



# SR 11/US 129 Widening From Limestone Parkway to South of Nopone Road

Project Number: STP00-0002-06(048); BRF00-0002-06(049);  
& BRF00-0002-06(050)

P.I. Nos.: 122060; 122064; & 122066  
Hall County

## Value Engineering Study Report

Concept Stage

March 2009

*Design Consultant*  
**Keck & Wood, Inc.**

*Value Engineering Consultant*





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Ms. Lisa L. Myers  
Design Review Engineering Manager/VE Coordinator  
GA DOT - Engineering Services  
One Georgia Center – 5<sup>th</sup> Floor  
Atlanta, Georgia 30308

Re: Project No.STP00-0002-06(048); BRF00-0002-06(049) & BRR00-0002-06(050) Hall, P.I. No.: 122060; 122064; & 122066  
SR 11/US 129 Widening From Limestone Parkway  
to South of Nopone Road  
Value Engineering Study Report

Date:  
March 26, 2009

Dear Ms. Myers:

Contact:  
Howard Greenfield

Lewis & Zimmerman Associates, Inc. is pleased to submit two hard copies and one electronic copy of the referenced value engineering study report that took place on March 10 – 13, 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

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hgreenfield@lza.com

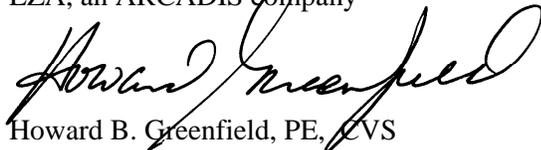
This VE workshop identified and developed several ideas which provide opportunities to improve the value of the project to GDOT. Of particular interest are alternatives to reduce right-of-way impacts, especially acquisitions, reduce earthwork requirements, reduce the median width, and reuse the existing Chattahoochee River bridge to save significant project costs.

Our ref:  
LZ083343.0000

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.

Sincerely yours,

LZA, an ARCADIS company



Howard B. Greenfield, PE, CVES  
Vice President

Attachment

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# EXECUTIVE SUMMARY

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## INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the SR 11/US 129 Widening From Limestone Parkway to South of Nopone Road, P.I. 122060, 122064, 122066, Hall County, STP00-0002-06(048), BRF00-0002-06(049) and BRF00-0002-06(50). The study was conducted in GDOT's Atlanta office March 10 – 13, 2009, using the Conceptual Plans developed for GDOT by Keck & Wood, Inc.

Comprising the VE team was a multidisciplinary group of engineers with highway and bridge planning, design and construction experience and a Certified Value Specialist team leader from LZA. The VE team used the following six-phase VE Job plan to guide its deliberations.

- Information Gathering Phase
- Function Identification and Analysis Phase
- Creative Idea Generation Phase
- Evaluation/Judgment Phase
- Alternative Development Phase
- Presentation Phase

## PROJECT DESCRIPTION

This project widens 5.4 miles of SR 11/US 129 to two lanes in each direction separated by a median to increase its capacity and improve the safety of this stretch of highway. The widened section will connect two existing four-lane sections of the highway. At the south end of the project, four-lane Limestone Parkway will become the primary connection to the new highway, SR 11/US 129, Cleveland Highway, with SR 11 teeing in at a signalized intersection. The widening will continue north with two 12-ft-wide travel lanes in each direction, 10-ft-wide shoulders (with only 6.5 ft of paved areas) and ditch drainage on both sides, and a 20-ft-wide raised concrete median.

At several of the cross streets, the median will be broken and left turn lanes and right turn pockets added. Where some existing cross streets intersect the highway on opposite sides of the road, but do not line up, they will be realigned to oppose each other. At locations where the cross streets intersect the highway at sharp skew angles, the roads will be realigned to intersect as close to 90 degrees as feasible. Provisions for U-turns will be provided at median breaks where there are no opposing intersecting roads. At the Chattahoochee River, the existing two-lane bridge will be replaced with a wider, four-lane bridge located to the east away from existing electrical lines to the west.

Just south of the East Fork Little River, the highway median will be expanded from 20 ft to 44 ft with a grassed section. The existing East Fork Little River bridge will be replaced with two parallel, one-directional bridges to the east. On the north side of the bridge, the highway will be located on a new

alignment first to the east of the existing Cleveland Highway and then crossing over to the west of the existing highway before connecting back to the existing alignment at C Loggins Road.

In order to construct the new highway, numerous properties are impacted and several must be totally acquired. The bridges will have to be constructed in fairly deep water.

The estimated total project cost is approximately \$108.1 million with \$61.8 million for construction including utility relocations and fuel adjustment and \$46.3 million for right-of-way. Construction is to begin in 2013.

## **CONCERNS AND OBJECTIVES**

This project is being planned to alleviate congestion and enhance highway safety in fast growing Hall County. However, in order to achieve these goals it will be necessary to acquire numerous residential and commercial properties causing a disruption to the community and resulting in a high cost for the project. It will also require that bridge foundations be constructed in deep water, a very expensive operation that will add to the project's current cost estimate.

To ensure that the project is developed cost-effectively, GDOT engaged this VE workshop. The objective of the workshop team was to identify specific changes to the current concept design that would result in cost reductions and functional improvements.

## **RESULTS OF THE STUDY**

After exploring numerous options for saving project costs while meeting GDOT's other project requirements, 14 alternatives for cost reduction and one design suggestion intended to avoid future costs were developed by the VE team. All of the alternatives are summarized on the following Summary of Potential Cost Saving table and detailed in the Study Results Section of the report. Note that each alternative was developed independently and thus some of the alternatives are either mutually exclusive or interrelated so that the total cost saving potential will have to be determined once implementation decisions are enacted. The narrative below highlights how the alternatives address GDOT concerns.

Acquiring right-of-way is an expensive and disruptive process, therefore the team sought out ways to reduce the need to obtain additional right-of-way. By judiciously installing mechanically stabilized earth walls and curb and gutter in lieu of a natural drainage swale, the extent of the construction can be limited. This is demonstrated in Alternative Numbers (Alt. Nos.) ROW-12 and ROW-19. Another means for reducing the right-of-way is to reduce the width of the median. In the more urban areas of the highway, the 20-ft-wide median could be necked down to 16 ft between the areas where left turn lanes are provided as shown in Alt. No. ROW-2. In the rural section of highway, the median can be reduced from 44 ft to 32 ft and a cable barrier installed for safety to save both right-of-way and earthwork costs as illustrated in Alt. No. ROW-1. There is also a potential to alter the vertical alignment in the rural section to again save right-of-way and earthwork costs as shown in Alt. No. ROW-7/ROW-15.

With respect to the new bridges, the existing bridge over the Chattahoochee River has a potential to have its substructure reused, thus avoiding some of the construction in water. Two alternatives are

presented (Alt. Nos. B-1 and B-2) that accomplish this. In Alt. No. B-1, a new bridge is first constructed for northbound traffic and then the deck of the existing bridge is removed, the substructure reinforced, and a new deck is added at a slightly higher elevation. This not only saves on bridge costs but will also reduce right-of-way impacts. In Alt. No. B-2, the existing bridge substructure is reinforced and expanded so that a new, four-lane bridge deck with a 6-ft-wide median can be installed. This too requires phasing of the work to first build the new part of the bridge, move all traffic to the new section and then rehabilitate the existing section. But in both instances, large cost savings are accrued.

There is also the potential to reduce the bridge widths by using 8-ft-wide shoulders in lieu of 10-ft-wide shoulders and reducing the median width from 20 ft to 6 ft on the Chattahoochee River Bridge. See Alt. Nos. B-5 and B-6.





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## STUDY RESULTS

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### INTRODUCTION

The results of this value engineering study since portray the benefits that can be realized by GDOT and the public. The results will directly affect the project's design and require coordination between the GDOT project team and the Keck & Wood design team 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 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. 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 alternative 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 VE Alternatives table. The Alt. No. contains one of the following letter prefixes indicating the project element being addressed:

PROJECT ELEMENT	PREFIX
Right-of-Way	ROW
Median	M
Bridges	B

Summaries of the alternatives are provided on the Summary of Potential Cost Savings table.

## **KEY ISSUES**

First, this project requires the acquisition of significant amounts of right-of-way necessitating displacements at numerous locations. Second, the bridges are to be constructed over deep pools of water requiring special construction to erect the substructures, which is more expensive than considered in the bridge cost estimates. Third, there is a substantial amount of borrow material required to construct the project based on the current vertical alignment and width of the typical sections. This combination of project features results in a high cost project that significantly disrupts the area.

## **STUDY OBJECTIVES**

In order to make the project more cost-effective, GDOT engaged this VE study. The task of the VE team was to identify specific opportunities to save project costs that could be evaluated and implemented by the GDOT and Keck & Wood project team.

## **RESULTS OF THE STUDY**

After exploring numerous options for saving project costs while meeting GDOT's other project requirements, 14 alternatives for cost reduction and one design suggestion intended to avoid future costs were developed by the VE team and are presented in this section of the report. The narrative below highlights how some of the alternatives address GDOT concerns.

Acquiring right-of-way is an expensive and disruptive process, therefore the team sought ways to reduce the need to obtain additional right-of-way. By judiciously installing mechanically stabilized earth walls and curb and gutter in lieu of a natural drainage swale, the extent of the construction can be limited. This is demonstrated in Alternative Numbers (Alt. Nos.) ROW-12 and ROW-19. Another means for reducing the right-of-way is to reduce the width of the median. In the more urban areas of the highway, the 20-ft-wide median could be necked down to 16 ft between the areas where left turn lanes are provided as shown in Alt. No. ROW-2. In the rural section of highway, the median can be reduced from 44 ft to 32 ft and a cable barrier installed for safety to save both right-of-way and earthwork costs as illustrated in Alt. No. ROW-1. There is also a potential to alter the vertical alignment in the rural section to again save right-of-way and earthwork costs as shown in Alt. No. ROW-7/ROW-15.

With respect to the new bridges, the existing bridge over the Chattahoochee River has potential to have its substructure reused, thus avoiding some of the construction in water. Two alternatives are presented Alt. Nos. B-1 and B-2 that accomplish this. In Alt. No. B-1, a new bridge is first constructed for northbound traffic and then the deck of the existing bridge is removed, the substructure reinforced, and a new deck is added at a slightly higher elevation. This not only saves on bridge costs but will also reduce right-of-way impacts. In Alt. No. B-2, the existing bridge substructure is reinforced and expanded so that a new, four-lane bridge deck with a 6-ft-wide median can be installed. This too requires phasing of the work to first build the new part of the bridge, move

all traffic to the new section and then rehabilitate the existing section. But in both instances, large cost savings are accrued.

There is also the potential to reduce the bridge widths by using 8-ft-wide shoulders in lieu of 10-ft-wide shoulders and reducing the median width from 20 ft to 6 ft on the Chattahoochee River Bridge. See Alt. Nos. B-5 and B-6.

## **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 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.



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road**  
*Hall County, Georgia*

ALTERNATIVE NO.:

**ROW-1**

DESCRIPTION: **REDUCE THE WIDTH OF THE 44-FT-WIDE MEDIAN TO 32-FT-WIDE**

SHEET NO.:

**1 of 3**

**ORIGINAL DESIGN:**

The original design beginning at Sta. 270+75, East Fork Little River bridge, indicates a 44-ft-wide median running north until the end of the project at Sta. 91+84.29.

**ALTERNATIVE:** (sketch attached)

Use a 32-ft-wide grassed median to reduce right-of-way impacts and costs and the construction schedule.

**ADVANTAGES:**

- Reduces right-of-way costs
- Reduces construction schedule
- Reduces earthwork

**DISADVANTAGES:**

- Will require cable barrier in median for safety reasons

**DISCUSSION:**

The proposed alternative will reduce right-of-way costs and aid in reducing the construction schedule. This alternative will require cable guard rail for safety in the median. This alternative is not uncommon and will provide effective cost savings for this project.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,422,039	—	\$ 1,422,039
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 1,422,039	—	\$ 1,422,039

# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia  
REDUCE 44-FT MEDIAN TO 32-FT.

ALTERNATIVE NO.:

ROW-1

SHEET NO.:

2 of 3

STA. 270+75 TO STA. 391+84.29  $\frac{1}{4}$  - GDOT CURRENT R.O.W WIDTH IS 325-FT  $\frac{1}{4}$   
TOTAL LENGTH 12,109.29 LF OR 2.29 MILES

MEDIAN REDUCTION WILL PROVIDE A REDUCTION FOR REQUIRED R.O.W

$$A = L \times W$$

$$= 12,109.29' \times 12'$$

$$= \underline{145,311.48 \text{ FT}^2} \times \frac{\$1.175}{\text{FT}^2} = \underline{\$170,740.99} \times 2.48 = \underline{\$423,437.66}$$

\$1.175 AVG. OF RESIDENTIAL & AGRICULTURAL

EARTH WORK REDUCTION  
STA. 270+75 TO STA. 391+84.29

12,109.29 LF

AVG. FILL/CUT LENGTH	LT	&	RT.	DEPTH
FRONT SLOPE OF TYP. SECTION.	45'		50'	3'

THE IMPACT OF REDUCTION WILL BE OBSERVED ON THE FRONT AND BACK SLOPES OF THE TYPICAL SECTION.

LT SIDE

$$12,109.29 \text{ LF} \times 45' \times 3' / 27 = \underline{60,546.45 \text{ CY}}$$

RT SIDE

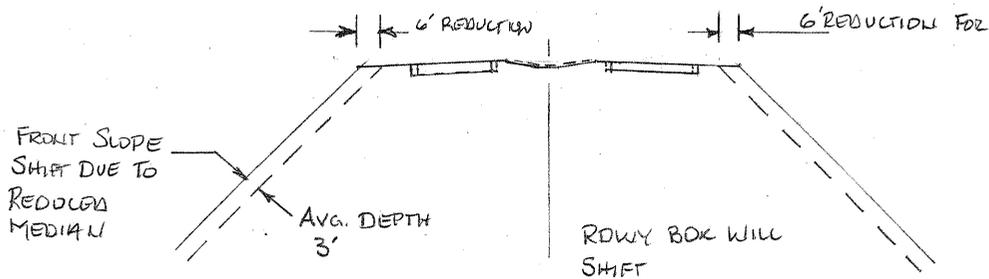
$$12,109.29 \text{ LF} \times 50' \times 3' / 27 = \underline{67,273.83 \text{ CY}}$$

$$\text{TOTAL} = 127,820.28 \text{ CY} \times 5.87 = \underline{\$750,305.04}$$

AVG. PRICE FOR UNCL. EXCAV. & BORROW EXCAV.

\$5.87

EX. 1.00





# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road**  
*Hall County, Georgia*

ALTERNATIVE NO.:

**ROW-2**

DESCRIPTION: **REDUCE THE WIDTH OF THE 20-FT-WIDE MEDIAN TO 16FT-WIDE FROM STA 143+00 TO STA 153+00 AND STA 240+00 TO 252+00**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:**

The original design calls for a 20-ft-wide raised concrete median beginning at Sta. 110+00 to Sta. 270+00.

**ALTERNATIVE:** (sketch attached)

Reduce the 20-ft-wide median to 16-ft-wide from Sta. 143+00 to 153+00 and Sta. 240+00 to Sta. 252+00. Add curb and gutter to better facilitate right-of-way reductions due to the narrower median where required.

**ADVANTAGES:**

- Reduces construction impacts
- Reduces right-of-way costs
- Falls within AASHTO criteria
- Eliminates wall between Sta. 140+00 LT to Sta. 146+00 LT and Sta. 240+00 to Sta. 252+00

**DISADVANTAGES:**

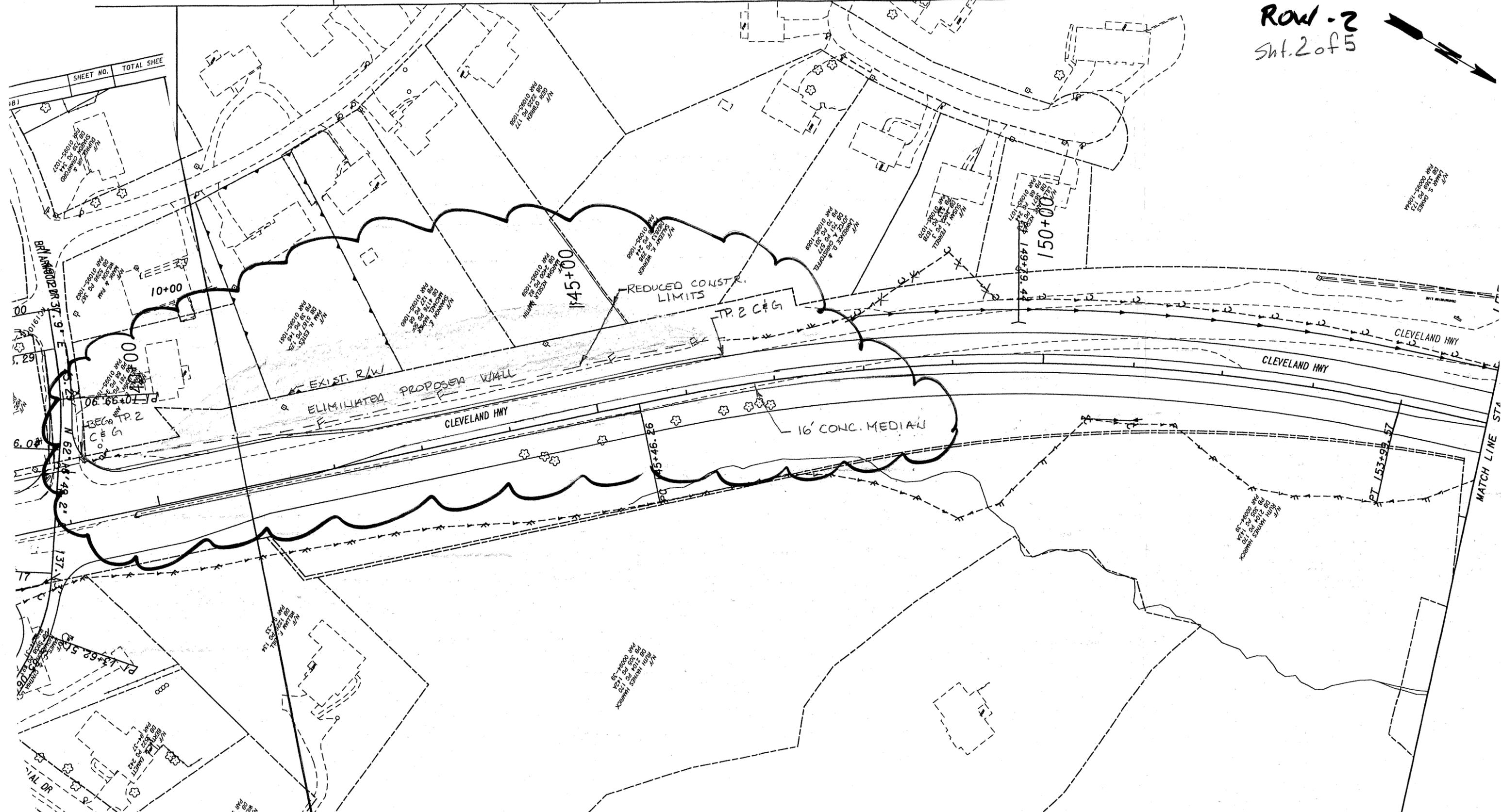
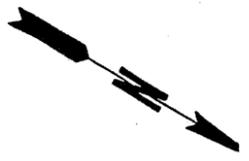
- None apparent

**DISCUSSION:**

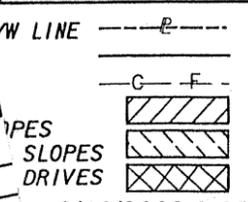
Selectively choosing locations to reduce the median width will provide cost benefits for the overall project. The median reductions at Sta. 140+00 to Sta. 146+00 LT will add value by incorporating curb and gutter. This location will produce costs savings by removing the proposed wall. There will be earthwork adjustments between Sta. 240+00 and Sta. 252+00 as a result of the median reduction and the concrete median area will be reduced. The bullnoses will remain in place at standard width to accommodate pedestrian traffic at various locations.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 420,466	—	\$ 420,466
ALTERNATIVE	\$ 14,143	—	\$ 14,143
SAVINGS	\$ 406,323	—	\$ 406,323

Row - 2  
Sht. 2 of 5



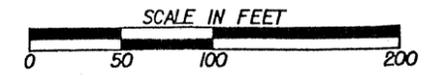
STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
CONSULTANT DESIGN  
CONSTRUCTION PLANS



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

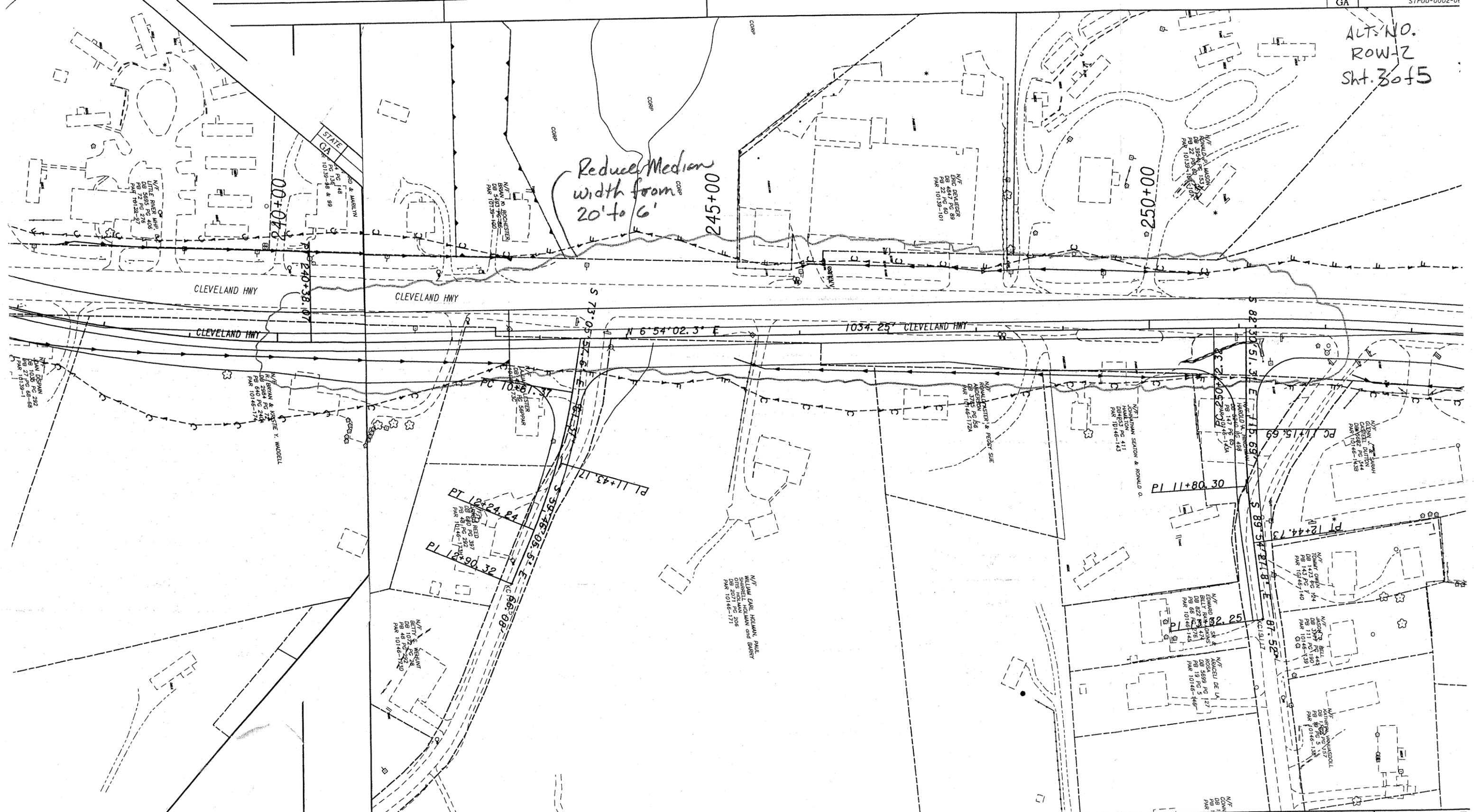
2/16/2009 3:01:38 PM


**KECK & WOOD, INC.**  
 2422 COMMERCE AVENUE  
 BUILDING 2100, SUITE 300  
 DULUTH, GEORGIA 30096  
 (678) 417-4000  
 ENGINEERS SURVEYORS  
 PLANNERS  
 666132

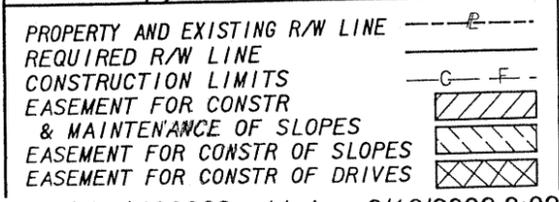


REVISION DATES	

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: CONSULTANT DESIGN  
**CONSTRUCTION PLANS**  
 HALL COUNTY  
 PROJECT: STP00-0002-06(048)

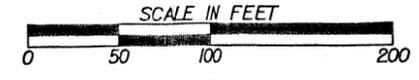


Reduce Median  
width from  
20' to 6''



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

**KECK & WOOD, INC.** ENGINEERS SURVEYORS  
 2425 COMMERCE AVENUE  
 BUILDING 2100, SUITE 300  
 DULUTH, GEORGIA 30096  
 (678)417-4000  
 PLANNERS  
 060132



REVISION DATES	

STA/  
DEPARTMENT  
OFFICE: CONS  
CONST  
  
HALL COUNT  
PROJECT: STP

# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

ROW-2

REDUCE 20-FT MEDIAN TO 16-FT. MEDIAN IN SELECTED LOCATIONS

SHEET NO.: **4 of 5**

Sta. 140+00 To Sta. 146+00 LT

\*We Recommend Adding TP. 2 CURB & GUTTER TO AID IN REDUCING PROPERTY IMPACTS

LF TP. 2, 24" C & G - 650 LF  $650 \text{ LF} \times 19.78 = \underline{\$12,857.00}$  ADD IN TO PROJ. COSTS.

WALL ELIMINATED BETWEEN STA. 140+25 - STA. 146+25 LT. = 600 LF

$$600' \times 1' \times 12' \div 27 = 266.67$$

$$600' \times 1' \times 6' \div 27 = 133.33$$

$$400.00 \text{ CY} (0.10\%) = 40 + 400 = \underline{440 \text{ CY}} - \text{DID NOT USE}$$

USED TP. P2 REMAINING WALL FOR ASSUMED HT @ THIS LOCATION.

$$600 \text{ LF} \times \$475.00 = \underline{\$285,000.00}$$

Sta. 240+00 TO 252+00 - REDUCTION OF CONCRETE MEDIAN (MAY OPT. FOR GRASS MEDIAN THIS SECTION TO FURTHER REDUCE COSTS).

A = LKW / (CONC. MEDIAN REDUCTION)

$$= 1200' \times 16' / 9$$

$$= \underline{2133.33 \text{ SY}} \times 0.10 = 213.33 + 2133.33$$

$$= \underline{2346.67 \text{ SY}} \times \$35.93 = \underline{\$84,315.73}$$

EARTHWORK REDUCTION:

LENGTH - 1200 LF

AVG. SLOPE LENGTH		DEPTH
LT (FT)	RT (FT)	FT
10	20'	1.50

LT. SIDE FRONT/BACK SLOPE REDUCTION

$$A_L = 10' \times 1200' \times 1.50 / 27$$

$$= 666.67 (0.10) = 66.67 + 666.67$$

$$= \underline{733 \text{ CY LT SIDE}}$$

$$A_R = 20' \times 1200' \times 1.50 / 27$$

$$= 1333.33 \times 0.10 = 133.33 + 1333.33$$

$$= \underline{1,466.66 \text{ CY RT SIDE}}$$

$$\text{TOTAL EARTHWORK } 2200 \text{ CYDS @ } \$5.87 = \underline{\$12,903.00}$$

AVG. PRICE EARTHWORK

\$5.87

THESE ADJUSTMENTS DID NOT WARRANT R.O.W REDUCTION THROUGH BOTH SECTIONS.



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road**  
*Hall County, Georgia*

ALTERNATIVE NO.:

**ROW-3**

DESCRIPTION: **REDUCE WIDTH OF INSIDE LANES TO 11 FT TO SAVE PAVEMENT AND REDUCE RIGHT-OF-WAY WIDTH**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (sketch attached)

The current design uses four lanes that are 12-ft-wide.

**ALTERNATIVE:** (sketch attached)

Use four lanes with the inside two lanes being 11-ft-wide and the outside two lanes being 12-ft-wide for trucks.

**ADVANTAGES:**

- Less construction cost
- Slightly less earth work (narrow typical section)
- Slightly less right-of-way cost

**DISADVANTAGES:**

- Narrower inside lane

**DISCUSSION:**

Use an 11-ft-wide inside lane to save construction costs and right-of-way costs. The 11-ft-wide lane meets AASHTO guidelines and there is a 2-ft-wide gutter pan at the median allowing vehicles to move to the left, if desired. However, the outside lanes are to remain 12-ft-wide for trucks (8%).

