SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS

NH000-0089-01(026), P.I. No. 231450

Baldwin County, GA

FINAL Value Engineering Study Report
60% Design Stage

February 2011

Designer

District 2

Value Engineering Consultant

Lewis & Zimmerman Associates, Inc.

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

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

Re: Project No.NH000-0089-01(026); P.I. 231450 Baldwin County
SR 49 From Just West of Felton Drive to East of Milledgeville Bypass
Value Engineering Study Report

Date:
February 18, 2011

Contact:
Howard Greenfield

Phone:
301.984.9590 x 20

Email:
howard.greenfield@
arcadis-us.com

Our ref:
LZ083361.0000

Dear Ms. Myers:

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 February 8-11, 2011. The objective of the VE effort was to identify opportunities to reduce costs and enhance the value of the project.

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 shorten the project so that it does not extend westward from the Horace Veal Road/Allen Memorial Drive intersection to west of the Felton Drive intersection; not extend the sidewalk on the south side across the Fishing Creek Bridge, modifying the shoulders to reduce right of way impacts; and using 11-ft.-wide lanes where there are two lanes in each direction separated by a flush median.

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 questions regarding the information presented in this report.

Sincerely yours,

LZA, an ARCADIS company

Howard B. Greenfield, PE, CVS
Vice President

Attachment

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SECTION ONE – EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. for the Georgia Department of Transportation (GDOT). The subject of the study was the SR 49 From West of Felton Drive to East of Milledgeville Bypass project (NH000-0089-01(026), P.I. No. 231450) being designed by GDOT District 2. The project was at the 60% Design Complete stage when the study was conducted February 8-11, 2011, in GDOT's Atlanta Headquarters building.

Comprising the VE team were a highway design engineer, a bridge engineer, a construction specialist and a Certified Value Specialist team leader. The team followed the six-phase VE Job Plan to guide its deliberations.

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

PROJECT DESCRIPTION

SR 49 is a primary north-south corridor in Central Georgia, connecting the city of Milledgeville in Baldwin County to the city of Macon in Bibb County and on to the city of Americus in Sumter County. This project widens and reconstructs SR 49, an urban principal arterial, to initially two lanes with opposing lanes divided by a flush 14-ft.-wide median from just west of Felton Drive (Station 391+73.56) to just west of the Horace Veal Road/Allen Memorial Drive intersection. The project continues east by widening SR 49 to four lanes with opposing lanes divided by a flush 14-ft.-wide median to the intersection with US 441/SR 29, the Milledgeville Bypass, before narrowing back down to a two-lane section with a flush 14-ft.-wide median and ending at Station 536+56.49, for a total length of 2.73 miles.

Included in the project are:

- The addition of right turn lanes at all intersections and the striping of the flush median to create left turn lanes at all intersections
- 4-ft.-wide paved shoulders expanding to 15-ft. 6-in. wide at guardrail locations in the rural section west of Blandy Road
- Adjustment of the vertical alignment of SR 49 between Allenwood Drive and US 441/SR 29
- Concrete curb and gutter with 5-ft.-wide concrete sidewalks set 2 ft. back from the back face of the curb and 4-ft.-wide bicycle lanes along the curb lane starting at Spaces Road West on the south side and Horace Veal Road on the north side of SR 49

- Concrete flumes for stormwater conveyance where guardrail is used
- A closed, piped stormwater conveyance system where there are curb and gutters
- Reconstruction of all driveways intersecting SR 49
- A new traffic signal at the Blandy Road intersection and a replacement traffic signal at the SR 441/SR 29 intersection
- Removal of the concrete barrier on the south side of the bridge over Fishing Creek and the addition of a 6-ft. 5-in.-wide sidewalk and straight railing

The design speed is 55 miles per hour (mph) from the west end of the project to County Road (CR) 426 and 45 mph from CR 426 east with a short 30 mph zone at the high school.

The estimated construction cost is $7.7 million. To construct this corridor it will also be necessary to acquire right-of-way at an estimated cost of $3.6 million.

CONCERNS AND OBJECTIVES

This project is being developed to improve traffic operations, and enhance vehicle and pedestrian safety. To achieve these goals it will be necessary to acquire a significant amount of right-of-way. Adjusting the vertical profile will also necessitate staged construction which adds to the cost of the project.

To assist GDOT achieve its project goals in a cost-effective manner, it convened this VE study. The study team was tasked with identifying specific changes to the current design that will enhance its value by improving functionality, reducing cost or a combination of the two.

RESULTS OF THE STUDY

The VE team generated 14 alternatives, 13 with cost reduction opportunities and 1 design suggestion to improve functionality, that address GDOT's project value objectives. Each alternative is identified with an Alternative Number (Alt. No.) that uses a letter prefix to indicate which project element is being addressed. The alternatives are developed independently so that some are mutually exclusive or interrelated and therefore the total cost reduction achievable will have to be ascertained once implementation decisions are made. All alternatives are summarized on the Summary of Potential Cost Savings worksheets and detailed in Section Two of the report. The following alternatives will have the greatest impact on the project.

At the request of the local authorities, the SR 49 project was extended from west of the Horace Veal Road/Allen Memorial Drive intersection to west of the Felton Drive intersection. However, a letter from the traffic engineer in 2002 indicated that the modification of the Felton Drive intersection was not needed. Accident data from 2007, 2008 and 2009 support this conclusion. Thus Alt. No. G-1 suggests revisiting whether the project should stop west of the Horace Veal Road/Allen Memorial Drive intersection to save approximately $1.1 million.

The sidewalk on the south side of SR 49 is being extended east from US 441/SR 29, across the existing bridge over Fishing Creek and on to Lake Drive. This requires removing the existing bridge edge barrier and replacing it with a new straight barrier with a 6-ft. 5-in.-wide concrete sidewalk. The

existing bridge has a sidewalk on the north side of the bridge. Alt. No. S-1 suggests not building the sidewalk on the south side and not modifying the existing bridge to save about $367,000.

Currently, 12-ft.-wide lanes are used throughout the project. In Alt. No. R-2, 11-ft.-wide lanes are proposed where the typical section consists of two 12-ft.-wide lanes in each direction separated by a 14-ft.-wide flush median. With bicycle lanes and a 2-ft.-wide gutter pan adjacent to the outside lanes and the flush median adjacent to the inside lane, 11-ft.-wide lanes in this area will not lead to additional accidents. About $245,000 could be saved by implementing this change.

Alt. No. ROW-3/ROW-4 shows how some right-of-way acquisitions can be avoided by revising the slope of the shoulder to slope away from the pavement, thus reducing the fill height and extension into adjacent properties. In addition, there will be some minor fill material cost savings.

The current plan is to revise the vertical profile of SR 49 between Allenwood Drive and US 441/SR 29 by lowering the grade about 5 ft. to correct a design deficiency for a road with a 45 mile per hour design speed. This plan requires staged construction. If this is not done as suggested in Alt. No. E-1, a design exception would have to be obtained. However, the VE team believes that, in this location, the risk is low and a design exception should be considered. Alternatively, Alt. No. E-2 suggests that the grade could be raised in this area to correct the deficiency as well as benefit the grades for driveways that intersect with the road.

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
NH000-0089-01(026) Baldwin County

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
GENERAL						
G-1	Start the project west of the Horace Veal/Allen Memorial Drive intersection at approximately Sta. 412+00	$1,100,000	$0	$1,100,000		$1,100,000
RIGHT-OF-WAY						
ROW-3/ ROW-4	Modify shoulders and slopes to reduce right-of-way impacts	$235,000	$0	$235,000		$235,000
ROADWAY						
R-1	Reduce the extent of driveway reconstruction	$24,000	$0	$24,000		$24,000
R-2	Reduce lane widths to 11 ft. wide between Horace Veal Drive/Allen Memorial Drive and US 441/SR 29	$245,000	$0	$245,000		$245,000
R-3	Retain existing bridge approach slabs and overlay approach slabs with an asphalt overlay	$64,000	$2,000	$62,000		$62,000

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
NH000-0089-01(026) Baldwin County

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	PRESENT WORTH OF COST SAVINGS: RECURRING COST SAVINGS	PRESENT WORTH OF COST SAVINGS: TOTAL PW LCC SAVINGS
DRAINAGE						
D-1	Use cross-drains to reduce the amount of longitudinal pipe runs from Sta. 493+00 to Sta. 513+80	$81,000	$51,000	$30,000		$30,000
D-2	Delete the cross-drain on the west side of bridge and discharge from the curb inlet on south side of the road directly to the creek	$2,200	$900	$1,300		$1,300
D-3	Eliminate 18 in. storm drain pipe from manhole H-4 to H-5 and discharge stormwater directly into ditch that flows directly to creek from existing swale	$20,000	$4,000	$16,000		$16,000
D-4	Install a new drainage structure at Sta. 445+52 to eliminate three concrete flumes	$25,000	$4,000	$21,000		$21,000
D-5	Install a new drainage structure at Sta. 458+20 to eliminate two concrete flumes	$15,000	$3,000	$12,000		$12,000

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
NH000-0089-01(026) Baldwin County

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EARTHWORK						
E-1	Retain the existing vertical profile on sr 49 from sta. 513+00 to sta. 522+00 and request a design Exception for the design speed in this area	$165,000	$0	$165,000		$165,000
E-2	Retain the existing vertical profile from Sta. 513+00 to Sta. 513+50 and raise the proposed profile from Sta. 518+50 to Sta. 523+00 to correct the existing vertical profile for design speed	$107,000	$0	$107,000		$107,000
SIDEWALK						
S-1	Do not Modify bridge and do not add sidewalk on the south side of SR 49 from Frank bone road east	$367,000	$0	$367,000		$367,000
S-2	Extend the sidewalk construction on both sides of the road to the end of the existing sidewalks east of Lake Drive	DESIGN SUGGESTION				

SECTION TWO – STUDY RESULTS

GENERAL

The results of this value engineering study conducted on the SR 49 From Just West of Felton Drive to East of Milledgeville Bypass project (NH000-0089-01(026); P.I. Number 231450) portray the benefits that can be realized by GDOT, the owner, Baldwin County, the users and GDOT District 2, the designer. The results will directly affect the project's design and will require coordination among the GDOT project team members to determine the disposition of each alternative.

During the conduct of the study, 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 the owner's project value objectives. Research performed on those ideas considered to have potential to enhance the value of the project resulted in the development of individual alternatives identifying specific changes to the project as a whole, or individual elements that comprise the project. These may be in the form of VE alternatives (accompanied by cost estimates) or design suggestions (typically without cost estimates). For each alternative developed the following information is provided:

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

The capital cost comparisons used unit quantities contained in the project cost estimate prepared by the designers, whenever possible. If unit quantities were not available, published data bases, such as the one produced by the RS Means Company or owner data bases were consulted.

Each design suggestion contains the same information as the VE alternatives, except that no cost information is usually included. Design suggestions are presented to bring attention to areas of the design that, in the opinion of the VE team, should be changed for reasons other than cost. Examples of these reasons include improved facility operation, ease of maintenance, ease of construction, safer working conditions, reduction in project risk, etc. In addition, some ideas cannot be quantified in terms of cost with the design information provided; these are also presented as design suggestions and are intended to improve the quality of the project.

Each alternative or design suggestion developed is identified with an alternative number (Alt. No.) track it through the value analysis process and thus facilitating referencing between the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of Potential Cost Savings table. The Alt. No. includes a prefix that refers to a major project element listed below:

PROJECT ELEMENT	PREFIX
General	G
Right-of-Way	ROW
Roadway	R
Drainage	D
Sidewalk	S
Earthwork	E

Summaries of the alternatives and design suggestions are provided on the Summary of Potential Cost Savings tables. The tables are divided into project elements for the convenience of the reviewer and are used to divide the results section. The complete documentation of the developed alternatives and design suggestions follow each of the Summary of Potential Cost Savings tables.

KEY ISSUES

This project is being developed to improve traffic operations and enhance safety. To achieve these goals it will be necessary to acquire a significant amount of right-of-way. It will also be necessary to stage construction where the vertical alignment of SR 49 is being revised.

STUDY OBJECTIVES

To assist GDOT achieve its project goals in a cost-effective manner, it convened this VE study. The study team was tasked with identifying specific changes to the current design that will enhance its value by improving functionality, reducing cost or a combination of the two.

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of 13 alternatives with cost saving opportunities and 1 design suggestion for consideration by the owner and designer. These alternatives and design suggestions address the key issues described above and are detailed in the remainder of this section of the report. The alternatives with the greatest potential to impact the project are highlighted below.

At the request of the local authorities, the SR 49 project was extended from west of the Horace Veal Road/Allen Memorial Drive intersection to west of the Felton Drive intersection. However, a letter from the traffic engineer in 2002 indicated that the modification of the Felton Drive intersection was not needed. Accident data from 2007, 2008 and 2009 support this conclusion. Thus Alt. No. G-1 suggests revisiting whether the project should stop west of the Horace Veal Road/Allen Memorial Drive intersection to save approximately $1.1 million.

The sidewalk on the south side of SR 49 is being extended east from US 441/SR 29, across the existing bridge over Fishing Creek and on to Lake Drive. This requires removing the existing bridge edge barrier and replacing it with a new straight barrier with a 6-ft. 5-in.-wide concrete sidewalk. A

sidewalk exists on the north side of the existing bridge. Alt. No. S-1 suggests not building the sidewalk on the south side and not modifying the bridge to save about $367,000.

Currently, 12-ft.-wide lanes are used throughout the project. In Alt. No. R-2, 11-ft.-wide lanes are proposed where the typical section consists of two 12-ft.-wide lanes in each direction separated by a 14-ft.-wide flush median. With bicycle lanes and a 2-ft.-wide gutter pan adjacent to the outside lanes and the flush median adjacent to the inside lane, 11-ft.-wide lanes in this area will not lead to additional accidents. About $245,000 could be saved by implementing this change.

Alt. No. ROW-3/ROW-4 shows how some right-of-way acquisitions can be avoided by revising the shoulder to slope away from the pavement thus reducing the fill height and extension into adjacent properties. In addition, there will be some minor fill material cost savings.

The current plan is to revise the vertical profile of SR 49 between Allenwood Drive and US 441/SR 29 to correct a design deficiency for a road with a 45 mile per hour design speed by lowering the grade about 5 ft., which requires staged construction. If this is not done as suggested in Alt. No. E-1, a design exception would have to be obtained. However, the VE team believes that, in this location, the risk is low and this should be considered. Alternatively, Alt. No. E-2 suggests that the grade be raised in this area to correct the deficiency as well as benefit the grades for driveways that intersect with the road.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

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

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

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

SUMMARY OF POTENTIAL COST SAVINGS

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NH000-0089-01(026) Baldwin County

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RIGHT-OF-WAY						
ROW-3/ ROW-4	Modify shoulders and slopes to reduce right-of-way impacts	$235,000	$0	$235,000		$235,000
ROADWAY						
R-1	Reduce the extent of driveway reconstruction	$24,000	$0	$24,000		$24,000
R-2	Reduce lane widths to 11 ft. wide between Horace Veal Drive/Allen Memorial Drive and US 441/SR 29	$245,000	$0	$245,000		$245,000
R-3	Retain existing bridge approach slabs and overlay approach slabs with an asphalt overlay	$64,000	$2,000	$62,000		$62,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **G-1**

DESCRIPTION: **START THE PROJECT WEST OF THE HORACE VEAL/ ALLEN MEMORIAL DRIVE INTERSECTION AT APPROXIMATELY STATION 412+00**

SHEET NO.: **1 of 8**

ORIGINAL DESIGN: (sketch attached)

The start of the project is at Station 391+73.56 west of the Felton Drive intersection with SR 49.

