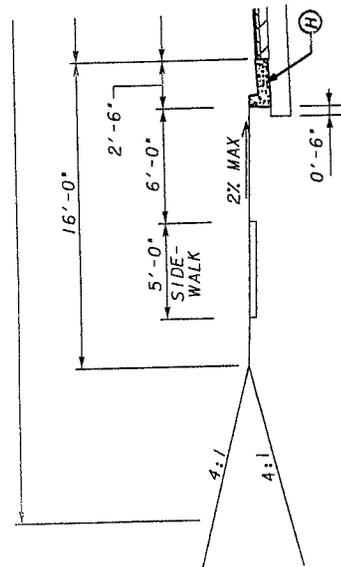
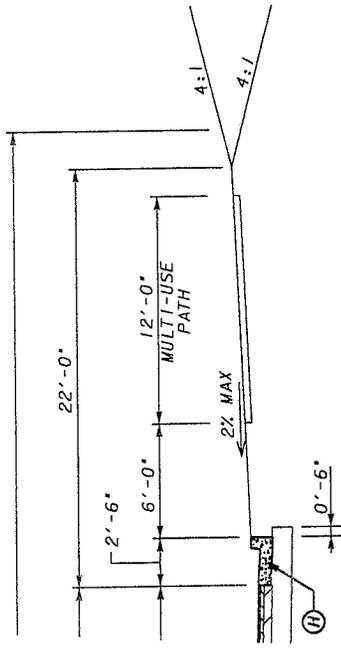
SUBJECT: Sketch
Alt. R-4
Phase 1 & 2

BY: _____ DATE: _____
 CHKD: _____ DATE: _____

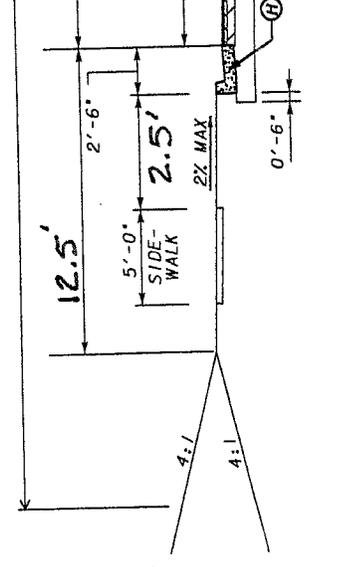
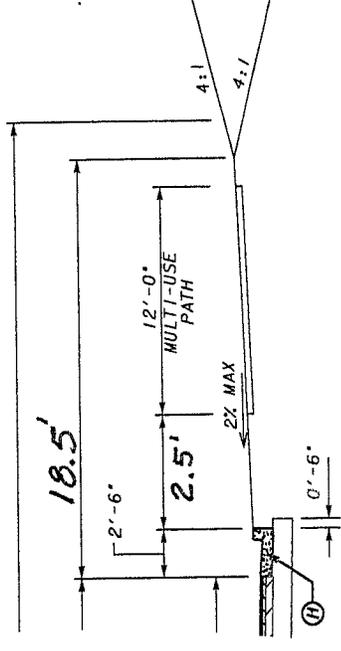
PAGE

SHEET
 2/4

Original shoulders



Alternate shoulders



CALCULATIONS



PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD
Fulton/Cobb Counties, Georgia

ALT. NO.:

Phase 1 & 2

R-4

SHEET NO.: 3 of 4

Phase 1 Quantities Saved:

$$\text{EARTH work: } \frac{(2 \text{ sides} \times 3.5') \times \underset{\text{AVG.}}{5'} \times 2200'}{27 \text{ cf/cy}} = 2,852 \text{ cy}$$

Phase 1 R/W Saved.

$$(2 \text{ sides} \times 3.5') \times 2,521' = 17,647 \text{ s.f.}$$

use wt. R/W unit cost \$11.65/sf

Phase 2 R/W Saved

$$(2 \text{ sides} \times 3.5') \times 2,800' = 19,600 \text{ sf}$$

$$\text{EARTH work: } \frac{(2 \text{ sides} \times 3.5') \times \underset{\text{AVG.}}{5'} \times 3450'}{27 \text{ cf/cy}} = 4,472 \text{ cy}$$

(Phase 2)

use: \$10/sf

Bridge Saved: see AH. B-3

to narrow the 5 ft. stamped
conc. to 3'. (this provides a 5 ft.
offset 2' gutter + 3' strip
on bridge)

(Phase 1)
Bridge Saved: \$46,492 AH. B-3

COST WORKSHEET



PROJECT:	SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD	ALTERNATIVE NO.	R-4
	<i>Fulton/Cobb Counties, Georgia</i>	SHEET NO.	4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Phase I							
Pavement Section	CY	2,852	4.50	12,834			
Bridge Saved (see Alt. No. B-3)				46,492			
Subtotal				59,326			
Markup (10%)				5,933			
Right-of-way saved	SF	17,647	11.65	205,588			
Right-of-way markup 148%				304,268			
Right-of-way Phase I subtotal				509,855			
Total Phase I				575,114			
Phase II							
Earthwork	CY	4,472	4.50	20,124			
Markup (10%)				2,015			
Subtotal				22,139			
Right-of-way saved	SF	19,600	10.00	196,000			
Right-of-way markup 148%				290,080			
Right-of-way Phase I subtotal				486,080			
Total Phase II				508,216			
Sub-total							
Mark-up at							
TOTAL					1,083,330		

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **S-1**

DESCRIPTION: **IN PHASES I AND II, USE ASPHALT CONCRETE IN LIEU OF CAST-IN-PLACE CONCRETE FOR THE MULTI-USE TRAIL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The original design has a 12-ft-wide, concrete multi-use trail that will be installed on the east side of SR 3/US 41 from Mount Paran Road to the Chattahoochee NRA Road East and on the west side of SR 3/US 41 from the Chattahoochee River Bridge to Paces Mill Road.

ALTERNATIVE:

Use asphaltic concrete for the construction of the 12-ft-wide multi-use trail.

ADVANTAGES:

- Reduces construction costs
- Expedites the construction schedule
- Softer material for pedestrian use/recreation
- Smoother surface for riding a bicycle

DISADVANTAGES:

- Changes appearance
- May require periodic resurfacing

DISCUSSION:

Asphaltic concrete paving is a more cost-effective material to use for the construction of the multi-use trail. Both Cobb County and Fulton County have combinations of asphalt and concrete pavement structures for these types of pedestrian facilities. This option will provide a lower costing material for construction and a softer material for pedestrian enjoyment for walkers, joggers and the like.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 306,129	—	\$ 306,129
ALTERNATIVE	\$ 61,397	—	\$ 61,397
SAVINGS	\$ 244,732	—	\$ 244,732

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**
 Fulton/Cobb Counties, Georgia

ALT. NO.:

PHASES 1 & 2
 USE ASPHALT CONCRETE IN LIEU OF CAST-IN-PLACE CONCRETE
 FOR THE MULTI-USE TRAIL

S-1

SHEET NO.: 2 of 3

PHASE 1

12' MULTI-USE TRAIL

$$2587 \text{ LF} \times 12' \div 9 = 3,449.33 \times 0.10 = 344.93 + 3,449.33 = \underline{\underline{3,794.26 \text{ SY}}}$$

ASPHALT CONCRETE

$$2" \text{ ASPHALT } 3,794.26 \text{ SY} \left(\frac{220 \text{ lbs}}{\text{YD}^2} \right) = 834,680 / 2000 \\ = \underline{\underline{417.00 \text{ TNS}}}$$

$$\text{COST } \$59.88/\text{TU} \cdot 417.00 = \underline{\underline{\$24,970.00}} \text{ ASPHALT}$$

CONCRETE COST

$$3794.26 \text{ SY} \times \$33.78 = \$128,170.00$$

$$\text{DIFF. IN COSTS } \$128,170.00$$

$$- 24,970.00$$

$$\underline{\underline{\$103,200.00 \text{ SAVINGS}}}$$

PHASE 2

12' MULTI-USE TRAIL

$$3,187 \text{ LF} \times 12' \div 9 = 4,249.33 \times 0.10 = 424.93 + 4,249.33 = 4,674.26$$

2" ASPHALT CONCRETE

$$4,674.26 \text{ SY} \left(\frac{220 \text{ lbs}}{\text{YD}^2} \right) = 1,028,339.00 / 2000 \\ = 514.00 \text{ TNS}$$

$$\text{COST } \$60.01 \times 514.00 = \$30,845.00 \text{ ASPHALT}$$

CONCRETE COST

$$4674.26 \text{ SY} \times \$32.12 = \$150,179.00$$

$$- 30,845.00$$

$$\underline{\underline{\$119,284.00}}$$

TOTAL SAVINGS PHASES 1 & 2

$$103,200 + 119,274 = \underline{\underline{\$222,474}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **S-2**

DESCRIPTION: **IN PHASES I AND II, ELIMINATE THE 5 FT SIDEWALK** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

In Phase I and Phase II, the original design has a 5-ft-wide sidewalk on the west side of SR 3/US 41 from Mount Paran Road to Chattahoochee NRA Road West.

ALTERNATIVE:

Eliminate the 5-ft-wide sidewalk on the west side of SR 3/US 41.

ADVANTAGES:

- Reduces construction costs
- Expedites construction schedule
- Eliminates long-term maintenance

DISADVANTAGES:

- Pedestrians are limited to east side access only

DISCUSSION:

Eliminating the sidewalk will expedite construction and reduce costs; however it will only allow pedestrian movement on the east side of the roadway through this portion of the corridor. There do not appear to be any users close to the location of the sidewalk that would make use of it. If it appears that people use the area for walking, the sidewalk can be added at a later date.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 138,639	—	\$ 138,639
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 138,639	—	\$ 138,639

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**
Fulton/Cobb Counties, Georgia

ALT. NO.:

S-2

ELIMINATE FIVE-FOOT SIDEWALK

SHEET NO.: 2 of 3

PHASE 1

$$\text{LENGTH } 3,094 \times 5 = 15,470 \text{ SF} \div 9 = 1718.88 \text{ SY} (0.10) = 171.88 + 1718.88 = 1890.78 \text{ SY}$$

$$\text{COST } \$ 33.78 (1890.78) = \underline{\underline{\$ 63,870.47}}$$

PHASE 2

$$\text{LENGTH } 3,167 \times 5 = 15,835 \div 9 = 1759.44 \text{ SY} (0.10) = 175.94 + 1759.44 = 1935.38 \text{ SY}$$

$$\text{COST } 32.13 (1935.38) = \underline{\underline{\$ 62,164.69}}$$

TOTAL SAVINGS FOR SIDEWALK ELIMINATION

$$\begin{array}{r} \$ 63,870.47 \\ \$ 62,164.69 \\ \hline \$ \underline{\underline{126,035.16}} \end{array}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **S-3**

DESCRIPTION: **IN PHASES I AND II, USE ASPHALT CONCRETE FOR THE** SHEET NO.: **1 of 3**
SIDEWALK IN LIEU OF CAST-IN-PLACE CONCRETE

ORIGINAL DESIGN:

The original design has a 5-ft-wide concrete sidewalk along SR 3/US 41.