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 826,142	—	\$ 826,142
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 826,142	—	\$ 826,142



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

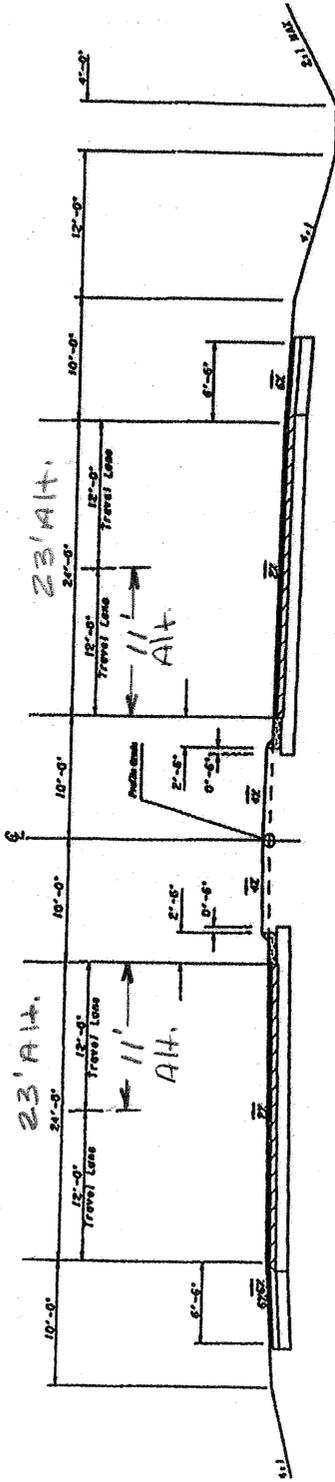
*RW-3*

ORIGINAL DESIGN  ALTERNATIVE DESIGN

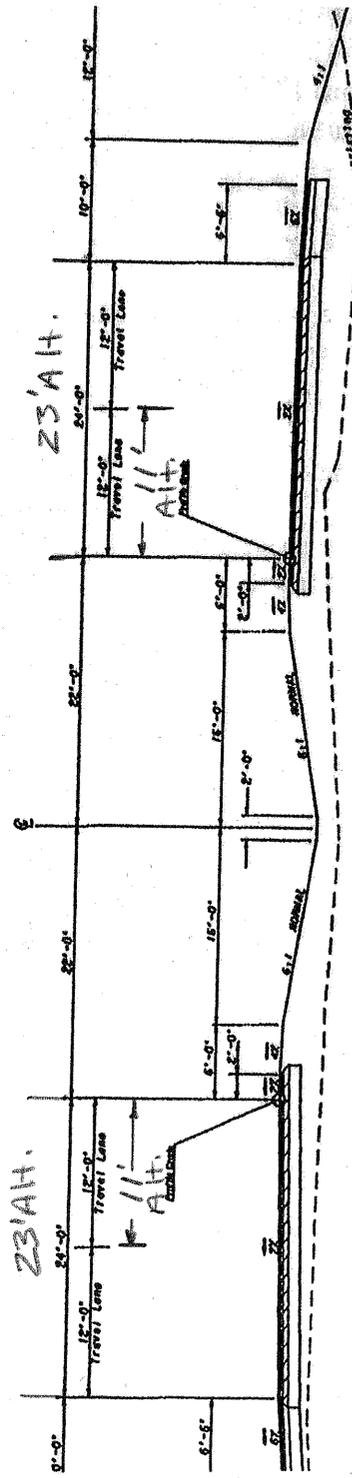
BOTH

SHEET NO.: *2 of 4*

*Original w/ 1/2' lanes / Alt. w/ 11' inside lanes*



APPLIES TO SEGMENT FROM LIMESTONE PARKWAY TO SOUTH OF LAKEVIEW STREET



APPLIES TO SEGMENT FROM SOUTH OF LAKEVIEW STREET TO SOUTH OF NOPORE ROAD

# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

RW-3

SHEET NO.: 3 of 4

Full-Depth pavement Area Saved: (SY)

$$\frac{(2' \times 5.4 \text{ mi} \times \frac{5,280'}{\text{mi}})}{9 \text{ sf/sy}} = 6,336 \text{ s.y.}$$

Earthwork Savings: (Rough Est.)  $\frac{2'}{200'} = 1\% (.01)$   
 $(1,002,060 \text{ cy} \times .01 = 10,021 \text{ cy.}) \leftarrow$

R/W Savings  $6,336 \text{ sy} \times \frac{9 \text{ sf}}{\text{sy}} = 57,024 \text{ SF}$   
 ↑ Potential savings since the distance from shoulder to shoulder is reduced by 2 ft.

Full Depth Pavement Section: Cost / sy

Mix:  
 $(1\frac{1}{2}'' ) 12.5 \text{ mm} : \left( \frac{110 \text{ lbs}}{\text{sy-in}} \times 1.5'' \right) \times \frac{T}{2000 \text{ lbs}} \times \frac{\$80^*}{T} = \$6.60 / \text{sy}$

$(2'' ) 19 \text{ mm} : \left( \frac{110 \text{ lbs}}{\text{sy-in}} \times 2'' \right) \times \frac{T}{2000 \text{ lbs}} \times \frac{\$82^*}{T} = \$9.02 / \text{sy}$

$(4'' ) 25 \text{ mm} : \left( \frac{110 \text{ lbs}}{\text{sy-in}} \times 4'' \right) \times \frac{T}{2000 \text{ lbs}} \times \frac{\$91^*}{T} = \$20.02 / \text{sy}$

10" GAB =  $16.46 / \text{sy}^* = \$16.46 / \text{sy}$

(Asph. & Base) Total Unit Cost =  $\$52.10 / \text{sy}$  ←

\* Prices \$/T are from GDOT Project Cost Estimate.



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **ROW-7/ROW-15**  
*Hall County, Georgia*

DESCRIPTION: **ADJUST VERTICAL PROFILE, STA. 260+00 TO 360+00 AND SHORTEN THE EAST FORK LITTLE RIVER BRIDGE** SHEET NO. **1 of 14**

**ORIGINAL DESIGN:** (sketch attached)

The current vertical profile has the following characteristics:

- VC1: PVI Sta. 253+43.19, EL. 1106.39, 150.00 VC, G1 -0.5%, G2 +1.3692%, K=80.25
- VC2: PVI Sta. 258+98.39, EL. 1113.99, 500.00 VC, G1 +1.3692%, G2 -1.0013%, K=210.93
- VC3: PVI Sta. 271+60.72, EL. 1101.35, 700.00 VC, G1 -1.0013%, G2 +4.8%, K=120.66
- VC4: PVI Sta. 295+04.26, EL. 1213.84, 1000.00 VC, G1 +4.8%, G2 +2.1217%, K=373.37
- VC5: PVI Sta. 318+41.56, EL. 1263.43, 1200.00 VC, G1 +2.1217%, G2 -2.5041%, K=259.42
- VC6: PVI Sta. 352+54.36, EL. 1177.97, 800.00 VC, G1 -2.5041%, G2 +1.3031%, K=210.13
- VC7: PVI Sta. 382+09.54, EL. 1216.48, 600.00 VC, G1 +1.3031%, G2 +0.3371%, K=621.12

**ALTERNATIVE:** (sketch attached)

Revise the roadway profile from Sta 260+00 to Sta 360+00 and shorten the East Fork Little River Bridge.

**ADVANTAGES:**

- Saves costs
- Reduces borrow embankment quantity
- Reduces impacts at historical boundary near Sta. 295+00
- Reduces East Fork Little River Bridge height

**DISADVANTAGES:**

- In some areas, increased depth of cut could require additional right-of-way

**DISCUSSION:**

Maximizing the grade to 6.0% north of the East Fork Little River Bridge allows the PVI at the south end of the new bridge to be lowered, reducing the height of the bridge and minimizing fill embankments at various locations north of the bridge. In addition, the length of the new bridge can be substantially reduced by means of mechanically stabilized embankment (MSE) crib walls. These adjustments, combined with measures to increase embankment slopes and strategically use retaining walls, will result in a substantial reduction of overall project construction costs.

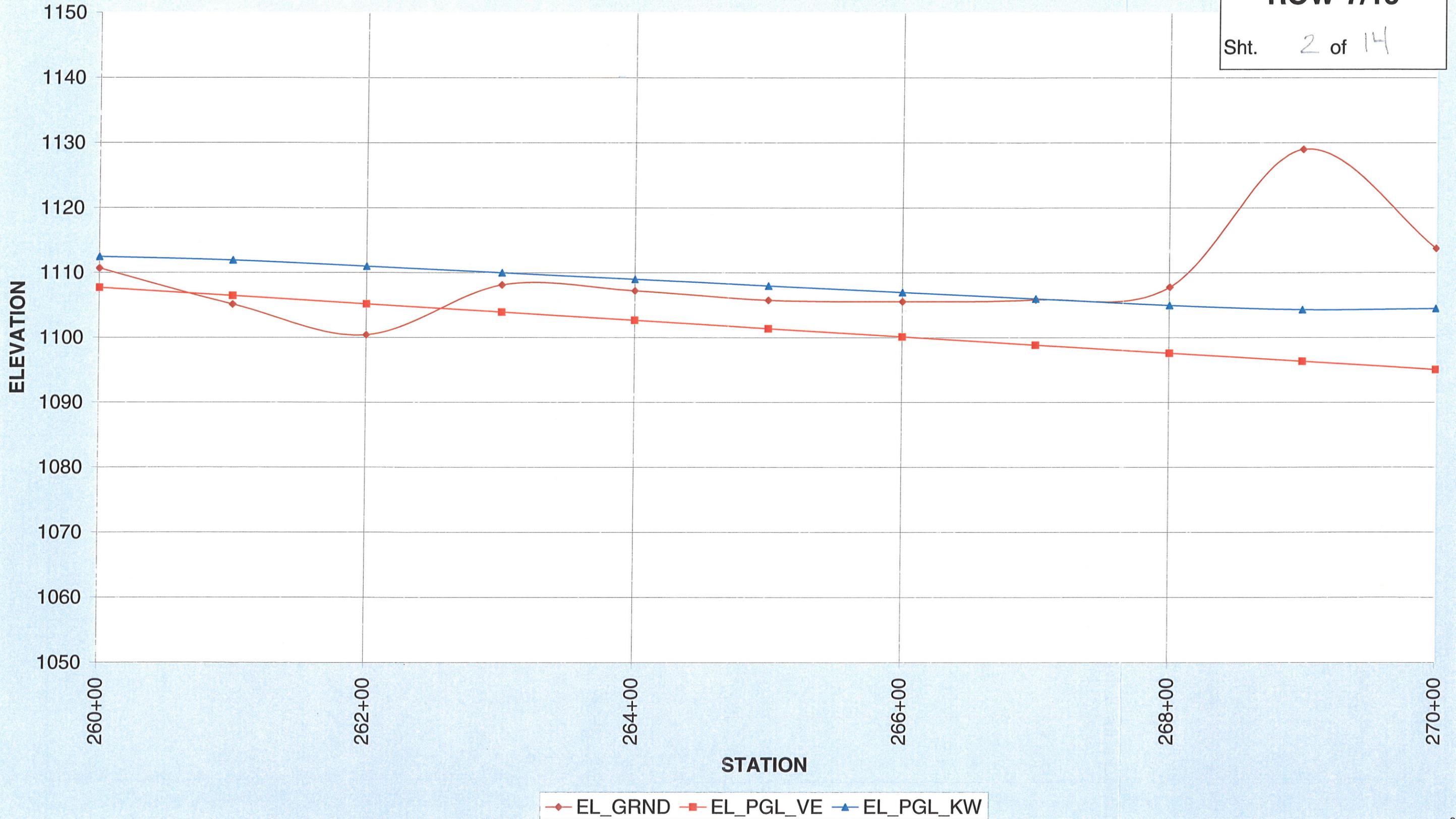
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 13,842,088	—	\$ 13,842,088
ALTERNATIVE	\$ 11,335,300	—	\$ 11,335,300
SAVINGS	\$ 2,506,788	—	\$ 2,506,788

# SR 11 / US 129 PROFILE

ALTERNATIVE NO.:

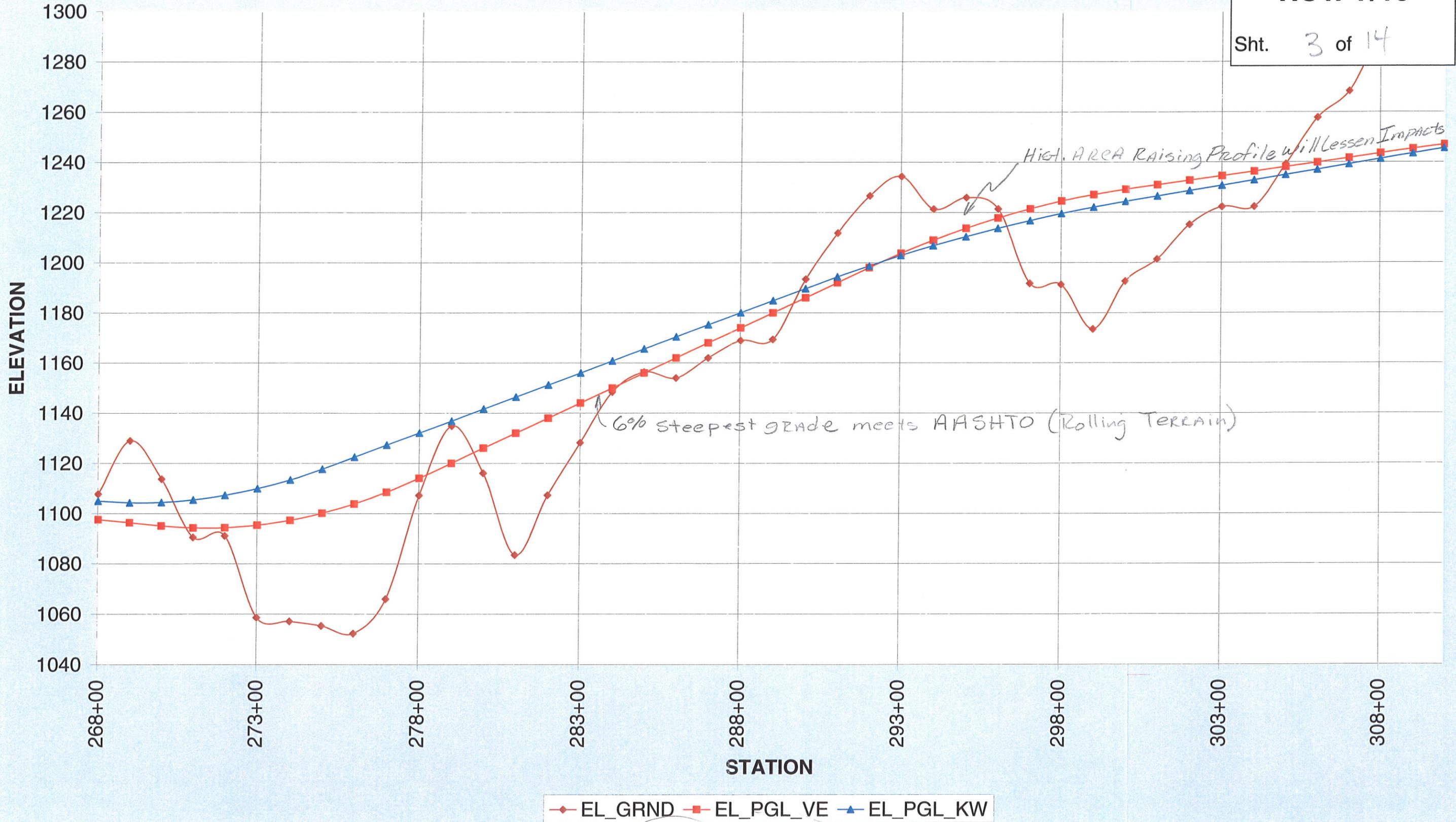
**ROW-7/15**

Sht. 2 of 14



# SR 11 / US 129 PROFILE

ALTERNATIVE NO.:  
**ROW-7/15**  
Sht. 3 of 14

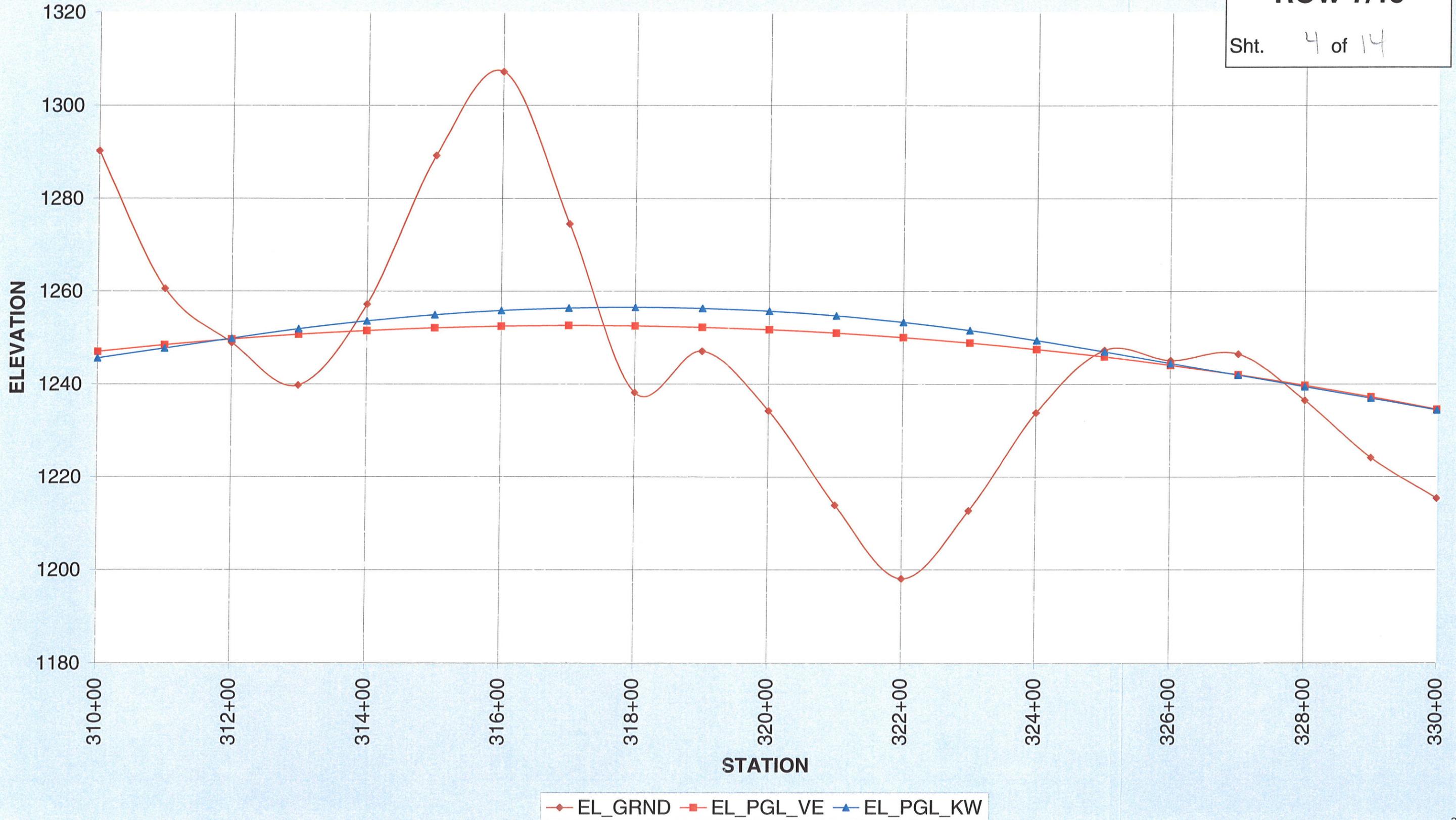


# SR 11 / US 129 PROFILE

ALTERNATIVE NO.:

**ROW-7/15**

Sht. 4 of 14

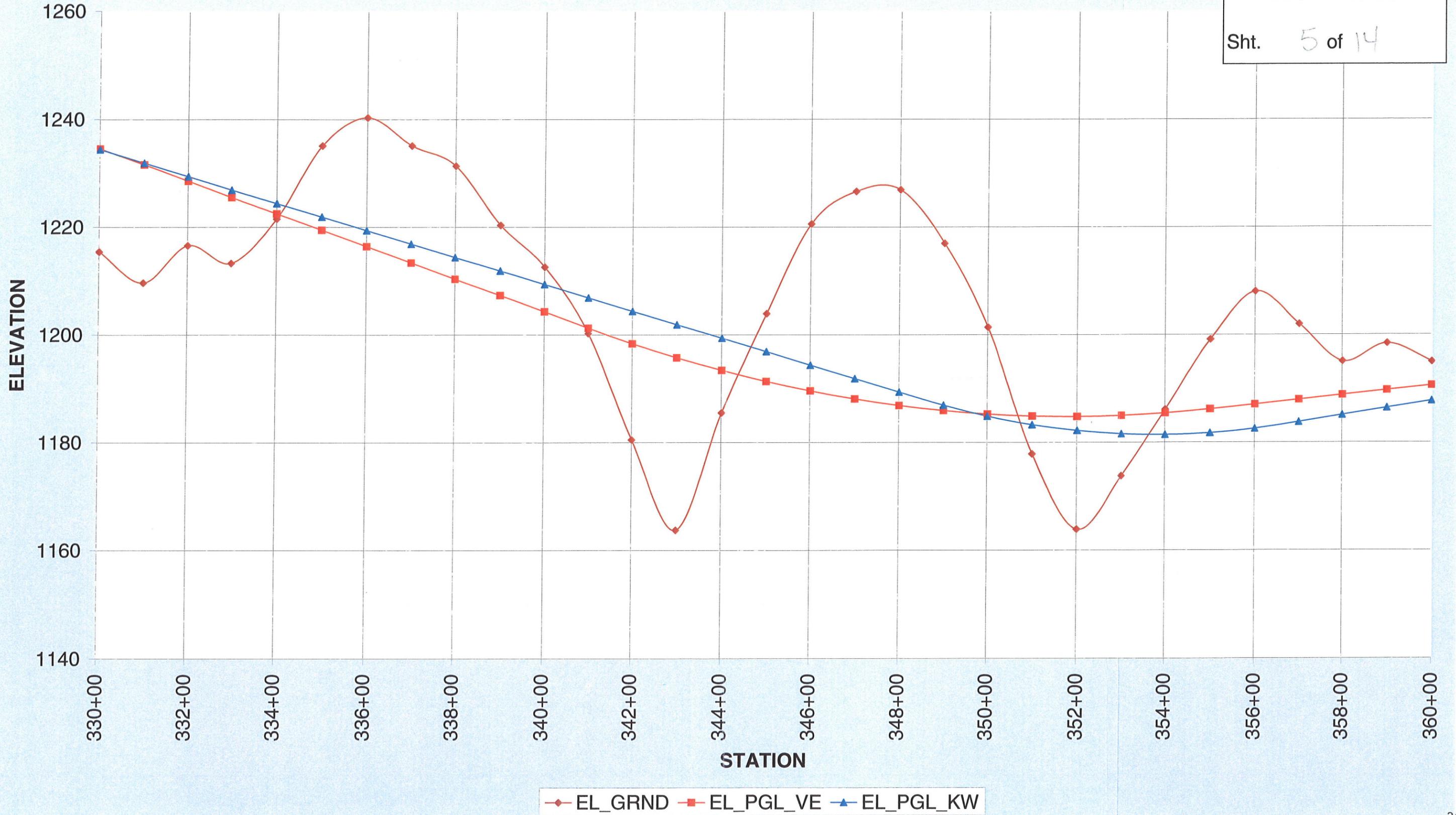


# SR 11 / US 129 PROFILE

ALTERNATIVE NO.:

**ROW-7/15**

Sht. 5 of 14



# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

RW-15

SHEET NO.:

6 of 14

Bridge Length Savings @ East Fork Little River  
Original Bridge length = 690'

Alternate (RW-15) Bridge = 532'

158' Less Bridge

Bridge Area saved. (158' x 41.25' x 2 bridges) =  
= 13,035 SF

RIW should not be affected since the Alt. Profile is only 4 to 5" different than the current (original) proposed profile and this is in the new location section of the project where the RIW is not required to be set so "tight".

use BORROW = \$10/c.y. (includes haul)

unclass EXCAV = \$6.50/c.y.

PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.: **RW-15**  
SHEET NO.: **7** of **14**

Cut - Unclass Excau. more 41,600 cy

$$+ (263+00 \rightarrow 270+50) \left( \frac{750' \times 6' \times 160'}{27} \right) = 26,600$$

$$+ (278+00 \rightarrow 280+00) \left( \frac{200' \times 8' \times 160'}{27} \right) = 9,500 \text{ cy.} +$$

$$+ (314+00 \rightarrow 317+50) \left( \frac{350' \times 4' \times 160'}{27} \right) = 8,300 \text{ cy.} +$$

$$+ (334+50 \rightarrow 341+00) \left( \frac{650' \times 4' \times 160'}{27} \right) = 15,410 \text{ c.y.} +$$

$$+ (345+50 \rightarrow 350+00) \left( \frac{450' \times 4' \times 160'}{27} \right) = 10,700 \text{ cy.} +$$

$$- (353+75 \rightarrow 370+00) \left( \frac{1625' \times 3' \times 160'}{27} \right) = -28,900 \text{ c.y.} -$$


---

Fill embankment  $\downarrow$

$$- (269+80 \rightarrow 272+00) \left( \frac{120' \times 10' \times 160'}{27} \right) = -7,100 \text{ c.y.} -$$

$$- (280+00 \rightarrow 289+50) \left( \frac{950' \times 9' \times 160'}{27} \right) = -50,700 \text{ cy.} -$$

$$+ (296+00 \rightarrow 304+50) \left( \frac{850' \times 5' \times 160'}{27} \right) = +25,180 \text{ c.y.} +$$

(Hist. AREA)

$$- (312+00 \rightarrow 313+50) \left( \frac{150' \times 1.5' \times 160'}{27} \right) = -1,330 \text{ c.y.} -$$

$$- (317+50 \rightarrow 325+00) \left( \frac{750' \times 4' \times 160'}{27} \right) = -17,770 \text{ c.y.} -$$

$$- (330+00 \rightarrow 334+00) \left( \frac{400' \times 1' \times 160'}{27} \right) = -2,370 \text{ c.y.} -$$

$$- (340+75 \rightarrow 344+50) \left( \frac{375' \times 7' \times 160'}{27} \right) = -15,560 \text{ c.y.} -$$

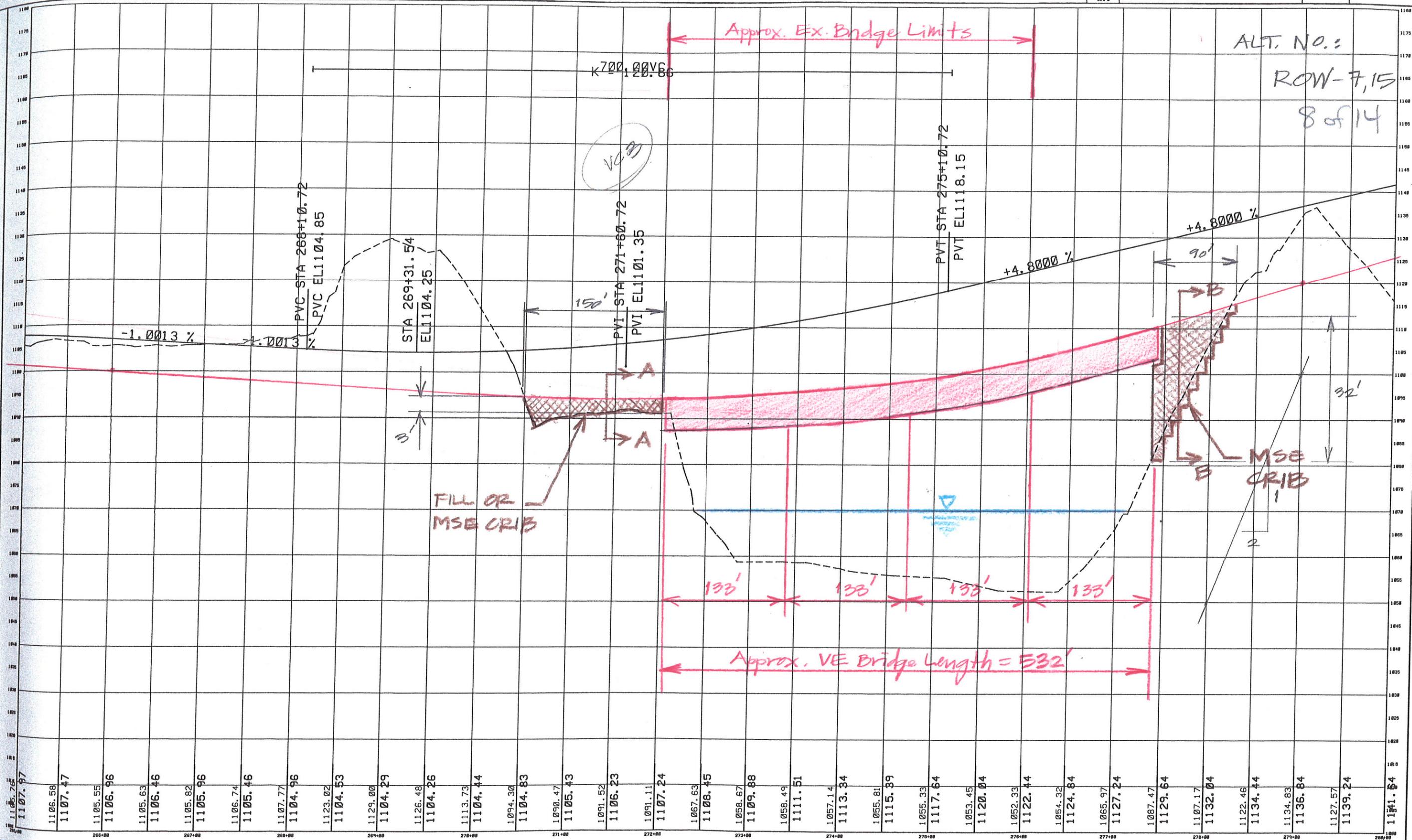
$$+ (350+75 \rightarrow 353+75) \left( \frac{300' \times 3.2' \times 160'}{27} \right) = +5,690 \text{ c.y.} +$$


---

Savings for Borrow:  
 $41,610 \times .8 = 33,290$   
 $+ 64,000$   
 Less Borrow  $\approx 97,290 \text{ c.y.}$