ALTERNATIVE: (sketch attached)

Begin the project at approximately Station 412+00.

ADVANTAGES:

- Reduces right-of-way acquisitions
- Shortens construction time
- Reduces disruption to the area

DISADVANTAGES:

- A dedicated left turn from SR 49 to Felton Drive is eliminated
- A dedicated eastbound right turn lane is eliminated, however there are two eastbound lanes in this location

DISCUSSION:

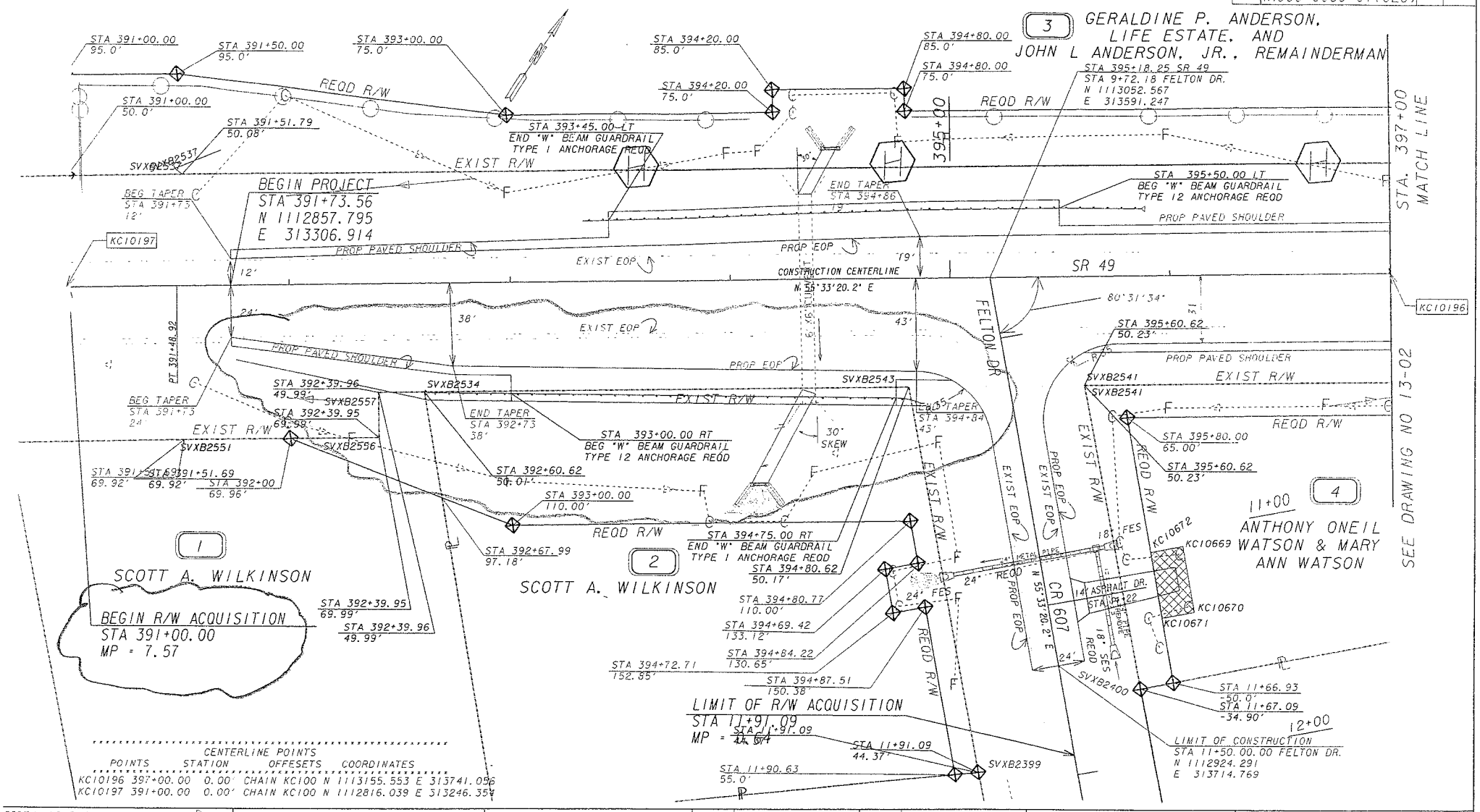
The original end of the project was at approximately Station 412+00, but it was extended in 2002. However, a letter from the District Traffic Officer, dated February 20, 2002, said "We have not been able to determine that restriping State Route 49 from the existing eastbound passing lane configuration to add a westbound left turn lane would improve the overall safety and/or operation of this intersection. We do not recommend this change."

Accident data for the years 2007, 2008, and 2009 indicate 7, 4 and 5 accidents respectively involving multiple vehicles at this location, which compares favorably to previous data supporting no new construction in this area.

Projected traffic data for 2034 shows 175 average daily westbound left turns and 20 peak hour left turns, which is not a large number. Thus we suggest returning the project to its original start point to save significant costs and reduce construction time and disruption to the area.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 1,100,000	—	$ 1,100,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 1,100,000	—	$ 1,100,000

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
G.A.	WH000-0089-01(026)		



DO NOT CONST.

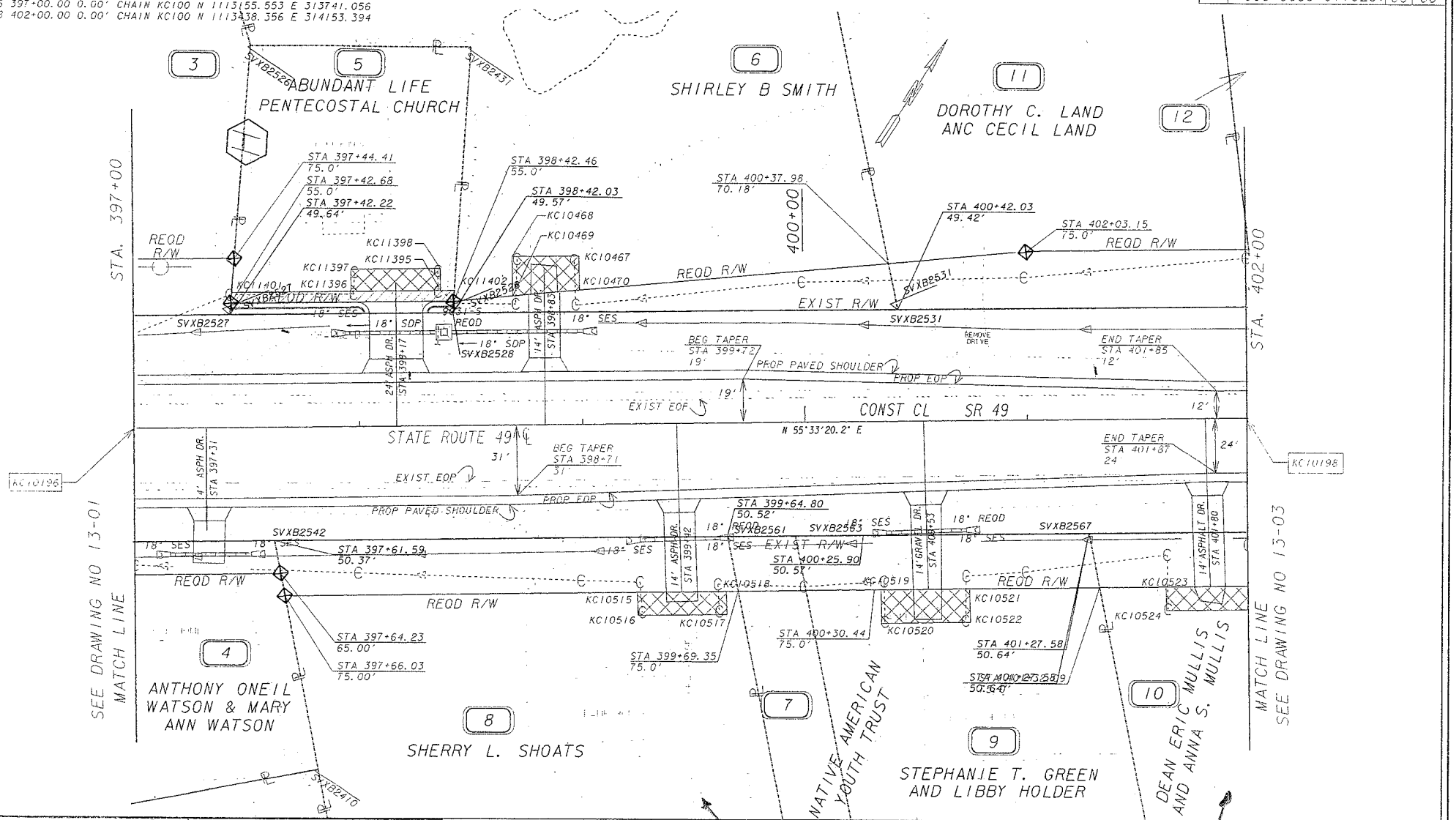
AS DESIGNED / ALTERNATIVE

ALT. No. G-1 Sht. 2 of 8

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

CENTERLINE POINTS

TS	STATION	OFFSETS	COORDINATES
196	397+00.00	0.00'	CHAIN KC100 N 1113155.553 E 313741.056
198	402+00.00	0.00'	CHAIN KC100 N 1113338.356 E 314153.394



AND EXISTING R/W LINE ---------- BEGIN LIMIT OF ACCESS.....BLA

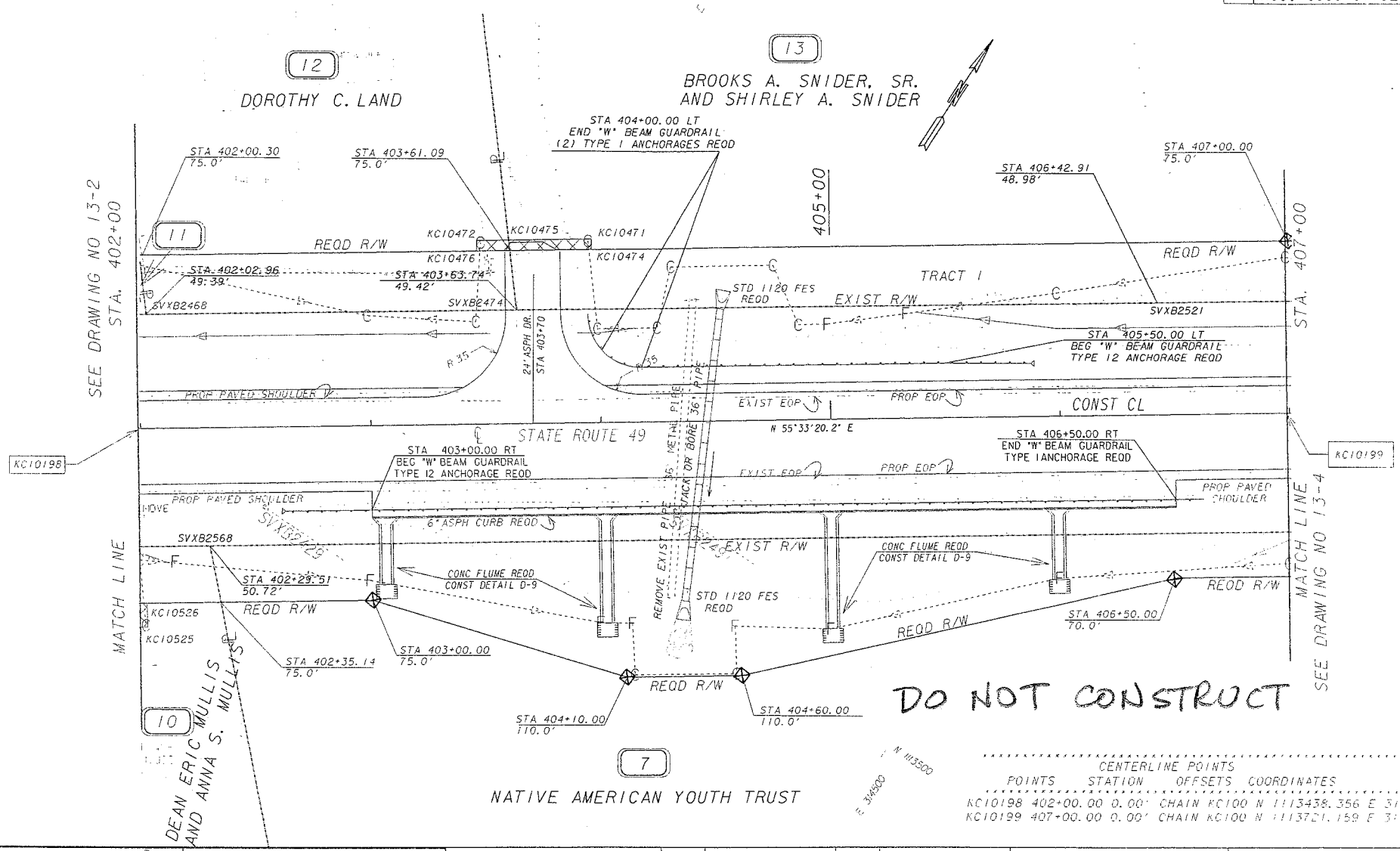
DATE	REVISIONS	DATE	REVISIONS

DO NOT CONST.