ALTERNATIVE:

Use asphaltic concrete for construction of the sidewalk throughout the project.

ADVANTAGES:

- Reduces construction costs
- Expedites construction schedule

DISADVANTAGES:

- Changes appearance of walking area
- May require periodic resurfacing

DISCUSSION:

The suggestion to use asphaltic concrete for the sidewalk installation will reduce construction costs and expedite the construction schedule. Because this area is anticipated to receive very limited use, changing from concrete to asphaltic pavement should not be detrimental to the project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 138,639	—	\$ 138,639
ALTERNATIVE	\$ 41,764	—	\$ 41,784
SAVINGS	\$ 96,875	—	\$ 96,875

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**
 Fulton/Cobb Counties, Georgia

ALT. NO.:

PHASES 1 & 2

S-3

USE ASPHALT CONCRETE FOR SIDEWALK I.L.O. CAST-IN-PLACE
 CONCRETE

SHEET NO.: 2 of 3

PHASE 1

$$\text{LENGTH } 3,094 \times 5 = 15,470 \text{ SF} \div 9 = 1718.88 \text{ SY } (0.10) = 171.88 + 1718.88 = 1,890.78 \text{ SY}$$

2" DEPTH ASPHALT

$$1,890.78 \text{ SY } (220 \frac{\text{lbs}}{\text{sq yd}}) = 415,971.60 \text{ lbs} / 2000$$

$$= 208 \text{ TNS} \times \$59.88 = \underline{\$12,455} \text{ ASPH}$$

4" G.A.B

$$15,470 \text{ SF} \times 0.33' = 5,156 \text{ FT}^3 (125 \frac{\text{lbs}}{\text{FT}^3})$$

$$= 644,583.00 \frac{\text{lbs}}{2000}$$

$$= 322.29 \text{ TNS} \times 0.10 = 32.23 + 322.29 = \underline{355.00 \text{ TNS}}$$

$$\text{COST } \$17.85 \times 355 = \underline{\$6,337.00} \text{ GAB}$$

PHASE 2

$$\text{LENGTH } 3,167 \times 5 = 15,835 \text{ SF} \div 9 = 1,759.44 (0.10) = 175.94 + 1759.44 = 1935.38$$

2" DEPTH INSTALLED

$$1,935.38 \text{ SY } (220 \frac{\text{lbs}}{\text{sq yd}}) = 425,785.55 \text{ LBS} \div 2000$$

$$= 213.00 \text{ TNS} \times \$60.01 = \underline{\$12,782.00} \text{ ASPH}$$

4" G.A.B

$$15,835 \text{ SF} \times 0.33' = 5,225.55 \text{ FT}^3 (125 \frac{\text{lbs}}{\text{FT}^3})$$

$$= 653,193.75 \text{ LBS} / 2000$$

$$= 326.60 \times 327 \text{ TNS} \times (0.10) = 32.7 + 327 = 360$$

$$\text{COST } \$17.74 \times 360 = \underline{\$6,394} \text{ GAB}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **CG-1**

DESCRIPTION: **IN PHASES I AND II, USE A 24-IN CURB AND GUTTER SECTION AND NARROW THE MEDIAN FROM 8-FT-WIDE TO 7-FT-WIDE** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

For Phases I and II, the original design typical section has 8 in x 30 in concrete curb and gutter, TP.2 and the installation of a raised concrete median throughout with 2 ft of shy distance from the raised median to the edge of the inside travel lanes.

ALTERNATIVE: (Sketch attached)

Use a typical section with a 6 in x 24 in concrete curb and gutter, TP.2 and a reduction of the median by one ft by reducing the shy distance from the raised median to the edge of the inside travel lanes to 1 ft 6 in.

ADVANTAGES:

- Narrows the typical section and reduces adjacent right-of-way impacts
- Reduces construction costs

DISADVANTAGES:

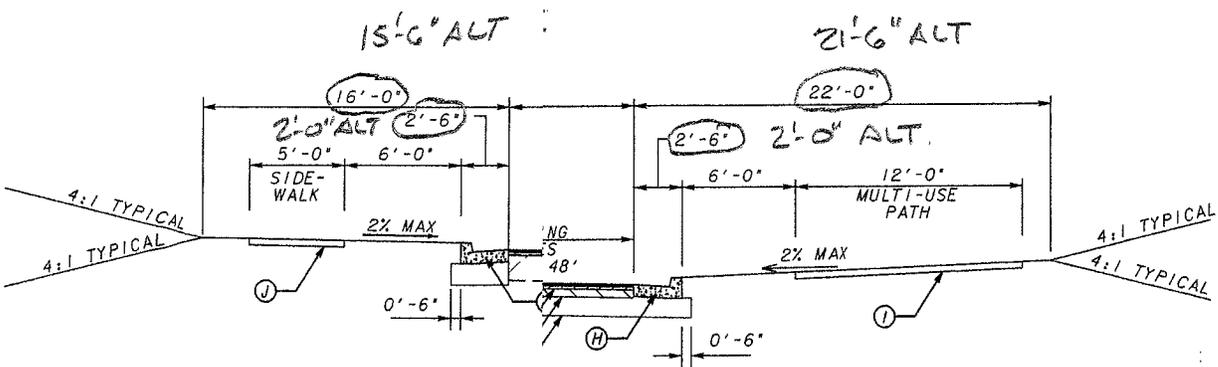
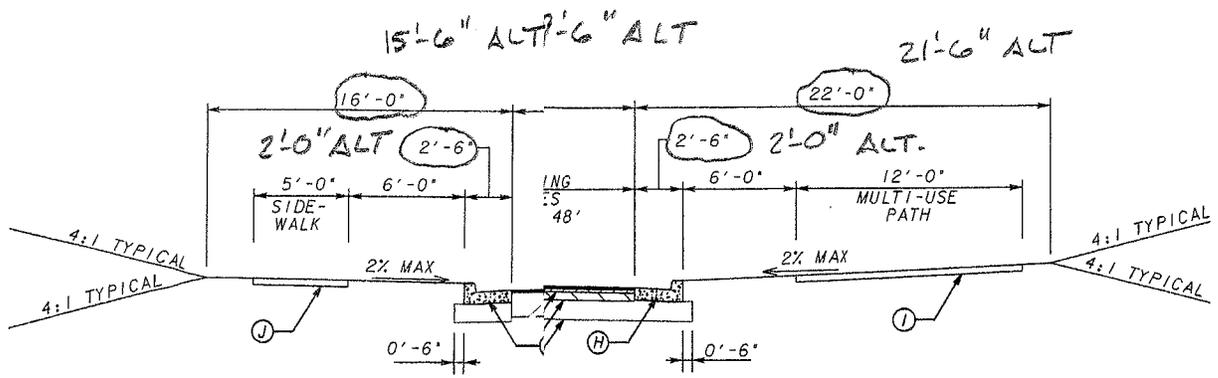
- None apparent

DISCUSSION:

The reduction of the curb and gutter width and median width will reduce the construction cost and right-of-way impacts. Because of the raised concrete median sits on top of the asphalt pavement section, reducing the shy distance should have no discernable difference on driver performance. Many jurisdictions use as little as a 1 ft shy distance in these situations.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 432,867	—	\$ 432,867
ALTERNATIVE	\$ 107,911	—	\$ 107,911
SAVINGS	\$ 324,956	—	\$ 324,956

DATE: 11/15/11	TIME: 11:30 AM	USER: JMM	STATE: GA	PROJECT NUMBER: BHFST-0001-05(024)	SHEET NO.:	TOTAL SHEETS:
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- ① ADDITIONAL 12' LEFT TURN LANES WHERE R
- ② ADDITIONAL 12' RIGHT TURN LANES WHERE

SLOPE	CUT	FILL
4:1	0-6'	0-10'
3:1	6'-10'	--
2:1	OVER 10'	OVER 10'

* GUARDRAIL TO BE INSTALLED ADJACENT TO FILL SLOPES GREATER THAN 3:1. SEE PLANS FOR LOCATIONS

- CONCRETE ITEMS
- 5mm SUPERPAVE (165 lbs/SY), POLY-MOD AC
 - mm SUPERPAVE (220 lbs/SY)
 - mm SUPERPAVE (330 lbs/SY)
 - mm SUPERPAVE (880 lbs/SY)
 - ASE (10")
 - LEVELING AS REQUIRED
 - RB & GUTTER, TYPE 2
 - LK
 - LK
 - TE MEDIAN WITH MOUNTABLE CURB FACE

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**
 Fulton/Cobb Counties, Georgia

ALT. NO.:
 PHASES 1 & 2

USE 24-IN. CURBS & GUTTER AND NARROW THE MEDIANS FROM 8-FT WIDE
 TO 7-FT WIDE.