(Less Borrow)  $\approx 64,000 -$

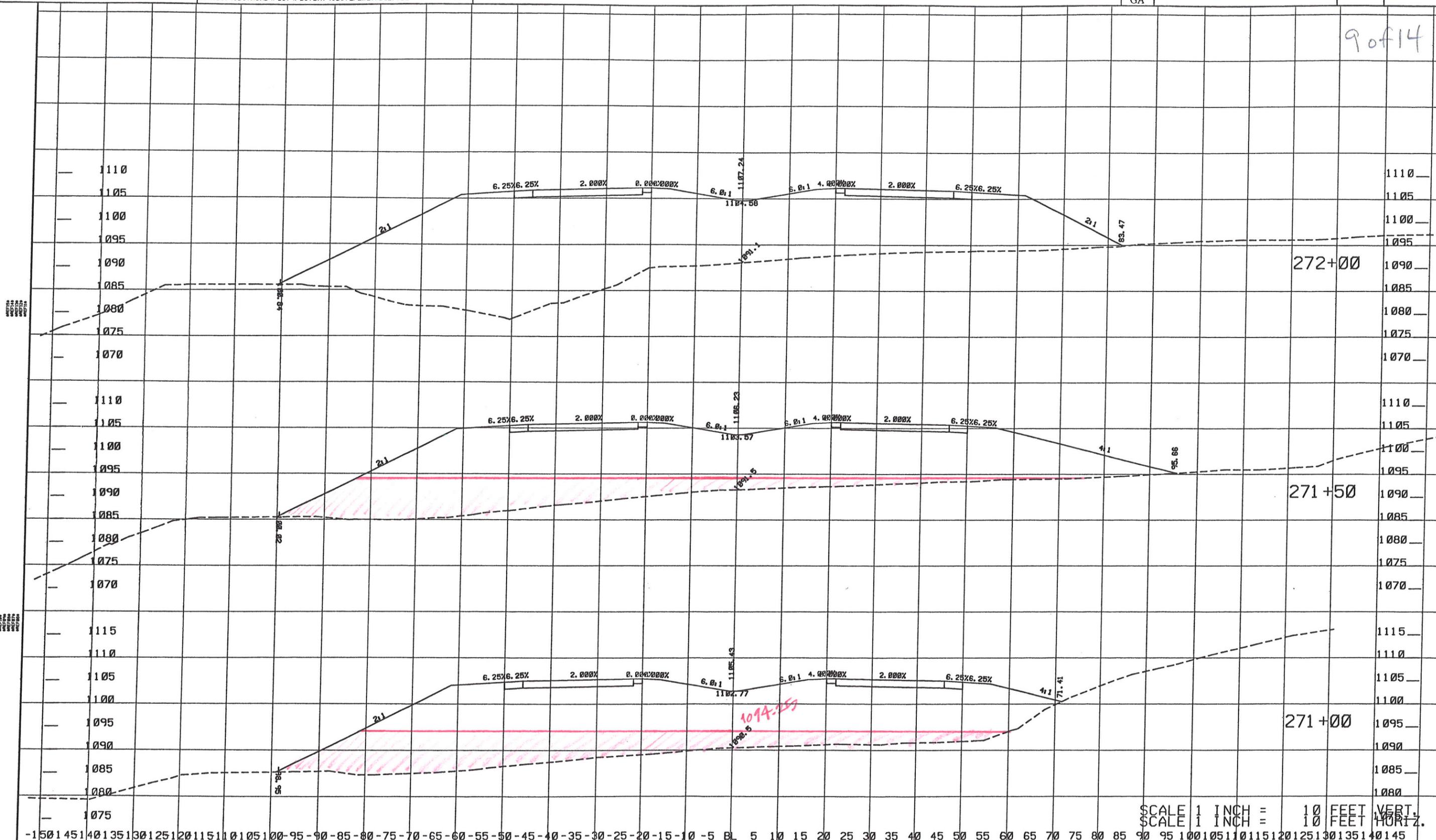
ALT. NO.:  
ROW-7,15  
8 of 14



1106.58	1107.47	1105.55	1106.96	1105.63	1106.46	1105.82	1105.96	1106.74	1105.46	1107.77	1104.96	1123.02	1104.53	1129.00	1104.29	1126.48	1104.26	1113.73	1104.44	1094.30	1104.83	1090.47	1105.43	1091.52	1106.23	1091.11	1107.24	1067.63	1108.45	1058.67	1109.88	1058.49	1111.51	1057.14	1113.34	1055.81	1115.39	1055.33	1117.64	1053.45	1120.04	1052.33	1122.44	1054.32	1124.84	1065.97	1127.24	1087.47	1129.64	1107.17	1132.04	1122.46	1134.44	1134.83	1136.84	1127.57	1139.24	1141.64
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REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE: MAINLINE PROFILE	
		DRAWING No. 15-29	

9 of 14



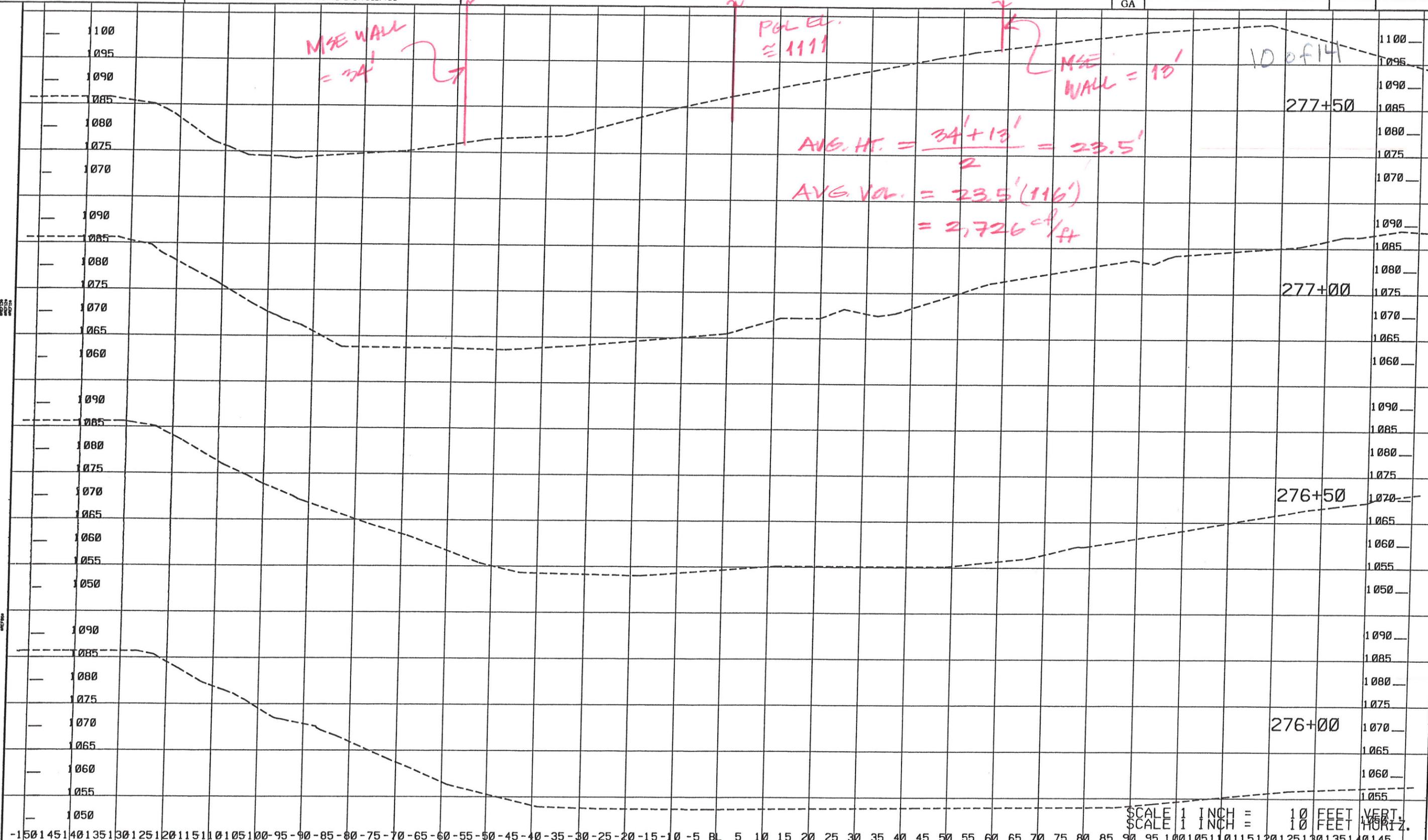
SCALE 1 INCH = 10 FEET VERT.  
 SCALE 1 INCH = 10 FEET HORIZ.

-150 145 140 135 130 125 120 115 110 105 100 -95 -90 -85 -80 -75 -70 -65 -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES	

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE:  
 DRC/PC/SAYS/EP/FO/IN/SES

DRAWING No.  
 23-30



SCALE 1 INCH = 10 FEET VERT.  
 SCALE 1 INCH = 10 FEET HORIZ.

-150 145 140 135 130 125 120 115 110 105 100 -95 -90 -85 -80 -75 -70 -65 -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 B L 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE:	
		DPC/PCB/SAYS/ERD/O/IN/SES	
		DRAWING No. 1	
		23-	





PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

ROW-7, 15

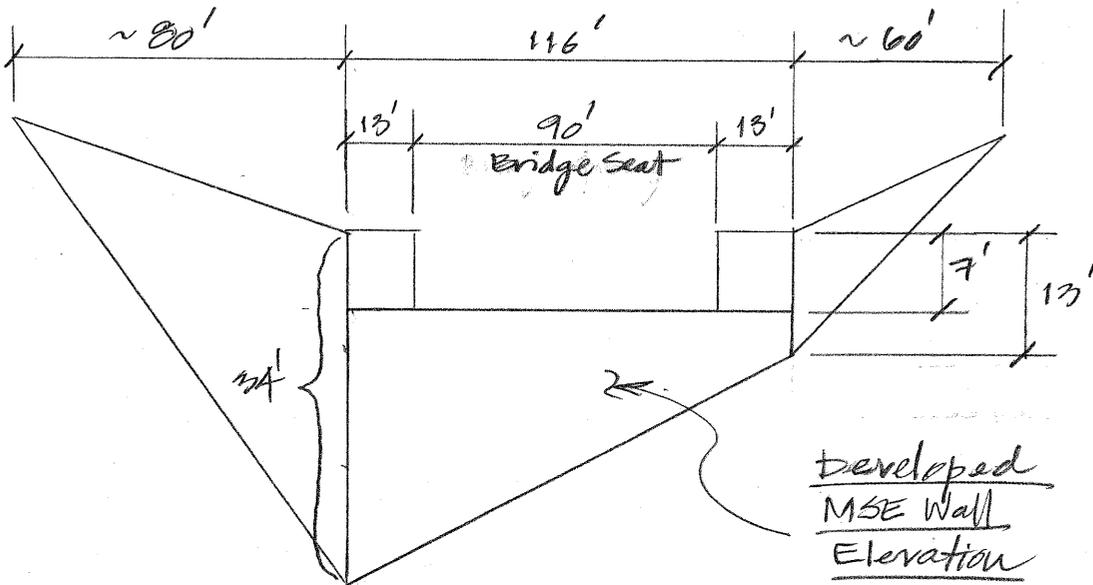
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.: 12 of 14

MSE Wall to Replace 159' of Bridge  
East Fork Little River Bridge



"Avg. End Area" = 2,726 sf

$$\begin{aligned} \text{Area} &= \frac{1}{2}(80')(34') + \frac{1}{2}(34' + 13')(116') \\ &\quad - 7'(90') + \frac{1}{2}(60')(13') \\ &= \underline{\underline{3,846 \text{ sf}}} \end{aligned}$$

$$\begin{aligned} \text{Fill Volume} &\approx \frac{1}{2}(2,726 \text{ sf}) \left( \frac{80' + 60'}{2} \right) \\ &= \underline{\underline{95,410 \text{ cf}}} \end{aligned}$$

ALTERNATIVE NO.:  
**ROW-7/15**  
 Sht. of

VC	VC	STA_PVC	EL_PVC	G1	STA_PVI	EL_PVI	G2	STA_PVT	EL_PVT
VC1	150.00	25268.19	---	---	25343.19	1107.00	0.01259	25418.19	1107.94
VC2	400.00	25500.00	1108.97	0.01259	25700.00	1111.49	-0.01264	25900.00	1108.96
VC3	800.00	27000.00	1095.06	-0.01264	27400.00	1090.00	0.06000	27800.00	1114.00
VC4	800.00	29200.00	1198.00	0.06000	29600.00	1222.00	0.01792	30000.00	1229.17
VC5	2200.00	30900.00	1245.29	0.01792	32000.00	1265.00	-0.03036	33100.00	1231.61
VC6	1400.00	34100.00	1201.25	-0.03036	34800.00	1180.00	0.00880	35500.00	1186.16
VC7	600.00	37909.54	1207.36	0.00880	38209.54	1210.00	0.01115	38509.54	1213.34
VC8	0.00	39042.73	1219.29	0.01115	39042.73	1219.29	---	39042.73	---



# VALUE ENGINEERING ALTERNATIVE



**PROJECT: SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road**  
*Hall County, Georgia*

ALTERNATIVE NO.:

**ROW-12**

**DESCRIPTION: USE A RETAINING WALL AT STA. 186+00 TO STA. 192+00 RT TO REDUCE RIGHT-OF-WAY IMPACTS**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (sketch attached)

The current design does not have a retaining wall in a “high” fill from Sta. 186+00 to Sta. 192+00 RT where there are three displacements.

**ALTERNATIVE:** (sketch attached)

Use a retaining wall from STA 186+00 to 192+00 RT to save three displacements and reduce the amount of right-of-way required.

**ADVANTAGES:**

- Reduces right-of-way cost (avoids taking three properties)
- Less borrow earthwork required

**DISADVANTAGES:**

- None apparent

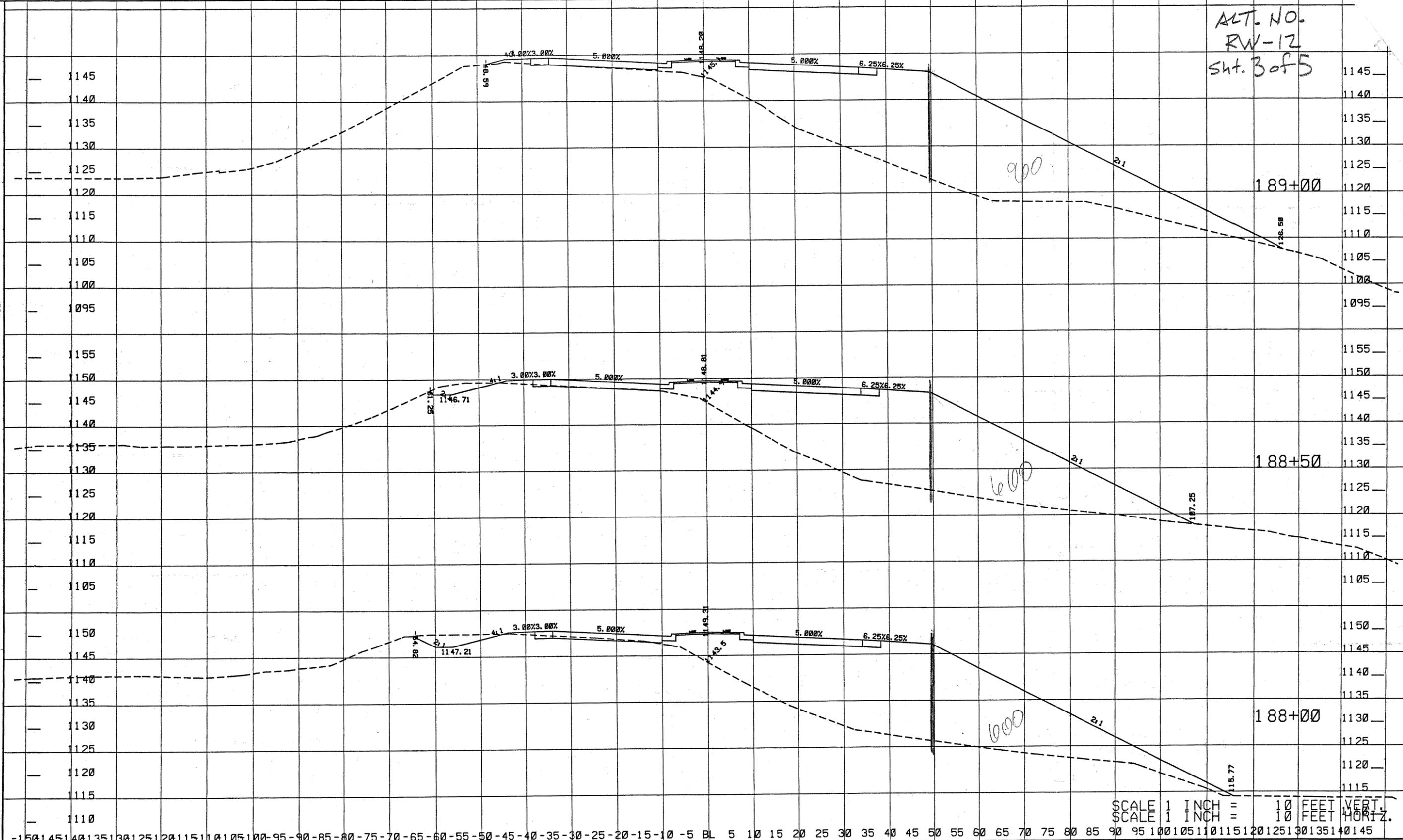
**DISCUSSION:**

A retaining wall in this area would be cost-effective since it would save the acquisition of three properties. The driveways would tie into SR11/US 129 without any difficulties.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,324,140	—	\$ 1,324,140
ALTERNATIVE	\$ 759,000	—	\$ 759,000
SAVINGS	\$ 565,140	—	\$ 565,140



ALT. NO.  
RW-12  
Sht. 3 of 5



SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

-150 145 140 135 130 125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES	

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE:  
D/C/INVESTIGATION

DRAWING No.  
23-



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

RW-12

SHEET NO.: 4 of 5

from: RW-12

Retain Wall

186+00 → 192+00 Rt.

$$(25' \text{ Ht. (Avg.)} \times 600') = 15,000 \text{ SF}$$

R/W saved:

$$65' \times 600' = 39,000 \text{ SF}$$

Improvements (SAVED) Resident = \$100,000  
(Matthew Jameson)

Borrow saved:

$$\frac{(25' \times \frac{66'}{2} \times 700')}{27 \text{ cf/cy}} \approx 21,600 \text{ cy.}$$

use: wt. R/W of \$2/SF

use \$46/SF from Item Mean Summary  
for MSE wall.

# COST WORKSHEET

PROJECT:	<b>SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road</b>  <i>Hall County, Georgia</i>	ALTERNATIVE NO.:	<b>ROW-12</b>  SHEET NO.: <b>5 of 5</b>
----------	--	------------------	---

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Earthwork borrow	CY	26,100	10.00	261,000			
Right-of-Way	SF	39,000	2.00	78,000			
Save residential displacement	EA	3	40,000.00	120,000			
1 resident home improvement saved	EA	1	100,000.00	100,000			
MSE wall	SF				15,000	46.00	690,000
Right-of-Way Subtotal				298,000			
Right-of-Way Markup 2.48				739,040			
Subtotal Right-of-Way				1,037,040			
<b>Subtotal</b>				261,000			690,000
<b>Markup (%) at 10%</b>				26,100			69,000
<b>TOTAL</b>				1,324,140			759,000

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road**  
*Hall County, Georgia*

ALTERNATIVE NO.:  
**ROW-13**

DESCRIPTION: **AVOID DISPLACEMENTS AT BRIARWOOD ROAD AND BETWEEN SKYLARK PLACE AND LAKELAND ROAD**

SHEET NO.: **1 of 9**

**ORIGINAL DESIGN:** (sketch attached)

The current design has displacements (right-of-way) at Briarwood Road and from Skylark Road to Lakeland Road.

**ALTERNATIVE:** (sketch attached)

Lessen the right-of-way impacts at the above side street locations by adding mechanically stabilized earth (MSE) walls or curb and gutter in lieu of drainage swales.

**ADVANTAGES:**

- Less construction cost
- Less right-of-way costs
- Eliminates two right-of-way displacements

**DISADVANTAGES:**

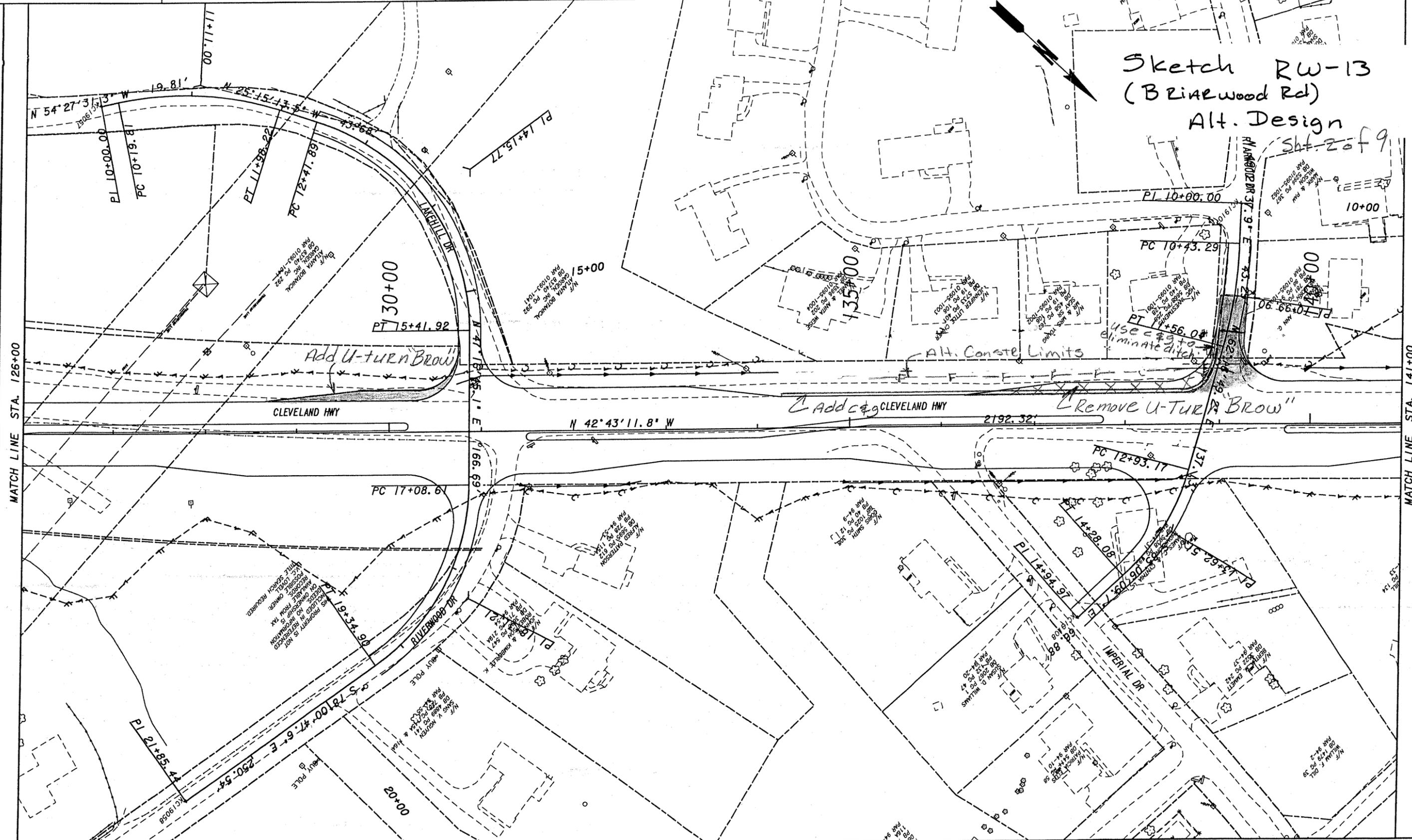
- Requires construction of some MSE walls

**DISCUSSION:**

This preliminary right-of-way savings analysis shows that displacements could be saved at Briarwood Road with the use of curb and gutter, and at Sta. 230+00 to 233+00 LT with a retaining wall.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 717,889	—	\$ 717,889
ALTERNATIVE	\$ 146,019	—	\$ 146,019
SAVINGS	\$ 571,870	—	\$ 571,870

Sketch RW-13  
(Blairwood Rd)  
Alt. Design  
Sht. 2 of 9



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

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

**KECK & WOOD, INC.** ENGINEERS SURVEYORS  
 2425 COMMERCE AVENUE  
 BUILDING 2100, SUITE 300  
 DUBLIN, GEORGIA 30096  
 (678)417-4000



REVISION DATES

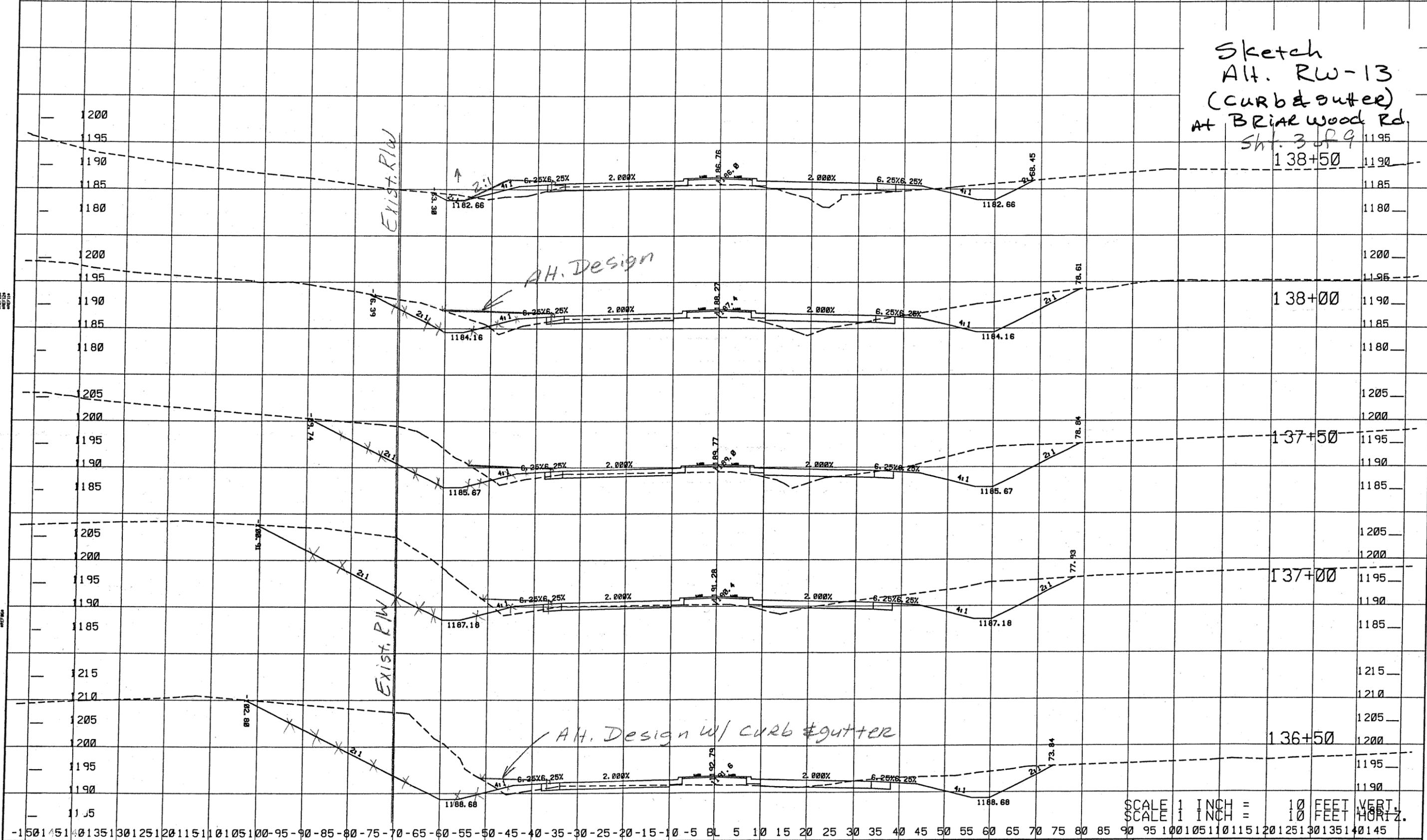
NO.	DATE	DESCRIPTION

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: CONSULTANT DESIGN  
**CONSTRUCTION PLANS**

HALL COUNTY  
 PROJECT: STP00-0002-06(048)

DRAWING No.  
**13-03**

Sketch  
 Alt. RW-13  
 (Curb & gutter)  
 AT Briarwood Rd.  
 Sh. 3 of 9

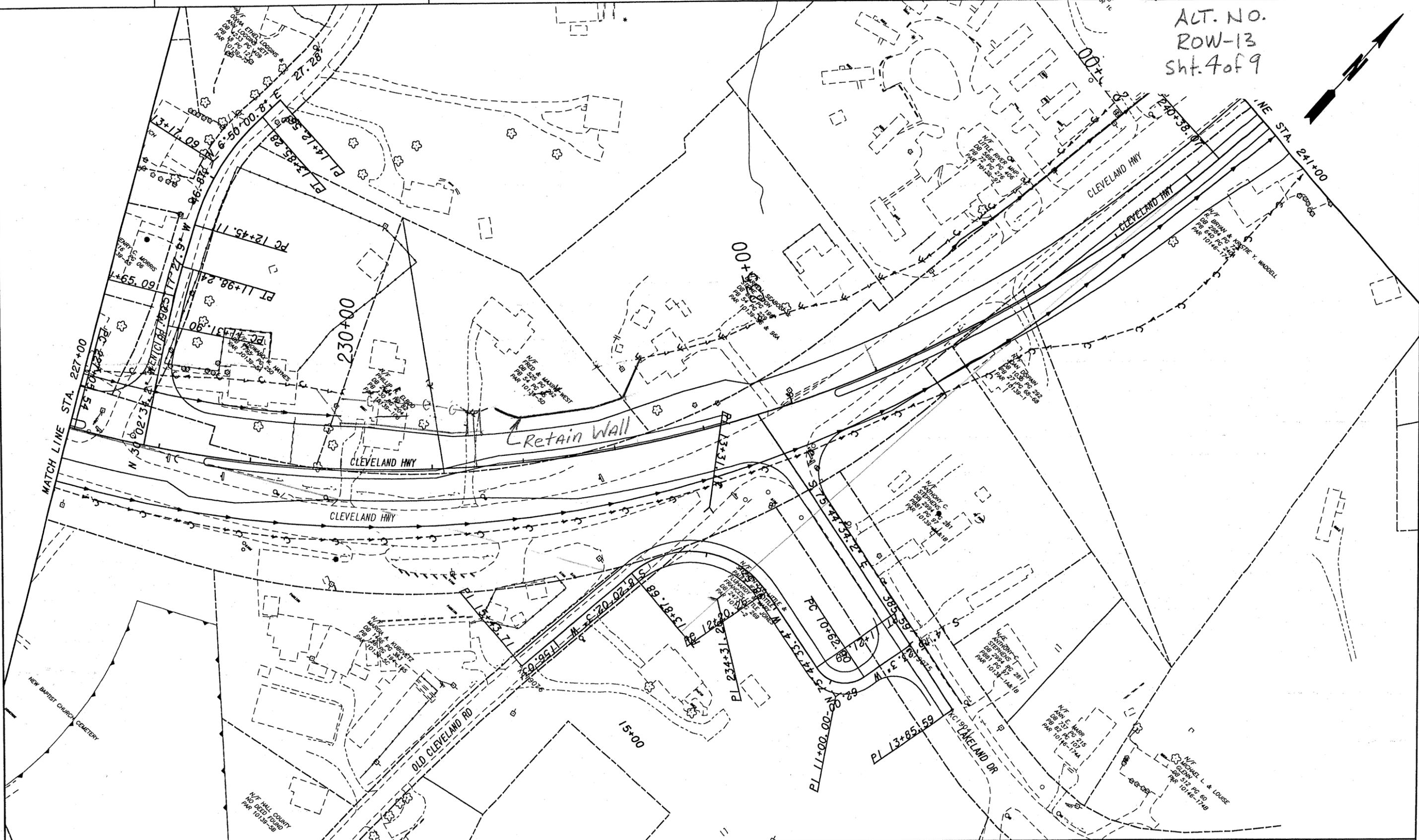
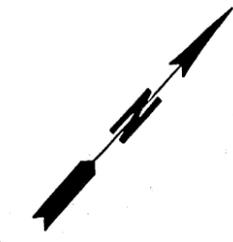


SCALE 1 INCH = 10 FEET VERT.  
 SCALE 1 INCH = 10 FEET HORIZ.