AS DESIGNED / ALTERNATIVE

ALT. NO. G-1 SHT. 3 of 8

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	WH000-0089-01(026)	00	00



DO NOT CONSTRUCT

CENTERLINE POINTS

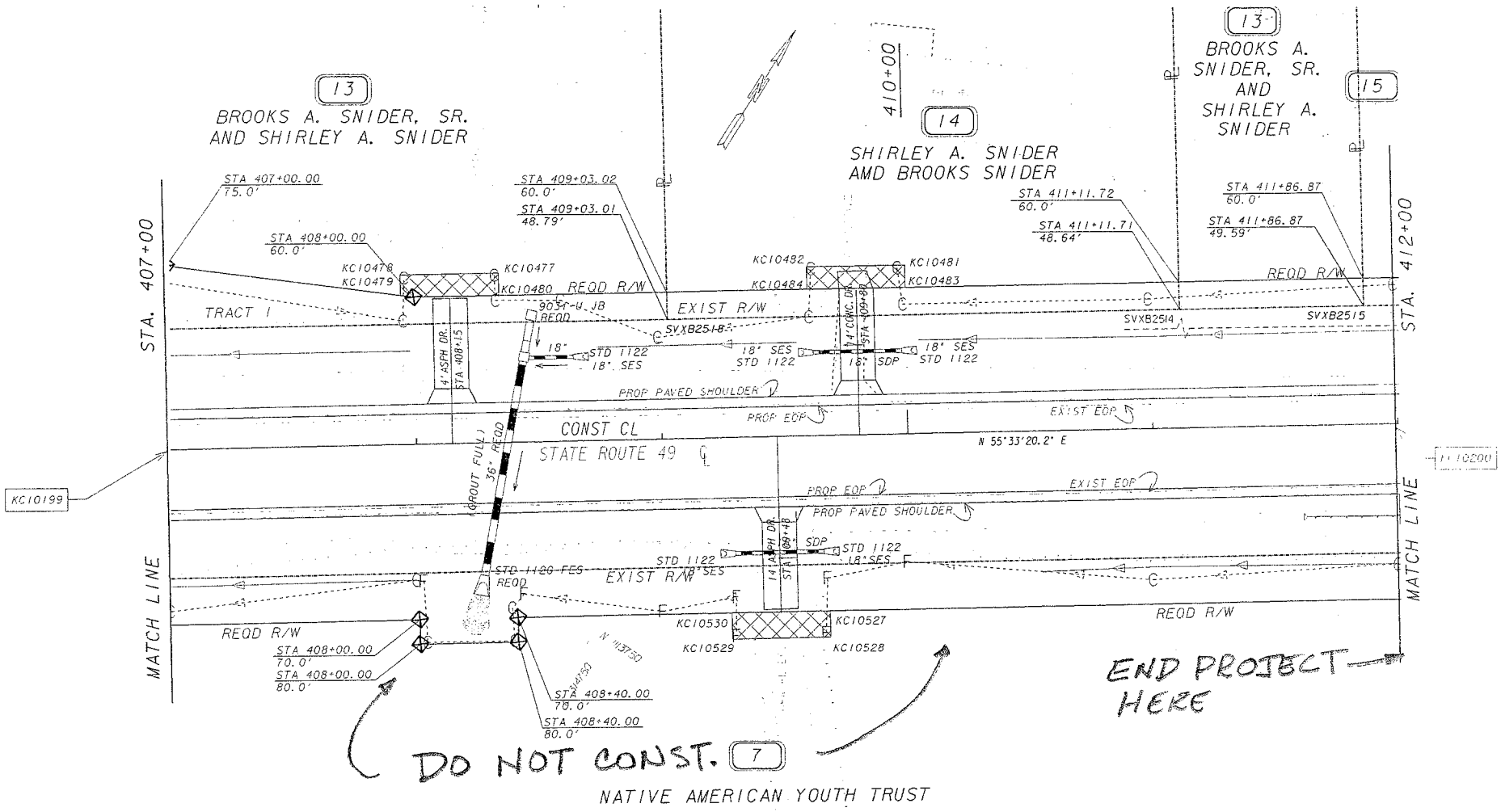
POINTS	STATION	OFFSETS	COORDINATES
KC10198	402+00.00	0.00'	CHAIN KC100 N 1113438.356 E 314153.394
KC10199	407+00.00	0.00'	CHAIN KC100 N 1113721.159 E 314565.732

Y AND EXISTING R/W LINE ----℄---- | BEGIN LIMIT OF ACCESS.....BLA | DATE | REVISIONS | DATE | REVISIONS | GEORGIA

AS DESIGNED/ALTERNATIVE

ALT. No. 5-1
Sht 4 of 8

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)		



CENTERLINE POINTS

POINTS STATION OFFSET COORDINATES

KC10199 407+00.00 0.00 CHAIN KC100 N 1113721.159 E 314555.732

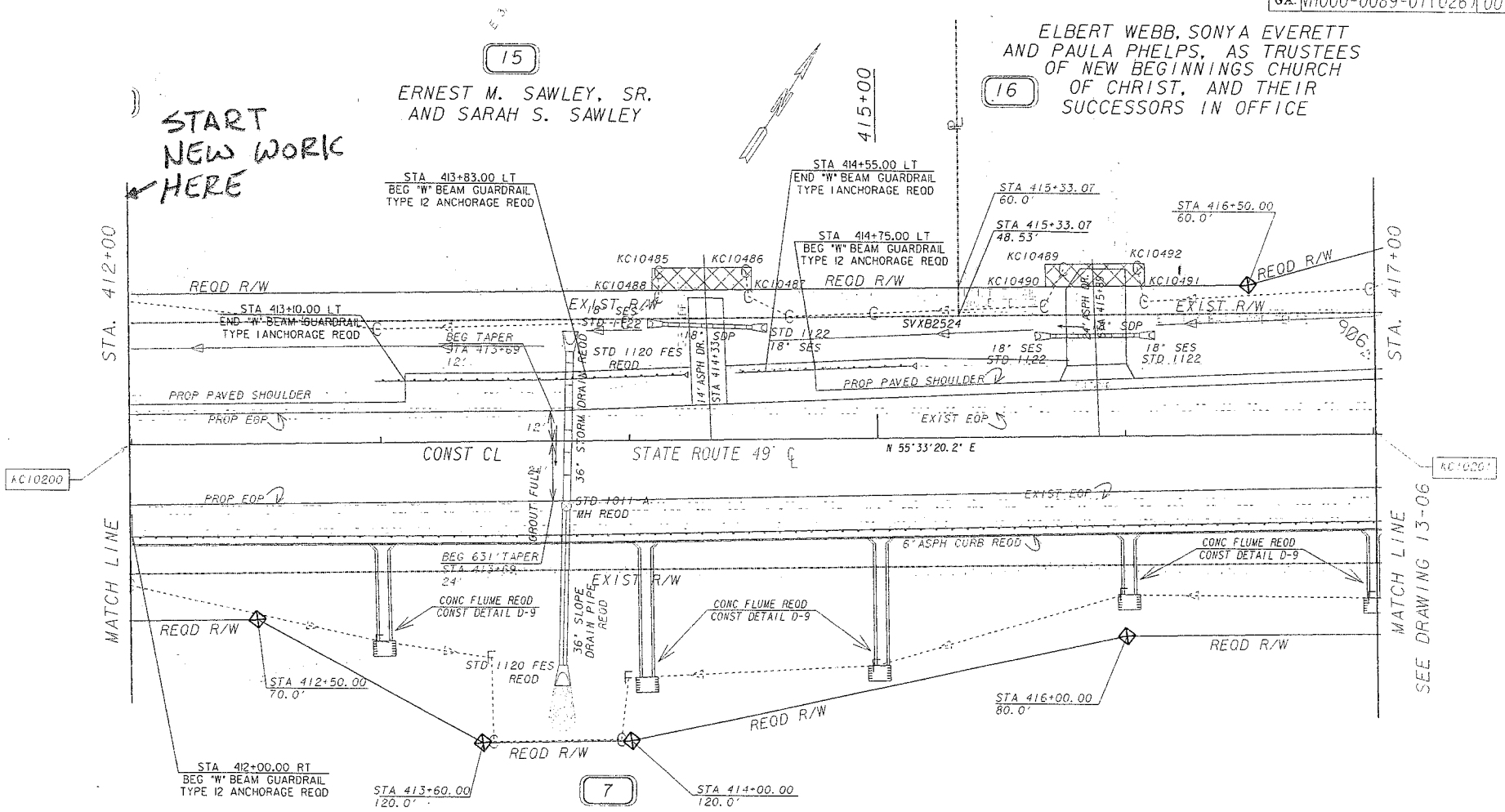
KC10200 412+00.00 0.00' CHAIN KC100 N 1114003.962 E 314978.069

TY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS.....BLA	SCALE IN FEET	DATE	REVISIONS	DATE	REVISIONS	GEORGIA DEPARTMENT OF TRANSPORTATION CONSTRUCTION PLAN
D R/W LINE	END LIMIT OF ACCESS.....ELA						
	LIMIT OF ACCESS						

AS DESIGNED / ALTERNATIVE

ALT. NO. G-1 Sht 5 of 8

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10200	412+00.00	0.00'	CHAIN KC100 N 1114003.962 E 314978.069
KC10201	417+00.00	0.00'	CHAIN KC100 N 1114286.765 E 315390.407

AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ... BLA
R/W LINE	END LIMIT OF ACCESS ... ELA
ICTION LIMITS	LIMIT OF ACCESS
IT FOR CONSTR	REQUIRED R/W AND LIMIT OF ACCESS
TENANCE OF SLOPES	

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

AS DESIGNED / ALTERNATIVE

ALT. NO. 9-1
SHT. 6 of 8

ACCIDENT DATA 2007 - 2009

Accident No	Date	Time	County	Route Type	Route	Milelog	Intersecting Rt Type	Intersecting Rt	Vehicle Analysis 1											
									Injuries	Fatalities	Collision	Location of Impact	Harmful Event	Light	Surface	DirVeh1	DirVeh2	MnvrVeh1	MnvrVeh2
'75670217	10/21/2007	8:57 PM	Baldwin	State Route	'004900	7.65	2	'009900	0	0	Not A Collision With A Motor Vehicle	On Roadway	Deer	Dark-Not Lighted	Dry	E		Straight	
'70850423	1/5/2007	4:00 PM	Baldwin	State Route	'004900	7.65	2	'009900	1	0	Rear End	On Roadway	Motor Vehicle in Motion	Daylight	Wet	W	W	Turning Left	Straight
'70930394	2/7/2007	6:32 PM	Baldwin	State Route	'004900	7.65	2	'009900	2	0	Angle	On Roadway	Motor Vehicle in Motion	Dusk	Dry	N	E	Straight	Straight
'76010514	12/30/2007	8:07 AM	Baldwin	State Route	'004900	7.65	2	'009900	2	0	Angle	On Roadway	Motor Vehicle in Motion	Daylight	Wet	W	N	Turning Left	Straight
'73050082	6/27/2007	5:32 PM	Baldwin	State Route	'004900	7.65	2	'009900	3	0	Angle	On Roadway	Motor Vehicle in Motion	Daylight	Dry	W	S	Turning Left	Straight
'75700672	11/2/2007	3:43 PM	Baldwin	State Route	'004900	7.65	2	'009900	0	0	Angle	On Roadway	Motor Vehicle in Motion	Daylight	Dry	W	S	Turning Left	Turning Left
'71930045	3/28/2007	1:26 PM	Baldwin	State Route	'004900	7.65	2	'009900	0	0	Not A Collision With A Motor Vehicle	On Roadway	Animal	Daylight	Dry	S		Straight	
'73050035	5/31/2007	11:38 PM	Baldwin	State Route	'004900	7.65	2	'009900	1	0	Angle	On Roadway	Motor Vehicle in Motion	Dark-Not Lighted	Dry	E	N	Turning Right	Stopped
'73050057	6/8/2007	6:08 PM	Baldwin	State Route	'004900	7.65	2	'009900	1	0	Angle	On Roadway	Motor Vehicle in Motion	Daylight	Dry	S	W	Negotiating a Curve	Negotiating a Curve
'80880296	1/12/2008	10:23 PM	Baldwin	State Route	'004900	7.65	2	'009900	3	0	Angle	On Roadway	Motor Vehicle in Motion	Dark-Not Lighted	Dry	E	E	Turning Right	Straight
'80880305	1/26/2008	6:33 AM	Baldwin	State Route	'004900	7.65	2	'009900	0	0	Not A Collision With A Motor Vehicle	On Roadway	Deer	Dark-Not Lighted	Dry	S		Straight	
'82480516	5/27/2008	9:47 AM	Baldwin	State Route	'004900	7.65	2	'009900	1	0	Angle	On Roadway	Motor Vehicle in Motion	Daylight	Dry	E	S	Turning Right	Negotiating a Curve
'84700432	10/9/2008	8:04 AM	Baldwin	State Route	'004900	7.65	2	'009900	1	0	Rear End	On Roadway	Motor Vehicle in Motion	Daylight	Wet	S	S	Straight	Stopped
'85280293	11/2/2008	9:50 PM	Baldwin	State Route	'004900	7.65	2	'009900	0	0	Not A Collision With A Motor Vehicle	On Roadway	Deer	Dark-Not Lighted	Dry	E		Straight	
'85660374	12/12/2008	10:50 AM	Baldwin	State Route	'004900	7.65	2	'009900	0	0	Angle	On Roadway	Motor Vehicle in Motion	Daylight	Dry	W	N	Straight	Straight
'90920478	2/28/2009	3:53 PM	Baldwin	State Route	'004900	7.65	2	'009900	2	0	Rear End	On Roadway	Motor Vehicle in Motion	Daylight	Wet	S	S	Stopped	Straight
'92380048	5/9/2009	1:12 PM	Baldwin	State Route	'004900	7.65	2	'009900	0	0	Sideswipe - Same Direction	On Roadway	Motor Vehicle in Motion	Daylight	Dry	W	W	Straight	Passing
'94750125	10/12/2009	10:31 PM	Baldwin	State Route	'004900	7.65	2	'009900	1	0	Not A Collision With A Motor Vehicle	Off Roadway	Ditch	Dark-Not Lighted	Wet	N		Negotiating a Curve	
'91800103	2/1/2009	7:43 PM	Baldwin	State Route	'004900	7.65	2	'009900	2	0	Angle	On Roadway	Motor Vehicle in Motion	Dark-Not Lighted	Dry	S	N	Turning Left	Straight
'93620521	7/2/2009	12:40 PM	Baldwin	State Route	'004900	7.66			0	0	Angle	On Roadway	Motor Vehicle in Motion	Daylight	Dry	W	W	Making U-Turn	Negotiating a Curve
'93620533	7/15/2009	5:20 PM	Baldwin	State Route	'004900	7.66			0	0	Rear End	On Roadway	Motor Vehicle in Motion	Daylight	Dry	S	S	Straight	Stopped

YEAR	2007	9 accidents	2 animals	7 vehicles
	2008	6 accidents	2 animals	4 vehicles
	2009	6 accidents	1 ditch	5 vehicles

ALT. NO.
G-1
SHT. 7 of 8

CALCULATIONS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **G-1**

SHEET NO.: **8 of 8**

Total Cost of Project:	$7,666,769 (including right of way)
Bridge Work:	345,500
Roadway Work:	$7,321,269
Roadway Length:	2.688 miles = 14,193 ft.
Average Cost Per Foot:	$7,321,269/14,193 ft. = $515.84/ft.
Feet of Project Reduced:	Station 412+86
	Station 391+74
	21+12
Cost Savings:	2,112 ft. x $515.84/ft. = $1,089,454 Rounded = $1,100,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **ROW-3/ROW-4**

DESCRIPTION: **MODIFY SHOULDERS AND SLOPES TO REDUCE RIGHT-OF-WAY IMPACTS**

SHEET NO.: **1 of 13**

ORIGINAL DESIGN: (sketch attached)

The original design indicates the use of the typical shoulder and front slopes for construction.