CG-1

SHEET NO.: 3 of 4

PHASE 1 TP. 2 6" x 24" C&G

LENGTH $4518 \times \$16.00 = \underline{\$72,694.62}$

G.A.B $4518 \times .50 \times 0.83 = 1,882.50 \text{ FT}^3$
 $1,883(.10) = 188.3 + 1,883 = 2,071 \text{ FT}^3 (125 \frac{100}{\text{FT}^3}) + 2000$
 $= 130 \text{ TUS} \times 17.85 = \underline{2321}$

PHASE 1 - 7 FT WIDE CONCRETE MEDIANS
 STA. 65+00 - STA. 66+50 = 100' x 1'
 $= 100 \text{ SF/9}$
 $= \underline{11.11 \text{ SY}}$

PHASE 1 MEDIAN REDUCTIONS

STA. 65+50 - STA. 66+50
 $(.5) 14 \cdot 100 = 700 \text{ SF/9}$
 $= \underline{77.77 \text{ SY}}$

STA. 60+93 - STA. 65+50
 $(.50)(14) \cdot 457/9 = \underline{355.44 \text{ SY}}$

* PHASE 1 MEDIAN TOTAL

$\underline{444.00 \text{ SY}} \times 0.10 = 44.4$
 $444.00 + 44.00 = 488$
 $\$62.93 \times 488 = \underline{\$30,709.84}$

PHASE 2 TP. 2 6" x 24" C&G

LENGTH $7142 \times \$16.00 = \underline{\$114,914.78}$

G.A.B $7142 \times (0.5) \times 0.83 = 2,963.93 \text{ FT}^3 (.10) = 296.4$
 $296.4 + 2,964 = 3,260 \text{ FT}^3 (125 \frac{100}{\text{FT}^3}) / 2000 = 203 (17.7) = 3,605$

PHASE 2 7-FT. WIDE CONCRETE MEDIANS

STA. 16+55 - STA. 19+26 = 271'
 STA. 20+27 - STA. 26+00 = 573
 STA. 33+71 - STA. 39+20 = 549
 STA. 40+07 - STA. 44+15 = 408
 STA. 45+30 - STA. 50+17 = 487
 SUBTOTAL $2288' \times 1' = 2288 \text{ SF/9}$
 $= \underline{254.22 \text{ SY}}$

PHASE 2 MEDIAN REDUCTIONS

STA. 26+00 - STA. 27+00 = 100' (.50) 15'
 $= 750 \text{ SF/9} = \underline{83.33 \text{ SY}}$

STA. 27+00 - STA. 32+72 = 572' .15' = 8580 SF/9
 $= \underline{953.33 \text{ SY}}$

STA. 32+72 - STA. 33+72 = .5(15) .100'/9
 $= \underline{83.33 \text{ SY}}$

STA. 50+17 - STA. 51+17 = .5(15) .100'/9
 $= \underline{83.33 \text{ SY}}$

STA. 51+17 - STA. 55+63 = 446' .(5) 16'/9
 $= \underline{396.44}$

STA. 65+50 - STA. 66+50 = (.5) 14 .100
 $= 700 \text{ SF/9} = \underline{77.77 \text{ SY}}$

* STA. 60+93 - 65+50 = (.5) 14' . 457/9
 $= 355.44 \text{ SY}$

* PHASE 2 MEDIAN TOTAL AREA

$\underline{2209.00 \text{ SY}} \times (0.10) = 220.94$
 $2209.422 + 220.94 = 2430.36$
 COSTS $\rightarrow 2430 \times \$62.93 = \underline{\$152,947}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **D-1**

DESCRIPTION: **FOR PHASES I AND II, USE HDPE PIPE IN LIEU OF CONCRETE PIPE FOR LONGITUDINAL DRAINAGE NOT UNDER ROADWAY PAVEMENT** SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current design uses reinforced concrete storm drain pipe (RCP) throughout the project.

ALTERNATIVE:

Use HDPE pipe in lieu of RCP storm drain pipe for the longitudinal drainage system not under roadway pavement.

ADVANTAGES:

- Less construction cost
- Easier installation; pipe comes in 20 ft lengths rather than 10 ft lengths

DISADVANTAGES:

- Requires 6 in of foundation backfill, TP2 under the pipe

DISCUSSION:

HDPE pipe is on the GDOT list of approved products and is being used in other states for urban-type drainage systems. HDPE pipe has a “track record” of being less expensive than RCP storm drain pipe when it is used in large quantities. It is suggested that GDOT consider bidding storm drain pipe (urban systems) as both HDPE pipe and RCP pipe to encourage competitive pricing (award to the least expensive unit price).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 225,945	—	\$ 225,945
ALTERNATIVE	\$ 185,296	—	\$ 185,296
SAVINGS	\$ 40,649	—	\$ 40,649

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**
 Fulton/Cobb Counties, Georgia

ALT. NO.:

(Phase 1 & 2) D-1

SHEET NO.: 2 of 4

Quantity of pipe that can be used as HDPE pipe (Longitudinal system).

18" storm DRAIN pipe (Phase 1) = 2,390 Lin ft. ←

24" storm DRAIN pipe (Phase 1) = 300 Lin ft. ←

18" storm DRAIN pipe (Phase 2) = 460 Lin ft. ←

24" storm DRAIN pipe (Phase 2) = 1,000 Lin ft. ←

Phase 2 quantities estimated from GDOT cost estimate since the drainage design is not finished.

30" storm DRAIN pipe (Phase 2) = 600 Lin ft. ←

36" storm DRAIN pipe (Phase 2) = 160 Lin ft. ←

Alternate Design Quantity for (Found. Backfill) material, TP2
 As per GDOT std 1030P

(Phase 1)

$$\frac{(1.5' \times .5' \times 2,390') + (2' \times .5' \times 300')}{27 \text{ cf/cy}} = 78 \text{ cy} \leftarrow$$

(Phase 2)

$$\frac{(1.5' \times .5' \times 460') + (2' \times .5' \times 1,000') + (3' \times .5' \times 160')}{27 \text{ cf/cy}} = 59 \text{ cy} \leftarrow$$

$$+ \frac{2.5(.5)(600)}{27} = 28 \quad \Sigma = 87 \text{ cy}$$

CALCULATIONS



PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD
Fulton/Cobb Counties, Georgia

ALT. NO.:

Phase 1 & 2

D-1

SHEET NO.: 3 of 4

HDPE Pipe Unit Costs

Installation: use \$1/LF per pipe size (diam-in.)
↑ (usually 0.70\$/LF + \$1/LF)

$$18'' \text{ HDPE pipe: } (\text{mat'l}) \quad (\text{Installation}) \\ \$8.00/\text{LF} + \$18.00/\text{LF} = \$26.00/\text{LF}$$

$$24'' \text{ HDPE pipe: } \$12.80/\text{LF} + \$24.00/\text{LF} = \$36.80/\text{LF}$$

$$30'' \text{ HDPE pipe: } \$17.60/\text{LF} + \$30/\text{LF} = \$47.60/\text{LF}$$

$$36'' \text{ HDPE pipe: } \$23.60 + \$36/\text{LF} = \$59.60/\text{LF}$$

$$42'' \text{ HDPE pipe: } \$30.80 + \$42/\text{LF} = \$72.80/\text{LF}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD** ALTERNATIVE NO.:
Fulton/Cobb Counties, Georgia **D-2**

DESCRIPTION: **FOR PHASES I AND II, USE HDPE PIPE IN LIEU OF** SHEET NO.: **1 of 4**
CONCRETE PIPE (RCP) FOR PIPING UNDER PAVEMENT

ORIGINAL DESIGN:

The current design uses reinforced concrete storm drain pipe (RCP) throughout the project.

ALTERNATIVE:

Use HDPE pipe in lieu of RCP storm drain pipe under roadway pavement.

ADVANTAGES:

- Less construction cost
- Easier installation; the pipe comes in 20 ft lengths

DISADVANTAGES:

- Requires 6 in foundation backfill, TP2, under the pipe

DISCUSSION:

Alt. No. D-1 shows cost savings for using HDPE for the longitudinal urban system only (pipe not under the pavement). Alt. No. D-2 is to show the additional cost savings if the drainage pipe under the roadway pavement also used HDPE pipe in lieu of RCP pipe.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 81,707	—	\$ 81,707
ALTERNATIVE	\$ 72,025	—	\$ 72,025
SAVINGS	\$ 9,682	—	\$ 9,682

CALCULATIONS



PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD
Fulton/Cobb Counties, Georgia

(Phase 1 & 2)

ALT. NO.:

D-2

SHEET NO.: 2 of 4

Quantity of Pipe Under Roadway Pavement Phase 1:

18" storm Drain Pipe: 295 Lin.ft.

24" storm Drain Pipe: 365 Lin.ft.

36" storm Drain Pipe: 169 Lin.ft.

Phase 2: quantities are estimated from GDOT cost estimate since the drainage design is not finished.

18" storm Drain Pipe: 55 Lin.ft.

24" storm Drain Pipe: 335 Lin.ft.

30" storm Drain Pipe: 150 Lin.ft.

36" storm Drain Pipe: 171 Lin.ft.

Alternate Design Quantity for Found. Backfill
TP. 2

(Phase 1)

$$\frac{(1.5' \times .5' \times 295) + (2' \times .5' \times 365) + (3' \times .5' \times 169)}{27 \text{ cf/cy}} = 33 \text{ cy}$$

(Phase 2)

$$\frac{(1.5' \times .5' \times 55) + (2' \times .5' \times 335) + (2.5' \times .5' \times 150) + (3' \times .5' \times 171)}{27 \text{ cf/cy}} = 30 \text{ cy}$$

CALCULATIONS



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD**
Fulton/Cobb Counties, Georgia

ALT. NO.:

Phase 1 & 2

D-2

SHEET NO.: 3 of 4

HDPE Pipe Unit Costs

Installation: use \$1/LF per pipe size (diam-in.)
↑ (usually 0.70\$/LF + 0 \$1/LF)

18" HDPE pipe: (mat'l) (Installation)
$$\$8.00/\text{LF} + \$18.00/\text{LF} = \$26.00/\text{LF}$$

24" HDPE pipe:
$$\$12.80/\text{LF} + \$24.00/\text{LF} = \$36.80/\text{LF}$$

30" HDPE pipe:
$$\$17.60/\text{LF} + \$30/\text{LF} = \$47.60/\text{LF}$$

36" HDPE pipe:
$$\$23.60 + \$36/\text{LF} = \$59.60/\text{LF}$$

42" HDPE pipe:
$$\$30.80 + \$42/\text{LF} = \$72.80/\text{LF}$$

COST WORKSHEET



PROJECT:	SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD <i>Fulton/Cobb Counties, Georgia</i>	ALTERNATIVE NO.	D-2
		SHEET NO.	4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
18 in RCP Phase I	LF	295	36.84	10,868			
24 in RCP Phase I	LF	365	44.71	16,319			
36 in RCP Phase I	LF	169	66.08	11,168			
18 in RCP Phase II	LF	55	37.73	2,075			
24 in RCP Phase II	LF	335	43.32	14,512			
30 in RCP Phase II	LF	150	54.77	8,216			
36 in RCP Phase II	LF	171	65.04	11,122			
18 in HDPE Phase I	LF				295	26.00	7,670
24 in HDPE Phase I	LF				365	36.80	13,432
36 in HDPE Phase I	LF				169	59.60	10,072
Found. Backfill, TP2	CY				33	51.00	1,683
18 in HDPE Phase II	LF				55	26.00	1,430
24 in HDPE Phase II	LF				335	36.80	12,328
30 in HDPE Phase II	LF				150	47.60	7,140
36 in HDPE Phase II	LF				171	59.60	10,192
Found. Backfill, TP2	CY				30	51.00	1,530
Sub-total				74,279			65,477
Mark-up at 10.00%				7,428			6,548
TOTAL				81,707			72,025

PROJECT DESCRIPTION

The SR 3/US 41 Northside Parkway and Cobb Parkway From Mount Paran Road to Northgate Drive in Fulton and Cobb Counties, BHFST-0001-05 (024), P.I. No. 720125, and CSSTP-0009-00 (410), P.I. No. 0009410 project will provide additional capacity along SR 3/US 41 and preserve the efficient and safe movement of traffic through the project corridor consistent with the functional classification of an urban principal arterial. In addition, it will increase capacity and connectivity for non-automobile transportation by providing a sidewalk and multi-use path. The project is being developed for Cobb County, the Cumberland Community Improvement District, and GDOT by Moreland Altobelli Associates, Inc. of Norcross, Georgia.