-150 145 140 135 130 125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE: <b>DPC/PCEN/SAYSER/POINSES</b>	
		DRAWING NO. <b>23-</b>	

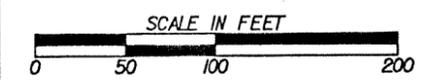
ACT. NO.  
ROW-13  
Sht. 4 of 9



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

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

**KECK & WOOD, INC.** ENGINEERS SURVEYORS  
 2425 COMMERCE AVENUE PLANNERS  
 BUILDING 2100, SUITE 300  
 DULUTH, GEORGIA 30096 060132  
 (678)417-4000



REVISION DATES	

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: CONSULTANT DESIGN  
**CONSTRUCTION PLANS**

HALL COUNTY  
 PROJECT: STP00-0002-06(04B)

DRAWING No.  
**13-10**





PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

RW-13

SHEET NO.: 6 of 9

a.) BRIAR Road (x-section at 139+00 Lt.)

— Eliminate the U-Turn Brow & Add curb & gutter to reduce construction limits (see x-sections)

Alt. Items:

Add'l C & g = 500 L.F.

(Possible) add'l catch Basin & 500 L.F. 18" storm Dr. Pipe

Original Items Saved

Full depth Pavement:

$$\frac{\left[ \left( 150' + \frac{100'}{2} \right) \times 12' \right]}{9 \text{ SF/sy}} = 267 \text{ sy.}$$

R/W saved:

(20' x 100' = 2,000 SF) Land

Displacement = \$40,000/EA

Consequential impacts = \$5,000/EA

b.) Hawthorne Lane to Britney Court

See (RW-12) for Savings

c.) Skylark Place to Lakeland Rd 222+00 → 235+00

Build Retaining Wall to save displacement

At Sta. 231+00 → 233+00 Lt. (Fred West)

$$\rightarrow \text{Wall Face Area} = \left[ \left( 25' \times \frac{10'}{2} \right) + (125' \times 14') + \left( 50' \times \frac{16'}{2} \right) \right] = 2,275 \text{ SF} \leftarrow$$

$$\text{R/W saved: } \left( \frac{22'}{2} \times 50' \right) + (125' \times 24') + \left( \frac{16'}{2} \times 50' \right) = 4,000 \text{ SF}$$



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

RW-13

SHEET NO.: 7 of 9

c.) Continued:

Earthwork (Borrow) Saved:

$$\left[ \frac{(12' \times 50' \times 5')}{2} + \frac{(24' \times 14' \times 125')}{2} + \frac{(8' \times 50' \times 50')}{2} \right] = 27cf/sy$$

= 1,200 c.y.

Improvements Saved: 1 Resident

d.) Lakeland to Hilltop: In this area the proposed alignment could not be changed to save displacements.





# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road**  
*Hall County, Georgia*

ALTERNATIVE NO.:

**ROW-19**

DESCRIPTION: **USE AN URBAN SECTION BETWEEN STA. 194+00 AND STA. 260+00**

SHEET NO.: **1 of 15**

**ORIGINAL DESIGN:** (sketch attached)

The current design calls for a 20-ft-wide raised concrete median, with graded flush shoulders.

**ALTERNATIVE:** (sketch attached)

Change the typical section to show an urban section between Sta. 190+00 to Sta. 260+00.

**ADVANTAGES:**

- Aids in reducing construction impacts
- Aids in reducing right-of-way impacts - displacements
- Roadway is classified as urban arterial in the concept documents

**DISADVANTAGES:**

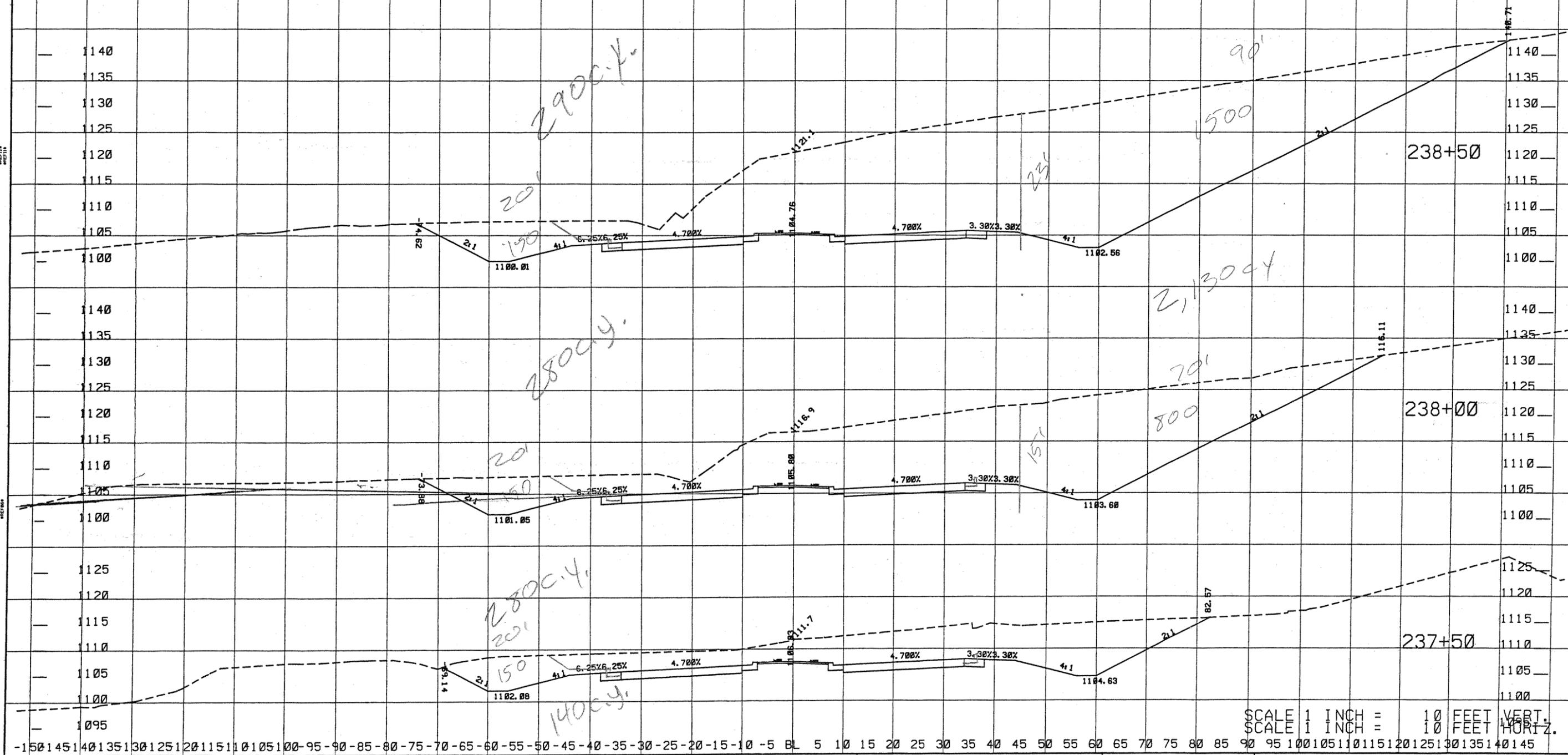
- None apparent

**DISCUSSION:**

Installing curb and gutter will help to reduce construction impacts and aid in the reduction of right-of-way. Proposing mechanically stabilized earth (MSE) walls will reduce property displacement with accompanying right-of-way and earthwork reductions. This modification requires the increase of storm drain pipe with catch basins.

This modification is strongly suggested due to the significant reduction in the displacements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,062,797	—	\$ 3,062,797
ALTERNATIVE	\$ 1,516,854	—	\$ 1,516,854
SAVINGS	\$ 1,545,943	—	\$ 1,545,943



SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

REVISION DATES

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE:  
DPC/PC/SAYS/EP/FO/IN/SES

DRAWING No.  
23-

3 of 15  
243+00

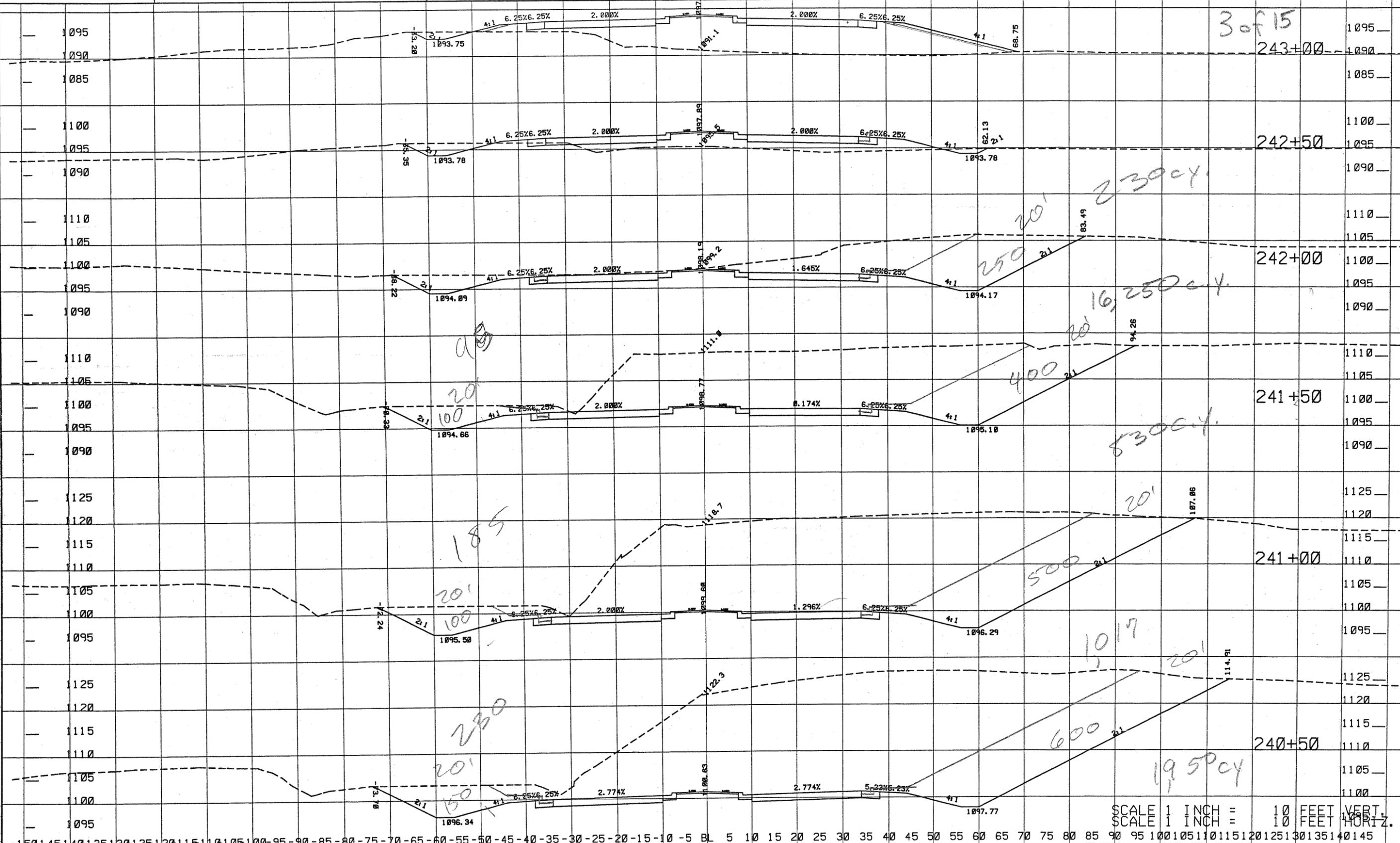
242+50

242+00

241+50

241+00

240+50



SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

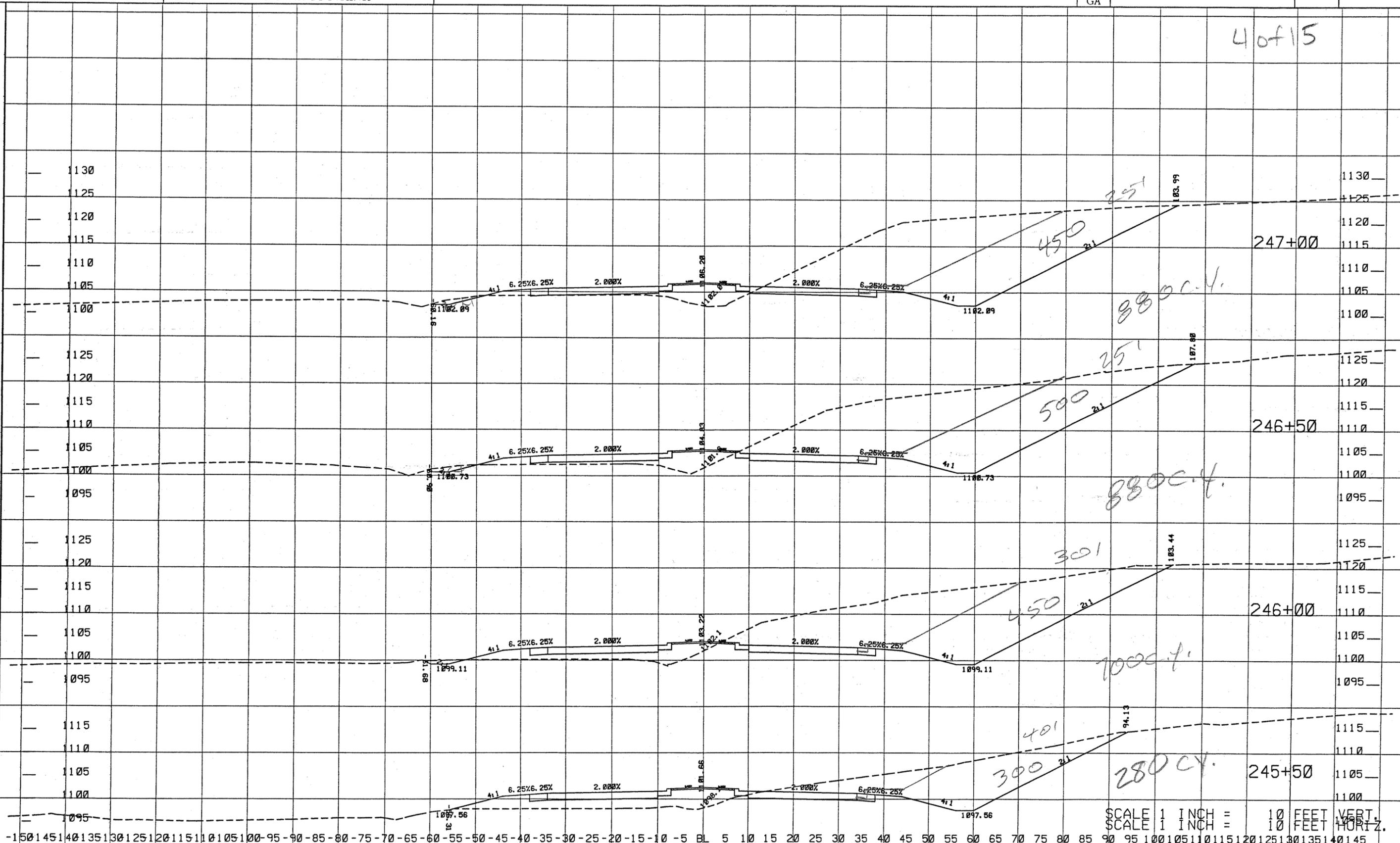
-150 145 140 135 130 125 120 115 110 105 100 -95 -90 -85 -80 -75 -70 -65 -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES	

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE:  
DPC/PCSA/S&E/RO/FO/IN/SES

DRAWING No.  
23-

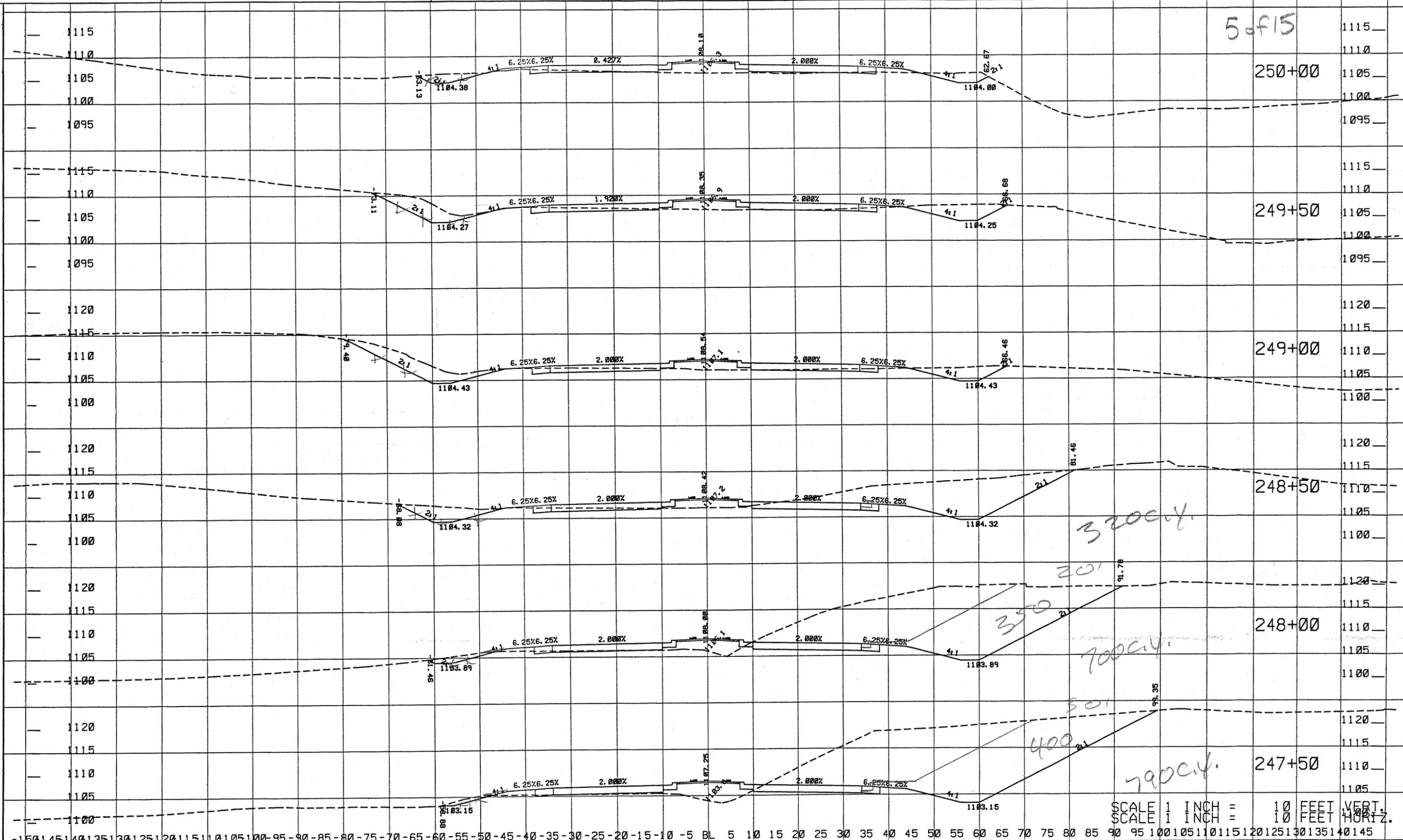
4 of 15



SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE: DPC/PC/BS/AS/ET/PO/IN/SES	
		DRAWING No. 23-	

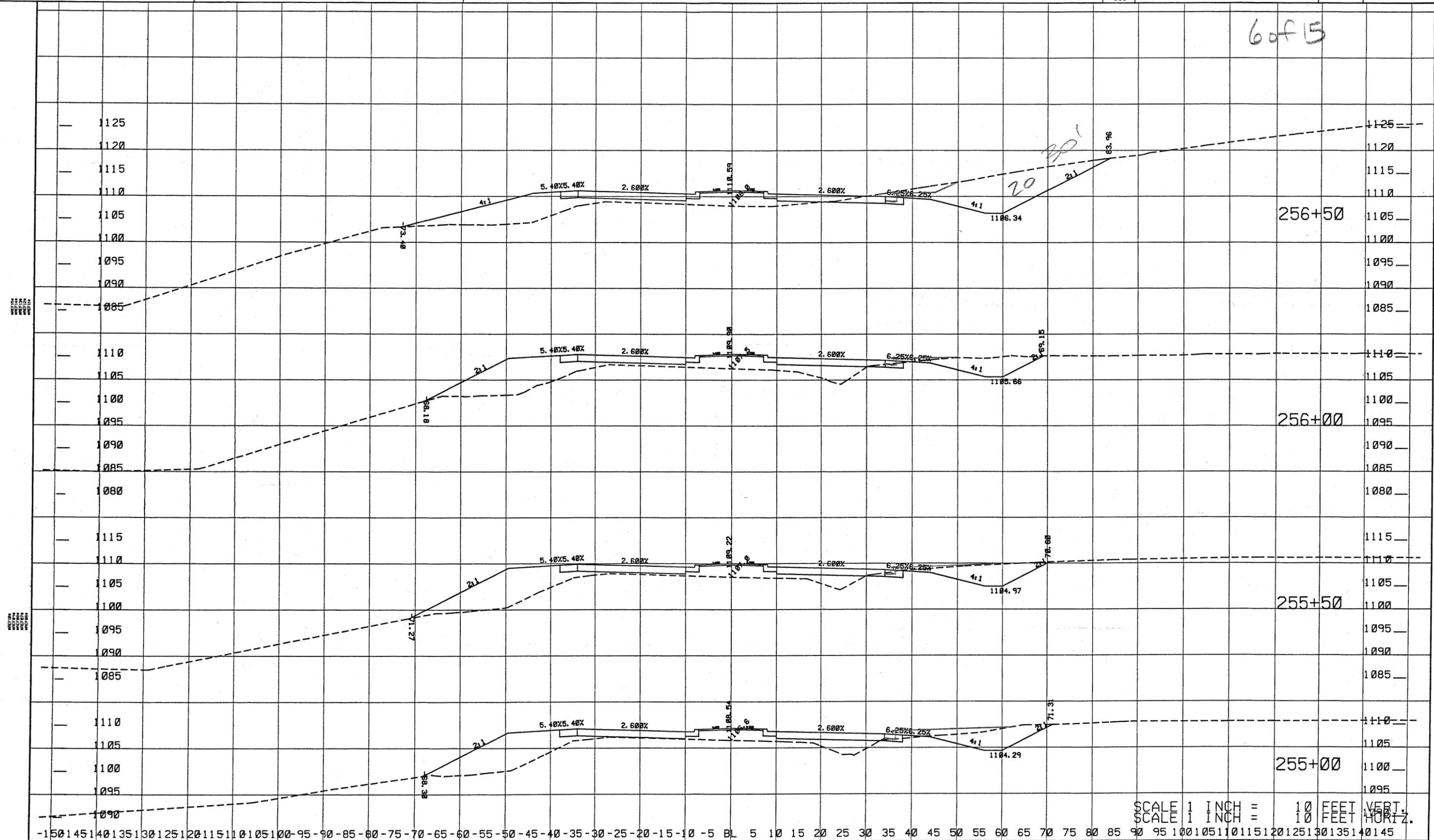
5 of 15



SCALE 1 INCH = 10 FEET VERT.  
 SCALE 1 INCH = 10 FEET HORIZ.

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE: DPC/PCVS/SAYS/EP/PO/IN/ES	
		DRAWING No. 23-	

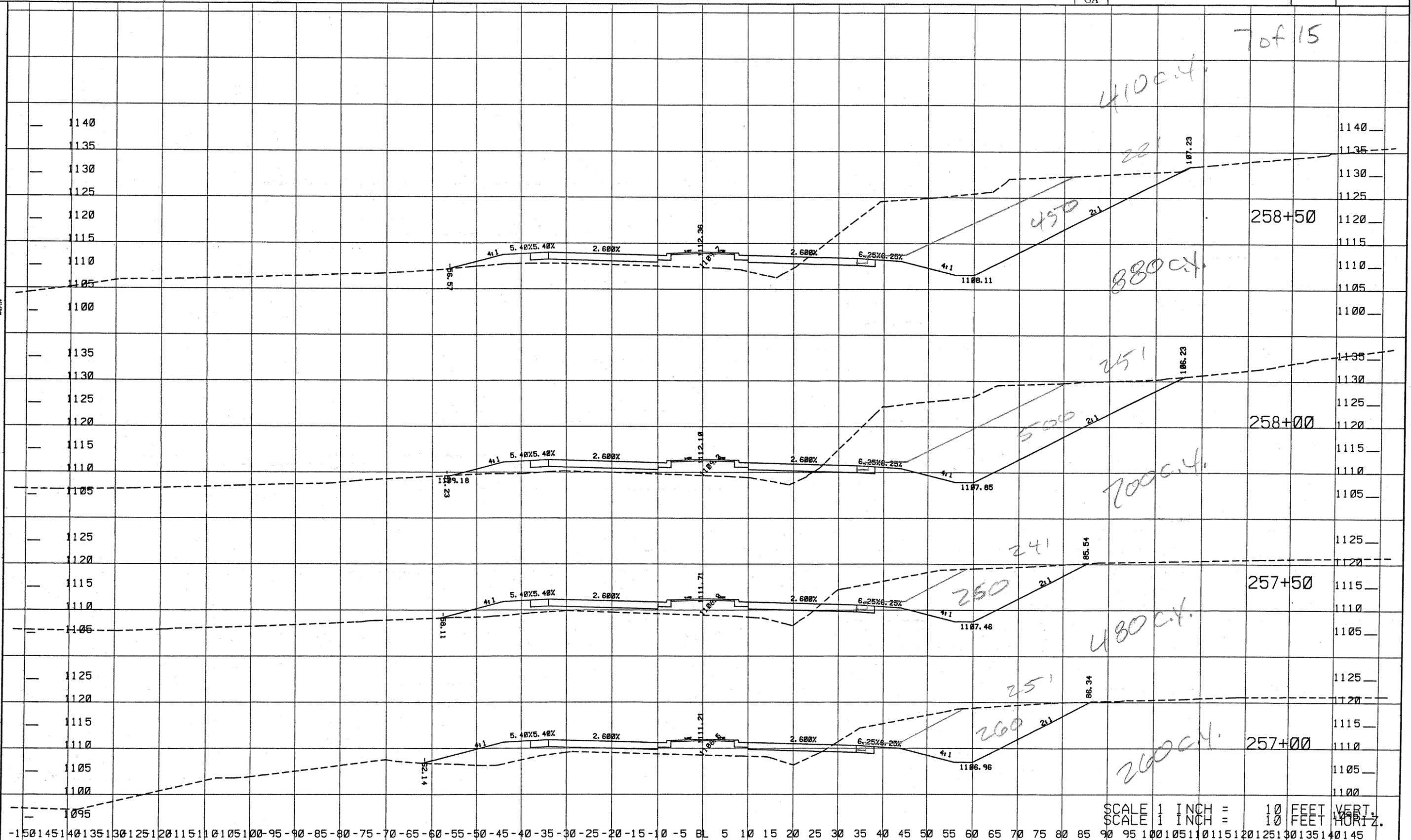
6 of 15



SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE:	
		DPC/PC/SA/SE/PO/IN/SES	
		DRAWING No.	
		23-	