ALTERNATIVE: (sketch attached)

Use shoulders with a -2% slope and vary the front and back slopes to reduce impacts to adjacent property owners.

ADVANTAGES:

- Reduces costs (material and labor)
- Eliminates and reduces required right-of-way
- Reduces construction schedule

DISADVANTAGES:

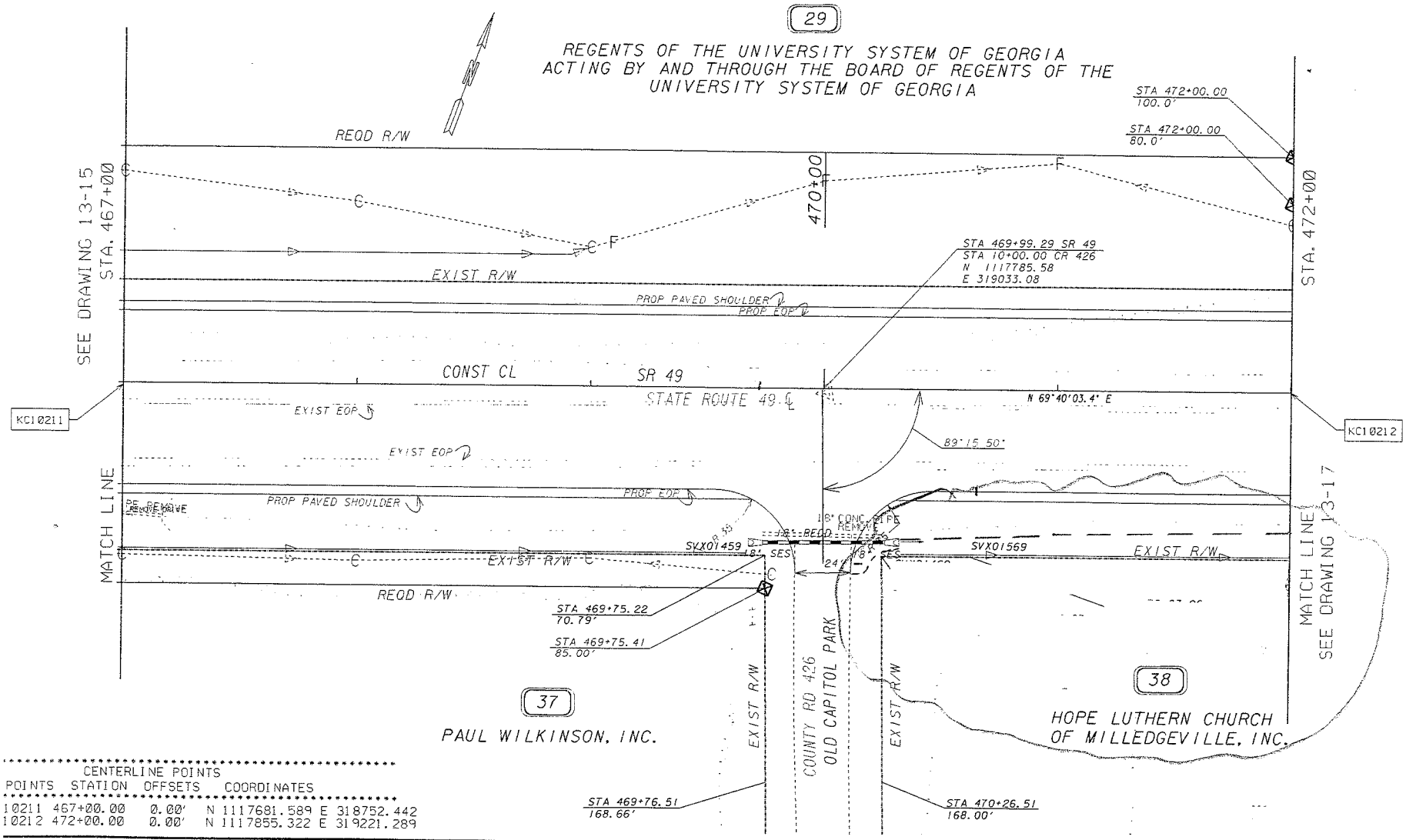
- None apparent

DISCUSSION:

This approach will help in reducing right-of-way costs, property impacts and improve design through the corridor for the public. It will also help to reduce earthwork for cut and fill areas and possibly save existing fencing along the route.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 235,000	—	$ 235,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 235,000	—	$ 235,000

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
10211	467+00.00	0.00'	N 1117681.589 E 318752.442
10212	472+00.00	0.00'	N 1117855.322 E 319221.289

RTY AND EXISTING R/W LINE
ED R/W LINE
RUCTION LIMITS
ENT FOR CONSTR
INTENANCE OF SLOPES
ENT FOR CONSTR OF SLOPES

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

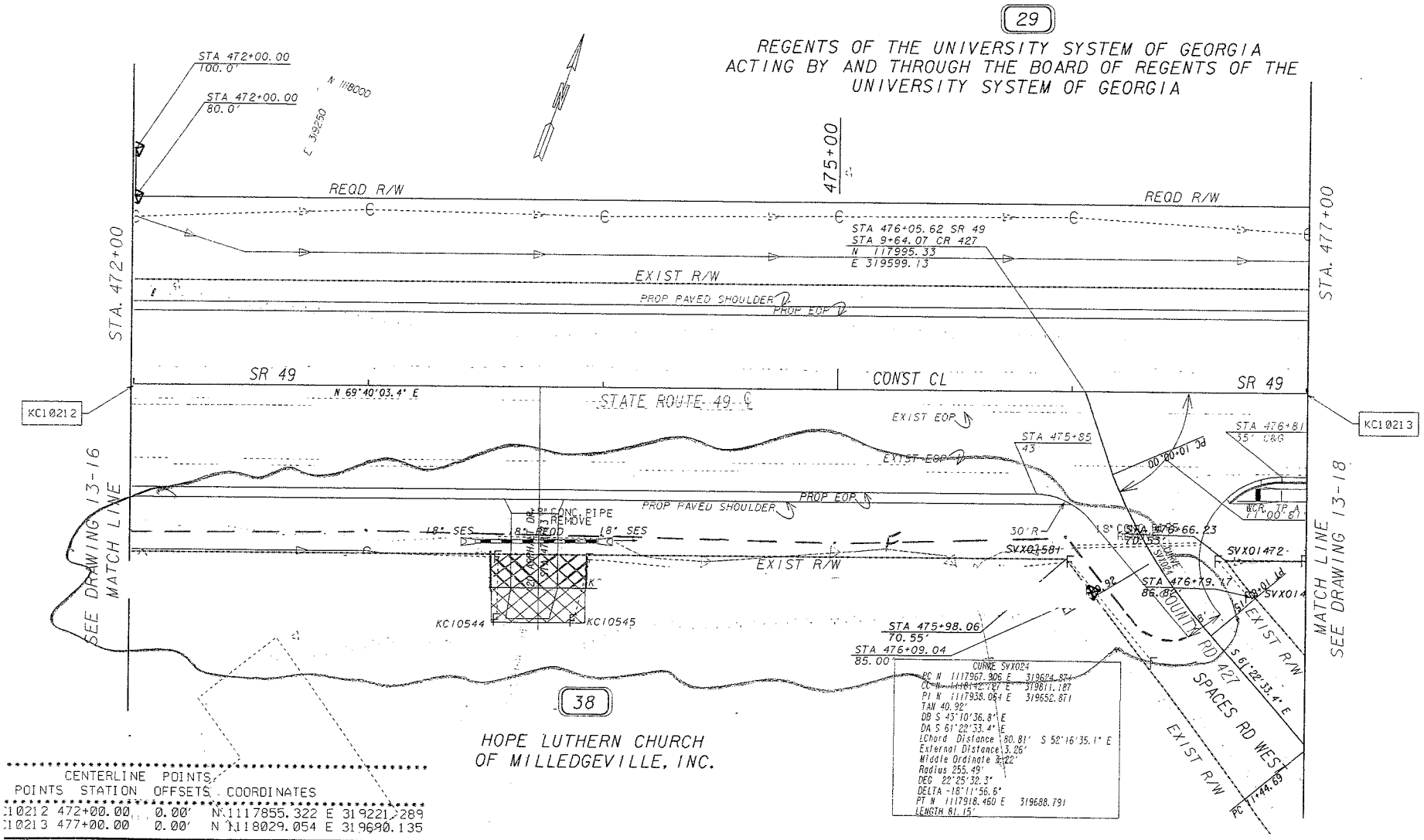
GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

SR 49

ALTERNATIVE

ALT. No. ROW-3/ROW-1
Sht. 2 of 13

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
C10212	472+00.00	0.00'	N 1117855.322 E 319221.289
C10213	477+00.00	0.00'	N 1118029.054 E 319690.135

PERTY AND EXISTING R/W LINE
IRED R/W LINE
TRUCTION LIMITS
MENT FOR CONSTR
MAINTENANCE OF SLOPES

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

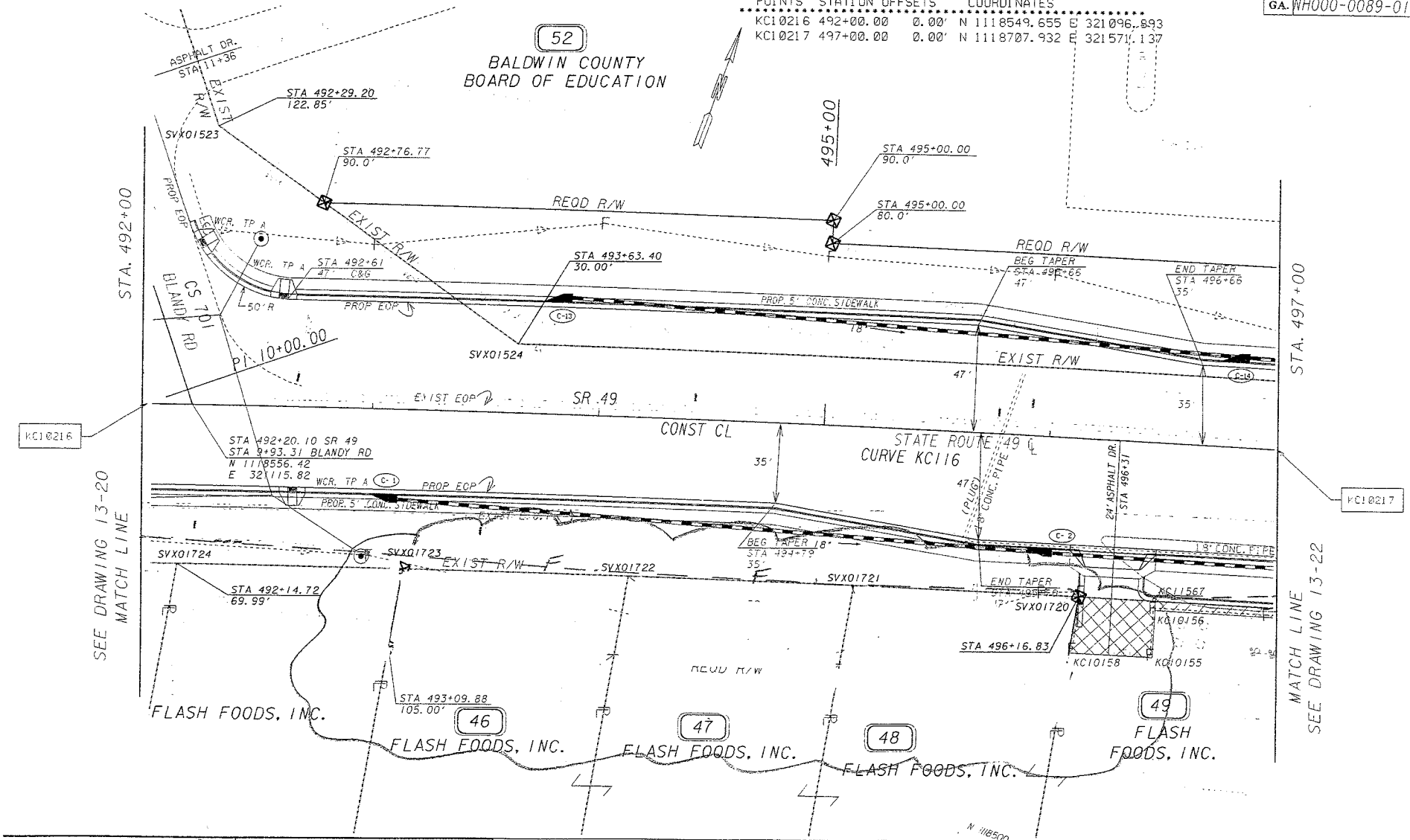
ALT. NO. Row-3/Row-4
Sht. 3 of 13

ALTERNATIVE

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	WH000-0089-01(026)	00	00

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10216	492+00.00	0.00'	N 1118549.655 E 321096.893
KC10217	497+00.00	0.00'	N 1118707.932 E 321571.137