This project widens 1.9 miles of SR 3/US 41 Northside Parkway from Mount Paran Road in Fulton County to the Chattahoochee River, where it changes its name to Cobb Parkway, and from the Chattahoochee River to Paces Mill Road in Cobb County from four undivided lanes of variable width to a divided six-lane road with appropriate right and left turn lanes added where necessary. Phase I, scheduled for construction starting in late 2010, goes from Northgate Drive in Fulton County to Paces Mill Road in Cobb County and Phase II, yet to be scheduled for construction, will start at Northgate Drive and end at Mount Paran Road. Future projects will expand SR 3/US 41 north and south of the project.

Starting at the intersection of Northgate Drive and Town Square Road with Northside Parkway, Northside Parkway will be widened to the east to allow for three through lanes in each direction separated by a raised, 16-ft-wide concrete median with 2 ft of shy distance between the median and the edges of the inside travel lanes. The IBM South Entrance Road will be relocated south to opposite the entrance to the Mount Paran Church of God and a traffic signal will be added. In the northbound direction there will be right and left turn lanes and in the southbound direction left and right turn lanes will also be provided.

A right-in/right out will be constructed for southbound SR 3/US 41 at the North Parkway Square intersection. At the intersection of Trinity School, Inc. and River Green Drive, right and left turn lanes will be provided on SR 3/US 41 in each direction and a traffic signal will be installed. Left and right turn lanes will also be provided for the northbound direction at the Northgate Drive intersection.

The road will narrow to three, 12-ft-wide lanes in each direction with an 8-ft-wide median (4 ft of which will be raised concrete) to cross the reconstructed Chattahoochee River Bridge. On the north side of the bridge where the road name changes to Cobb Parkway, the northbound lanes will expand to provide a right turn lane for access to the Chattahoochee National Recreation Area (NRA) Road East. The northbound lanes will expand again to provide a right turn lane for River Parkway which intersects Cobb Parkway opposite Paces Mill Road, and a left turn lane to Paces Mill Road. The southbound lanes will expand to include a right turn lane to and from Chattahoochee NRA Road West and again for a right turn lane from Paces Mill Road.

On the west side of the road there will be a five-ft-wide concrete sidewalk separated from the back of the 30-in-wide concrete curb and gutter section with a 6-ft-wide planting strip from Northgate Drive

to Chattahoochee NRA Road West. There will also be a sidewalk on the east side starting along Chattahoochee NRA Road East and continuing on Cobb Parkway south to Paces Mill Road.

On the east side will be 12-ft-wide, concrete multi-use trail separated from the back of the 30-in-wide concrete curb and gutter section with a 6-ft-wide planting strip. The multi-use trail will start at Northgate Drive, go across the Chattahoochee Bridge to Chattahoochee NRA Road East. It will follow Chattahoochee NRA Road East and then turn 180 degrees to go under the bridge and connect to Chattahoochee NRA Road West. It will follow Chattahoochee NRA Road West back up to the west side of Cobb Parkway and then proceed along Cobb Parkway to Paces Mill Road.

As part of the project, the Chattahoochee NRA Road will be modified so there is a right-in/right-out for southbound and northbound traffic. The reconfigured road will start out as Chattahoochee NRA Road West, continue south parallel to Cobb Parkway, turn east and go under the new Chattahoochee River Bridge and then turn northeast to connect to Chattahoochee NRA Road East, which intersects with Cobb Parkway on the northbound side.

In Phase I, the Chattahoochee River Bridge will be replaced with a longer, wider bridge on a slightly higher alignment by first building a new section to the east and then demolishing the existing bridge and building the west portion. The bridge will be constructed using precast, prestressed concrete girders and a cast-in-place concrete deck, supported on pier bents and spread footings on rock. It will carry six traffic lanes, an 8-ft-wide median (4-ft-wide raised concrete with 2 ft shy distances to the edges of the travel lanes on each side), a 6-ft-wide concrete sidewalk on the west side and a 12-ft-wide multi-use trail on the east side, separated from the traffic lane by a 5-ft-wide stamped concrete strip.

A substantial right-of-way is required to construct the new roadway typical section. To limit the acquisition of properties, several retaining walls are being designed. Some will be mechanically stabilized embankment walls and some will be tie-back walls depending upon the situation.

A piped storm water collection and conveyance system will be provided.

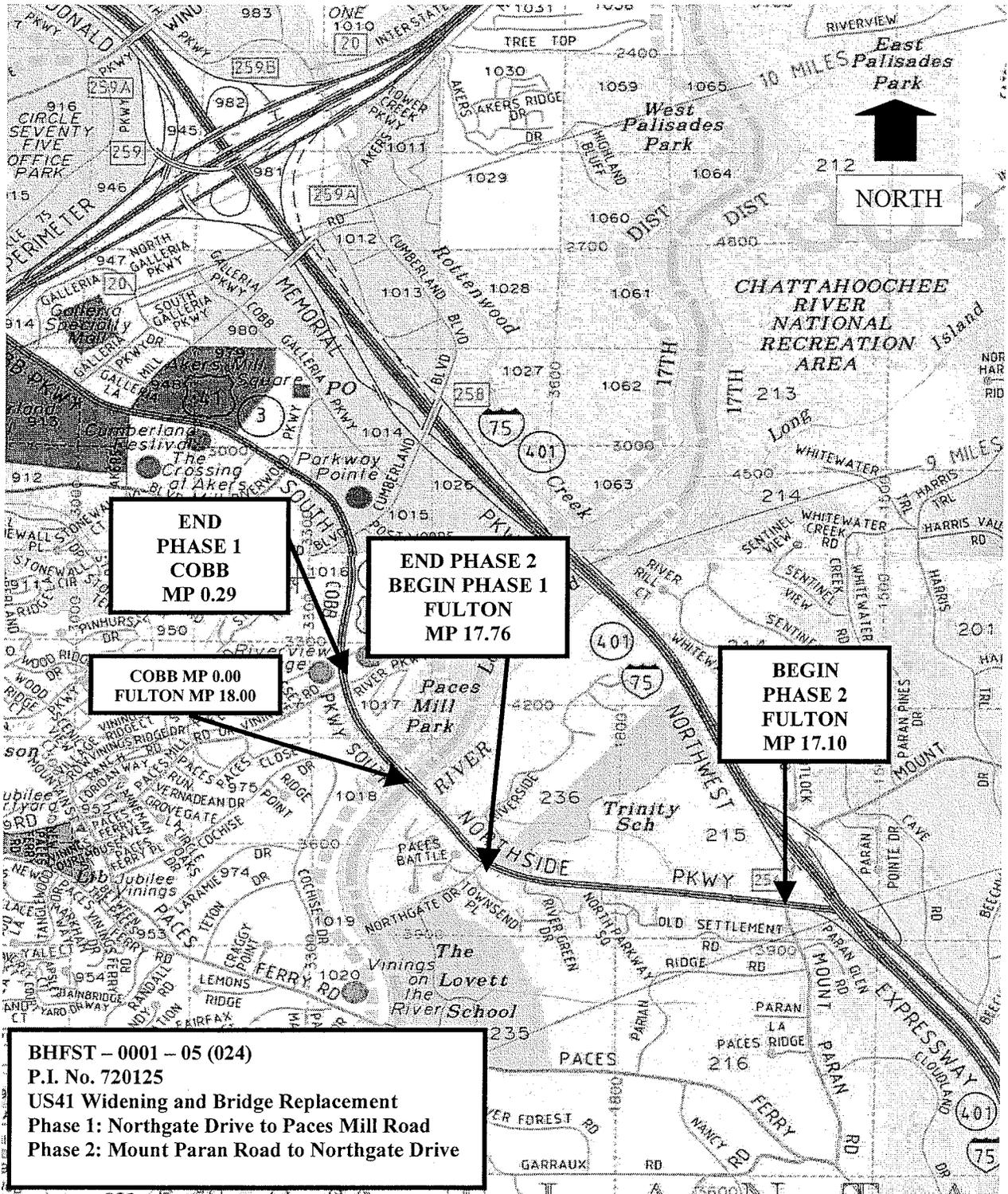
Existing traffic signals will be replaced and new ones added at the relocated South IBM Entrance/ Mount Paran Church of God Entrance and Town Square/Northgate Drive intersections.