7 of 15

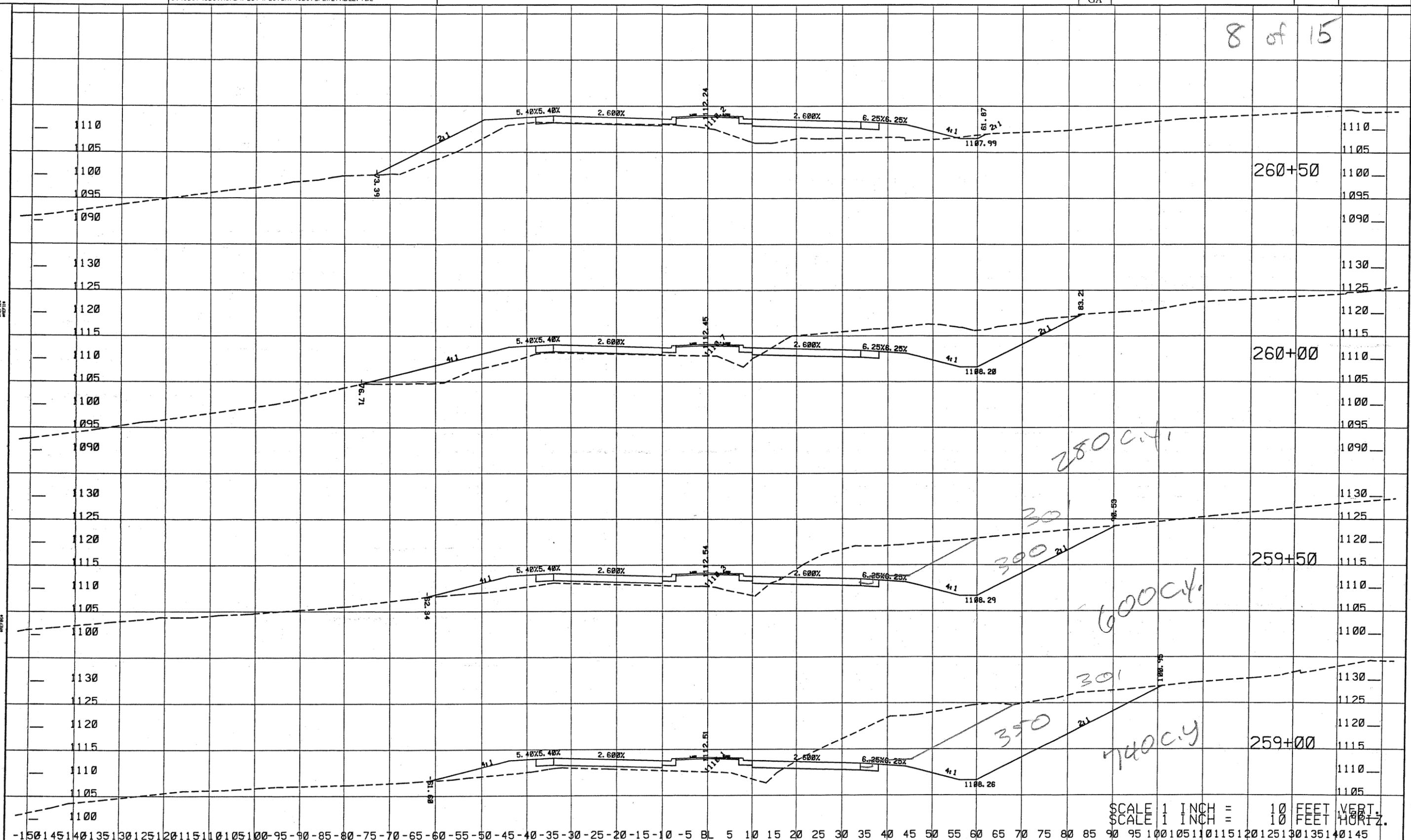


SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

-150 145 140 135 130 125 120 115 110 105 100 -95 -90 -85 -80 -75 -70 -65 -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE: DRC/PAVEMENTS/SECTION/FOUNDES

DRAWING No. 23-

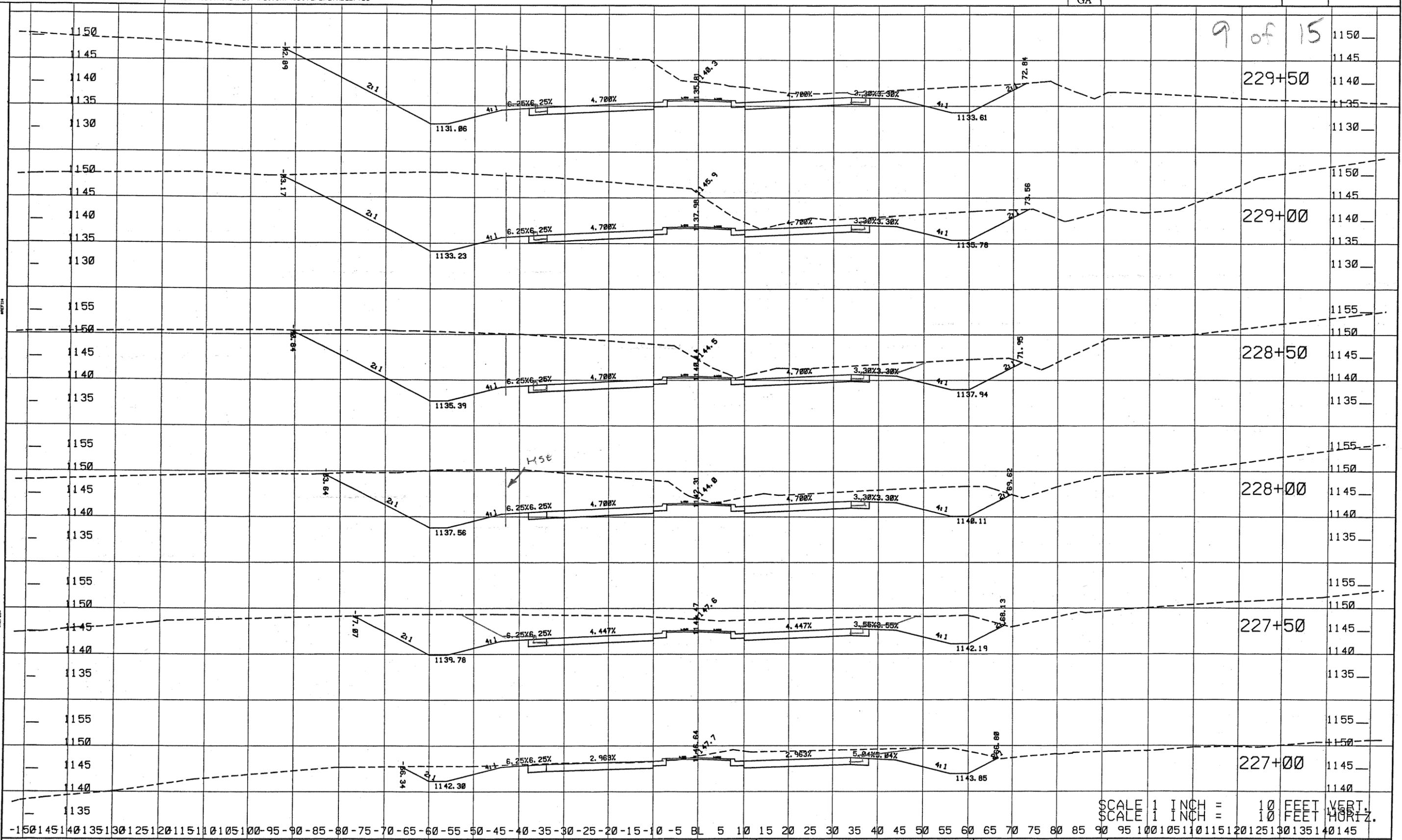


-150 145 140 135 130 125 120 115 110 105 100 -95 -90 -85 -80 -75 -70 -65 -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE:	
		DPC/RCB/SAYS/ERR/O/FO/IN/SES	
		DRAWING No.	
		23-	

9 of 15



SCALE 1 INCH = 10 FEET VERT.  
SCALE 1 INCH = 10 FEET HORIZ.

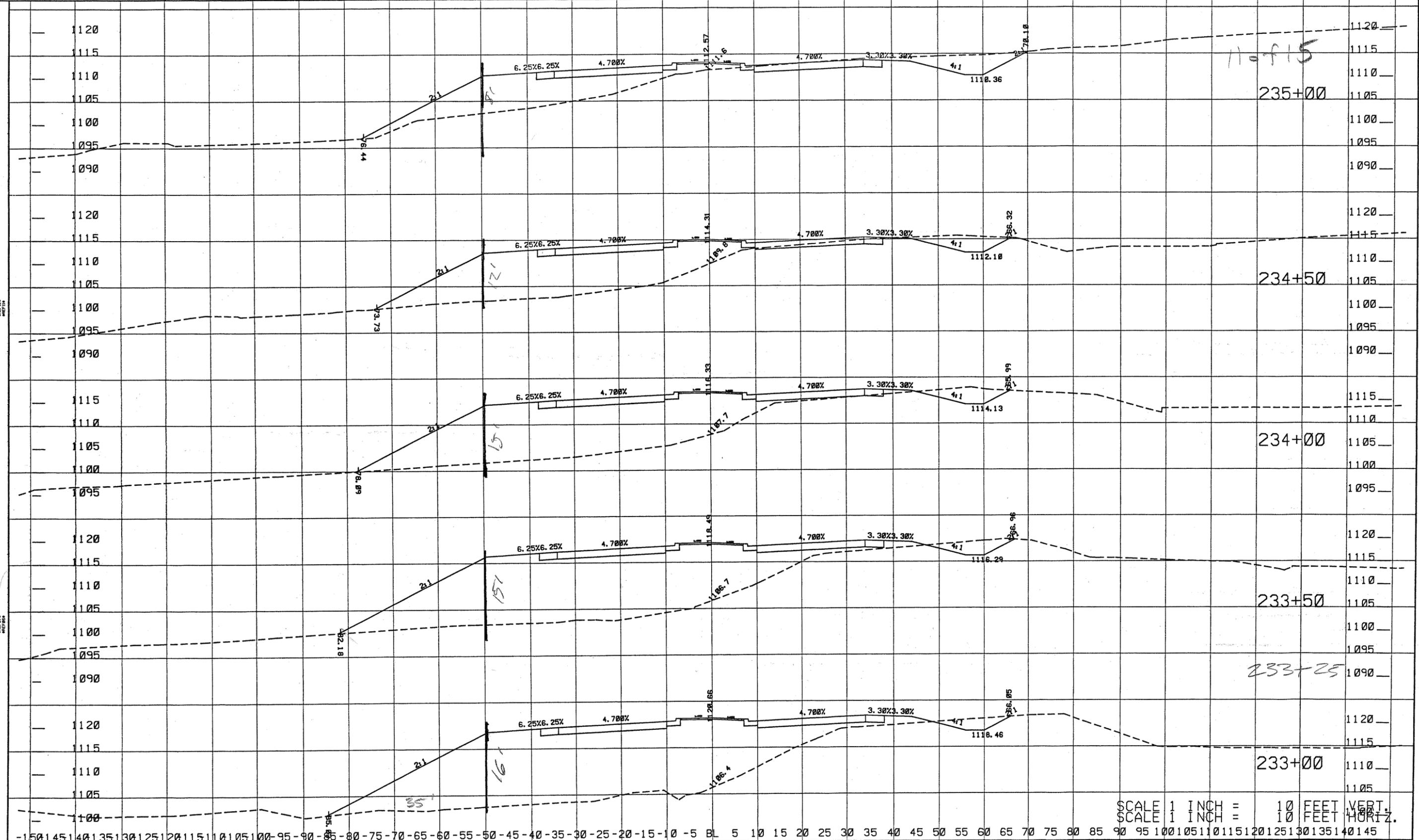
-150 145 140 135 130 125 120 115 110 105 100 -95 -90 -85 -80 -75 -70 -65 -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES	

STATE OF GEORGIA  
DEPARTMENT OF TRANSPORTATION  
OFFICE:  
D/CIP/CS/SAYS/ERO/POINSES

DRAWING No.  
23-



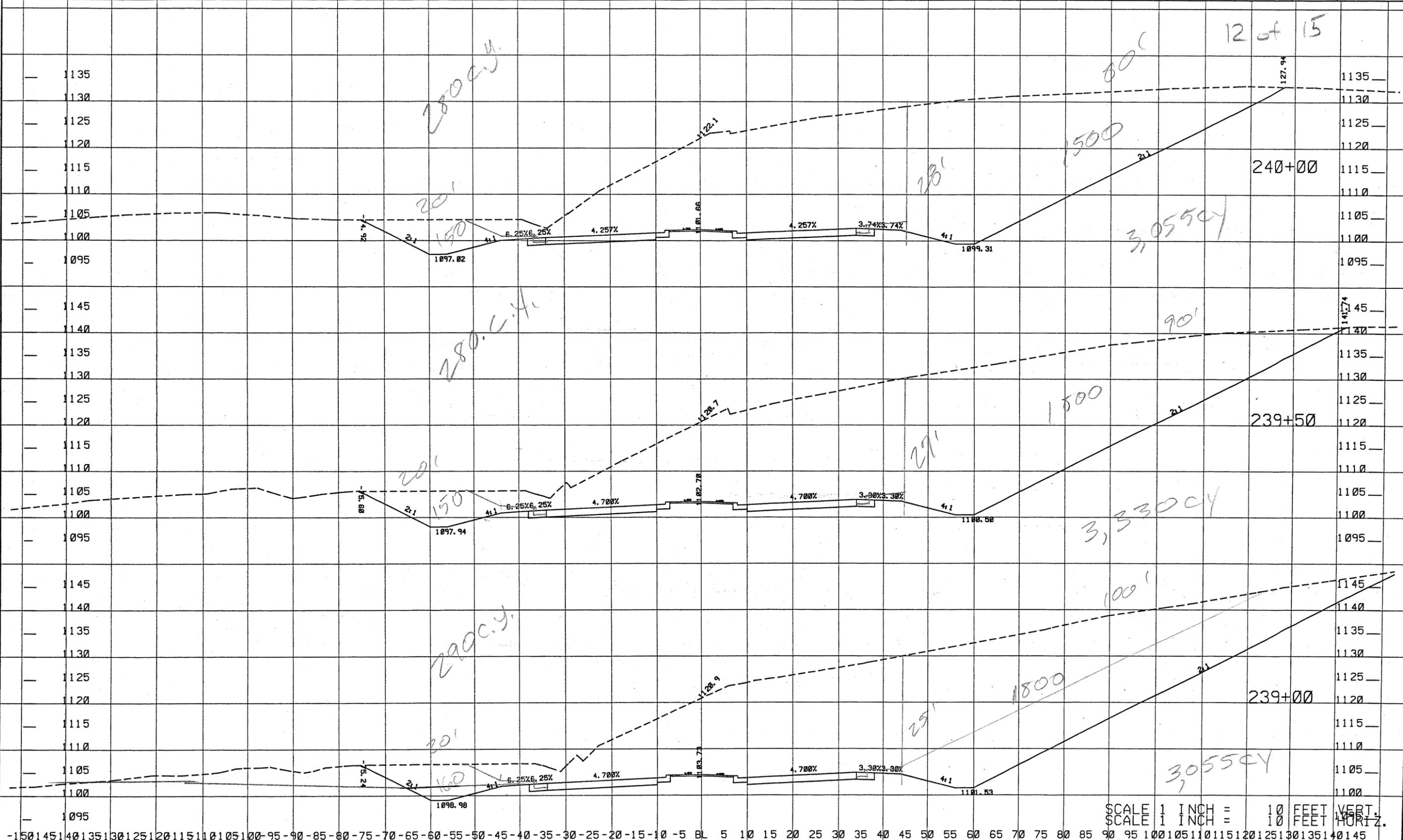


SCALE 1 INCH = 10 FEET VERT.  
 SCALE 1 INCH = 10 FEET HORIZ.

-150 145 140 135 130 125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 BL 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE:	
		DPC/PC/SAYS/EP/RO/FO/IN/SES	
		DRAWING No.	
		23-	

12 of 15



SCALE 1 INCH = 10 FEET VERT.  
 SCALE 1 INCH = 10 FEET HORIZ.

REVISION DATES		STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
		OFFICE:	
		DRC/RES/SA/SE/PO/IN/SES	
		DRAWING No.	
		23-	

# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

ROW-19

USE URBAN SECTION BETWEEN STA. 194+00 - STA. 260+00

SHEET NO.: 13 of 15

TP. 2 24" C & G 200 LF x 19.78 = \$3,956.00 STA.

EARTHWORK REDUCTION

1,018 CY (5.87) = \$5,975.66

STA. 227+00 - STA. 231+00

TP. 2, 24" C & G = 400 LF x 19.78 = 7,912.00

MSE WALL

STA. 228+00 - STA. 229+50

150' x 14' - 2100 SF (\$44.82) = \$94,122.00

RIGHT-OF-WAY

75'

DISPLACEMENTS POSSIBLY SAVED

HOWARD HAINES \$112,395

SHIRVEY JEVAN 80K

DARRELL SEABOARD }  
STEVIE EATON } \$58,273

LITTLE RIVER MOBILE HOME PPK 136

BARTON 42

C & G TOTAL - 4000 LF x 19.78 = \$79,120.00

MSE WALL TOTAL

EARTHWORK TOTAL

RIGHT-OF-WAY TOTAL

# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

R.O.W - 19

USE URBAN SECTION BETWEEN STA. 194+00 - STA. 260+00

SHEET NO.: **14** of **15**

STA. 194+00 - STA. 202+00 LT

$$TP. 2, 24" C \& G = 800 LF \times 19.78 = \$15,824.00 +$$

MSE WALL

STA. 194+50 - STA. 198+50

$$LF = 400' \times \text{AVG. HT. } 26.11' = 10,444.44 \text{ SF} \times \$44.82 = \$468,120.00 +$$

EARTH WORK (REDUCTION) STA. 194+00 - STA. 202+00 LT (5.87 AVG COST)

$$17,164 \text{ CY} \times \$5.87 = \underline{\underline{100,753.00}} -$$

RIGHT-OF-WAY

REDUCTION STA. 194+00 - STA. 202+00 LT

$$65,600.00 \text{ SF (RESID)} \times \$1.35 = 88,560.00 (2.48)$$

$$= \underline{\underline{219,628.80}}$$

STA. 209+00 - STA. 218+50 LT

$$TP. 2, 24" C \& G = 950 LF \times 19.78 = \underline{\underline{18,791.00}}$$

MSE WALL

STA. 209+50 - STA. 212+50

$$LF = 300' \times \text{AVG. HT. } 11' = 3300.00 \text{ SF} \times \$44.82 = \underline{\underline{147,906.00}}$$

EARTHWORK (REDUCED BORROW)

$$6914.00 \times 5.87 = 40,585.18$$

RIGHT-OF-WAY REDUCTION

$$33,000 \text{ SF (RESID)} \times \$1.35 = \$44,550.00 \times 2.48$$

$$= \underline{\underline{\$110,484.00}}$$

237+50 - 260+00 RT, & LT.

$$C \& G 1650 LF, \times 19.78 = \$32,637$$

$$MSE = 5,500 \text{ SF} \times 44.82 = \$246,510$$

$$\text{Earthwork} = 43,090 \text{ CY} \times 5.87 = \$252,938$$

$$\text{RIW Reduction} = 45,900 \text{ S.F.} \times 1.35 = \$61,965$$

# COST WORKSHEET



**PROJECT: SR 11/US 129 Widening from Limestone Parkway  
to South of Nopone Road**

ALTERNATIVE NO.:

**ROW-19**

*Hall County, Georgia*

SHEET NO.:

**15 of 15**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
MSE Walls	SF				21,344	44.82	956,638
Curb & Gutter	LF				4,000	19.78	79,120
Earthwork	CY	68,186	6.47	441,163			
Drainage	LF				6,600	52.00	343,200
Subtotal				441,163			1,378,958
Mark-up @ 10%				44,116			137,896
Total Construction				485,279			1,516,854
Right-of-Way							
Howard Haynes	EA	1	112,000.00	112,000			
Relocation	EA	1	40,000.00	40,000			
Shirley Irvin	EA	1	80,000.00	80,000			
Relocation	EA	1	40,000.00	40,000			
Darrell Seabolt	EA	1	58,000.00	58,000			
Relocation	EA	1	40,000.00	40,000			
Little River MHP, LLC	EA	1	136,000.00	136,000			
Relocation	EA	1	40,000.00	40,000			
Barton	EA	1	42,000.00	42,000			
Relocation	EA	1	40,000.00	40,000			
Land	LS			112,666			
Right-of-Way Subtotal				740,666			
Right-of-Way Markup 2.48%				1,836,852			
Total Right-of-Way				2,577,518			
<b>Subtotal</b>				3,062,797			1,516,854
<b>Markup (%) at</b>							
<b>TOTAL</b>				3,062,797			1,516,854

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road**  
*Hall County, Georgia*

ALTERNATIVE NO.:  
**M-1**

DESCRIPTION: **USE A GRASS MEDIAN IN LIEU OF A CONCRETE MEDIAN IN THE 20-FT-WIDE MEDIAN AREA**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The original design concept typical section called for a 44-ft-wide grassed median which was later changed to a 20-ft-wide raised concrete median.

**ALTERNATIVE:** (sketch attached)

Use a 20-ft-wide grassed median from Sta. 105+00 to Sta. 270+00.

**ADVANTAGES:**

- Reduces material cost
- Decreases project schedule
- Increases “green” area

**DISADVANTAGES:**

- Median will require mowing maintenance

**DISCUSSION:**

Using a grassed median will reduce construction costs and materials, and will shorten the construction schedule. This reduction of material is estimated at 85%. It also adds more “green” space for the highway.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,125,378	—	\$ 1,125,378
ALTERNATIVE	\$ 168,807	—	\$ 168,807
SAVINGS	\$ 956,571	—	\$ 956,571

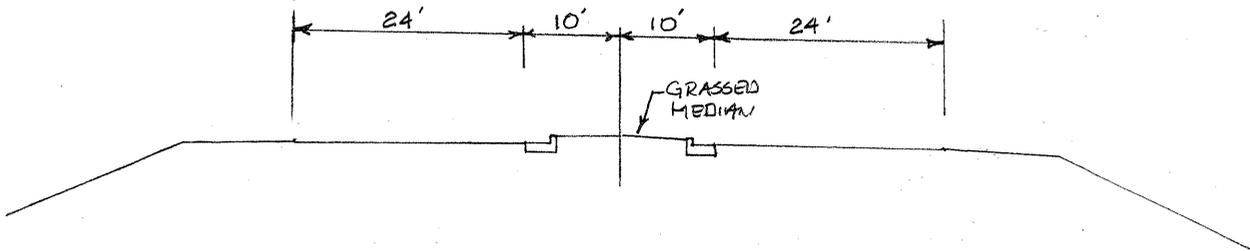
PROJECT: **SR 43/US 129 WIDENING**  
*Hall County, Georgia*

ALTERNATIVE NO.:

ORIGINAL DESIGN  ALTERNATIVE DESIGN  BOTH

M-1  
SHEET NO.: 2 of 4

TYP. SECTION



\* REMOVE CONCRETE MEDIAN  
AND USE SUGGESTED GRASSED  
MEDIAN.

# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.:

M-1

USE GRASS MEDIAN I.L.O CONCRETE IN 20 FT. MEDIAN AREA.

SHEET NO.:

3 of 4

ORIGINAL ESTIMATED COSTS WITH MARK UP @ 10% \$1,125,377.90

VE SUGGESTED ALTERNATIVE

COST REDUCTION ESTIMATED @ 85% OF THE ENGR'S ORIG. ESTM.

$$.85 \times \$1,125,377.90 = \underline{\$956,571.22} \text{ SAVINGS}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **M-2**  
*Hall County, Georgia*

DESCRIPTION: **USE A 24-IN-WIDE CURB AND GUTTER SECTION IN LIEU OF A 30-IN-WIDE CURB AND GUTTER SECTION AND REDUCE MEDIAN WIDTH TO 19 FT** SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:** (sketch attached)

A 30-in-wide curb and gutter section with a 24-in-wide gutter pan is designed.

**ALTERNATIVE:** (sketch attached)

Use a 24-in-wide curb and gutter section with an 18-in-wide gutter pan and reduce the median width to 19 ft.

**ADVANTAGES:**

- Saves concrete and its associated cost
- Provides more green area
- Reduces right-of-way required

**DISADVANTAGES:**

- Reduces median width by one foot
- Requires a change to a GDOT standard

**DISCUSSION:**

Many other jurisdictions use gutter pans less than 24-in-wide. Using the smaller section on this project will save both concrete costs and right-of-way costs. With a 12-ft-wide travel lane this still provides 13 ft 6 in for vehicles to use before hitting the curb.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,191,292	—	\$ 1,191,292
ALTERNATIVE	\$ 946,685	—	\$ 946,685
SAVINGS	\$ 244,577	—	\$ 244,577

PROJECT: **SR 48/US 129 WIDENING**  
*Hall County, Georgia*

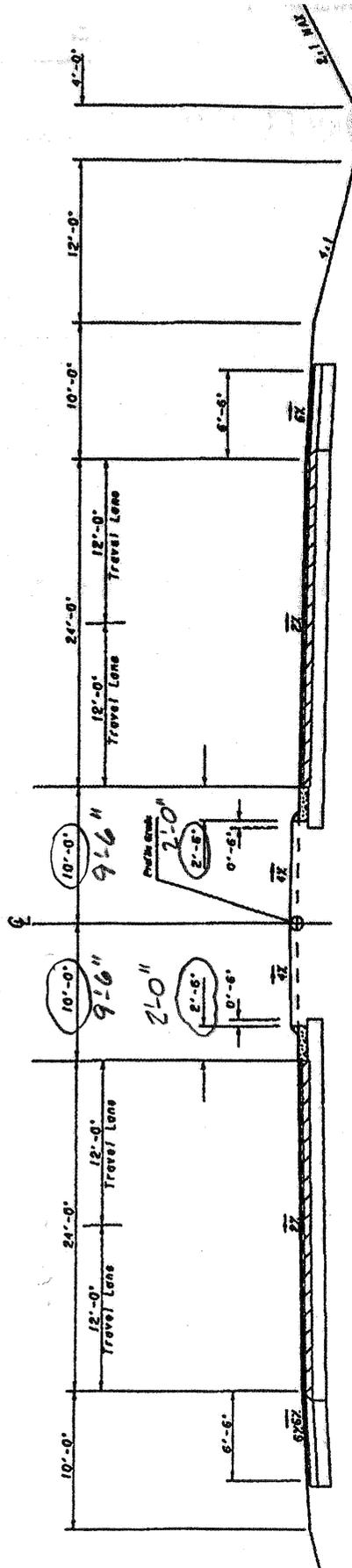
ALTERNATIVE NO.:

M-2

ORIGINAL DESIGN

SHEET NO.:

2 of 3



APPLIES TO SEGMENT FROM  
 LIMESTONE PARKWAY TO  
 SOUTH OF LAKEVIEW STREET





# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **B-1**  
*Hall County, Georgia*

DESCRIPTION: **REBUILD THE EXISTING SUPERSTRUCTURE OF THE CHATTAHOOCHEE RIVER BRIDGE, REINFORCE THE SUBSTRUCTURE AND USE THIS BRIDGE FOR SOUTHBOUND TRAFFIC; BUILD A NEW BRIDGE FOR NORTHBOUND TRAFFIC** SHEET NO. **1 of 2**

**ORIGINAL DESIGN:**

The design includes complete replacement of the existing, two-lane Chattahoochee River Bridge structure and construction of a four-lane bridge structure with 20 ft in concrete median east of the existing alignment, and subsequent demolition of the former. The proposed structure consists of six 140 ft spans for a total length of 840 feet. The typical section consists of 10 lines of 74 in precast concrete bulb tee girders (10 ksi) spaced at 9 ft 3 in centers with 4 ft overhangs for a total deck width of 91 ft 3 in.

**ALTERNATIVE:**

Build a new bridge for northbound traffic to the east of the existing Chattahoochee River Bridge and move all traffic to the new bridge. Remove the superstructure of the existing bridge and reinforce the substructure by wrapping with fiber-wrap. Add pedestals at the top of the cap beam to raise the elevation of the roadway. Install new precast concrete bridge girders and a new cast-in-place concrete deck. Use the new bridge for southbound traffic.

**ADVANTAGES:**

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

**DISADVANTAGES:**

- MOT is more challenging
- Existing substructures may require strengthening
- Bridge profile controls roadway profile

**DISCUSSION:**

The bridge substructures are approximately 130 feet tall and the river is approximately 50 feet deep. New foundations and piers will be expensive, and complete demolition of the existing structure will adds to the expense. Therefore, the feasibility of reusing the existing substructures to accommodate a rehabilitated two-lane bridge should be investigated. In addition to potentially saving bridge costs, minimization of the bridge footprint will also minimize required right-of-way width, which will be advantageous on the approach roadways.

It will be necessary to raise the profile of the approaches to the rehabilitated southbound bridge, but less than for the new bridge allowing more use of the existing paving, which is not accounted for in the cost comparison.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 18,806,150	—	\$ 18,806,150
ALTERNATIVE	\$ 13,646,892	—	\$ 13,646,892
SAVINGS	\$ 5,159,258	—	\$ 5,159,258



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **B-2**  
*Hall County, Georgia*

DESCRIPTION: **WIDEN THE EXISTING CHATTAHOOCHEE RIVER BRIDGE SUBSTRUCTURE TO THE EAST AND REBUILD THE EXISTING SUPERSTRUCTURE TO ACHIEVE THE REQUIRED BRIDGE WIDTH** SHEET NO. **1 of 8**

**ORIGINAL DESIGN:**

The design includes complete replacement of the existing, two-lane bridge Chattahoochee River Bridge structure and construction of a four lane bridge structure with 20-ft-wide concrete median east of the existing alignment. The proposed structure consists of six, 140 ft spans for a total length of 840 feet. The typical section consists of 10 lines of 74 in precast concrete bulb tee girders (10 ksi) spaced at 9 ft 3 in centers with 4 ft overhangs for a total deck width of 91 ft 3 in.

**ALTERNATIVE:** (sketch attached)

- 1) Reinforce the existing bridge substructures and widen to the east. Construct one-half of a four-lane superstructure with a 6-ft-wide median.
- 2) Divert two-way traffic to the completed part of the bridge and replace the existing bridge superstructure.
- 3) Divert southbound, two-way traffic to rehabilitated bridge and retain northbound traffic on the new portion of the bridge.