PERTY AND EXISTING R/W LINE
UIRED R/W LINE
STRUCTION LIMITS
EMENT FOR CONSTR
MAINTENANCE OF SLOPES

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

ALTERNATIVE

ALT. No. Row-3/Row-4
Sht. 4 of 13

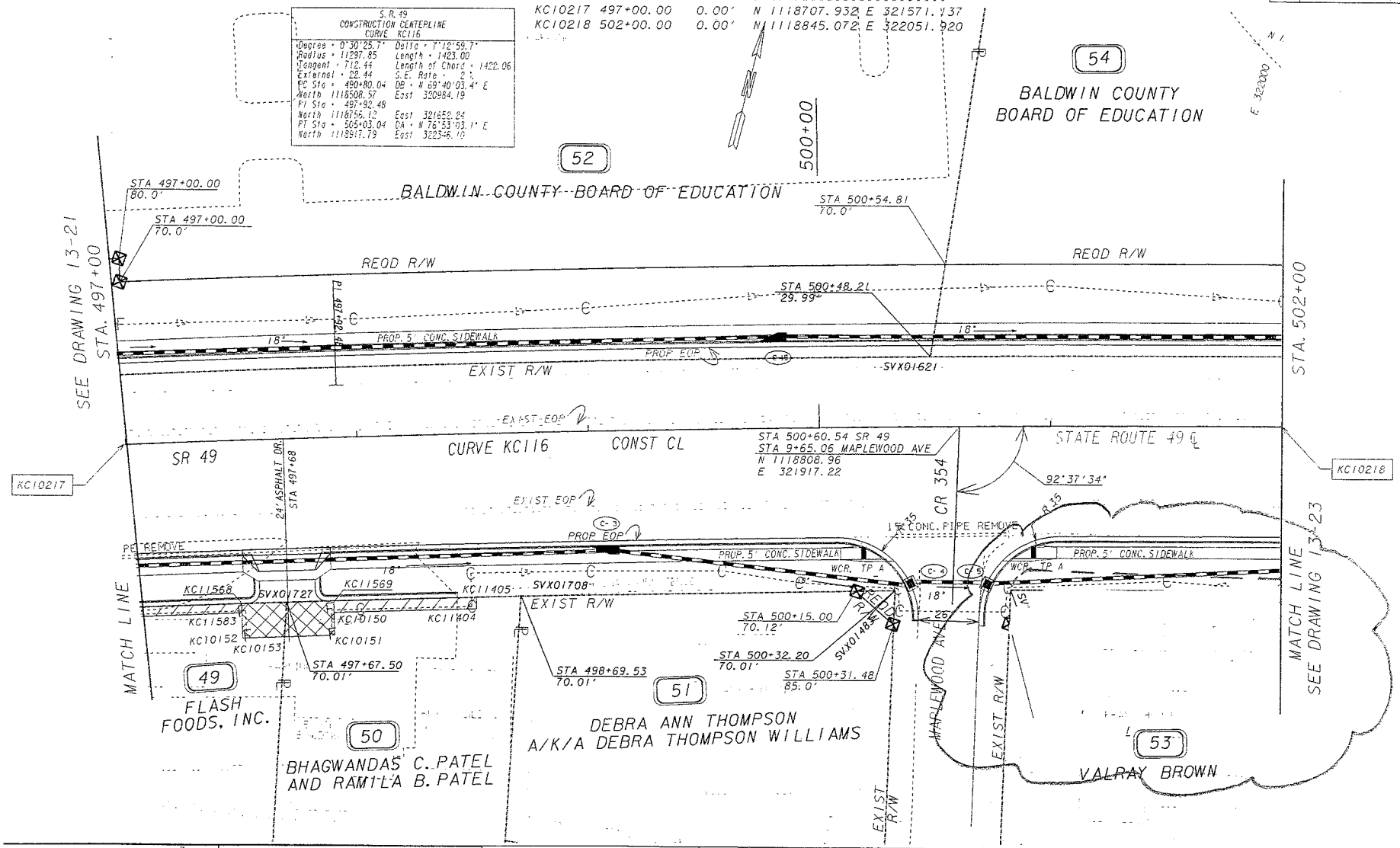
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10217	497+00.00	0.00'	N 1118707.932 E 321571.137
KC10218	502+00.00	0.00'	N 1118845.072 E 322051.920

S.R. 49
CONSTRUCTION CENTERLINE
CURVE KC116

Degree = 0°30'25.7"	Delta = 7°12'59.7"
Radius = 11297.85	Length = 1423.00
Tangent = 712.44	Length of Chord = 1422.06
External = 22.44	S.E. Rate = 0 %
PC Sta = 490+80.04	DB = N 69°40'03.4" E
North 1118508.57	East 320984.19
PI Sta = 497+92.48	
North 1118755.12	East 321659.84
PT Sta = 505+03.04	DA = N 76°53'03.1" E
North 1118917.79	East 322546.10



Y AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS	BLA
R/W LINE	END LIMIT OF ACCESS	ELA
ICTION LIMITS	LIMIT OF ACCESS	
IT FOR CONSTR	REQUIRED R/W AND LIMIT OF ACCESS	
TENANCE OF SLOPES		

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

ALTERNATIVE

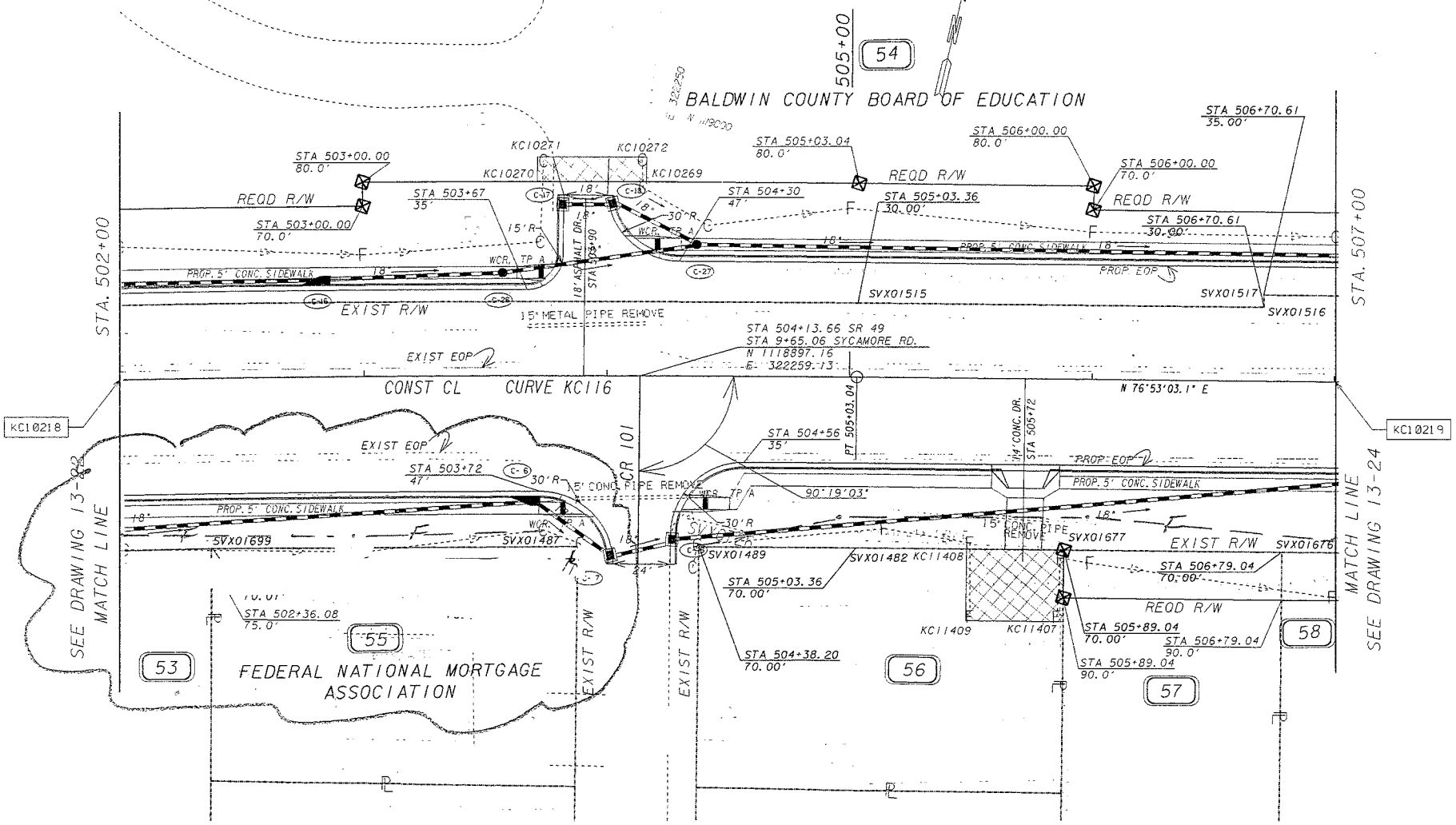
ALT. No. ROW-3/ROW-4
Sht. 5 of 13

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

NOTE:
DO NOT DISTURB DRAINAGE SYSTEM
OF THE BALDWIN COUNTY SCHOOL DURING CONSTR.

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10218	502+00.00	0.00'	CHAIN KC100 N 1118845.072 E 322051.920
KC10219	507+00.00	0.00'	CHAIN KC100 N 1118962.482 E 322537.919



PERTY AND EXISTING R/W LINE
UIRED R/W LINE
STRUCTION LIMITS
EMENT FOR CONSTR
MAINTENANCE OF SLOPES
EMENT FOR CONSTR OF SLOPES

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN
SR 49

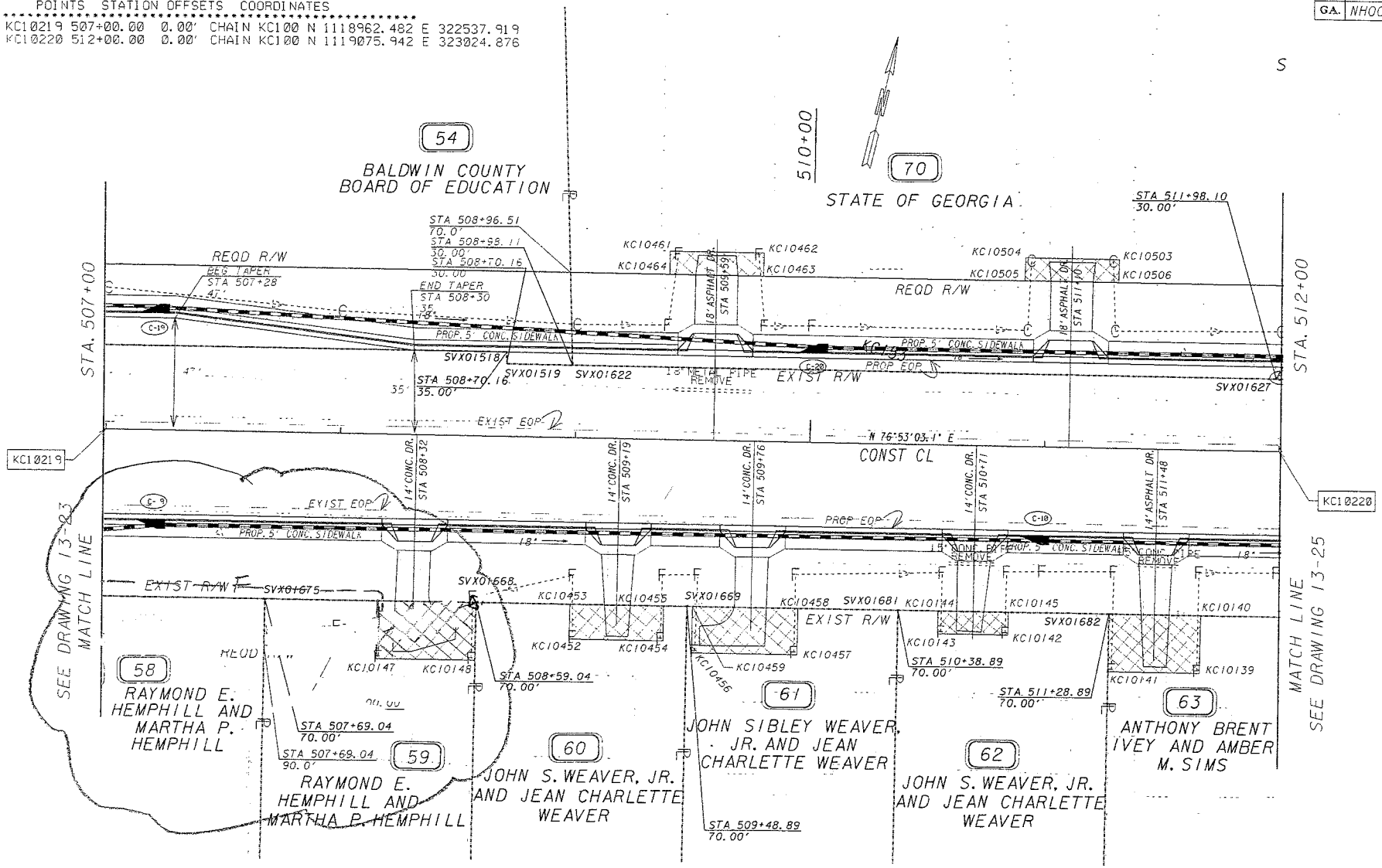
ALTERNATIVE

ALT. NO. Row-3/Row-4
Sht. 6 of 13

STATE	PROJECT NUMBER	SHEET NO.	TOT SHE
GA.	NH000-0089-01(026)	00	0

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10219	507+00.00	0.00'	CHAIN KC100 N 1118962.482 E 322537.919
KC10220	512+00.00	0.00'	CHAIN KC100 N 1119075.942 E 323024.876



PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS	BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS	ELA
CONSTRUCTION LIMITS	LIMIT OF ACCESS	
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	REQUIRED R/W AND LIMIT OF ACCESS	

SCALE IN FEET 0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

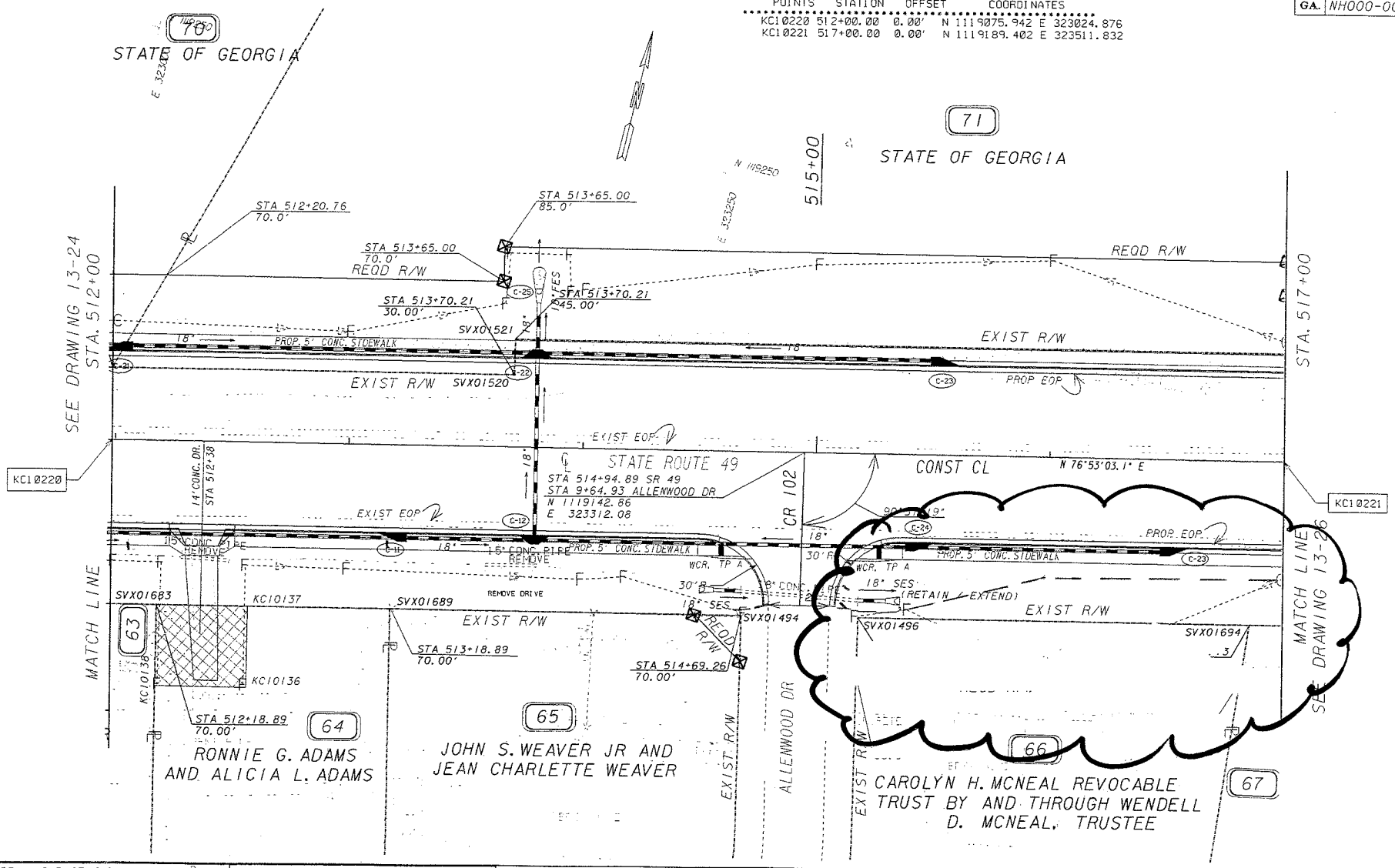
GEORGIA DEPARTMENT OF TRANSPORTATIO
CONSTRUCTION PLAN

ALT. NO. ROW-3/ROW-4 SHT. 9 of 13

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

CENTERLINE POINTS

POINTS	STATION	OFFSET	COORDINATES
KC10220	512+00.00	0.00'	N 1119075.942 E 323024.876
KC10221	517+00.00	0.00'	N 1119189.402 E 323511.832