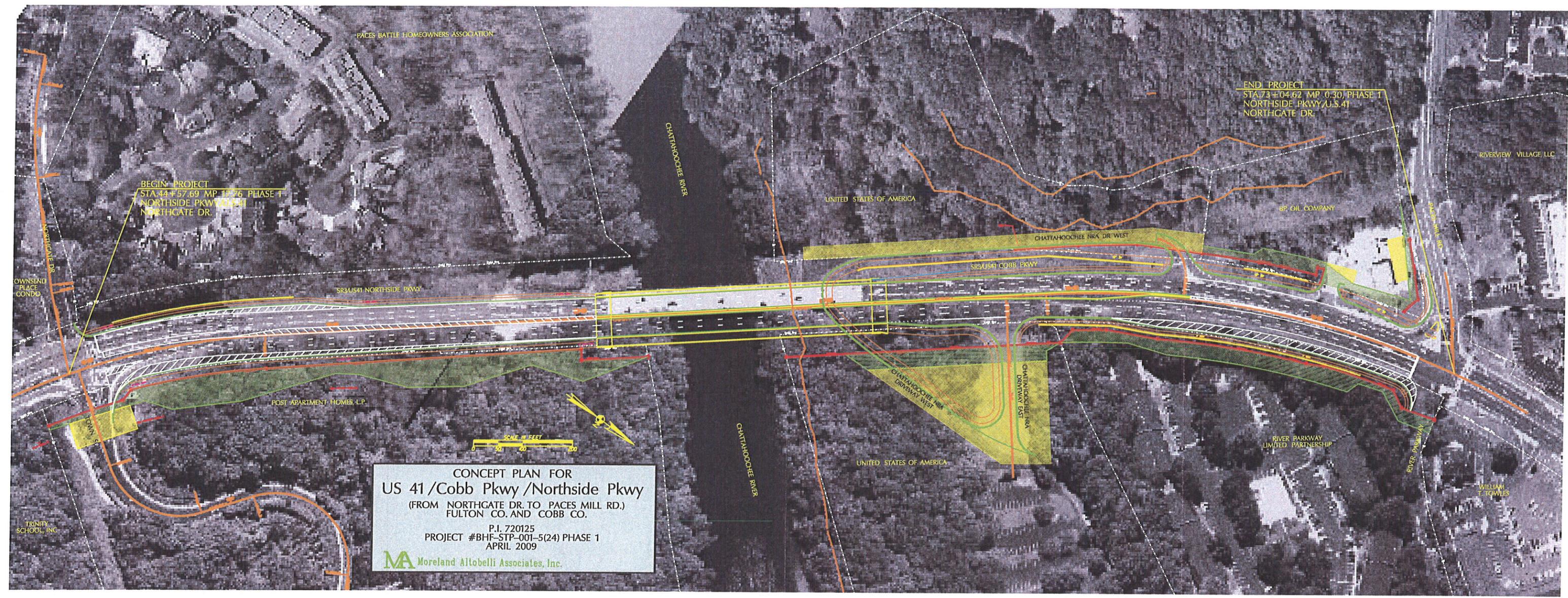
The estimated project costs are as follows:

<u>Project</u>	<u>Construction</u>	<u>Right-of-Way</u>	<u>Reimbursable Utilities</u>	<u>Total</u>
BHFST-0001-05 (024)	\$11,346,284	\$2,700,000	\$140,000	\$14,186,284
CSSTP-0009-00 (410)	<u>\$5,618,443</u>	<u>\$1,552,000</u>	<u>\$162,500</u>	<u>\$7,332,943</u>
TOTAL	\$16,964,727	\$4,252,000	\$303,500	\$21,519,227

A Project Location Map and Concept Plans for the two phases follow.

Project Location Map

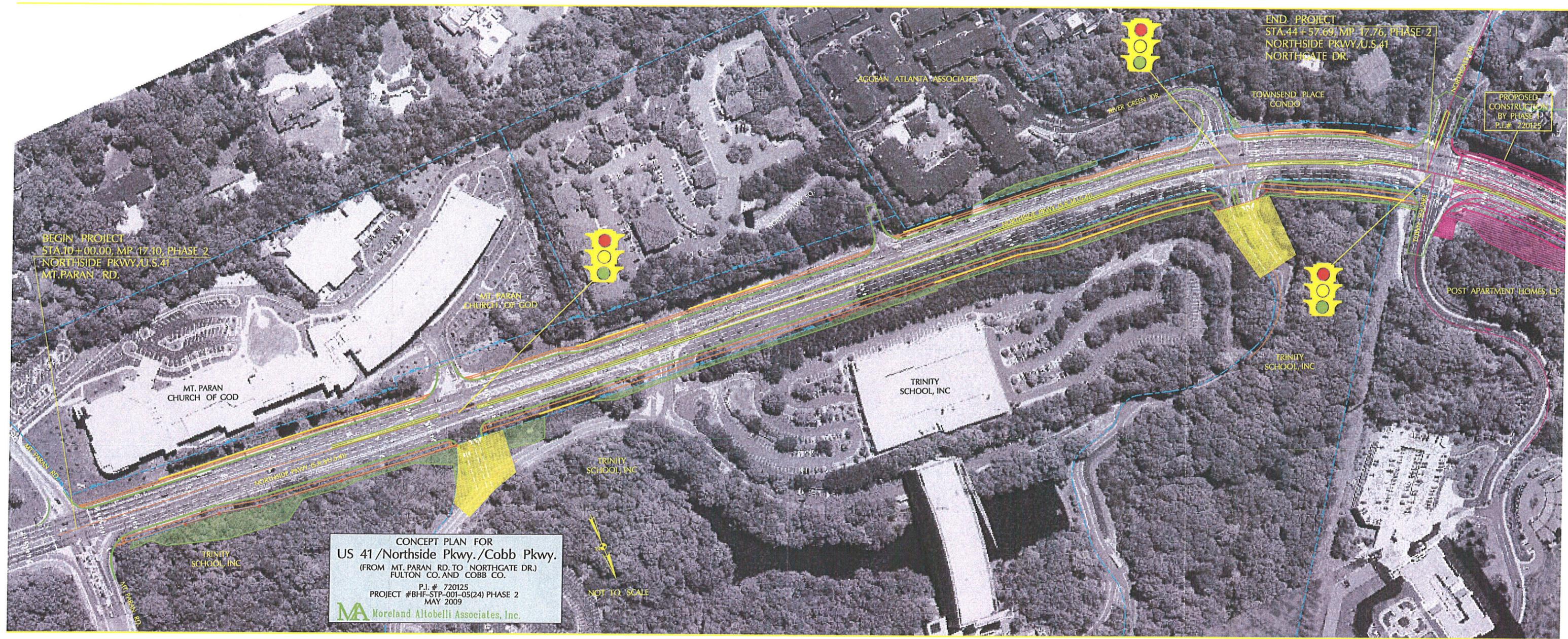




BEGIN PROJECT
 STA. 44+57.69 MP 15.26 PHASE 1
 NORTHSIDE PKWY/US 41
 NORTHGATE DR.

END PROJECT
 STA. 73+04.62 MP 0.30 PHASE 1
 NORTHSIDE PKWY/US 41
 NORTHGATE DR.

CONCEPT PLAN FOR
 US 41 /Cobb Pkwy /Northside Pkwy
 (FROM NORTHGATE DR. TO PACES MILL RD.)
 FULTON CO. AND COBB CO.
 P.I. 720125
 PROJECT #BHF-STP-001-5(24) PHASE 1
 APRIL 2009
 MA Moreland Altobelli Associates, Inc.



BEGIN PROJECT
 STA 10+00.00, MP 17.10, PHASE 2
 NORTHSIDE PKWY./U.S. 41
 MT. PARAN RD.

END PROJECT
 STA 44+57.69, MP 17.76, PHASE 2
 NORTHSIDE PKWY./U.S. 41
 NORTHGATE DR.

PROPOSED
 CONSTRUCTION
 BY PHASE 1
 P.I.# 720125

CONCEPT PLAN FOR
 US 41 /Northside Pkwy./Cobb Pkwy.
 (FROM MT. PARAN RD. TO NORTHGATE DR.)
 FULTON CO. AND COBB CO.
 P.I.# 720125
 PROJECT #BHF-STP-001-05(24) PHASE 2
 MAY 2009
 Moreland Altobelli Associates, Inc.

NOT TO SCALE

VALUE ANALYSIS AND CONCLUSION

GENERAL

This section describes the value methodology followed during the value engineering study on the SR 3/US 41 From Mount Paran Road to Paces Mill Road (P.I. No. 720125, Federal Aid Project BHFST-0001-05 (024) for Phase I from Northgate Drive to Paces Mill Road and P.I. No. 0009410, Federal Aid Project CSSTP-0009-00 (410) for Phase II from Northgate Drive to Mount Paran Road) for the CCID, Cobb County, and the Georgia Department of Transportation. The project is being designed for Cobb County and GDOT by Moreland Altobelli Associates. The methodology is followed by narratives and conclusions concerning:

- Value Engineering Workshop Participants
- Economic Data
- Cost Model
- Function Analysis
- 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) preparation; 2) VE orientation meeting and workshop; and 3) post-study. A Task Flow Diagram that outlines the procedures included in the VE study follows.

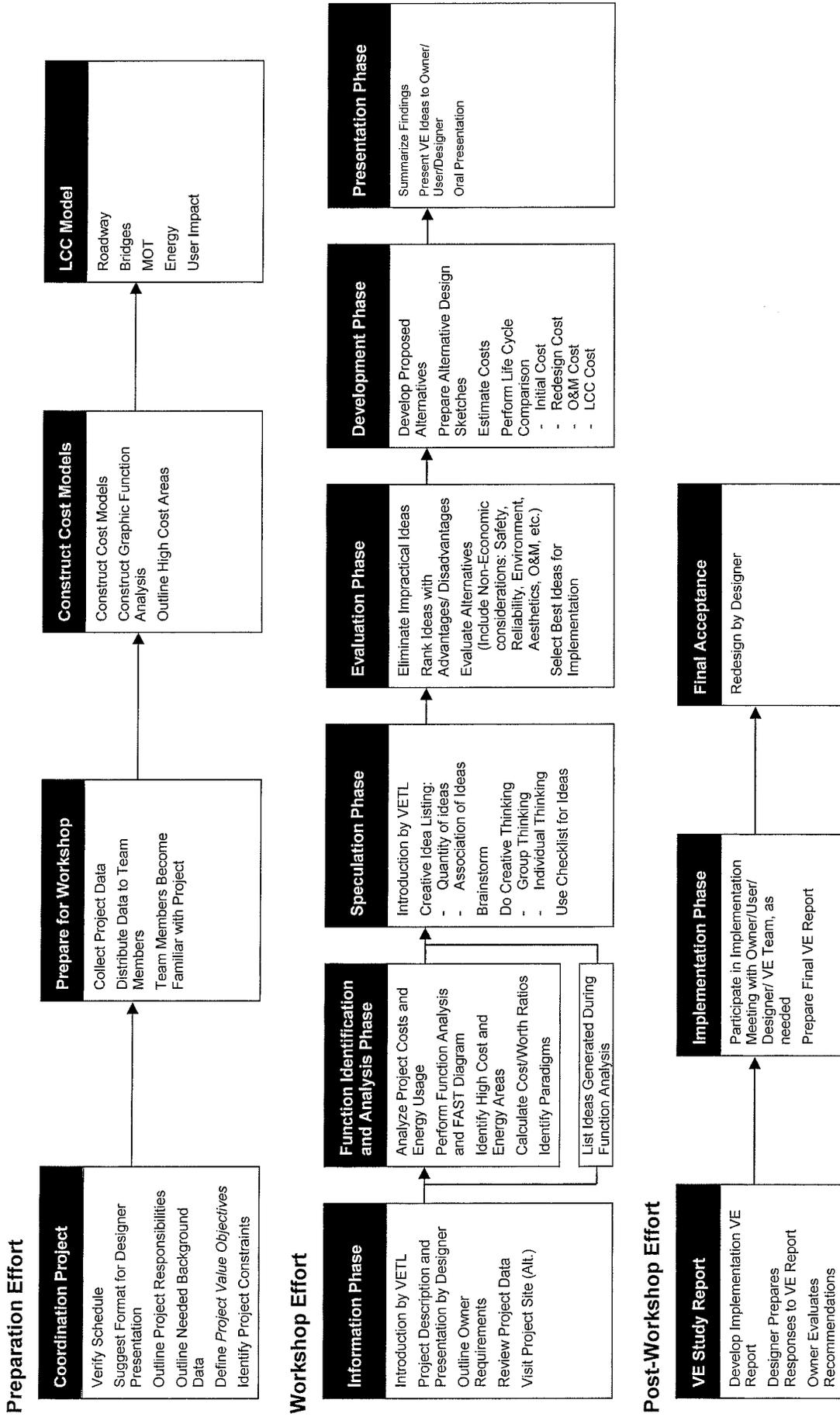
PREPARATION EFFORT

Preparation for the workshop consisted of scheduling workshop participants and tasks and gathering necessary project documents for team members to review before attending the workshop. These documents, listed below, were used as the basis for generating VE alternatives and for determining the cost implications of the selected VE alternatives:

- Preliminary Plan and Profile of Proposed SR 3/US 41/Northside Parkway and Cobb Parkway, Fulton/Cobb Counties BHFST-0001-05 (024), prepared by Moreland Altobelli Associates, Inc.
- Preliminary Plan and Profile of Proposed SR 3/US 41/Northside Parkway, Fulton County BHFST-0001-05 (024) Phase 2, prepared by Moreland Altobelli Associates, Inc.
- Project Concept Report, Project No. CSSTP-0006-00(049), P.I. Number: 0006049, approved 1/22/07
- Estimate Report for file 720125 Phase I (US 41 From Northgate Dr. to Paces Mill Rd) dated 5/28/2009
- Estimate Report for file 720125 Phase II (US 41 From Mount Paran RD. to Northgate Dr.) dated 5/28/2009
- Preliminary Right-of-Way Cost Estimate, P.I. Number 720125 – Phase 1, dated May 28, 2009



Value Engineering Study Task Flow Diagram



- Preliminary Right-of-Way Cost Estimate, P.I. Number 720125 – Phase 2, dated May 28, 2009
- Interdepartmental Correspondence, BHFST-0001-05(024), Fulton/Cobb County US41/ SR 3 fm Mt Paran Rd to Paces Mill Rd: P.I. No. 720125, dated June 10, 2009, Revised Concept Report

Information relating to the project’s purpose and need, owner concerns, project stakeholder concerns, design criteria, project constraints, funding sources and availability, regulatory agency approval requirements, and the project’s schedule and costs is very important as it provides the VE team with insight about how the project has progressed to its current state.

Project cost information provided by the designers is used by the VE team as the basis for a comparative analysis with similar projects. To prepare for this exercise, the VE team leader used the cost estimate prepared by Moreland Altobelli to develop cost models for the project. The models were used to distribute the total project cost among the various elements or functions of the individual project phases and the combined project. The VE team used these models to identify the high-cost elements or functions that drive the project and the elements or functions providing little or no value so that the team could focus on reducing or eliminating their impact.

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a 3-1/2-day effort beginning with an orientation/kickoff meeting on Tuesday, August 4, 2009, and concluding with the final VE Presentation on Friday, August 7, 2009. During the workshop, the VE Job Plan was followed in compliance with Federal Highway Administration guidelines for conducting a VE study. The Job Plan guided the search for alternatives to mitigate or eliminate high-cost drivers, secondary functions providing little or no value, and potential project risks. Alternatives to specifically address the owner’s project concerns and enhance value by improving operations, reducing maintenance requirements, enhancing constructability, and providing missing functions were also considered. The Job Plan includes six phases:

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

Information Phase

At the beginning of the study, the decisions that have influenced the project’s design and proposed construction methods have to be reviewed and understood. For this reason, the workshop began with a presentation of the project by Moreland Altobelli to the team. The presentation highlighted the information provided in the documentation reviewed by the VE team before the workshop and expanded on it to include a history of the project’s development and any underlying influences that caused the design to develop to its current state. During this presentation, VE team members were given the opportunity to ask questions and obtain clarification about the information provided.

Function Identification and Analysis Phase

Having gained some information on the project, the VE team proceeded to define the functions provided by the project, identifying the costs to provide these functions, and determining whether the value provided by the functions has been optimized. Function analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project or if there are disproportionate amounts of money spent on support functions. Elements performing support functions add cost to the project but have a relatively low worth to the basic function.

Function is defined as the intended use of a physical or process element. The team attempted to identify functions in the simplest manner using measurable noun/verb word combinations. To accomplish this, the team first looked at the project in its entirety and randomly listed its functions, which were recorded on Random Function Analysis Worksheets (provided in the Function Identification and Analysis section). Then the individual function(s) of the major components of the project depicted on the cost model were identified.

After identifying the functions, the team classified the functions according to the following:

<u>Abbreviation</u>	<u>Type of Function</u>	<u>Definition</u>
HO	Higher Order	The primary reason the project is being considered or project goal.
B	Basic	A function the must occur for the project to meet its higher order functions.
S	Secondary	A function that occurs because of the concept or process selected and may or may not be necessary.
R/S	Required Secondary	A secondary function that may not be necessary to perform the basic function but must be included to satisfy other requirements or the project cannot proceed.
G	Goal	Secondary goal of the project.
O	Objective	Criteria to be met.
LO	Lower Order	A function that serves as a project input.

Higher order and basic functions provide value, while secondary functions tend to reduce value. The goal of the next job phase is to reduce the impact of secondary functions and thereby enhance project value.

To further clarify the impact of the various functions, the team assigned costs to provide the functions or group of functions indicated by a specific project element using the cost estimate and cost models. Where possible, they seek to find the lowest cost, or worth, to perform the function. This is accomplished using published data from other sources or team knowledge obtained from working on other similar projects to establish cost goals and then comparing them to the current costs. By identifying the cost and worth of a function or group of functions, cost/worth ratios were calculated. Cost/worth ratios greater than one indicated that less than optimum value was being provided. Those project functions or elements with high cost/worth ratios became prime targets for value improvement.

As well as looking at areas with high cost/worth ratios, the team used the cost model(s) previously prepared to seek out the areas where most of the project funds are being applied. Because of the absolute magnitude of these high-cost elements or functions, they also became initial targets for value enhancement.

Overall, these exercises stimulated the VE team members to focus on apparently low value areas and initially channel their creative idea development in these places.

Creative/Speculation Phase

This VE study phase involved the creation and listing of ideas. Starting with the functions or project elements with high cost/worth ratios, a high absolute cost compared to other elements in the project, and secondary functions providing little or no value and using the classic brainstorming technique, the VE team began to generate as many ideas as possible to provide the necessary functions at a lower total life cycle cost, or to improve the quality of the project. Ideas for improving operation and maintenance, reducing project risk, and simplifying constructability were also encouraged. At this stage of the process, the VE team was looking for a large quantity of ideas and free association of ideas. A Creative Idea Listing worksheet was generated and organized by the function or project element being addressed.

CCID, Cobb County, GDOT and the Moreland Altobelli team may wish to review these creative lists since they may contain ideas that were not pursued by the VE team but can be further evaluated for potential use in the design.

Evaluation Phase

Since the goal of the Creative/Speculation Phase was to conceive as many ideas as possible without regard for technical merit or applicability to the project goals, the Evaluation Phase focused on identifying those ideas that do respond to the project value objectives and are worthy of additional research and development before being presented to the owner. The selection process consisted of the VE team evaluating the ideas originated during the Creative/Speculation Phase based on CCID, Cobb County, and GDOT's value objectives identified through conversations during the in briefing. Based on the team's understanding of the owner's value objectives, each idea was compared with the present design concept, and the advantages and disadvantages of each idea were discussed.

How well an idea met the design criteria was also reviewed. Based on the results of these reviews, the VE team rated the idea by consensus using a scale of 1 to 5, with 5 or 4 indicating an idea with the greatest potential to be technically sound and provide cost savings or improvements in other areas of the project, 3 indicating an idea that provides marginal value but could be used if the project was having budget problems, 2 indicating an idea with a major technical flaw, and 1 indicating an idea that does not respond to project requirements. Generally, ideas rated 4 and 5 are pursued in the next phase and presented to the owner during the Presentation Phase.

The team also used the designation "DS" to indicate a design suggestion, which is an idea that may not have specific quantifiable cost savings but may reduce project risk, improve constructability, help to minimize claims, enhance operability, ease maintenance, reduce schedule time, or enhance

project value in other ways. Design suggestions could also increase a project's cost but provide value in areas not currently addressed. These are also developed in the next phase of the VA process.

Development Phase

In this phase, each highly rated idea was expanded into a workable solution designated as a VE alternative. The development consisted of describing the current design and the alternative solution, preparing a life cycle cost comparison where applicable, describing the advantages and disadvantages of the proposed alternative solution, and writing a brief narrative to compare the original design to the proposed change and provide a rationale for implementing the idea into the design. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in the Study Results section of this report.

Design suggestions include the same information as the alternatives except that no cost analysis is performed. They also are included in Section Two.

Presentation Phase

The goals of the last phase of the workshop were to summarize the results of the study, to prepare draft Summary of Potential Cost Saving worksheets to hand out at the presentation, and to present the key VE alternatives and design suggestions to CCID, Cobb County, GDOT and the Moreland Altobelli design team. The presentation was held on Friday, August 7, 2009, at GDOT's Central Office in Atlanta, GA. The purpose of the meeting was to provide the attendees with an overview of the suggestions for value enhancement resulting from the VE study and afford them the opportunity to ask questions to clarify specific aspects of the alternatives presented. Procedures for implementing the results of the study were discussed, and arrangements were made for the reviewers of the VE report to contact the VE team in order to obtain further clarifications, if necessary. Draft copies of the Summary of Potential Cost Savings worksheets were given to CCID, Cobb County, GDOT and the design team to facilitate a timely review and speedy implementation of the selected ideas.

POST-WORKSHOP EFFORT

The post-workshop portion of the VE study includes the preparation of this report. Professionals from Cobb County, 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.

After the parties have had an opportunity to make their initial evaluations of the alternatives presented, GDOT will then decide which alternatives to implement.