**ADVANTAGES:**

- Potential cost savings
- Reduces right-of-way impacts
- Reduces construction time

**DISADVANTAGES:**

- MOT more challenging
- Existing substructures may require strengthening
- Existing bridge profile controls roadway profile

**DISCUSSION:**

The bridge substructures are approximately 130 ft tall and the river is approximately 50 ft deep. New foundations and piers will be expensive, and complete demolition of the existing structure will only add to the expense. Therefore, the feasibility of reusing and widening existing substructures to accommodate a new four-lane bridge should be investigated. In addition to potentially saving bridge costs, minimization of the bridge footprint will also minimize required right-of-way width, which will be advantageous on the approach roadways.

It will be necessary to raise the profile of the approaches to the widened rehabilitated bridge, but less than for the two new bridges allowing for more use of the existing pavement, which is not accounted for in the cost comparison.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 18,806,150	—	\$ 18,806,150
ALTERNATIVE	\$ 11,004,577	—	\$ 11,004,577
SAVINGS	\$ 7,801,573	—	\$ 7,801,573

PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

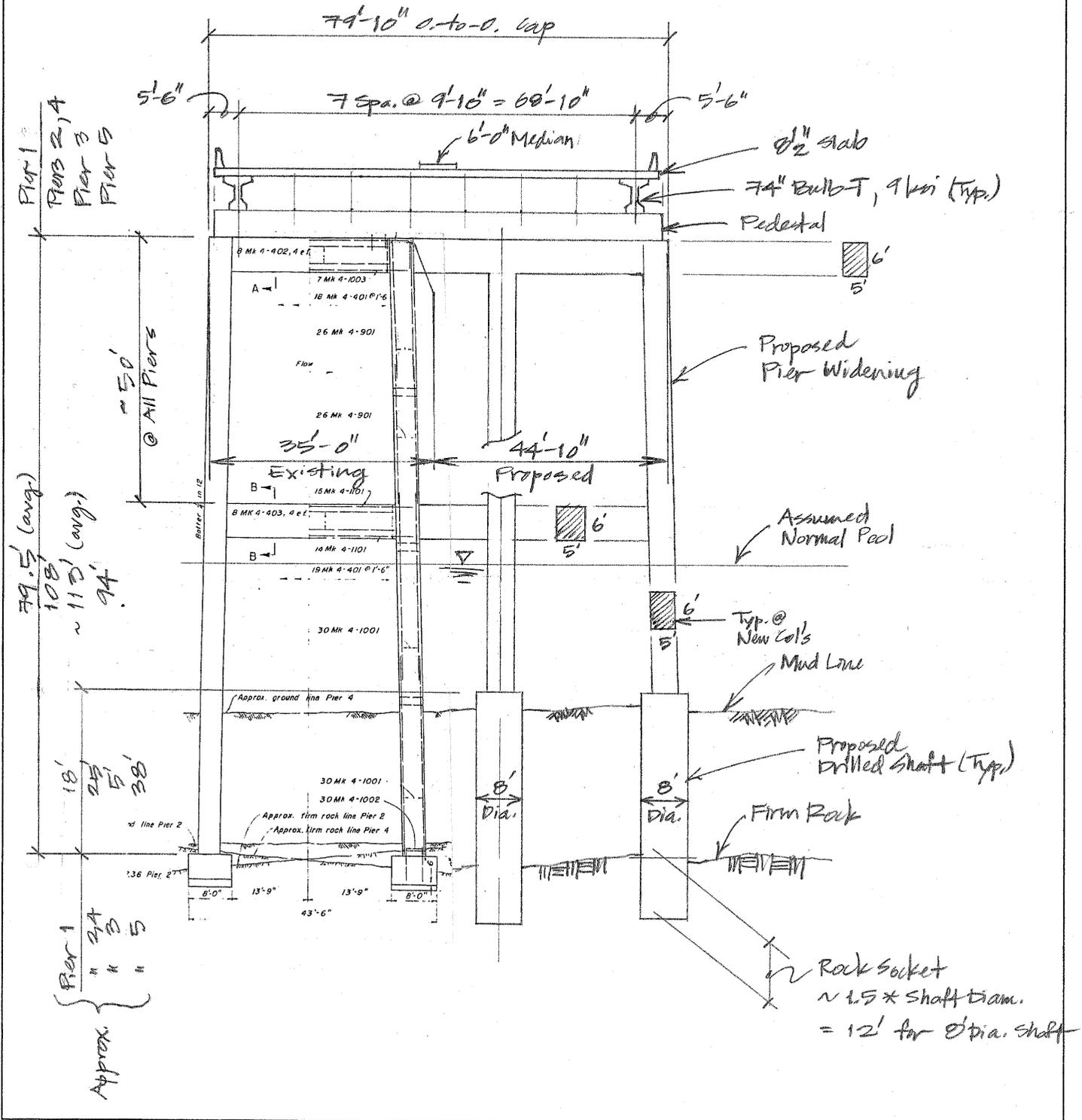
ALTERNATIVE NO.: **B-2**

ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.: **2 of 8**





PROJECT: SR 43/US 129 WIDENING  
Hall County, Georgia

ALTERNATIVE NO.: B-2

SHEET NO.: 3 of 8

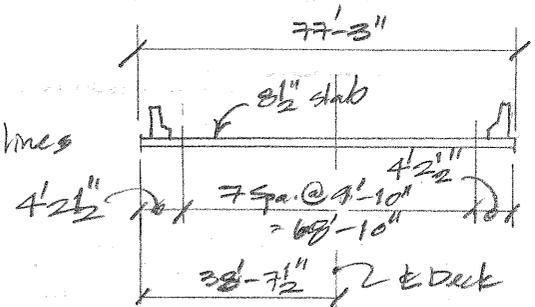
Use revised typical section from B-6, i.e. 6'-0" median:

$$\begin{aligned}
 \text{Deck width} &= 12'-0" (4) \text{ lanes} \\
 &+ 10'-0" (2) \text{ shoulders} \\
 &+ 1'-7\frac{1}{2}" (2) \text{ barriers} \\
 &+ 6'-0" \text{ median} \\
 &= 77'-3" \text{ out-to-out}
 \end{aligned}$$

Reusing existing piers requires the following span arrangement:  
127'-6" - 153'-0" - 127'-6" - 127'-6" - 153'-0" - 127'-6"

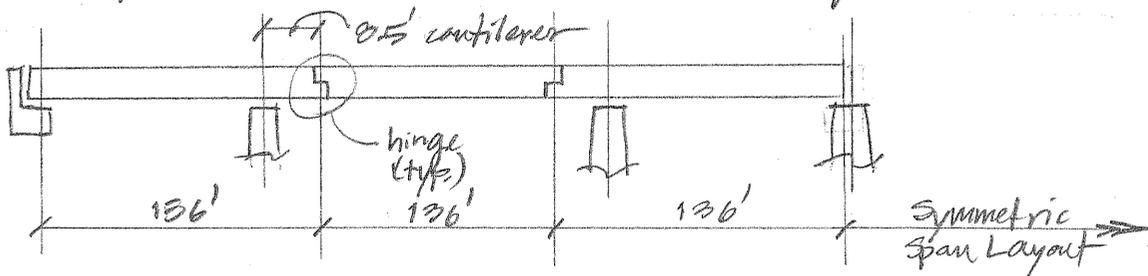
Revised Beam Spacing:

$$\frac{77'-3" - 2(4'-2\frac{1}{2}")}{7} = 9'-10" \text{ w/ 8 beam lines}$$



Beam Types:

- Use "drop-in" mid-span due to 153'-0" span length:



- Use 74" exhb-T<sub>0</sub>, 9 ksi

Note: Existing piers must be analyzed for ability to handle weight of concrete superstructure.

# CALCULATIONS



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.: **B-2**

SHEET NO.: **4** of **8**

## Substructure Quantities:

### Pier 1:

#### Concrete:

$$\text{Cap} = 5' (6) (44'10") = 1,345 \text{ cf}$$

$$\text{Ped.} = 4.5' (5) (78'10") = 1,774 \text{ cf}$$

$$\text{Col's} = 5' (6) (79.5' - 18' - 6") (2) = 3,330 \text{ cf}$$

$$\text{Strut} = 5' (6) (44'10" - 10") = 1,045 \text{ cf}$$

$$\Sigma = 7,494 \text{ cf} = 278 \text{ cy}$$

#### Drilled shafts:

$$\text{Not in Rock} = 18' (2) = 36 \text{ LF}$$

$$\text{Rock Socket} = 12' (2) = 24 \text{ LF}$$

$$\text{Temp. Casings} = 23' (2) = 46 \text{ LF}$$

#### Reinf. Steel:

$$150 \text{ lb/cy} (278 \text{ cy}) \\ \approx 42,000 \text{ lbs}$$

### Pier 2 & 4:

#### Concrete:

$$\text{Cap} + \text{Ped.} + \text{Strut} = 4,164 \text{ cf (same as Pier 1)}$$

$$\text{Col's} = 5' (6) (108' - 25' - 6") (2) = 4,620 \text{ cf}$$

$$\Sigma = 8,784 \text{ cf} = 325 \text{ cy}$$

#### Drilled shafts

$$\text{Not in Rock} = 25' (2) = 50 \text{ LF}$$

$$\text{Rock Socket} = 24 \text{ LF (same as Pier 1)}$$

$$\text{Temp. Casings} = 30' (2) = 60 \text{ LF}$$

#### Reinf. steel:

$$150 \text{ lb/cy} (325 \text{ cy}) \approx 49,000 \text{ lbs}$$



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.: **B-2**

SHEET NO.: **5 of 8**

## Substructure Quantities (cont):

### Pier 3:

#### Concrete:

$$\text{Cap/Ped/Strut} = 4,164 \text{ cf (same as Pier 1)}$$

$$\text{Columns} = 5'(6')(11\frac{1}{2}' - 5' - 6')(2) = 6,120 \text{ cf}$$

$$\Sigma = 10,284 \text{ cf} = 381 \text{ cy}$$

#### Drilled Shafts:

$$\text{Not in Rock: } 5'(2) = 10 \text{ LF}$$

$$\text{Rock Socket: } 24 \text{ LF (same as Pier 1)}$$

$$\text{Temp. Casing: } 6'(2) = 20 \text{ LF}$$

#### Reinf. Steel:

$$150 \text{ lb/cy} (381 \text{ cy}) \\ = 57,000 \text{ lbs}$$

### Pier 5:

#### Concrete:

$$\text{Cap/Ped/Strut} = 4,164 \text{ cf (Pier 1)}$$

$$\text{Columns: } 5'(6')(9\frac{1}{4}' - 3\frac{1}{2}' - 6')(2)$$

$$= 3,000 \text{ cf}$$

$$\Sigma = 7,164 \text{ cf} = 265 \text{ cy}$$

#### Drilled Shafts:

$$\text{Not in Rock: } 38'(2) = 76 \text{ LF}$$

$$\text{Rock Socket: } 24 \text{ LF (same as Pier 1)}$$

$$\text{Temp. Casing: } 40'(2) = 80 \text{ LF}$$

#### Reinf. Steel:

$$150 \text{ lb/cy} (265 \text{ cy}) \\ = 40,000 \text{ lbs}$$



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.: B-2

SHEET NO.: 6 of 8

## Superstructure Quantities:

$$\text{Bridge Length} = 2(127.5' + 153' + 127.5') = 816'$$

$$\text{Parapet} = 2(816) = 1,632 \text{ LF}$$

$$\text{Deck Slab} = 77'3''(816') = 63,036 \text{ SF}$$

$$63,036 \text{ SF} \left(\frac{8\frac{1}{2}''}{12}\right) = 44,650 \text{ CF}$$

$$= 1,654 \text{ CY}$$

$$\text{Deck Slab Reinf.} = 2550 \text{ lb/cy} (1,654 \text{ cy})$$

$$= 413,500 \text{ lbs}$$

$$\text{Girders} = 2(816') = 1,632 \text{ LF}$$

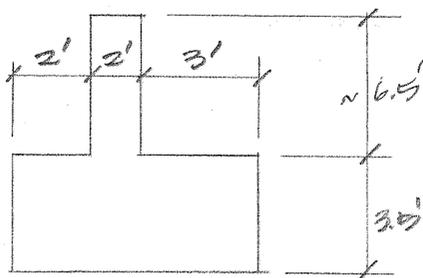
## Diaph. Conc.:

$$3(1') (74'') (68'10'') (6) = 7,640 \text{ cf} = 283 \text{ cy}$$

$$283 \text{ cy} / 1,654 \text{ cy} \approx 17\% \rightarrow \text{use for reinf. steel}$$

## Abutment Quantities:

### Concrete:



$$A = 10'(7) - 5'(6.5)$$

$$= 37.5 \text{ sf}$$

$$\text{Wingwall} = 10.4'(22')(1')$$

$$= 229 \text{ cf}$$

$$37.5 \text{ sf} (44.88)$$

$$= 1,681 \text{ cf}$$

$$+ 229 \text{ cf}$$


---


$$1,910 \text{ cf}$$

$$= 71 \text{ cy/abut}$$

### Reinf. Steel:

$$71 \text{ cy} (1500 \text{ lb/cy})$$

$$= 11,000 \text{ lb/abut}$$

### H-Piles:

$$\frac{44.88 \text{ sf}}{5'} (2 \text{ rows}) = 18 \text{ sticks}$$

$$18 (30') = 540 \text{ LF/abut}$$

↑ est. depth to FWR



PROJECT: **SR 43/US 129 WIDENING**  
Hall County, Georgia

ALTERNATIVE NO.: **B-2**

SHEET NO.: **7 of 8**

## Existing Substructure Rehab - Fiber-Wrap =

- Wrap columns and strut

Avg Col. Dim's:  $5' \times 7.5' \Rightarrow \text{perimeter} = 2(5' + 7.5') = 25'$

Strut Dim's:  $5' \times 6' \Rightarrow \text{perimeter} = 2(5' + 6') = 22'$

Column Sq Footage:

$$25' (79.5' + 100' + 100' + 113' + 94') (2) \approx 257,000 \text{ sq ft}$$

Struts:

$$22' (27') (5 \text{ piers}) \approx 3,000 \text{ sq ft}$$

↑ approx. strut length

↑ columns per pier

Assume  $\$25/\text{sq ft}$  cost of fiber wrap

# COST WORKSHEET



<b>PROJECT: SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road</b>  <i>Hall County, Georgia</i>	<b>ALTERNATIVE NO.:</b>  <b>B-2</b>  <b>SHEET NO.:</b> <b>8 of 8</b>
---	--

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Chattahoochee River Bridge							
4 lanes on new alignment, 6 ft median	SF	76,650	210.00	16,096,500			
(SF costs are revised to include higher foundation costs)							
Substructure Widening:							
Class AA Concrete	CY				1,716	488.00	837,408
Bar Reinforcing Steet	LB				257,400	0.88	226,512
8 ft diameter Drilled Shafts - Wet	LF				222	3,700.00	821,400
8 ft diameter Drilled Shafts - In Rock	LF				120	3,900.00	468,000
Piling in Place, HP 12x53	LF				1,080	55.00	59,400
Note:	LF						
Drilled shaft "wet" cost/unit includes temporary/permanent steel casing							
Superstructure (4 lanes, 77 ft 3 in wide)							
Superstructure Concrete Class AA	CY				1,937	763.00	1,477,931
Superstructure Reinforced Steel	LB				484,250	0.92	445,510
Concrete Barrier	LF				1,632	43.00	70,176
PSC Bms, AASHTO, 74 in Bulb T	LF				6,528	214.00	1,396,992
Existing Substructure Rehabilitation							
Fiber Wrap	SF				28,000	50.00	1,400,000
Subtotal							7,203,329
25% Contingency for barge construction							1,800,832
Demolition of existing bridge	LS			1,000,000			500,000
MOT							500,000
<b>Subtotal</b>				17,096,500			
<b>Markup (%) at 10%</b>				1,709,650			
<b>TOTAL</b>				18,806,150	11,004,577		

# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **B-5**  
*Hall County, Georgia*

DESCRIPTION: **REDUCE THE OUTSIDE SHOULDER WIDTH ON BOTH BRIDGES FROM 10-FT-WIDE TO 8-FT-WIDE** SHEET NO.: **1 of 6**

**ORIGINAL DESIGN:** (sketch attached)

The shoulders on the bridges over the Chattahoochee River and East Fork Little River are designed as 10 ft wide.

**ALTERNATIVE:** (sketch attached)

Reduce the shoulder widths to 8 ft wide.

**ADVANTAGES:**

- Saves costs
- Lightens the bridge structure
- Eliminates one girder line on each bridge saving erection time

**DISADVANTAGES:**

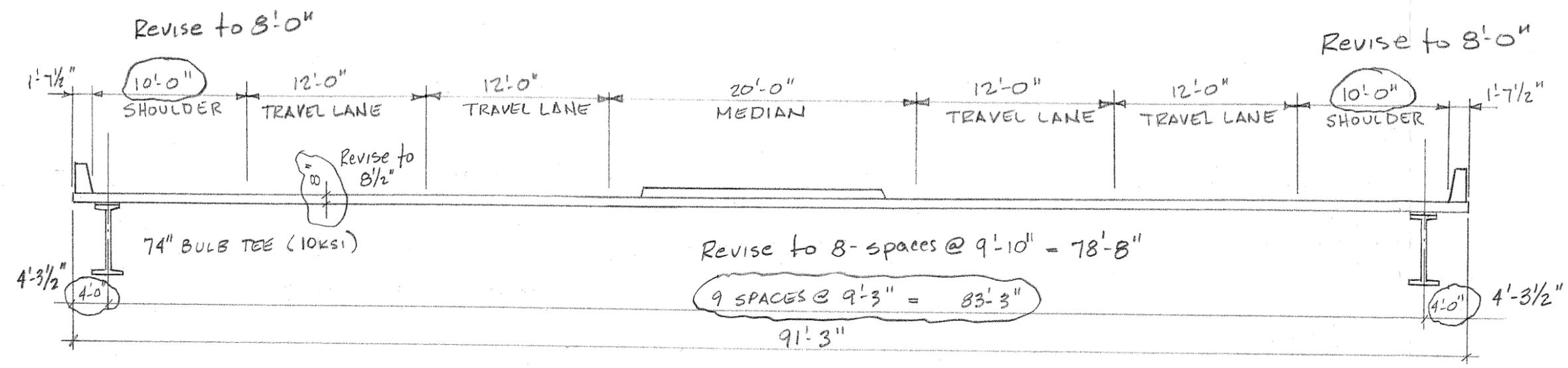
- None apparent

**DISCUSSION:**

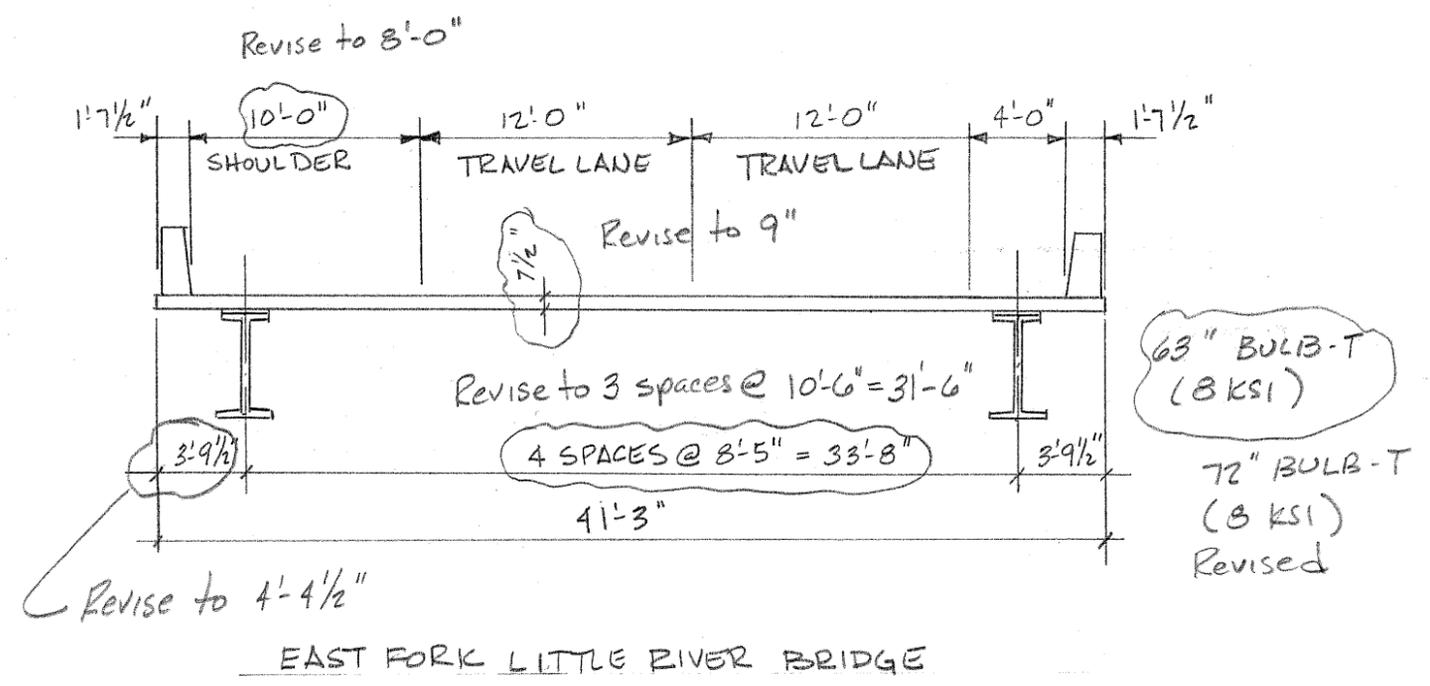
The 8 ft wide shoulders matches the GDOT recommended shoulder width for urban arterials with state and federal route numbers (see attached bridge policies and procedures). Making this change will save significant costs.

Note that the bridge costs are based on the bridge lengths shown on the Concept Plans dated November 2007.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 22,039,875	—	\$ 22,039,875
ALTERNATIVE	\$ 21,030,075	—	\$ 21,030,075
SAVINGS	\$ 1,009,800	—	\$ 1,009,800



CHATTAHOOCHEE RIVER BRIDGE



ALT. NO.  
B-5  
Sht. 3 of 6



# Policies & Procedures

## POLICIES & PROCEDURES

### Policies : Geometric Design Guide for Bridges on Highways Having State Route Numbers, Other Than Interstate

Cancel

<b>Subject</b>	Geometric Design Guide for Bridges on Highways Having State Route Numbers, Other Than Interstate	<b>Subject No.</b>	4265-10
<b>Section</b>	Widths	<b>Division</b>	Pre-Construction
<b>Office</b>	Bridge and Structural Design	<b>Contact</b>	
<b>Date Last Reviewed</b>	3/3/2008	<b>Procedures</b>	N/A

#### Details

Geometric design standards shall be in accordance with the AASHTO publication "A Policy on Geometric Design of Highways & Streets," Collector Roads and Streets, 2004, p. 426.

#### I. Minimum Bridge Widths

##### A. Rural section (2 lanes without curb)

Speed Design: All Speeds  
 Design YearADT: 0 - 399  
 Bridge WidthClear Distance: TW + 4 ft + 4 ft (TW + 1.2 m + 1.2 m)  
 Design\* Live Loading: HS-20 (MS-18)

Speed Design: All Speeds  
 Design YearADT: 400 - 2000  
 Bridge WidthClear Distance: TW + 6 ft + 6 ft ( TW + 1.8 m + 1.8 )  
 Design\* Live Loading: HS-20 (MS-18)

Speed Design: All Speeds  
 Design YearADT: Over 2000  
 Bridge WidthClear Distance: TW + 8ft + 8 ft (TW + 2.4 m + 2.4 m)  
 Design\* Live Loading: HS-20 (MS-18)

##### B. Multilane rural (undivided -- 4 or more lanes)

TW + 16 feet (4.8 m) | 8 feet (2.4 m) shoulders right and left

ALT. NO.  
B-5  
Sht. 4 of 6

- C. Multilane rural (divided)  
TW + 12 feet (3.6 m) | 4 feet (1.2 m) inside shoulders + 8 feet (2.4 m) outside shoulders

D. Urban sections (with curb)

The minimum clear width for all new or reconstructed bridges shall be the curb to curb width of the approaches except that the minimum curb to curb width for two-lane, two-way bridges shall be TW + 4 ft (1.2 m) unless an exception is obtained from the Chief Engineer. Sidewalks shall be provided on bridges where curb and gutter is provided on the approach roadway. Minimum sidewalk width on bridges shall be 5.5 ft (1.7 m).

- II. Vertical Clearance Vertical clearance shall be a minimum of 16.5 ft (5.1 m) on all State Route highway separations except that 17.5 ft (5.4 m) may be a minimum where the overpass structure design is such that future jacking to increase clearance is not feasible. A minimum vertical clearance of 14.5 ft (4.4 m) is permissible for Rural Secondary or Urban System facilities where a suitable bypass is available for high vehicles.

- III. Bridge Widening When an existing bridge is to be widened, its structural capacity will be accepted if the live load capacity is HS20-44 (MS-18) or greater. If the structural capacity is less than HS 20-44 (MS-18) and the bridge is to be retained, then a design variance will be obtained from the Chief Engineer.

- IV. Design Variances When a project is implemented using Federal Funds and the structural capacity and/or width characteristics do not meet the above criteria, a design variance request will be submitted to the Chief Engineer for approval.

ALT. NO.  
B-5  
Sht. 5 of 6

**History**

submitted by the Division of Preconstruction issued: 09/02/86 revised: 10/08/96 added to TOPPS:  
12/31/96 title changed: 03/30/01 title changed: 08/22/02 revised: 12/30/03 reviewed: 01/27/05 reviewed:  
03/03/08 revised: 07/12/08

**Tags**

bridge

**Public Visibility**

Yes

Version: 11.0

Created at 9/15/2008 3:53:26 PM by Helene Nickey

Last modified at 2/12/2009 9:53:08 AM by Anna M. Flamberg



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **B-6**  
*Hall County, Georgia*

DESCRIPTION: **REDUCE THE WIDTH OF THE MEDIAN ON THE CHATTAHOOCHEE BRIDGE FROM 20FT-WIDE TO 6-FT-WIDE** SHEET NO.: **1 of 7**

**ORIGINAL DESIGN:** (sketch attached)

The 20-ft-wide median continues across the Chattahoochee River Bridge.

**ALTERNATIVE:** (sketch attached)

Reduce the width of the median on the Chattahoochee River Bridge from 20-ft-wide to 6-ft-wide. On the south side of the bridge move the Riverview Drive intersection with SR 11/US 129 to its current location and move the median opening south. Retain the northbound direction in its current location and start shifting the southbound lanes east where the southbound left turn bay for Riverview Drive begins.

At the north end of the bridge, start flaring the southbound lanes west to widen the median back to 20 ft.