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

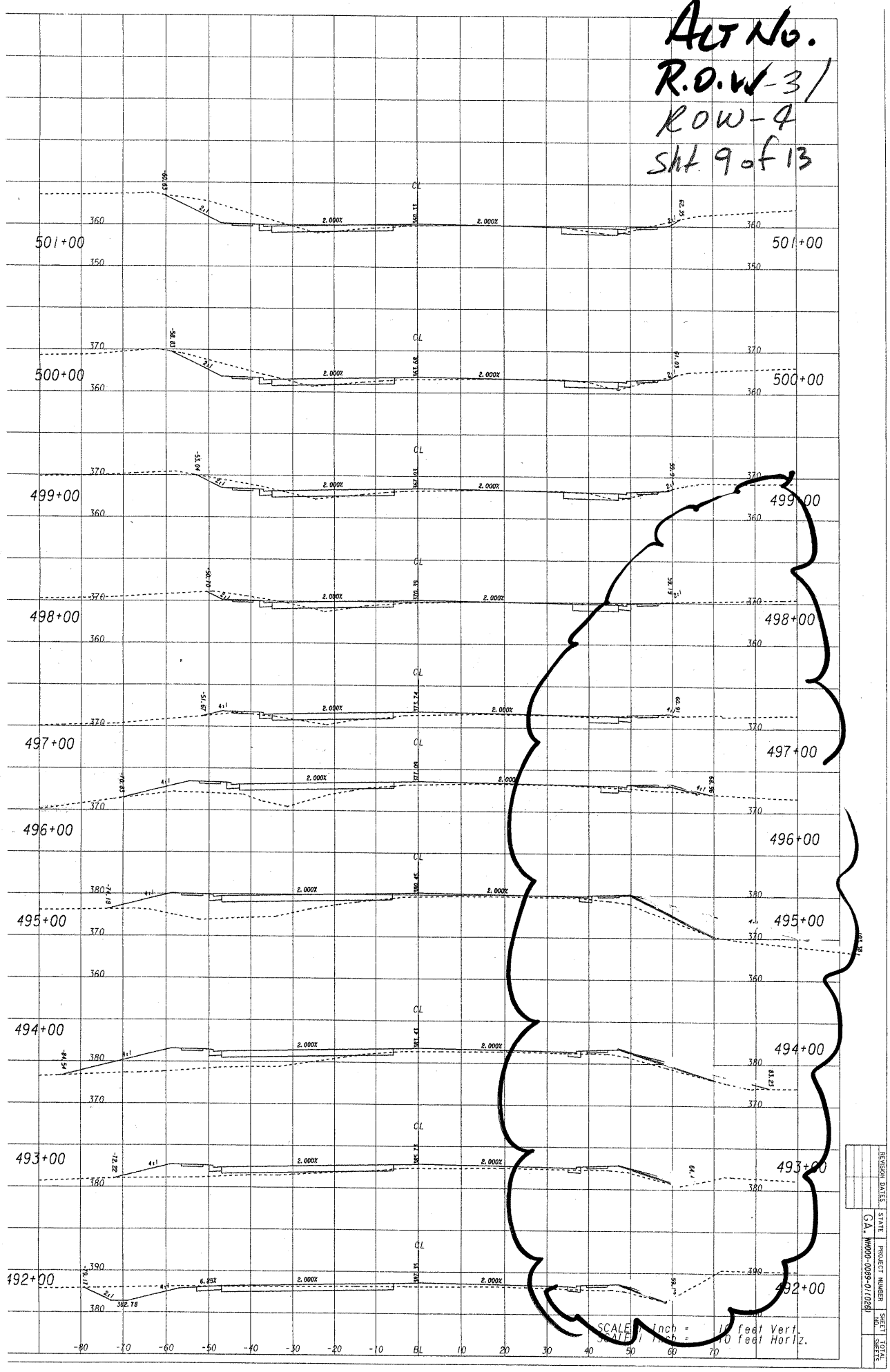
BEGIN LIMIT OF ACCESS ..... BLA
END LIMIT OF ACCESS ..... ELA
LIMIT OF ACCESS
REQUIRED R/W AND LIMIT OF ACCESS

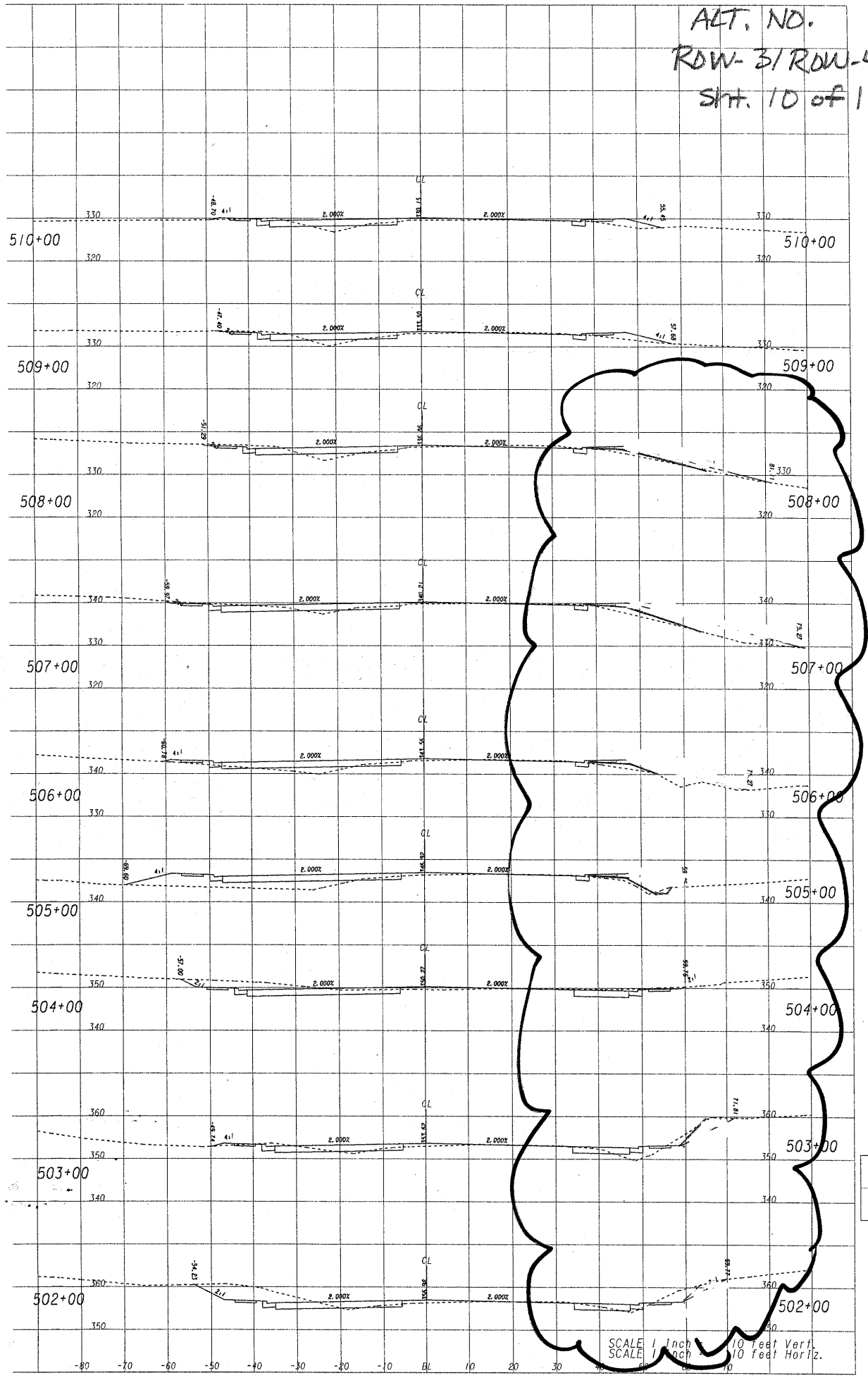
SCALE IN FEET
0 20 40 80

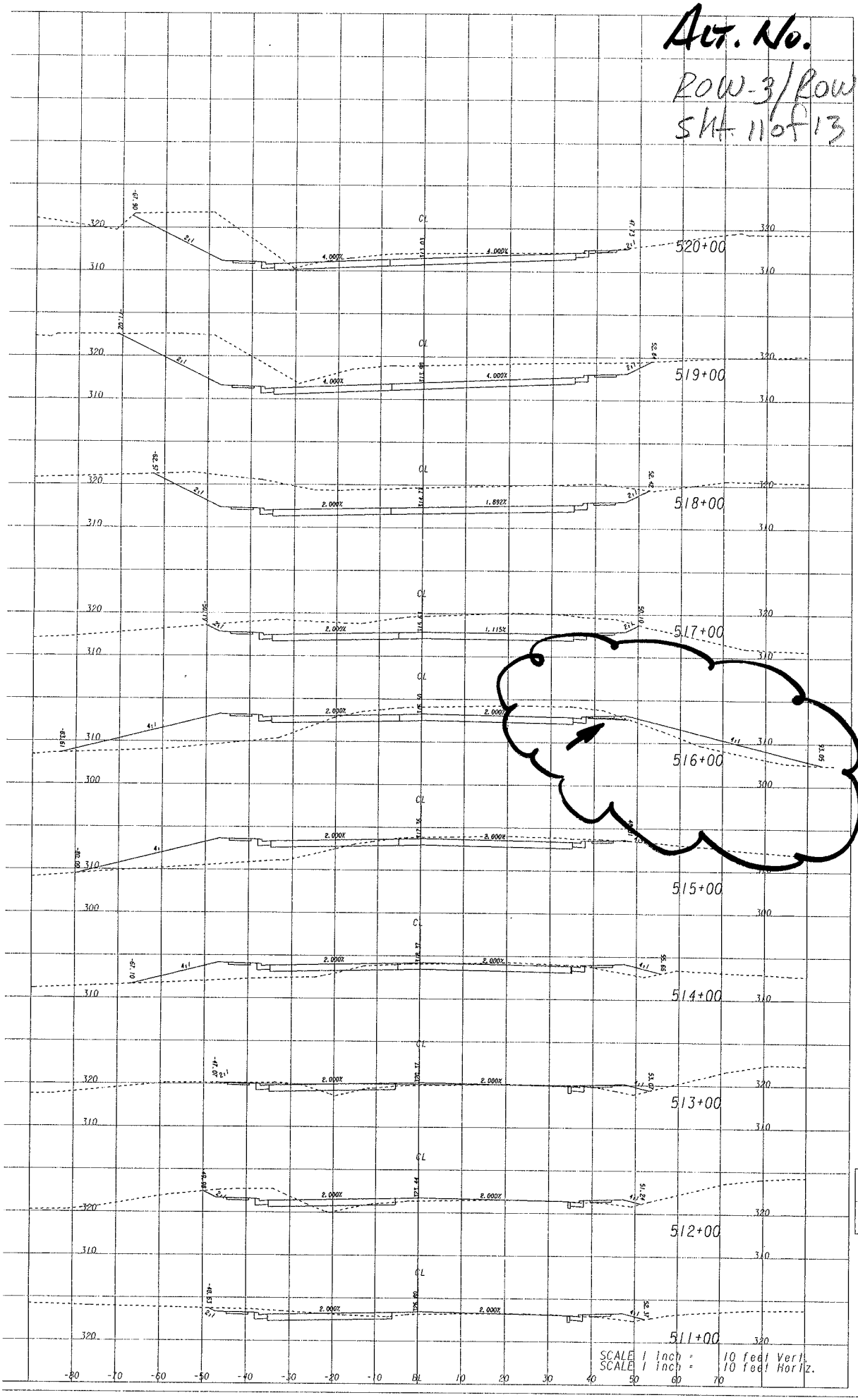
DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

ALT. NO. Row-3/Row-4
Sht 8 of 13


ALT NO.
R.O.W-3/
ROW-4
Sht 9 of 13
501+00
500+00
499+00
498+00
497+00
496+00
495+00
494+00
493+00
492+00
CL
2.000%
6.25%
382.78
SCALE: 1 inch = 10 feet Vert.
1 inch = 10 feet Horiz.
REVISION DATES
STATE
GA.
PROJECT NUMBER
M0000-0089-01(029)
SHEET NO.
TOTAL SHEETS


ALT. NO.
ROW-3/ROW-4
Sht. 10 of 13
510+00
509+00
508+00
507+00
506+00
505+00
504+00
503+00
502+00
CL
2.000%
SCALE 1 Inch = 10 feet Vert.
SCALE 1 Inch = 10 feet Horiz.
REVISION DATES
STATE
PROJECT NUMBER
SHEET NO.
TOTAL SHEETS
GA.
WH000-0089-01(026)


Alt. No.
ROW-3/ROW-4
Sht. 11 of 13
520+00
519+00
518+00
517+00
516+00
515+00
514+00
513+00
512+00
511+00
CL
4.000%
2.000%
1.892%
1.115%
SCALE 1 inch = 10 feet Vert.
SCALE 1 inch = 10 feet Horiz.
REVISION DATES
STATE
PROJECT NUMBER
SHEET NO.
TOTAL SHEETS
GAH000-0089-011026)

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **ROW-3/ROW-4**

SHEET NO.: **12 of 13**

Right-of-Way Reductions:

A factor of 2 is used to determine the anticipated costs of right-of-way at the time of the project purchase date.