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 highway and bridge planning, design, and construction experience and a working knowledge of VE procedures. The VE team included the following:

<u>Participant</u>	<u>Specialization</u>	<u>Organization</u>
Joseph Leoni, PE	Highway Engineering	ARCADIS US, Inc.
John P. Tiernan, PE	Bridge/Structural Engineering	ARCADIS US, Inc.
Harley Griffin	Cost/Constructability	Delon Hampton Associates
Howard B. Greenfield, PE, CVS	VE Team Leader	Lewis & Zimmerman Associates

DESIGNER'S PRESENTATION

Representatives from GDOT and Moreland Altobelli presented an overview of the project on Tuesday, August 4, 2009. The purpose of this meeting, in addition to being an integral part of the Information Phase of the VE study, was to bring the VE team "up-to-speed" regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail those areas of the project requiring additional or special attention. The attendees at that meeting are indicated on the following sign-in sheet.

VALUE ENGINEERING TEAM'S PRESENTATION

A VE presentation was conducted on Friday, August 7, 2009. The purpose of this meeting was to review the alternatives developed during the study and allow attendees to ask questions of the VE team to enhance their understanding of the alternatives present. A Draft Summary of Potential Cost Savings was distributed to those attending. Those attending are noted with a check mark next to their name on the Designer's Presentation attendance list.

VE STUDY SIGN-IN SHEET

Project No.: BHFST-0001-05(024) County: Cobb/Fulton PI No.: 720125-0009410 Date: Aug. 4-7, 2009

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
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Ken Werthe	00258268	Traffic Operations	404-635-8144	kwertho@dot.ga.gov
Ron Wishon	00208160	Engineering Services	404-631-1753	rwishon@dot.ga.gov
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Ben Buchan	00200360	Urban	4-631-1706	bbuchan@dot.ga.gov
Dale Ferris	00731411	AZ construction	(770) 528-3238	dferris@dot.ga.gov
DAVID ZOECKLER	00248729	ENGINEERING SERVICES	404-631-1704	dzoeckler@dot.ga.gov

B. Hale mobile - 678-457-6316

ECONOMIC DATA

The economic criteria used to evaluate ideas were developed by the VE team with information gathered from documents provided by GDOT and the design team. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for planning project period interest rates are based on the following parameters:

Year of Analysis:	2009
Current Construction Cost Estimate	\$10.3 million for Phase I \$5.1 million for Phase II
Expected Construction Start	2010 – Phase I Unknown – Phase II
Construction Duration	24 months
Economic Planning Life:	50 years

A 10% markup for Engineering and Construction Administration was used to calculate the total cost savings associated with each alternative.

COST MODEL

The VE team prepared three cost histograms, or Pareto Charts, for the project that follows this page. These cost models display the major construction elements for each project phase and the combine project and reflects the information that appeared in the cost estimates. The Pareto Charts are an aid to identify high cost areas in the projects.

The high cost elements for Phases I and II combined are:

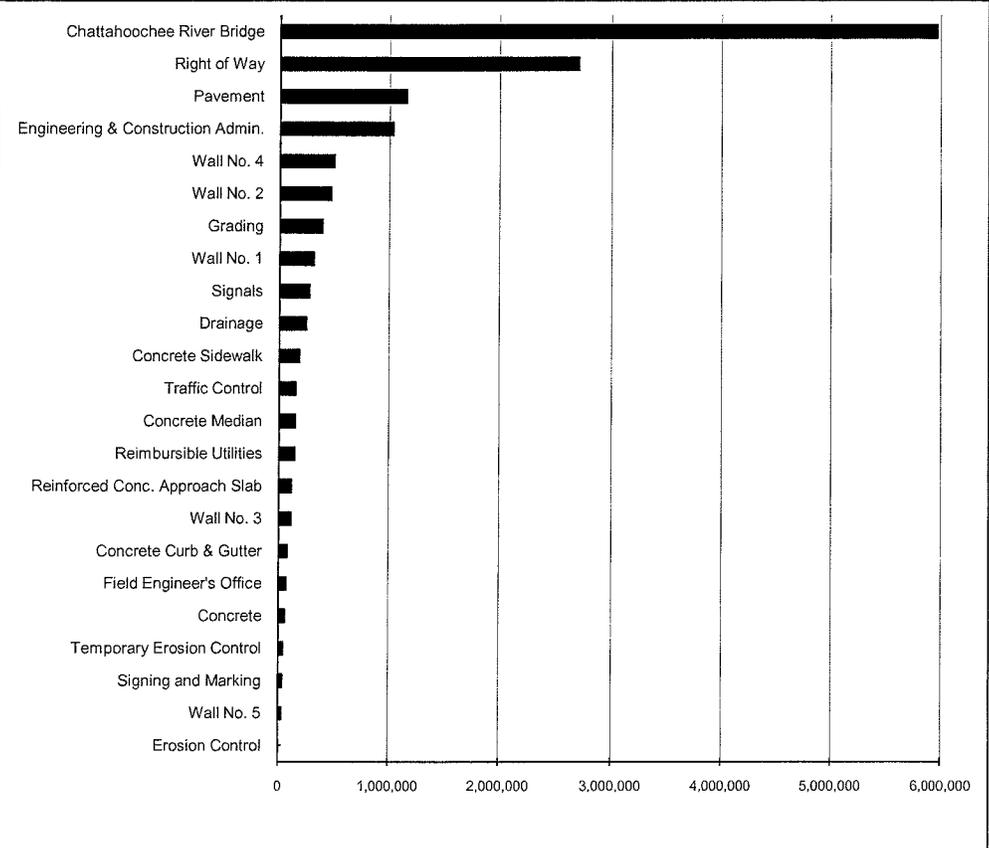
- Chattahoochee River Bridge
- Right of Way
- Pavement
- Engineering & Construction Admin.
- Grading
- Wall No. 6 - II
- Drainage
- Wall No. 4 - I

These elements represent about 79% of the cost of the combined project.

COST HISTOGRAM

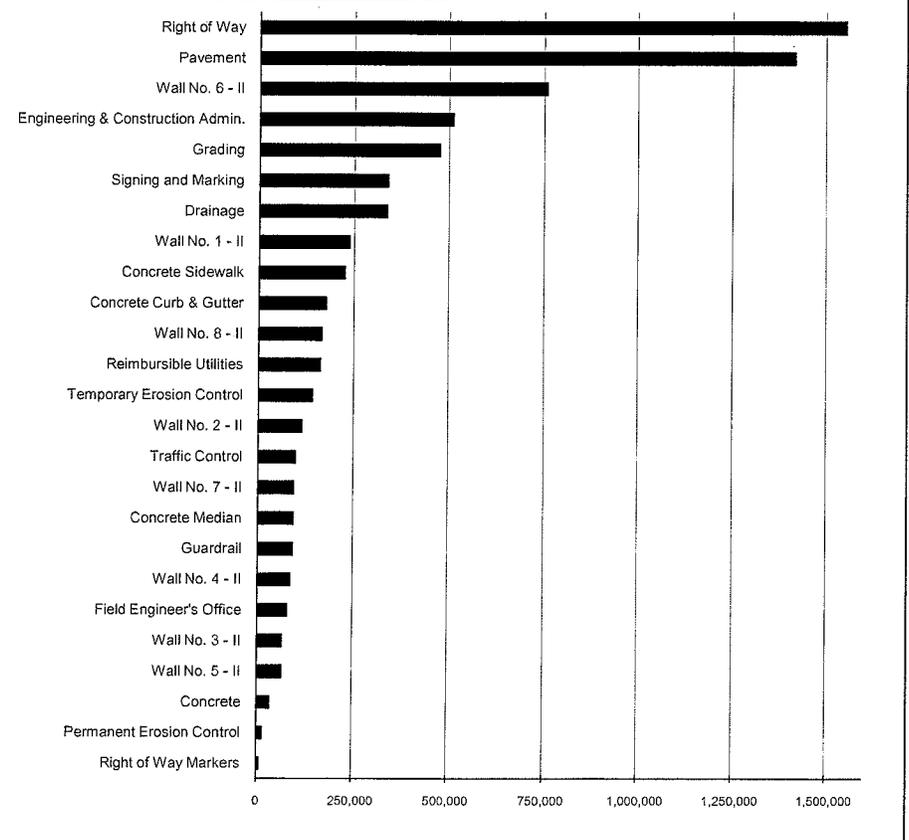
PROJECT: SR 3/US 41 Northgate Road to Paces Mill Road, Cobb/Fulton County

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Chattahoochee River Bridge	5,967,380	42.06%	42.06%
Right of Way	2,700,000	19.03%	61.10%
Pavement	1,155,479	8.15%	69.24%
Engineering & Construction Admin.	1,031,480	7.27%	76.51%
Wall No. 4	496,770	3.50%	80.01%
Wall No. 2	469,320	3.31%	83.32%
Grading	390,002	2.75%	86.07%
Wall No. 1	311,670	2.20%	88.27%
Signals	272,123	1.92%	90.19%
Drainage	245,442	1.73%	91.92%
Concrete Sidewalk	181,534	1.28%	93.20%
Traffic Control	150,000	1.06%	94.25%
Concrete Median	145,620	1.03%	95.28%
Reimbursible Utilities	140,000	0.99%	96.27%
Reinforced Conc. Approach Slab	111,493	0.79%	97.05%
Wall No. 3	108,941	0.77%	97.82%
Concrete Curb & Gutter	75,551	0.53%	98.35%
Field Engineer's Office	69,628	0.49%	98.85%
Concrete	56,783	0.40%	99.25%
Temporary Erosion Control	39,814	0.28%	99.53%
Signing and Marking	37,344	0.26%	99.79%
Wall No. 5	28,101	0.20%	99.99%
Erosion Control	1,809	0.01%	100.00%
TOTAL	\$ 14,186,284	100.00%	



COST HISTOGRAM

PROJECT: SR 3/US 41 MOUNT PARAN ROAD TO NORTHGATE DRIVE			
PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Right of Way	1,552,000	21.16%	21.16%
Pavement	1,416,404	19.32%	40.48%
Wall No. 6 - II	758,255	10.34%	50.82%
Engineering & Construction Admin.	510,768	6.97%	57.79%
Grading	475,785	6.49%	64.27%
Signing and Marking	338,374	4.61%	68.89%
Drainage	336,310	4.59%	73.48%
Wall No. 1 - II	238,880	3.26%	76.73%
Concrete Sidewalk	227,056	3.10%	79.83%
Concrete Curb & Gutter	176,018	2.40%	82.23%
Wall No. 8 - II	165,091	2.25%	84.48%
Reimbursible Utilities	162,500	2.22%	86.70%
Temporary Erosion Control	141,465	1.93%	88.63%
Wall No. 2 - II	114,473	1.56%	90.19%
Traffic Control	97,673	1.33%	91.52%
Wall No. 7 - II	93,399	1.27%	92.79%
Concrete Median	92,845	1.27%	94.06%
Guardrail	91,586	1.25%	95.31%
Wall No. 4 - II	85,080	1.16%	96.47%
Field Engineer's Office	77,627	1.06%	97.53%
Wall No. 3 - II	63,810	0.87%	98.40%
Wall No. 5 - II	63,810	0.87%	99.27%
Concrete	32,778	0.45%	99.71%
Permanent Erosion Control	14,627	0.20%	99.91%
Right of Way Markers	6,328	0.09%	100.00%
TOTAL \$ 7,332,942 100.00%			