**ADVANTAGES:**

- Saves bridge costs
- Saves construction time

**DISADVANTAGES:**

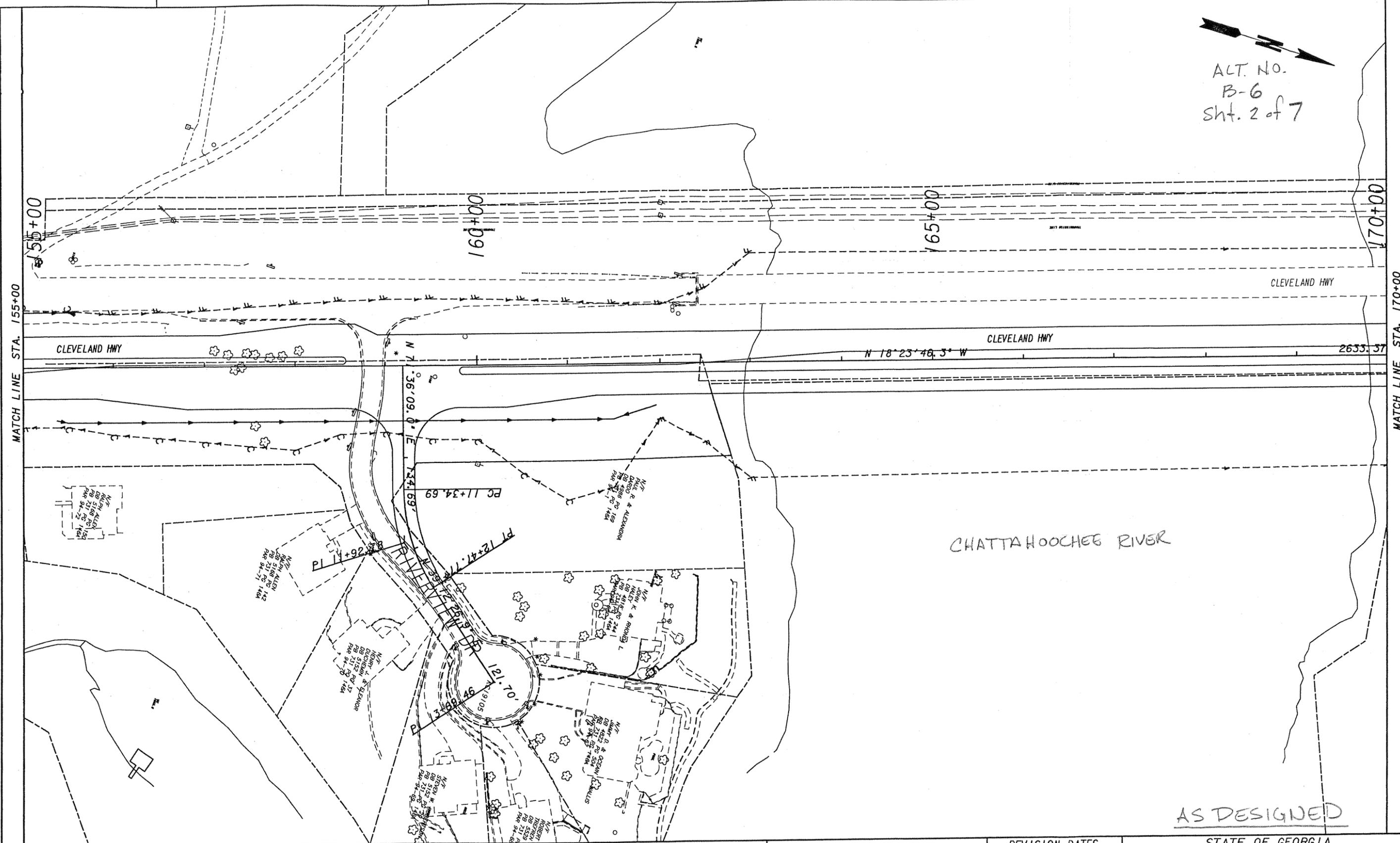
- May require a temporary road for Riverview Drive in order to connect the existing road to the new SR 11
- Three spans of the bridge must be constructed as flared areas

**DISCUSSION:**

Because of the expense of the bridge, this provides an opportunity to reduce its area significantly and thus the cost.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 17,706,150	—	\$ 17,706,150
ALTERNATIVE	\$ 15,609,594	—	\$ 15,609,594
SAVINGS	\$ 2,096,556	—	\$ 2,096,556

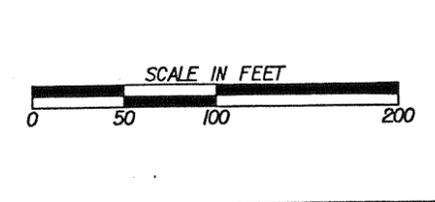
ALT. NO.  
B-6  
Sht. 2 of 7



PROPERTY AND EXISTING R/W LINE --- P ---  
 REQUIRED R/W LINE --- C --- F ---  
 CONSTRUCTION LIMITS  
 EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES [diagonal hatching]  
 EASEMENT FOR CONSTR OF SLOPES [cross-hatching]  
 EASEMENT FOR CONSTR OF DRIVES [diagonal cross-hatching]

BEGIN LIMIT OF ACCESS.....BLA  
 END LIMIT OF ACCESS.....ELA  
 LIMIT OF ACCESS  
 REQ'D R/W & LIMIT OF ACCESS [double line with dashes]

**KECK & WOOD, INC.** ENGINEERS SURVEYORS  
 2415 COMMERCE AVENUE PLANNERS  
 BUILDING 2100, SUITE 300  
 DULUTH, GEORGIA 30096 06132  
 (678)474-4000



REVISION DATES	

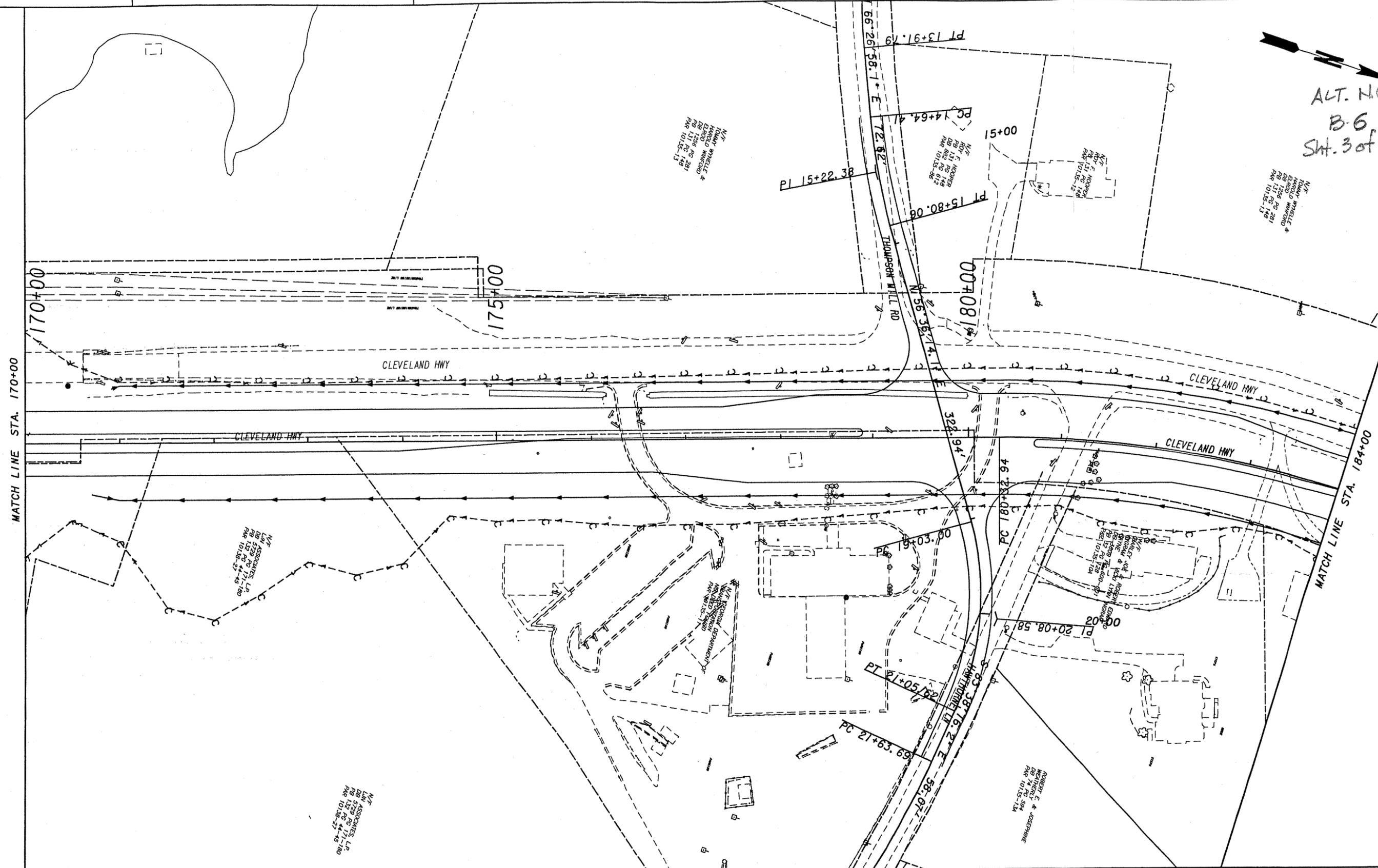
STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: CONSULTANT DESIGN  
**CONSTRUCTION PLANS**

HALL COUNTY  
 PROJECT: STP00-0002-06(04B)

DRAWING No.  
**13-05**

AS DESIGNED

ALT. NO.  
B.6  
Sht. 3 of 7



PROPERTY AND EXISTING R/W LINE ---E---  
 REQUIRED R/W LINE \_\_\_\_\_  
 CONSTRUCTION LIMITS ---C---F---  
 EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES [Hatched Box]  
 EASEMENT FOR CONSTR OF SLOPES [Diagonal Hatched Box]  
 EASEMENT FOR CONSTR OF DRIVES [Cross-hatched Box]

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

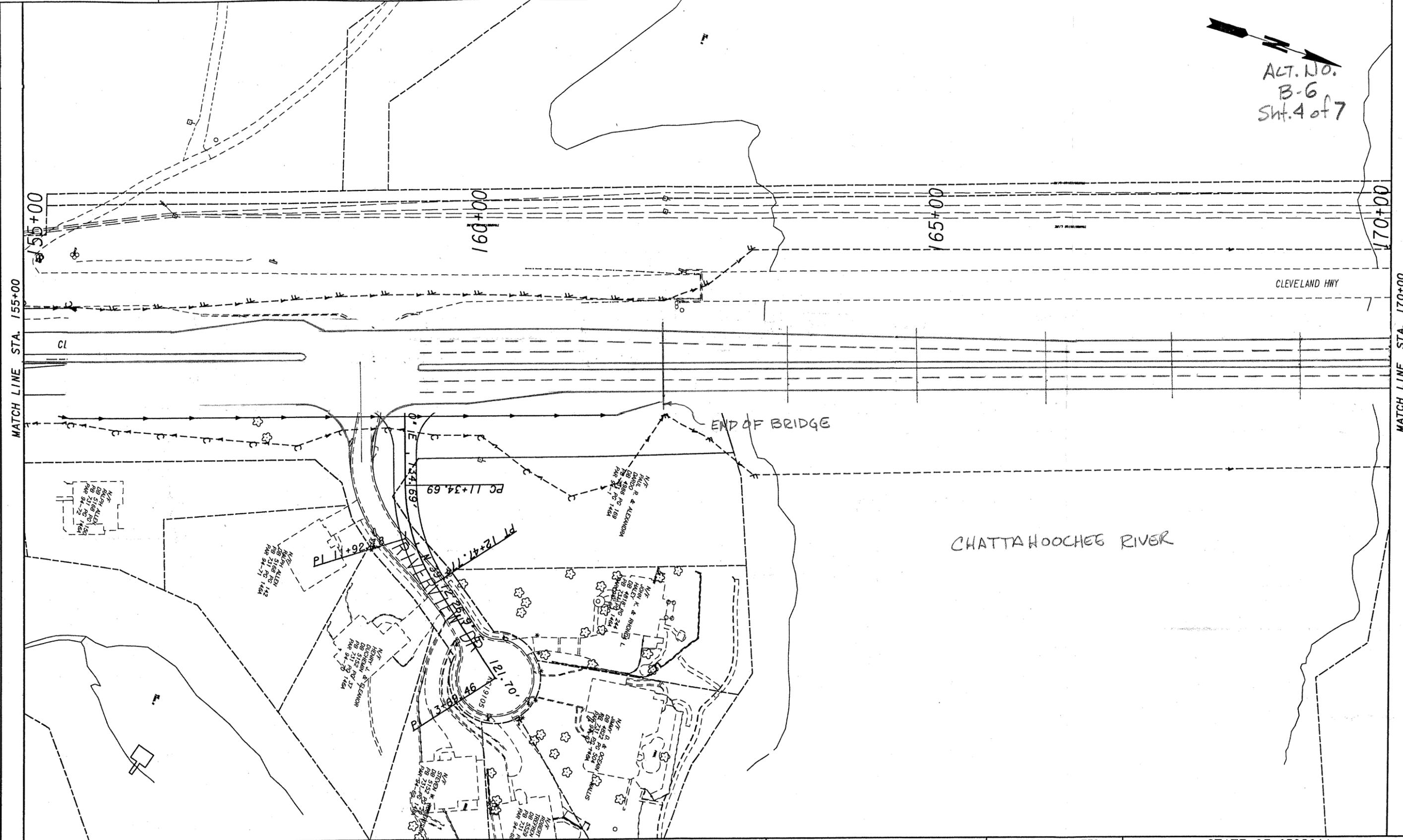
**KECK & WOOD, INC.** ENGINEERS SURVEYORS PLANNERS  
 2425 COMMENCE AVENUE  
 BUILDING 2100, SUITE 300  
 DUBLUTH, GEORGIA 30096  
 (678)417-4000  
 660131



REVISION DATES	

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: CONSULTANT DESIGN  
**CONSTRUCTION PLANS**  
 HALL COUNTY  
 PROJECT: STP00-0002-06(048)  
 DRAWING No. 13-06

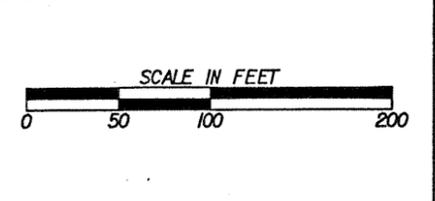
ACT. NO.  
B-6  
Sht. 4 of 7



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

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

**KECK & WOOD, INC.** ENGINEERS SURVEYORS PLANNERS  
 2425 COMMERCE AVENUE  
 BUILDING 2100, SUITE 300  
 DULUTH, GEORGIA 30096  
 (678)417-4000



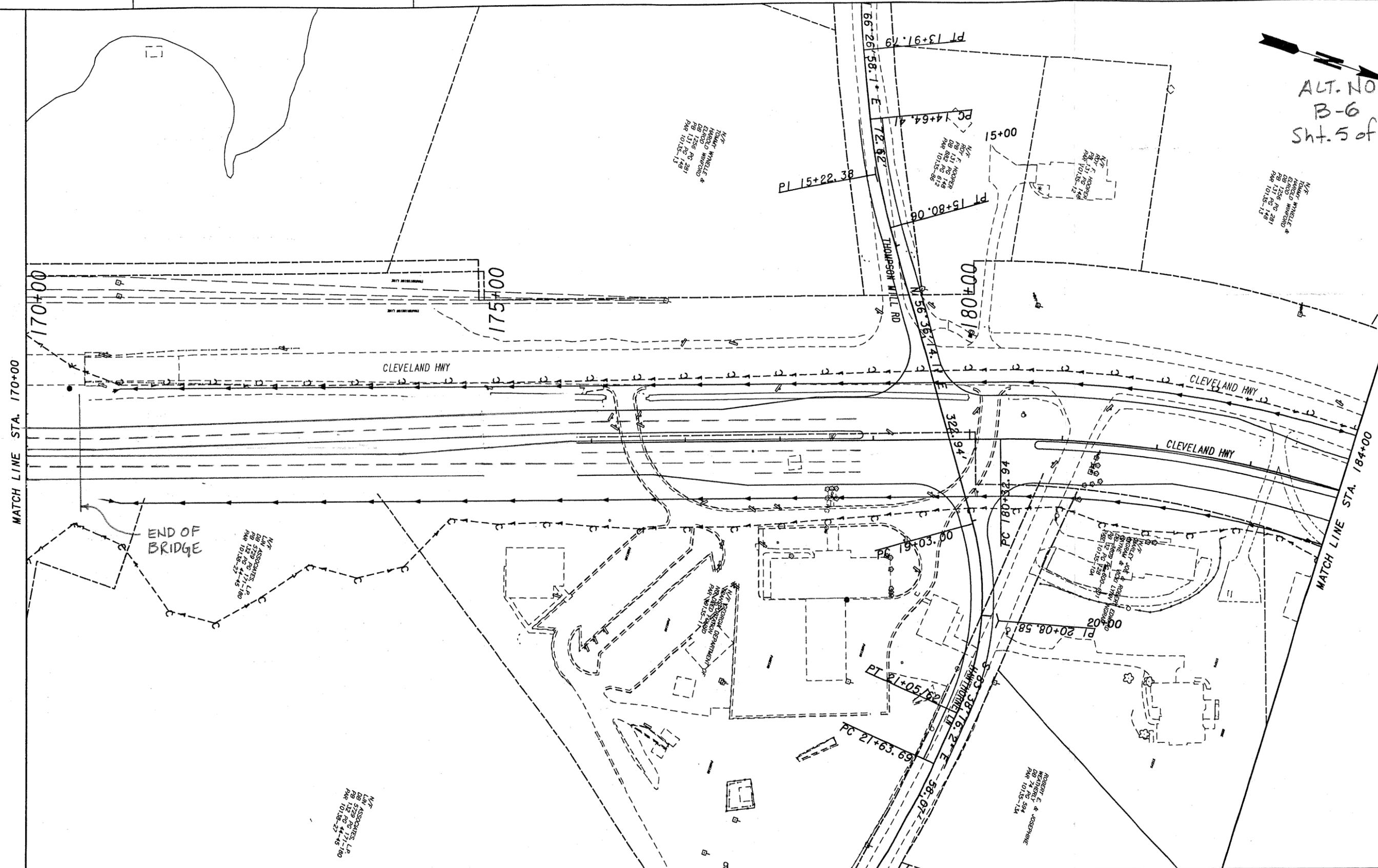
REVISION DATES	

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: CONSULTANT DESIGN  
**CONSTRUCTION PLANS**

HALL COUNTY  
 PROJECT: STP00-0002-06(048)

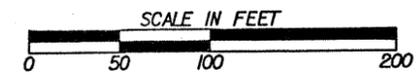
DRAWING No.  
**13-05**

ALT. NO. B-6 Sht. 5 of 7



PROPERTY AND EXISTING R/W LINE --- e ---  
 REQUIRED R/W LINE --- ---  
 CONSTRUCTION LIMITS --- C --- F ---  
 EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES [diagonal hatching]  
 EASEMENT FOR CONSTR OF SLOPES [cross-hatching]  
 EASEMENT FOR CONSTR OF DRIVES [diagonal cross-hatching]

BEGIN LIMIT OF ACCESS.....BLA  
 END LIMIT OF ACCESS.....ELA  
 LIMIT OF ACCESS --- ---  
 REQ'D R/W & LIMIT OF ACCESS [thick lines]



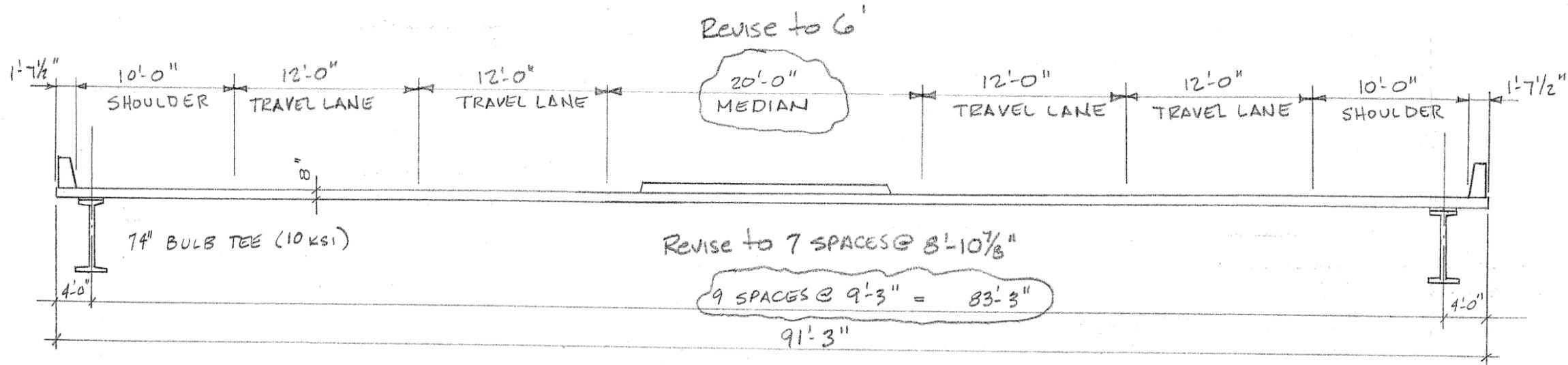
REVISION DATES	

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: CONSULTANT DESIGN  
**CONSTRUCTION PLANS**  
 HALL COUNTY  
 PROJECT: STP00-0002-06(048)

**KECK & WOOD, INC.** ENGINEERS SURVEYORS PLANNERS  
 2425 COMMERCE AVENUE  
 BUILDING 2100, SUITE 300  
 DULUTH, GEORGIA 30096  
 (678)417-4000  
 060132

DRAWING No. 13-06

ALT. NO.  
B-6  
Sht. 6 of 7



CHATTAHOOCHEE RIVER BRIDGE



# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **B-7**  
*Hall County, Georgia*

DESCRIPTION: **USE FEWER BENTS WITH LONGER SPANS BETWEEN BENTS FOR THE CHATTAHOOCHEE RIVER BRIDGE** SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (sketch attached)

The Chattahoochee Bridge is currently planned as six, 140 ft spans for a total length of 840 ft. It is assumed that 10, 74-in-deep, precast concrete bulb tees spaced at 9 ft 3 in on center will be used to support the bridge deck.

**ALTERNATIVE:** (sketch attached)

Increase the girder span length to 210 ft between piers and use post-tension precast concrete girders with a drop-in section to support the bridge deck. Eliminate two bridge foundations.

**ADVANTAGES:**

- Saves costs
- Eliminates two deep-water pier foundations
- Reduces the number of obstructions in the river

**DISADVANTAGES:**

- Requires a different type of superstructure construction

**DISCUSSION:**

The proposed bridge girder construction is a common method for spanning long distances. Because the bridge piers are to be located in relatively deep water, it will be very expensive to construct them. Reducing the number required, even if they are larger, results in a cost savings. The use of fewer river piers also reduces the obstructions to the many recreational boaters who use the lake and river.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 8,886,350	—	\$ 8,886,350
ALTERNATIVE	\$ 8,673,506	—	\$ 8,673,506
SAVINGS	\$ 212,844	—	\$ 212,844



PROJECT: **SR 43/US 129 WIDENING**  
*Hall County, Georgia*

ALTERNATIVE NO.:

B-7

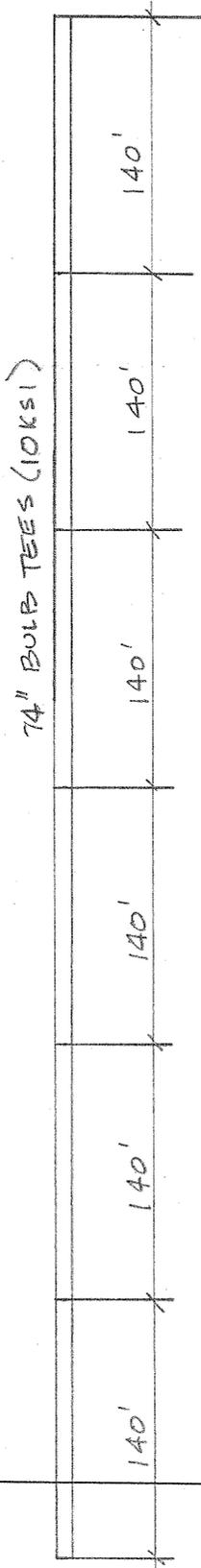
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

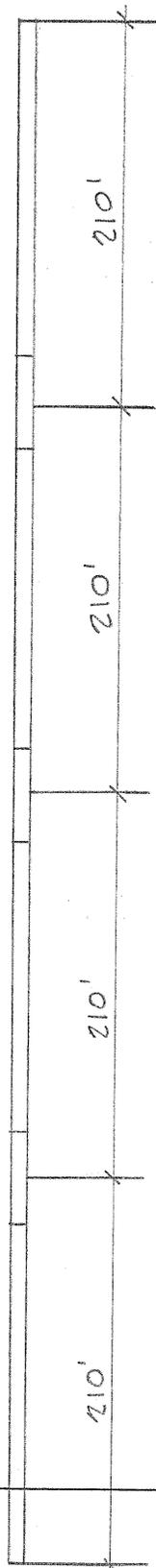
SHEET NO.:

2 of



AS DESIGNED

POST-TENSIONED GIRDERS w/ DRAP-IN SECTIONS



ALTERNATIVE



PROJECT: **SR 43/US 129 WIDENING**  
*Hall County, Georgia*

ALTERNATIVE NO.:

**B-7**

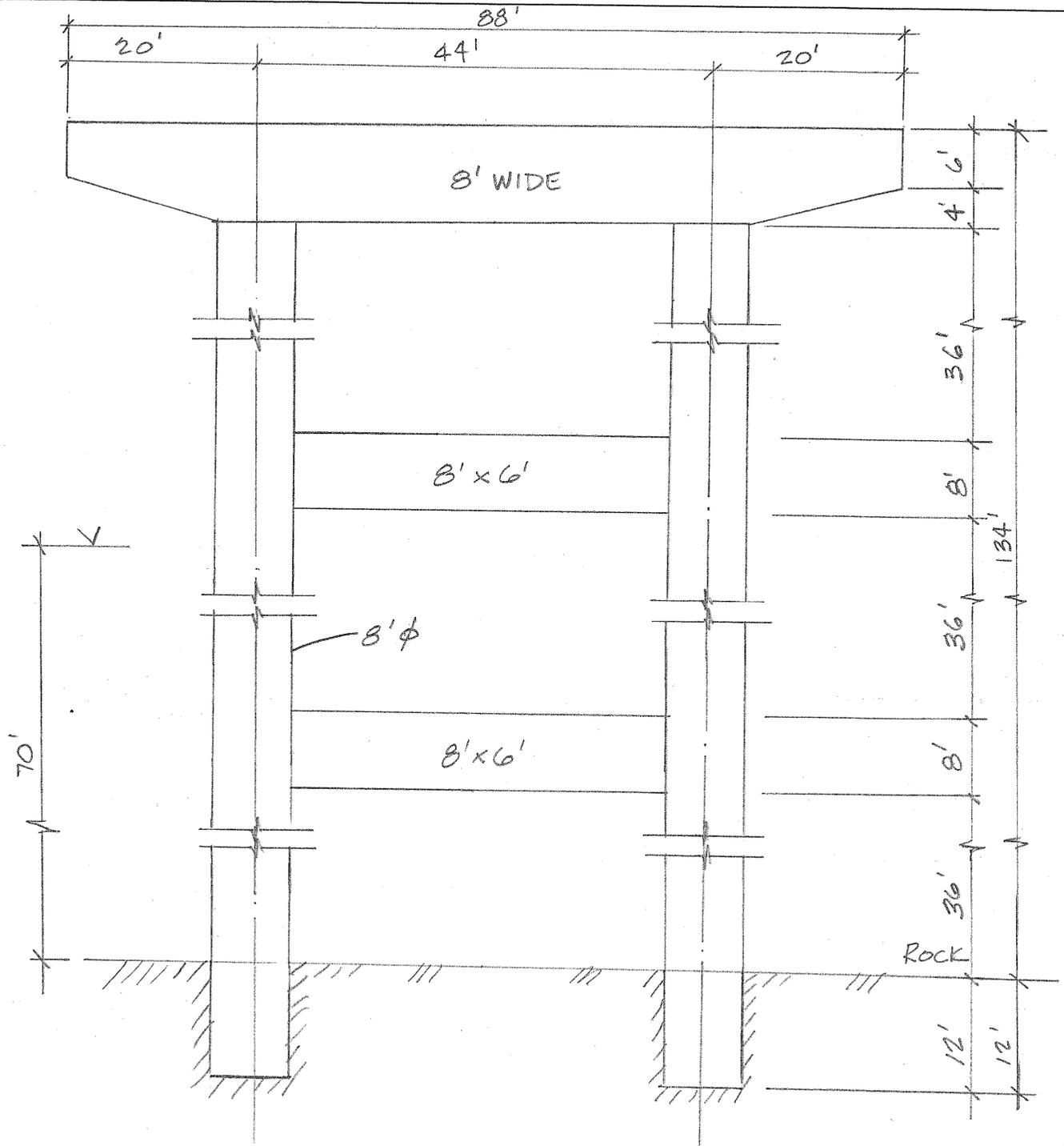
ORIGINAL DESIGN

ALTERNATIVE DESIGN

BOTH

SHEET NO.:

**of**





# VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD** ALTERNATIVE NO.: **B-12**  
*Hall County, Georgia*

DESCRIPTION: **USE DRILLED PIERS FOR THE BRIDGE FOUNDATIONS IN LIEU OF COFFERDAMS WITH CONCRETE SEALS AND SPREAD FOOTINGS** SHEET NO.: **1 of 1**

**ORIGINAL DESIGN:**

No bridge concept design has been presented to the value engineering team for either the Chattahoochee River or East Fork Little River Bridges.

**ALTERNATIVE:**

Use drilled piers into rock for the foundations of the bridges.

**ADVANTAGES:**

- Saves costs
- Avoids building large cofferdams in the rivers
- Saves construction time
- Provides less obstruction to boaters during construction

**DISADVANTAGES:**

- None apparent

**DISCUSSION:**

The Chattahoochee River Bridge could potentially be constructed in a 60-ft-deep pool of water. The existing bridge foundations sit on top of the rock. If cofferdams are used, they will be very deep to seat them into the rock and a large concrete seal will be required for the spread footings. Drilled piers fixed into the rock will be easier and less costly to construct. This was demonstrated on a similar bridge for SR 43 over the Savannah River.

For the two East Fork Little River Bridges, the foundations could be constructed in a 40-ft-deep pool of water. Although the existing bridge foundations are pile supported, the piles do not appear to be exceptionally long. Thus using drilled piers for this bridge also appears economical and once again avoids constructing large cofferdams in the river.

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

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## **PROJECT DESCRIPTION**

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### **NEED AND PURPOSE**

The SR 11/US 129 Widening from Limestone Parkway to South of Nopone Road, P.I. Nos. 122060, 122064, 122066, Hall County, STP00-0002-06(048), BRF00-0002-06(049) and BRF00-0002-06(50) is being developed to enhance the transportation network in Gainesville/Hall County. Hall County is located northeast of the Atlanta Metropolitan Area. The population has been growing rapidly over the past 15 years and this growth is expected to continue in the future. According to the US Census, the 1990 population was 95,428. By the year 2000, the population had grown by approximately 46 percent to 139,277. The Atlanta Regional Commission estimates the population will grow to 166,481 in 2010 and 242,077 in 2030. Respectively, this is a 19 percent and 74 percent growth in population since the year 2000. This increase in population will result in an increase in travel demand throughout Hall County.

The purpose of this project is to provide a safe transportation facility and improve operational deficiencies in the system for the citizens of Hall County and the traveling public. The project is needed due to the existing deficiencies in the system, which includes substandard intersections and insufficient capacity to handle the current traffic volumes. Levels of service at many intersections are projected to have very low levels of service.

### **PROJECT DESCRIPTION**

Conceptual Plans developed for GDOT by Keck & Wood, Inc. widens 5.4 miles of SR 11/US 129 to two lanes in each direction. The opposing lanes are separated by a median to increase the highway's capacity and improve the safety of this stretch of highway. The widened section will connect two existing four-lane sections of the highway. At the south end of the project, four-lane Limestone Parkway will become the primary connection to the new highway, SR 11/US 129, Cleveland Highway, with SR 11 teeing in at a signalized intersection. The widening will continue north with two 12-ft-wide travel lanes in each direction, 10-ft-wide rural shoulders (with only 6.5 ft of paved areas) with drainage ditches on both sides, and a 20-ft-wide raised concrete median with a 30-in-wide curb and gutter section surrounding the median.

At several of the cross streets, the median will be broken and left turn lanes and right turn pockets added. Some of the existing cross streets that intersect the highway on opposite sides of the road, but do not line up, will be realigned to oppose each other. At locations where the cross streets intersect the highway at sharp skew angles, the roads will be realigned to intersect as close to 90 degrees as feasible. Provisions for U-turns will be provided at median breaks where there are no opposing intersecting roads. At the Chattahoochee River, the existing two-lane bridge will be replaced with a wider, four-lane bridge located to the east away from existing electrical lines to the west.

Just south of the East Fork Little River, the highway median will be expanded from 20 ft to 44 ft and a grassed section will replace the raised concrete median. At the south end of this section, the existing East Fork Little River Bridge will be replaced with two parallel, one-directional bridges to

the east. On the north side of the bridge, the highway will be located on a new alignment first to the east of the existing Cleveland Highway and then crossing over to the west of the existing highway before connecting back to the existing alignment at C Loggins Road where it is a four-lane highway. The north end of the project is 1,500 ft south of Jim Hood/Nopone Road.

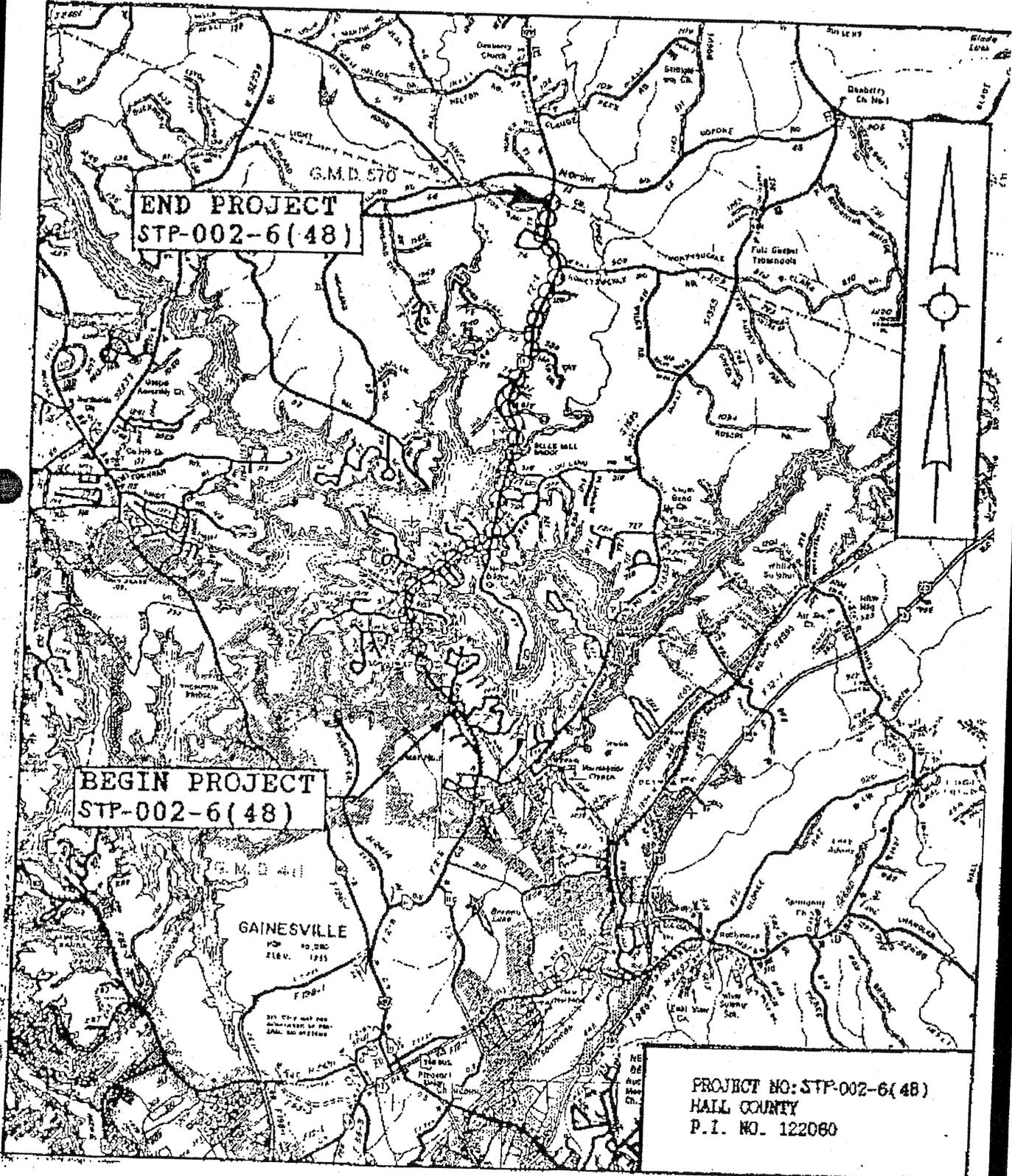
In order to construct the new highway, numerous properties are impacted and several must be totally acquired. The bridges will have to be constructed in fairly deep water. Based on the 140-ft spans of the Chattahoochee Bridge, it is expected that 74 in deep precast, prestressed concrete bulb tee girders will be used to support the cast-in-place concrete deck. For the East Fork Little River Bridges, it is expected that 60-in-deep girders will be used.

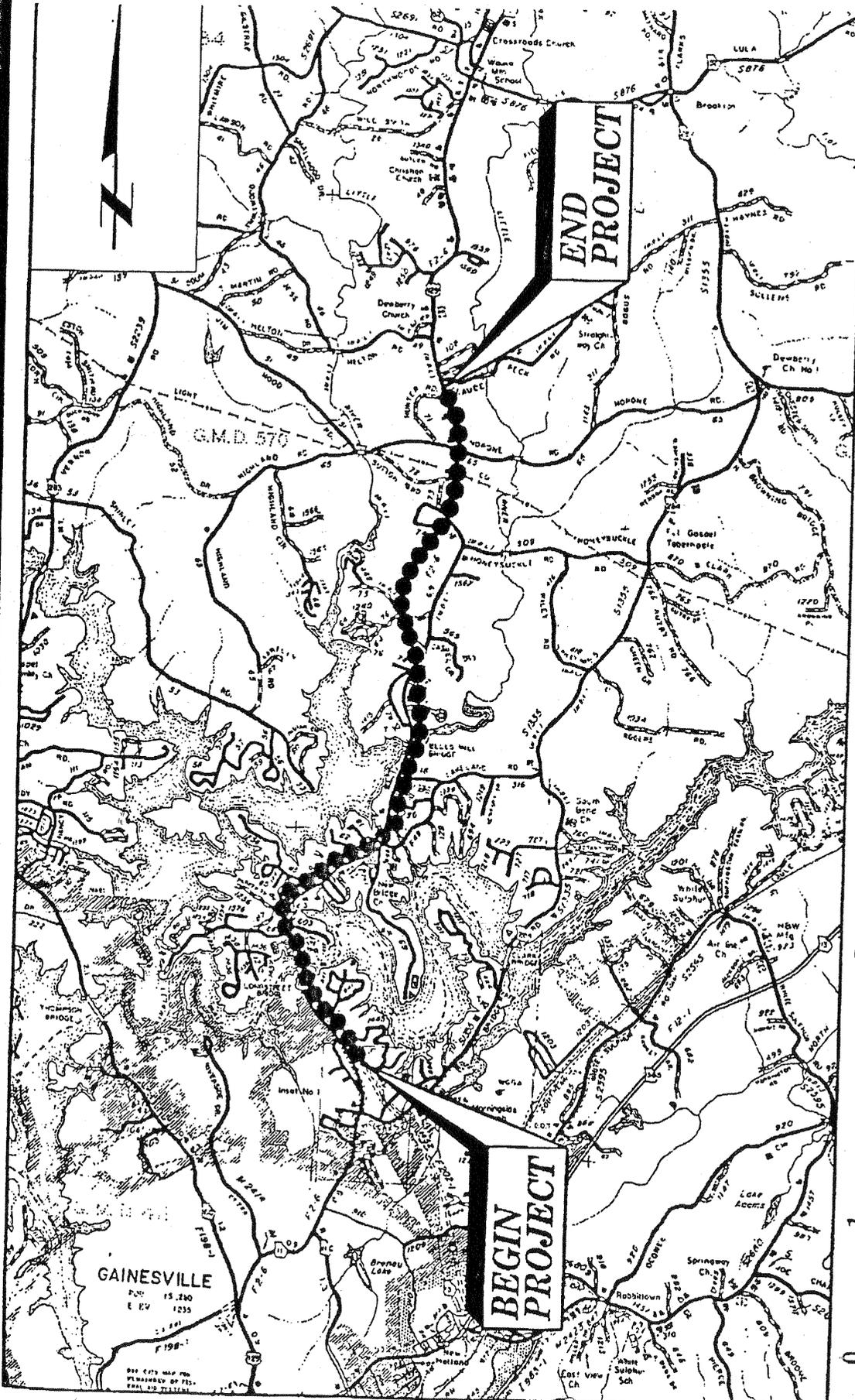
The estimated total project cost is approximately \$108.1 million with \$61.8 million for construction including utility relocations and fuel adjustment and \$46.3 million for right-of-way. Construction is to begin in 2013.

## **DRAWINGS**

Location Maps and typical sections follow.

# LOCATION SKETCH





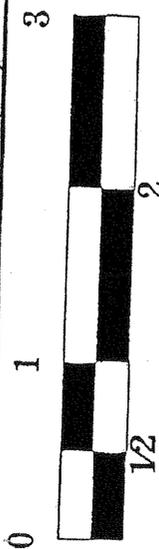
**END PROJECT**

**BEGIN PROJECT**

STP-002-6(48)  
 HALL COUNTY  
 US 129SR II IMPROVEMENTS  
 P.I.# 122060



**LOCATION**



**SCALE IN MILES**

SOURCE: GENERAL HIGHWAY MAP, HALL CO., GEORGIA  
 PREPARED BY THE GEORGIA DEPARTMENT OF TRANSPORTATION, 1990



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## VALUE ANALYSIS AND CONCLUSIONS

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### GENERAL

This section describes the value analysis (VA) procedure used during the VE study on the SR 11/US 129 Widening From Limestone Parkway to South of Nopone Road facilitated by Lewis & Zimmerman Associates, Inc., for the Georgia Department of Transportation. The workshop was performed March 10 – 13, 2009, in GDOT's Central Office in Atlanta, Georgia. Keck & Wood, Inc. has been selected by GDOT to assist with the development of the project and has provided information for the VE team to use as the basis of the study.

A systematic approach was used in the VE study, which is divided into three parts: (1) Preparation Effort, (2) Workshop Effort, and (3) Post-Workshop Effort. A task flow diagram outlining each of the procedures included in the VE study is attached for reference.

Following this description of the VA procedure, separate narratives and supporting documentation identify the following:

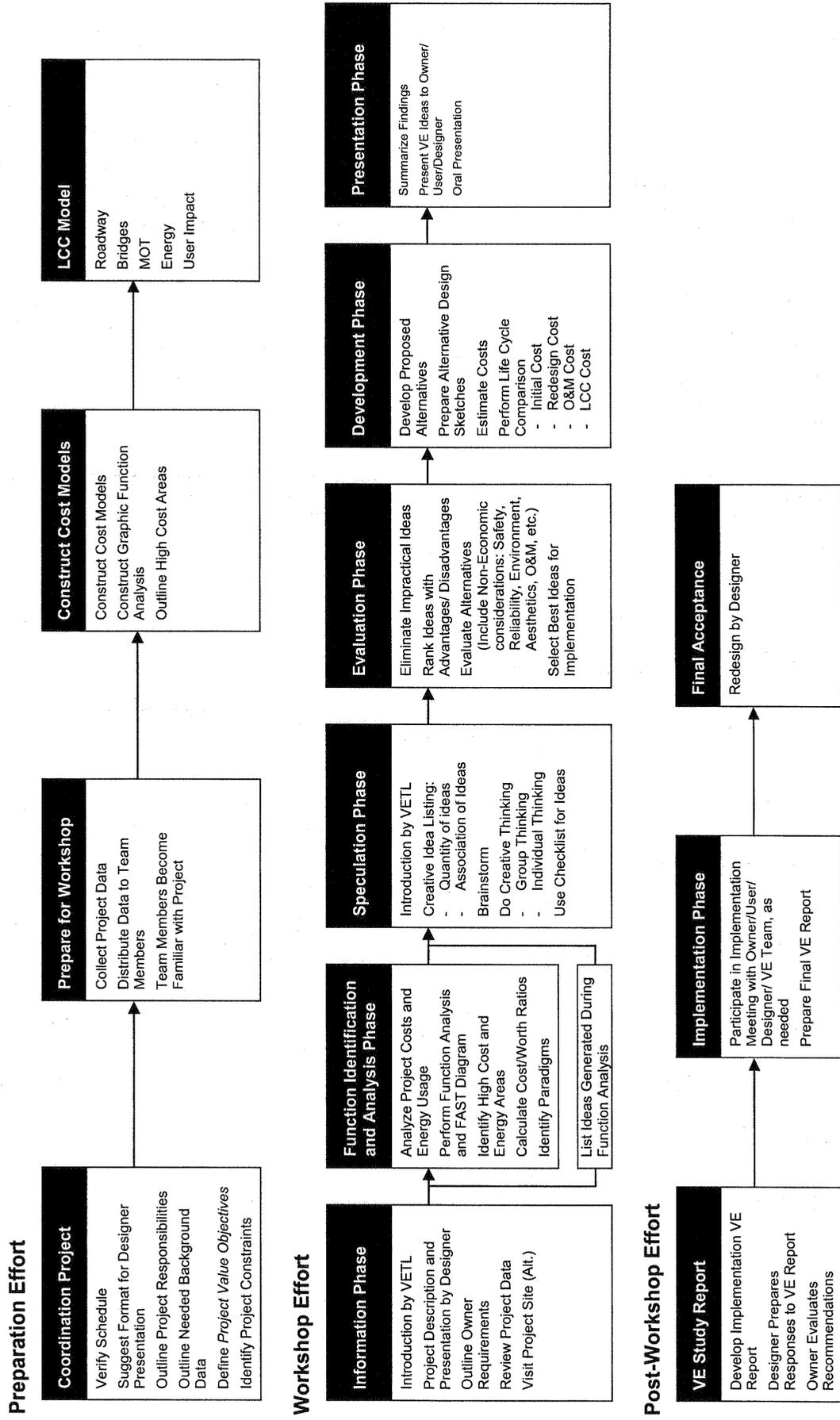
- VE workshop participants
- Economic data
- Cost model
- Function analysis
- Creative ideas and evaluations

### 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:

- Hall County, Georgia SR 11 /US 129 Widening/Relocation Concept Plans A & B, dated November 2007, prepared by Keck & Wood, Inc.
- Construction Plans Hall County, Project STP00-0002-06(048), dated 2/16/2009, prepared by Keck & Wood, Inc.
- Traffic Concept Study for STP-002-6(48) P.I. # 122060 State Route 11/US Highway 129, Hall County, Georgia, dated May 2007, prepared by Keck & Wood, Inc. and Street Marts
- Bell's Mill Bridge U.S. Highway No. 129, East Fork of Little River, Georgia, Buford Reservoir, Corps of Engineers, U.S. Army, Office of the District Engineer, Mobile, Alabama, dated September 1955, prepared by Patchen and Zimmerman Engineers

# Value Engineering Study Task Flow Diagram



- Longstreet Bridge U.S. 129 (Georgia State Highway No. 11), Chattahoochee River, Georgia, Buford Reservoir, Corps of Engineers, U.S. Army, Office of the District Engineer, Mobile, Alabama, dated September 1955, prepared by Patchen and Zimmerman Engineers
- Department of Transportation State of Georgia, P.I. No. 122060-, 122064, 122066-, Hall County, STP00-1112-06(48), BRF00-0002-06(49) & BRF00-002-06(049) SR 11/US 129 Widening from Limestone Parkway To South of Nopone Road, Approved Revised Project Concept Report, dated September 12, 2008
- Department of Transportation State of Georgia, STP00-6(48), BRF-002-6(49)/(50) Hall County, P.I. No. 122060/122064/122066 Hall County, Revised Project Concept Report, dated September 8, 1998; December 18, 1997; October 1, 1991
- Estimate Report for File “STP-002-6(48)\_2008-05-15,” prepared by GDOT, dated 6/11/2008; Estimate Report for file “BRF-002-6(49), prepared by GDOT, dated 6/12/2008; and Estimate Report for file “BRF-002-6(50),” prepared by GDOT, dated 6/12/2008
- Preliminary – Right of Way Cost Estimate, prepared by GDOT
- Earthwork Report, dated March 11, 2009, prepared by Keck & Wood, Inc.
- SR 11/US 129 Cleveland Highway Widening Relocation, Concept Stage Study, Project SR11/US129 Widening/Relocation, Project # STP-002-6(48), BRF-0026(49), and BRF-002-6(50), P.I. 122060, 122064, & 122066 Hall County, dated December 18, 2008, prepared by Terrell, Hundley, and Carroll Right of Way Services, Inc.

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 GDOT to develop a cost model for the project. The model was used to distribute the total project cost among the various elements or functions of the project. The VE team used this model 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, March 10, 2009, and concluding with the final VE Presentation on Friday, March 13, 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 Keck & Wood, Inc. 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 model(s). 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.

GDOT and the Keck & Wood 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 GDOT's value objectives identified through conversations. 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 the Study Results section.

### **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 GDOT and the Keck & Wood design team. The presentation was held on Friday, March 13, 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 GDOT and 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 consisted of the preparation of this VE Study Report. Personnel from GDOT and the Keck & Wood design team will analyze each alternative and prepare a short response, recommending incorporation of the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. LZA is available at your convenience as you

review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

Upon completing their reviews, the owner and designer will meet and, by consensus, select VE alternatives and design suggestions to incorporate into the project.

## VALUE ENGINEERING WORKSHOP PARTICIPANTS

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The VE team was organized to provide specific expertise in the unique project elements involved with the SR 11/US 129 Widening From Limestone Parkway to South of Nopone Road project. The multidisciplinary team comprised professionals with highway and bridge planning, design and construction experience and a working knowledge of VE procedures. The following lists the VE team members:

<b><u>Participant</u></b>	<b><u>Specialization</u></b>	<b><u>Affiliation</u></b>
Neil T. Greenlee, PE	Bridge Engineering	HNTB Corporation
Harley Griffin	Cost/Constructability	Delon Hampton & Associates
Joseph Leoni, PE	Highway Engineer	ARCADIS US, Inc.
Howard B. Greenfield, PE	VE Team Leader	Lewis & Zimmerman Associates

### DESIGNER'S PRESENTATION

An overview of the project was presented on Tuesday, March 10, 2009, by representatives from GDOT and the Keck & Wood design team. 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 specifics. Additionally, the meeting afforded the owner and design team the opportunity to highlight in greater detail those areas of the project requiring additional or special attention. An attendance list for the meeting is attached.

### VALUE ENGINEERING TEAM'S FORMAL PRESENTATION

A formal presentation was conducted by the VE team on Friday, March 13, 2009, at GDOT's Central Office, in Atlanta, GA to review VE alternatives with the owner and representatives from the design team. Copies of the Draft Summary of Potential Cost Savings worksheet were provided to the attendees. An attendance list for the meeting is attached.

VE STUDY SIGN-IN SHEET

Project No.: STP00-0002-06(048)      County: Hall      PI No.: 122060/122064/122066      Date: March 10-13, 2009  
 BHF00-0002-06(049)(050)

3-13-09

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
<del>3-10-09</del> Lisa L. Myers	00244168	Engineering Services	404-631-1770	lmyers@dot.ga.gov
James K. Magnus	00208161	Construction	404-631-1971	jmagnus@dot.ga.gov
Ken Werho	00258268	Traffic Operations	404-635-8144	kwerho@dot.ga.gov
<del>Ron</del> Wishon	00208180	Engineering Services	404-631-1753	rwishon@dot.ga.gov
Douglas Fadoo	00928931	" "	404-631-1764	d.fadoo@dot.ga.gov
Rick Gurney		Keck & Wood	678-417-4008	rgurney@keckwood.com
Howard Greenfield		Lewis & Zimmerman	301-984-9590	hgreenfield@lzs.com
Katherine Russett	00930650	OEL	404-699-6882	Krussett@dot.ga.gov
Neil Greenlee		HNTB Corporation	404-946-5764	nrgreenlee@hntb.com
Joe Leonie		ARCADIS	770-431-8666	Joe.Leonie@Arcadis-US.com
Harley Griffin		DHA	404-524-8030	hgriffin@edelsonhampton.com
Joe King	00343482	GDOT Bridge	404-631-1913	joking@dot.ga.gov
Stanley Hill	00232993	GDOT OPD	404-631-1560	sthille@dot.ga.gov
Steve Adewale	00340853	GDOT OPD	404-631-1578	sadewale@dot.ga.gov

## **ECONOMIC DATA**

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The comparisons of life cycle costs between the VE alternatives and the current design solutions were performed on the basis of discounted present worth. To accomplish this, the VE team developed economic criteria to use in its calculations based on information gathered from GDOT and the design team. The following parameters were used when calculating discounted present worth:

Year of Analysis:	2009
Construction Start Date:	2013
Construction Completion Date:	2016
Planning Period (n):	20

When computing capital costs, direct material, labor and equipment costs are marked up using a 10% for Engineering and Construction Administration.

### **COMMENTS ON THE COST ESTIMATE**

The cost estimate uses \$150 per square foot for the bridges over the Chattahoochee River and the East Fork Little River. Because the bridges are to be constructed over 50 ft of water for the former and over 20 ft of water for the latter, the VE team increased the estimated cost of these bridges to \$210 per square foot based on an analysis of the foundations performed for the SR 43 bridge over the Savannah River which is also to be constructed over 60 ft deep water.

## **COST ESTIMATE SUMMARY AND COST MODEL**

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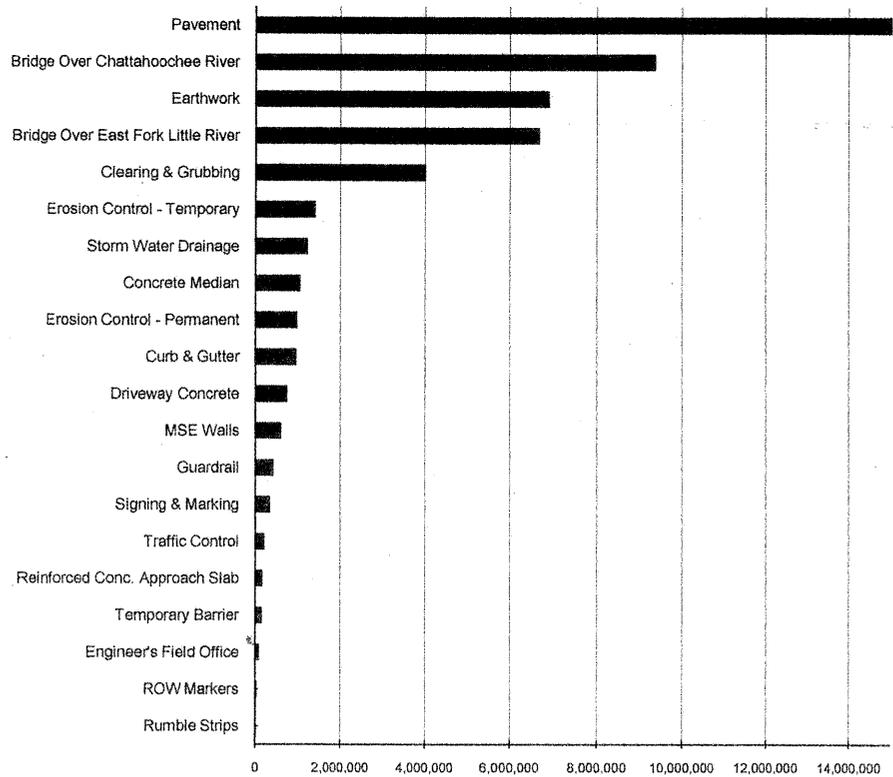
The VE team prepared the attached cost model for the project prior to the workshop. The cost model is arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas. As can be expected, judgments at this stage of the study are based on experience and intuition rather than facts, which are not uncovered until well along in the analysis of function. As a result of these qualified hypotheses, there appears to be a potential for initial savings in the following areas:

- Pavement
- Bridge over the Chattahoochee River
- Earthwork
- Bridge Over East Fork Little River

# COST HISTOGRAM



PROJECT: SR 11/US 129 WIDENING FROM LIMESTONE PARKWAY TO SOUTH OF NOPONE ROAD, HALL COUNTY			
PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Pavement	15,274,255	30.41%	30.41%
Bridge Over Chattahoochee River	9,348,000	18.61%	49.02%
Earthwork	6,888,336	13.71%	62.73%
Bridge Over East Fork Little River	6,669,000	13.28%	76.01%
Clearing & Grubbing	4,000,000	7.96%	83.97%
Erosion Control - Temporary	1,383,461	2.75%	86.72%
Storm Water Drainage	1,195,472	2.38%	89.10%
Concrete Median	1,023,071	2.04%	91.14%
Erosion Control - Permanent	945,476	1.88%	93.02%
Curb & Gutter	924,630	1.84%	94.86%
Driveway Concrete	715,500	1.42%	96.29%
MSE Walls	578,581	1.15%	97.44%
Guardrail	398,140	0.79%	98.23%
Signing & Marking	324,414	0.65%	98.88%
Traffic Control	191,419	0.38%	99.26%
Reinforced Conc. Approach Slab	143,523	0.29%	99.54%
Temporary Barrier	131,750	0.26%	99.81%
Engineer's Field Office	69,628	0.14%	99.94%
ROW Markers	20,300	0.04%	99.98%
Rumble Strips	7,915	0.02%	100.00%
<b>Subtotal</b>	<b>\$ 50,232,871</b>	<b>100.00%</b>	
<b>E&amp;C @ 10.00%</b>	<b>\$ 5,023,287</b>		
<b>Subtotal</b>	<b>\$ 55,256,158</b>		
<b>Right-of-Way</b>	<b>\$ 46,351,097</b>		
<b>Reimbursable Utilities</b>	<b>\$ 635,000</b>		
<b>Fuel Price Adjustment</b>	<b>\$ 5,846,784</b>		
<b>TOTAL</b>	<b>\$ 108,089,039</b>		<b>Comp Mark-up: 10%</b>



Costs in graph are not marked-up.

## **FUNCTION ANALYSIS**

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A function analysis of the project was prepared to (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain the given project purpose and need, (4) identify other public goals, and (5) identify secondary functions that should be addressed by the VE team. The Random Function Analysis worksheet completed by the team for the project in its entirety and the various elements follow.





## CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

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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
Right-of-Way	ROW
Bridges	B
Earthwork	E
Median	M
General	G

### 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:

- Saves costs
- Improves functionality
- Improves safety
- Reduces right-of-way impacts and acquisitions
- Reduces environmental impacts
- Improves constructability

After discussing each idea, the team evaluated the ideas by consensus. This produced 20 ideas rated 4 or 5 to research and develop into formal VE alternatives to be included in the Study Results section 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.

# CREATIVE IDEA LISTING



<b>PROJECT:</b>	<b>SR 11/US 129 Widening (Limestone Pkwy to south of Nopone Rd)</b> <i>Hall County, Georgia</i>	<b>SHEET NO.:</b>	<b>1 of 2</b>
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NO.	IDEA DESCRIPTION	RATING
	<b>RIGHT-OF-WAY (ROW)</b>	
ROW-1	Reduce 44-ft-wide median to 32-ft-wide	5
ROW-2	Reduce 20-ft-wide median to 16-ft-wide	4
ROW-3	Reduce pavement width by using 11 ft lanes for the inside lanes	4
ROW-4	Reduce shoulder width	3
ROW-5	Reduce gutter pan width	See M-2
ROW-6	Build three lanes with the center lane for left turns in lieu of four 12 ft lanes and median	1
ROW-7	Tweak vertical profile	4
ROW-8	Revise horizontal alignment	4
ROW-9	Use an urban typical section in selected locations	4
ROW-10	Use steeper grades	Combine with ROW-7
ROW-11	Use steeper embankment slopes	3
ROW-12	Use more retaining walls	5
ROW-13	Avoid displacement at Briarwood Road, Hawthorne Lane to Britney Court, Skylark Place to Lakeland Road; Lakeland Road to Hilltop Circle	5
ROW-14	Move Chattahoochee Bridge closer to existing bridge	3
ROW-15	Revise profile from 280+00 to 310+00	4
ROW-16	Retain the 20 ft median throughout the project with a 45 mph speed limit	3
ROW-17	Use a concrete barrier with a narrow median in high cut and fill areas	3
ROW-18	Use an urban section with curb and gutter and a wall in cut selected sections	See others

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

# CREATIVE IDEA LISTING



PROJECT:	SR 11/US 129 Widening (Limestone Pkwy to south of Nopone Rd) Hall County, Georgia	SHEET NO.:	2 of 2
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NO.	IDEA DESCRIPTION	RATING
	<b>MEDIAN (M)</b>	
M-1	Use grass median in lieu of concrete in 20 ft median area	5
M-2	Use and 18-in-wide gutter pan in lieu of a 24-in-wide gutter	5
	<b>BRIDGES (B)</b>	
B-1	Reuse existing Chattahoochee River Bridge for one direction	4
B-2	Widen to the east the existing Chattahoochee River Bridge substructure and rebuild bridge to required width	4
B-3	Use a single bridge for East Fork Little River Crossing in lieu of two bridges and reduce median width to 10 ft 6 in	4
B-4	Move Chattahoochee River Bridge to the west side of the existing bridge	2
B-5	Reduce shoulders on bridges to 8 ft in lieu of 10 ft	5
B-6	Reduce median width on Chattahoochee River Bridge from 20 ft to 6 ft	5
B-7	Use fewer bents with longer spans for the Chattahoochee River Bridge	5
B-8	Use fewer bents with longer spans for the East Fork Little River Bridge	5
B-9	Convert the existing East Fork Little River Bridge to a framed substructure	1
B-10	Reuse the Chattahoochee River Bridge, converting span arrangement to 2-1-2, i.e. 2 span cont. unit, 1 simple span, 2 span cont. unit, and demolish the existing center pier	2
B-11	Widen bents symmetrical on Chattahoochee River Bridge, shift and strengthen existing span, construct new, two-lane parallel span	1
B-12	Drilled shafts, both bridges	5
B-13	Redeck existing East Fork Little River Bridge for southbound direction and build new parallel northbound bridge	4
	<b>EARTHWORK (E)</b>	
E-1	Revise highway profile starting at East Fork Little River Bridge and proceeding north	See others
E-2	Use 1:1 slopes with slope stabilization in lieu of 2:1 natural slopes	See others
	<b>GENERAL (G)</b>	
G-1	Delete Lakehill Drive intersection with SR 11 and use intersection at south end for access	3

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