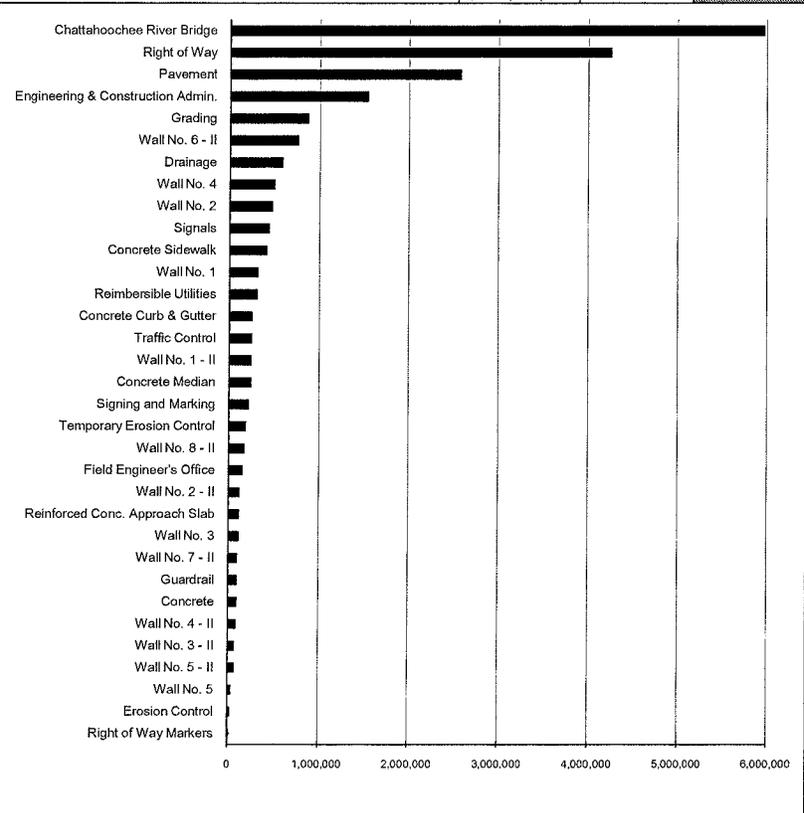


Costs in graph are not marked-up.

COST HISTOGRAM

PROJECT: SR 3/US 41 Mount Paran Road to Paces Mill Road, Cobb/Fulton County

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Chattahoochee River Bridge	5,967,380	27.73%	27.73%
Right of Way	4,252,000	19.76%	47.49%
Pavement	2,571,883	11.95%	59.44%
Engineering & Construction Admin.	1,542,248	7.17%	66.61%
Grading	865,787	4.02%	70.63%
Wall No. 6 - II	758,255	3.52%	74.15%
Drainage	581,752	2.70%	76.86%
Wall No. 4	496,770	2.31%	79.17%
Wall No. 2	469,320	2.18%	81.35%
Signals	434,588	2.02%	83.37%
Concrete Sidewalk	408,590	1.90%	85.27%
Wall No. 1	311,670	1.45%	86.71%
Reimbursible Utilities	302,500	1.41%	88.12%
Concrete Curb & Gutter	251,569	1.17%	89.29%
Traffic Control	247,673	1.15%	90.44%
Wall No. 1 - II	238,880	1.11%	91.55%
Concrete Median	238,465	1.11%	92.66%
Signing and Marking	213,254	0.99%	93.65%
Temporary Erosion Control	181,279	0.84%	94.49%
Wall No. 8 - II	165,091	0.77%	95.26%
Field Engineer's Office	147,255	0.68%	95.94%
Wall No. 2 - II	114,473	0.53%	96.48%
Reinforced Conc. Approach Slab	111,493	0.52%	96.99%
Wall No. 3	108,941	0.51%	97.50%
Wall No. 7 - II	93,399	0.43%	97.93%
Guardrail	91,586	0.43%	98.36%
Concrete	89,561	0.42%	98.78%
Wall No. 4 - II	85,080	0.40%	99.17%
Wall No. 3 - II	63,810	0.30%	99.47%
Wall No. 5 - II	63,810	0.30%	99.76%
Wall No. 5	28,101	0.13%	99.89%
Erosion Control	16,436	0.08%	99.97%
Right of Way Markers	6,328	0.03%	100.00%
TOTAL	\$ 21,519,227	100.00%	



FUNCTION ANALYSIS

Function analysis was performed to: (1) define the requirements for each project element, and (2) ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain a given requirement. A random function analysis worksheet for the overall project is attached. This sheet stimulated the VE team members to think of the areas in which to channel their creative idea development.

The key functions of the project were:

- Increase Capacity
- Enhance Safety
- Provide Pedestrian/Bicycle Connectivity

The costs for “Creating Space” were a large part of the project as well as the costs for “Spanning River” and thus should be carefully reviewed.

RANDOM FUNCTION ANALYSIS



PROJECT: SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL ROAD SHEET NO.:1 of 2 <i>Cobb/Fulton Counties, Georgia</i>			
DESCRIPTION	FUNCTION		
	VERB	NOUN	KIND
Project	Increase	Capacity	HO
	Enhance	Safety	HO
	Replace	Outdated Infrastructure	B
	Accommodate	Pedestrians	B
	Accommodate	Bicyclists	B
	Improve	Traffic Operations	B
	Provide	Pedestrian Connectivity	HO
	Avoid	Environmental Impacts	G
Walls	Create	Space	S
	Retain	Soil/Rock	B
	Reduce	Right-of-Way Impacts	S
Right-of-Way	Create	Space	B
Pavement/Approach Slabs	Support	Loads	B
	Distribute	Loads	B
Bridge	Span	River	B
	Support	Loads	B
Drainage	Convey	Storm Water	B
	Collect	Storm Water	B
Grading	Establish	Elevation	B
Median	Separate	Opposing Traffic	B
Sidewalk/Multi-use trail	Support	Pedestrians/ Bicyclists	B
Reimbursable Utilities	Relocate	Utilities	S

Function defined as: Action Verb Measurable Noun	Kind: B = Basic S = Secondary RS = Required Secondary	HO = Higher Order LO = Lower Order
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CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the Creative/Speculation Phase, numerous ideas were generated for the project using conventional brainstorming techniques. These ideas were recorded and are shown with their corresponding ranking on the attached Creative Idea Listing Worksheets. For the convenience of tracking an idea through the VA process, the ideas were grouped into the following project elements and numbered according to the order in which they were conceived. The following letter prefixes were used to identify the project elements.

PROJECT ELEMENTS	PREFIX
Bridge	B
Walls	W
Roadway	R
Sidewalks	S
Curb and Gutter	CG
Drainage	D

Creative Idea Evaluation

The ideas were then ranked on a qualitative scale of 1 to 5 on how well the VE team believed the idea met the project purpose and need criteria. To assist the team in evaluating the creative ideas, the advantages and disadvantages of each new idea compared to the existing design solution were discussed based on the owner's value objectives for the project. The following are the top value objectives for this project:

- Meets need and purpose
- Enhances safety
- Provides multi-use access
- Minimizes environmental impact
- Minimizes right of way impact
- Enhances maintainability
- Minimizes community impact

After discussing each idea, the team evaluated the ideas by consensus. This produced 22 ideas rated 4 or 5 to research and develop into formal VE alternatives to be included in Section Two of the report. Highly rated ideas that were not developed further may have been combined with another related idea or discarded as a result of additional research indicating the concept as not being cost effective or technically feasible. The reader is encouraged to review the Creative Idea Listing and Evaluation worksheet since it may suggest additional ideas that can be applied to the design.

Typically, all ideas rated four or above are included in this report. When this is not the case, an idea was combined with another related idea or discarded, as a result of additional research that indicated the concept as not being cost-effective or technically feasible.

The reader is encouraged to review the Creative Idea Listing since it may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING



PROJECT: **SR 3/US 41 FROM MOUNT PARAN ROAD TO PACES MILL RD**
Cobb/Fulton Counties, Georgia

SHEET NO.: **1 of 2**

NO.	IDEA DESCRIPTION	RATING
BRIDGE		
B-1	Re-space the beams on the bridge to use fewer beams	5
B-2	Use black reinforcing bars in the superstructure in lieu of epoxy coated reinforcing bars	5
B-3	Reduce the stamped concrete width from 5 ft to 3 ft	4
B-4	Lower the vertical curve across the bridge	2
B-5	Omit the deck drain system	4
WALLS		
W-1	In Phase I, eliminate Wall No. 4	2
W-2	In Phase I, eliminate Wall No. 1	2
W-3	Use soil nail walls in lieu of tie-back walls	4
W-4	In Phase II, shift right to avoid building walls at Sta. 40+00 to Sta. 45+00	4
W-5	In Phase II, build Wall Nos. 2 and 8 as mechanically stabilized embankment, type II or cast-in-place concrete in lieu of a tie-back wall	4
W-6	Take out concrete barrier in front of cut walls	5
W-7	In Phase I, move wall No. 6 closer to the roadway and align with the guard rail on both ends	4
W-8	Use a bin wall for Phase I Wall No. 2	4
W-9	Use a soil nail wall for Phase I, Wall No. 2	4
W-10	Use a soil nail wall for Phase I, Wall No. 4 in lieu of a mechanically stabilized embankment wall	4
W-11	Use a soil nail wall for Phase I, Wall No. 1 in lieu of a mechanically stabilized embankment wall	4
W-12	Use a 1:1 reinforced slope for Phase I, Wall No. 2	4
ROADWAY		
R-1	Use 11-ft-wide lanes for the inside lanes in lieu of 12-ft-wide lanes	4
R-2	Minimize improvements to roadway leading to the Trinity School	DS
R-3	Leave the right-out at the existing IBM South Driveway	DS

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