Shoulder & Slope Changes for Parcel No. 38 (Hope Lutheran Church) Sta. 471+00 to STA. 476+00 RT.
Eliminate ROW at Hope Lutheran Church Sta. 470+25.22 to Sta. 476+09.04:
$23,210 x 2 = $46,420 + $12,000 (Replace Fence) = **$58,420**

Shoulder & Slope Changes for Parcel's 46, 47 & 48 (Flash Foods, Inc.) Sta. 492+00 to STA. 497+00 RT.
Eliminate ROW
Parcel 46
$1,429 x 2 = **$2,858**

Parcel 47
$1,429 x 2 = **$2,858**

Parcel 48
$22,125 x 2 = $44,250 + $12,210 (Damages) = **$56,460**

Shoulder & Slope Changes for Parcel's 57, 58 & 59 Sta. 501+00 to STA. 508+00 RT.
Eliminate ROW

Parcel 57 - Donald J. Rouk
$5,536 x 2 = **$11,072**

Parcel 58 – Raymond E. Hemphill and Martha P. Hemphill
$15,058 x 2 = $30,116 + $9,522 (Damages) = **$39,638**

Parcel 59 - Raymond E. Hemphill and Martha P. Hemphill
$5,536 x 2 = **$11,072**

Shoulder & Slope Changes for Parcel No. 66 (Carolyn H. McNeal) Sta. 515+00 to STA. 517+00 RT.
Eliminate ROW

Parcel 59 - Carolyn H. McNeal
$18,136 x 2 = $36,272 + $16,440 (Damages) = **$52,712**

Total Amount = $235,090

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia
MODIFY SHOULDERS AND SLOPES (2:1 VARYING) AND PROVIDE GUARDRAIL TO REDUCE RIGHT-OF-WAY

ALTERNATIVE NO.: **ROW-3/ROW-4**

SHEET NO.: **13 of 13**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
ROW Reduction Costs Modifications				235,090			
See Calculation Sheet							
Subtotal				235,090			
Markup (%) at							
TOTAL				235,090			
TOTAL (ROUNDED)				235,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-1**

DESCRIPTION: **REDUCE EXTENT OF DRIVEWAY RECONSTRUCTION**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design for most driveways affected by construction indicate proposed driveways either extending beyond existing or proposed right-of-way to accommodate grade changes throughout the project.

ALTERNATIVE: (sketch attached)

Consider reduction of proposed driveway lengths and call outs for dust pan installations for both asphalt and concrete materials used in construction.

ADVANTAGES:

- Reduces material and labor
- Aids maintenance during construction
- Reduces proposed right-of-way

DISADVANTAGES:

- None apparent

DISCUSSION:

This suggestion will help reduce construction cost, project construction schedule, right-of-way and aid in maintenance of private and commercial driveways. The driveways located between Sta. 496+31 Rt. and 497+68 Rt. will need to be reviewed again to allow wider openings for fuel tractor trailers ingress/egress in the commercial property. The current configuration may not allow for large delivery trucks to enter safely at the location and will need to be reviewed for that purpose.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 24,000	—	$ 24,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 24,000	—	$ 24,000

CALCULATIONS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-1**

REDUCE EXTENT OF DRIVEWAY RECONSTRUCTION

SHEET NO.: **2 of 5**

Driveway Locations w/dimensions and Material Reductions:

Asphalt & Concrete Driveways Reduction

1. Sta. 11+22 Lt. (CR 607)
   10'x14'=140 SF/9= 15.56 SY
2. Sta. 397+31 Rt. M/L
   10'x14'=140 SF/9= 15.56 SY
3. Sta. 398+17 Lt. M/L (Church)
   5'x24'=120 SF/9= 13.33 SY
4. Sta. 398+83 Lt. M/L
   21'x14=294 SF/9= 32.67 SY
5. Sta. 399+42 Rt. M/L
   5'x14'= 70 SF/9= 7.78 SY
6. Sta. 400+53 Rt. M/L
   13'x14'=182 SF/9= 20.22 SY
7. Sta. 401+80 Rt. M/L
   3'x14'= 42 SF/9= 4.66 SY
8. Sta. 403+70 Lt. M/L
   24'x26'=624 SF/9= 69.33 SY
9. Sta. 408+15 Lt. M/L
   10'x14'=140 SF/9= 15.56 SY
10. Sta. 409+80 Lt. M/L Concrete
    7'x14'= 98 SF/9= 10.89 SY
11. Sta. 409+48 Rt. M/L (Allow Asph. Apron Only)
    35'x14'=490 SF/9= 54.44 SY
12. Sta. 414+33 Lt. M/L (Allow Asph. Apron Only/Property Covered in kudzu)
    14'x38'= 532 SF/9= 59.11 SY
13. Sta. 415+89 Lt. M/L (Allow Asph. Apron Only)
    24'x 7'= 168 SF/9= 18.67 SY
14. Sta. 435+11 Rt. M/L (Allow Asph. Apron Only /Sta. Incorrect on 17-2)
    14'x50'= 700 SF/9= 77.78 SY
15. Sta. 436+02 Lt. M/L (Should the Church D/W be paved on their property?)
    14'x106'= 1,484 SF/9= 164.89 SY
16. Sta. 443+14 Lt. M/L (Allow Asph. Apron Only)
    47'x24'= 1,128 SF/9= 125.33 SY
17. Sta. 450+92 Rt. M/L (Allow Asph. Apron Only)
    14'x34'= 476 SF/9= 52.89 SY
18. Sta. 457+36 Lt. M/L (Allow Asph. Apron Only)
    14'x58'= 812 SF/9= 90.22 SY
19. Sta. 461+04 Rt. M/L (Allow Asph. Apron Only)
    14'x30'= 420 SF/9= 46.67 SY
20. Sta. 463+94 Rt. M/L (Allow Asph. Apron Only)
    14'x30'= 420 SF/9= 46.67 SY

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-1**

REDUCE EXTENT OF DRIVEWAY RECONSTRUCTION

SHEET NO.: **3 of 5**

Driveway Locations w/dimensions and Material Reductions:

Asphalt & Concrete Driveways Reduction

21. Sta. 473+73 Rt. M/L (Allow Asph. Apron Only)
    14'x20'= 280 SF/9= 31.11 SY
22. Sta. 481+93 Rt. M/L
    14'x24'= 336 SF/9= 37.33 SY
23. Sta. 485+27 Rt. M/L (Allow Asph. Apron Only)
    14'x32'= 448 SF/9= 49.78 SY
24. Sta. 486+35 Rt. M/L
    14'x24'= 336 SF/9= 37.33 SY
25. Sta. 509+59 Lt. M/L
    14'x18'= 252 SF/9= 28.00 SY
26. Sta. 509+76 Rt. M/L Concrete
    14'x17'= 238 SF/9= 26.44 SY
27. Sta. 510+71 Rt. M/L Concrete
    14'x18'= 252 SF/9= 28.00 SY
28. Sta. 511+48 Rt. M/L
    14'x33'= 462 SF/9= 51.33 SY
29. Sta. 512+38 Rt. M/L Concrete
    14'x35'= 490 SF/9= 54.44 SY

Total Material Square Yards for Asphalt = $15,925

Residential – 986 SY
165 LBS/SY Recyc. Asph. Conc. 12.5mm
986 SY x 165 LBS/SY = 162,690 LBS/2000 = 81.3 Tons
$65 x 81 Tons = **$5,265**

220 LBS/SY Recyc. Asph. Conc. 12.5mm
986 SY x 220 LBS/SY = 216,920 LBS/2000 = 108.5 Tons
$65 x10 9 Tons = **$7,085**

Commercial - 180 SY
165 LBS/SY Recyc. Asph. Conc. 12.5mm
180 SY x 165 LBS/SY = 29,700/2000 = 14.85 Tons
$65 x 15 Tons = **$975**

440 LBS/SY Recyc. Asph. Conc. 19 mm
180 SY x 440 LBS/SY = 79,200 LBS/2000 = 39.6 Tons
$65 x 40 Tons = **$2,600**

CALCULATIONS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-1**

REDUCE EXTENT OF DRIVEWAY RECONSTRUCTION

SHEET NO.: **4 of 5**

Driveway Locations w/dimensions and Material Reductions:

Total Material Square Yards for Concrete Driveway 6 In Thick= $5,004.12
*119.78 SY (.10) = 11.98 + 119.78= 131.76
$37.91x132SY = **$5,004.12**

Total Material Square Yards for Aggregate Surface Course = $364.60
1285.78 SY x 9= 11,572.02 SF x .33 FT = 3857.34 CF x .07 Tns/CF = 289.3 Tns x .10 = 28.93 + 289.3= 18.23Tns 18.23 Tns x $20 = **$364.60**

Bituminous Tack Coat
1,166 SY x .035 GL/SY = 40.81 GL ~ 41 GL x $2.25 = **$92.25**

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia
REDUCE EXTENT OF DRIVEWAY RECONSTRUCTION

ALTERNATIVE NO.: **R-1**

SHEET NO.: **5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
318-3000 Aggr Surf Crs Matl	TNS	18	20.00	360			
402-3113 Recyl. AC 12.5 MM SPP, GP 1/2 BM&HL	TNS	205	65.00	13,325			
402-3190 Recyl. AC 19 MM SP, GP 1 OR 2 , INC BM	TNS	40	65.00	2,600			
413-1000 Bitum Tack Coat	GL	41	2.25	92			
441-0016 Driveway Concrete - 6 Inch	SY	132	37.91	5,004			
Subtotal				21,381			
Markup (%) at 10.00%				2,138			
TOTAL				23,519			
TOTAL (ROUNDED)				24,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-2**

DESCRIPTION: **REDUCE LANE WIDTH TO 11 FT. WIDE BETWEEN HORACE VEAL DRIVE/ALLEN MEMORIAL DRIVE AND TO US441/SR 29**

SHEET NO.: **1 of 7**

ORIGINAL DESIGN: (sketch attached)

Four 12-ft.-wide lanes with a 14-ft.-wide flush median are provided from Horace Veal Drive/Allen Memorial Drive to US 441/SR 29.

ALTERNATIVE: (sketch attached)

Use four 11 ft. through lanes from Horace Veal Drive/Allen Memorial Drive to US 441/SR 29.

ADVANTAGES:

- Reduces material and labor requirements
- Reduces pavement
- Reduces right-of-way
- Reduces clearing and grubbing
- Reduces fill slopes

DISADVANTAGES:

- None apparent

DISCUSSION:

There are four 12-ft.-wide lanes proposed from Horace Veal Drive to the Milledgeville Bypass/US441. Changing to 11-ft.-wide lanes saves pavement cost, right-of-way cost, fill slope cost as well as clearing and grubbing costs. 11-ft.-wide lanes are acceptable for this situation without increasing the potential for accidents since there is a paved shoulder or gutter pan on one side of the outside lane and a flush median on the inside of the inner lane in each direction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 245,000	—	$ 245,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 245,000	—	$ 245,000

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-2**

SHEET NO.: **2 of 7**

Mainline SR 49 Full Depth Pavement Unit Cost ($/SY):

12.5mm:	165#/SY x Ton/2,000# x $65/Ton	=	$5.36/SY
19mm:	220#/SY x Ton/2,000# x $65/Ton	=	$7.15/SY
25mm:	440#/SY x Ton/2,000# x $60/Ton	=	$13.20/SY

12" GAB: 1ft x 147#/CF x Ton/2,000# x 9SF/SY x $18/Ton = $11.91SY

Total Pavement Unit Cost = $37.62/SY = $4.18/SF

Shoulder Pavement Unit Cost ($/SY):

12.5mm:	165#/SY x Ton/2,000# x $65/Ton	=	$5.36SY
19mm:	220#/SY x Ton/2,000# x $65/Ton	=	$7.15/SY

6" GAB: 1ft x 147#/CF x Ton/2,000# x 9SF/SY x $18/Ton = $5.96/SY

Total Shoulder Pavement Unit Cost = $18.47/SY

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-2**

SHEET NO.: **3 of 7**

Clearing and Grubbing Cost per SF Estimate

Total Clearing and Grubbing Cost = $ 755,000

Length of Project = 14,482.93 ft

Estimated Project Width (based on X-Sections) = 130 ft

Approximate Clearing and Grubbing Area = 14,482.93 ft x 130 ft = 1,882,781 SF

$/SF Cost = $ 755,000/1,882,781 SF = $ 0.4/SF approximate

ARCADIS

SUBJECT: ALT. No. R-2
Reduce Lane Widths to 11 ft

JOB NO:

BY: DATE:
CHKD: DATE:

PAGE

SHEET 4/7

Reduce Right of Way 4 ft

Parcel	Sta. to Sta.	Length x Width	Area	$/SF	$ Cost
19	444+38.42 - 429+50 =	1488.42' x 2'	= 2976.84'	x $1.35 =	$4019
20	431+00 - 424+32.09 =	667.91' x 2'	= 1335.82	x 0.41 =	$548
21	432+38.70 - 431+00 =	138.70' x 2'	= 277.40'	x 1.35 =	$375
22	434+85.89 - 432+38.7 =	247.19 x 2'	= 494.38'	x 1.35 =	$668
23	435+12.96 - 434+85.89 =	27.07' x 2'	= 54.14'	x 0.41 =	$21
24	437+43.79 - 435+14.07 =	229.72' x 2'	= 459.44'	x 1.35 =	$620
25	446+44.42 - 437+43.79 =	900.63' x 2'	= 1801.26'	x 1.35 =	$2432
26	450+21.57 - 446+44.42 =	377.15' x 2'	= 754.30	x 0.09 =	$68
27	450+07.35 - 444+38.42 =	568.93' x 2'	= 1137.86'	x 0.09 =	$102
28	452+24.30 - 450+07.35 =	216.95' x 2'	= 433.90'	x 0.41 =	$178
29	477+45.37 - 450+21.57 =	2723.8' x 2	= 5447.6'	x 1.35 =	$7354
30	454+43.27 - 452+24.30 =	218.97' x 2'	= 437.94	x 0.41 =	$180
31	456+64.89 - 454+43.27 =	221.62' x 2'	= 443.24	x 0.41 =	$182
32	458+41.41 - 456+80.10 =	161.31' x 2	= 322.62	x 0.41 =	$132
33	460+42.25 - 458+41.41 =	200.84' x 2'	= 401.68	x 0.41 =	$165
34	at Existing R/w				
35	at Existing R/w				
36	at Existing R/w				
37	469+75.41 - 466+42.27 =	333.14' x 2'	= 666.28'	x 2.84 =	$1892

Page total $18,936

ARCADIS

SUBJECT: ALT. R-2
Reduce Lane Widths to 11 FE
JOB NO: Reduce R/W 4 FE

BY: DATE:
CHKD: DATE:

PAGE
SHEET 5/7

Parcel	Sta	to	Sta.	Length x	Width	Area	$/SF	Cost
38	476+09.04	-	470+25.41	= 583.63' x 2'		= 1167.26' x 1.35		= $1576
39	at Existing R/W							
40	491+23.95	-	477+45.37	= 1378.58' x 2'		= 2757.16 x 1.35		= $3722
41	at Existing R/W							
42	at Existing R/W							
43	at Existing R/W							
44	at Existing R/W							
45	at Existing R/W							
46	494+10.81	-	493+09.88	= 100.93' x 2		= 201.86 x 0.41		= $83
47	495+11.71	-	494+10.81	= 100.90' x 2		= 201.80 x 0.41		= $83
48	496+12.59	-	495+11.71	= 100.88' x 2		= 201.76 x 2.84		= $573
49	at Existing R/W							
50	at Existing R/W							
51	at Existing R/W							
52	500+54.81	-	492+76.77	= 778.04' x 2		= 1556 x 1.35		= $2101
53	502+36.08	-	500+81.91	= 154.17' x 2		= 308.34 x 0.41		= $126
54	508+96.51	-	500+54.81	= 841.70' x 2		= 1683.4 x 1.35		= $2273
55	503+87.83	-	502+36.08	= 151.75 x 2		= 303.50 x 0.41		= $124
56	at Existing R/W							
57	506+79.04	-	505+89.04	= 90' x 2		= 180 x 0.41		= $74

Page total = $10,735

ARCADIS

SUBJECT: R-2
Reduce Lane Widths to 11 Ft
JOB NO: Reduce R/w 4 Ft

BY: DATE:
CHKD: DATE:

PAGE

SHEET 6/7

Parcel	Sta.	to	Sta.	Length	x Width	Area	$/SF	Cost
58	507+69.04	-	506.79.04	= 90'	x 2	= 180'	x 0.41	= $74
59	508+59.04	-	507+69.04	= 90'	x 2	= 180'	x 0.41	= $74
60	at Existing R/w							
61	at Existing R/w							
62	at Existing R/w							
63	at Existing R/w							
64	at Existing R/w							
65	at Existing R/w							
66	518+83.49 - 515+19.03 = 164.46 x 2 = 328.92 x 0.41 = $135							
67	at Existing R/w							
68	at Existing R/w							
69	at Existing R/w							
70	512+20.76 - 508+96.51 = 324.25 x 2 = 648.5 x 1.35 = $875							
71	520+71.97 - 512+20.76 = 851.21 x 2 = 1702.42 x 1.35 = $2298							

Page Total = $3,456

R/w Cost = $18,936 + $10,735 + $3,456 = $33,127

=> $33,127 x 2 (to account for fees) = $66,254

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**

Baldwin County, Georgia

ALTERNATIVE NO.: **R-2**

SHEET NO.: **7 of 7**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Full depth Pavement 4ft wide							
From Sta. 424+34.27 - 522+14.86	SF	39,122	4.18	163,531			
4ft of Right of Way - See R/W Cost	LS	1	66,254.00	66,254			
Clearing & Grubbing	SF	39,122	0.40	15,649			
Subtotal				245,434			
Markup (%) at							
TOTAL				245,434			
TOTAL (ROUNDED)				245,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **R-3**

DESCRIPTION: **RETAIN EXISTING BRIDGE APPROACH SLABS AND OVERLAY APPROACH SLABS WITH AN ASPHALT OVERLAY**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

Remove and reconstruct the concrete bridge approach slabs to match the proposed grades at the existing bridge over Fishing Creek.

ALTERNATIVE:

Retain the existing bridge approach slabs and overlay the approach slabs with asphalt to match the proposed grades.

ADVANTAGES:

- Avoids having to stage the construction thus saving time and inconvenience for the users
- Avoids demolition

DISADVANTAGES:

- Must assess the condition of the existing concrete approach slab

DISCUSSION:

Retain the existing bridge approach slabs and overlay the approach slabs with asphalt to match the proposed grades to save both time and costs. If the existing concrete slabs are structurally sound, then adding the asphalt overlay will not affect performance. If it is necessary to remove the approach slab to accommodate the modifications to the south side of the bridge, then a small section of the approach slab can be removed and replaced at a fraction of the cost and disruption to the traveling public.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 64,000	—	$ 64,000
ALTERNATIVE	$ 2,000	—	$ 2,000
SAVINGS (Original minus Alternative)	$ 62,000	—	$ 62,000

PROJECT:	SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS *Baldwin County, Georgia*	ALTERNATIVE NO.: R-3 SHEET NO.: 2 of 3

ASPHALT OVERLAY CALCULATION

20 ft (wide) x 65.63 ft (length) x 2 in (avg. asphalt thickness) x 0.0757 tn/cf = 16.56 tn Say 17 tn per App. Slab.

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**

Baldwin County, Georgia

ALTERNATIVE NO.: **R-3**

SHEET NO.: **3 of 3**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Reconstruct Bridge App. Slabs	SY	370	173.81	64,310			
Asphalt Overlay on West App. Slab	TN				17	65.00	1,077
Asphalt Overlay on East App. Slab	TN				17	65.00	1,077
Subtotal				64,310			2,153
Markup (%) at							
TOTAL				64,310			2,153
TOTAL (ROUNDED)				64,000			2,000

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
NH000-0089-01(026) Baldwin County

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
DRAINAGE						
D-1	Use cross-drains to reduce the amount of longitudinal pipe runs from Sta. 493+00 to Sta. 513+80	$81,000	$51,000	$30,000		$30,000
D-2	Delete the cross-drain on the west side of bridge and discharge from the curb inlet on south side of the road directly to the creek	$2,200	$900	$1,300		$1,300
D-3	Eliminate 18 in. storm drain pipe from manhole H-4 to H-5 and discharge stormwater directly into ditch that flows directly to creek from existing swale	$20,000	$4,000	$16,000		$16,000
D-4	Install a new drainage structure at Sta. 445+52 to eliminate three concrete flumes	$25,000	$4,000	$21,000		$21,000
D-5	Install a new drainage structure at Sta. 458+20 to eliminate two concrete flumes	$15,000	$3,000	$12,000		$12,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-1**

DESCRIPTION: **USE CROSS-DRAINS TO REDUCE THE AMOUNT OF LONGITUDINAL PIPE RUNS FROM STA. 493+00 TO STA. 513+80**

SHEET NO.: **1 of 9**

ORIGINAL DESIGN: (sketch attached)

The current drainage design uses two long longitudinal pipe runs (one on each side of the roadway) from Sta. 493+00 to Sta. 513+80 to drain the roadway.

ALTERNATIVE: (sketch attached)

Use additional cross-drains to reduce the length of longitudinal pipe on the right side of the roadway.

ADVANTAGES:

- Reduces construction time
- Reduces amount of drain excavation for laying pipe
- Less storm drain pipe to maintain

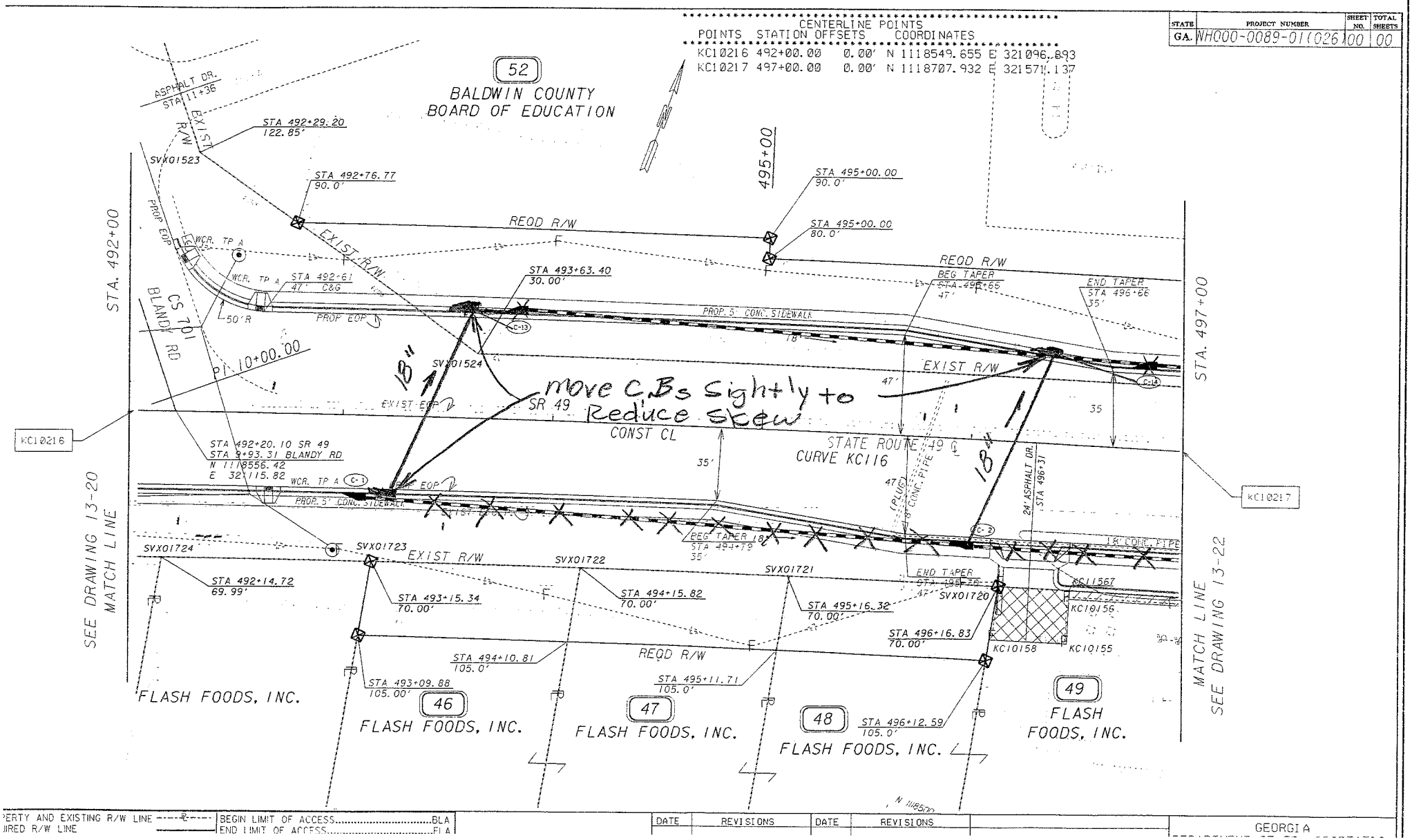
DISADVANTAGES:

- Slightly increases size of pipe
- Must lay pipe during maintenance of traffic

DISCUSSION:

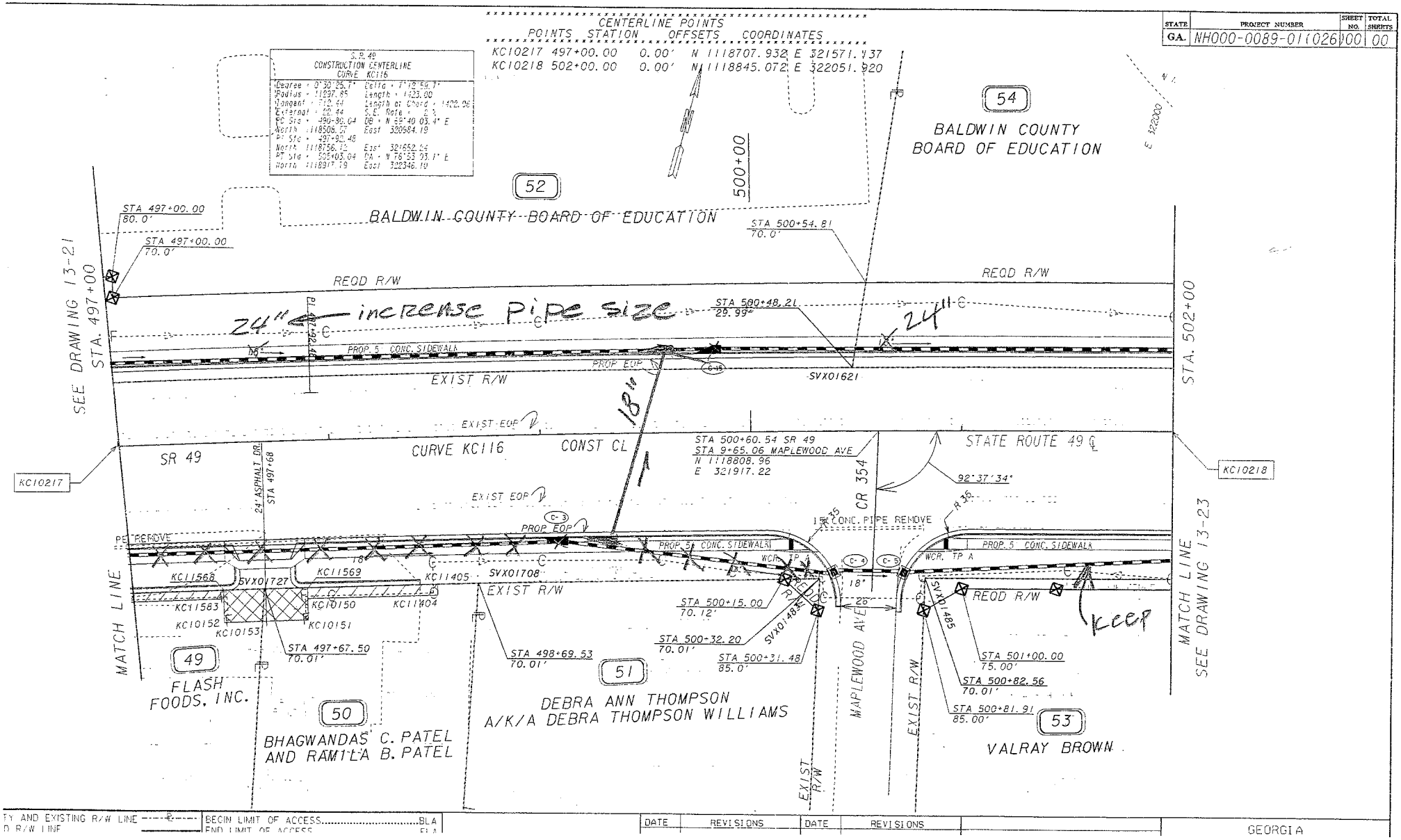
The current drainage design has two long longitudinal pipe runs, which could be avoided and would reduce the amount of 18 in. storm drain pipe to be laid by using cross-drains to drain the roadway with one longitudinal system. This alternate drainage design would save approximately 1,800 ft of 18 in. storm drain pipe.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 81,000	—	$ 81,000
ALTERNATIVE	$ 51,000	—	$ 51,000
SAVINGS (Original minus Alternative)	$ 30,000	—	$ 30,000



SR49 Baldwin Co. Sketch Alt. D-1

Sht. 2 of 9



STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
G.A.	NH000-0089-01(026)	00	00

SR49 Baldwin Co. Sketch Alt. D-1

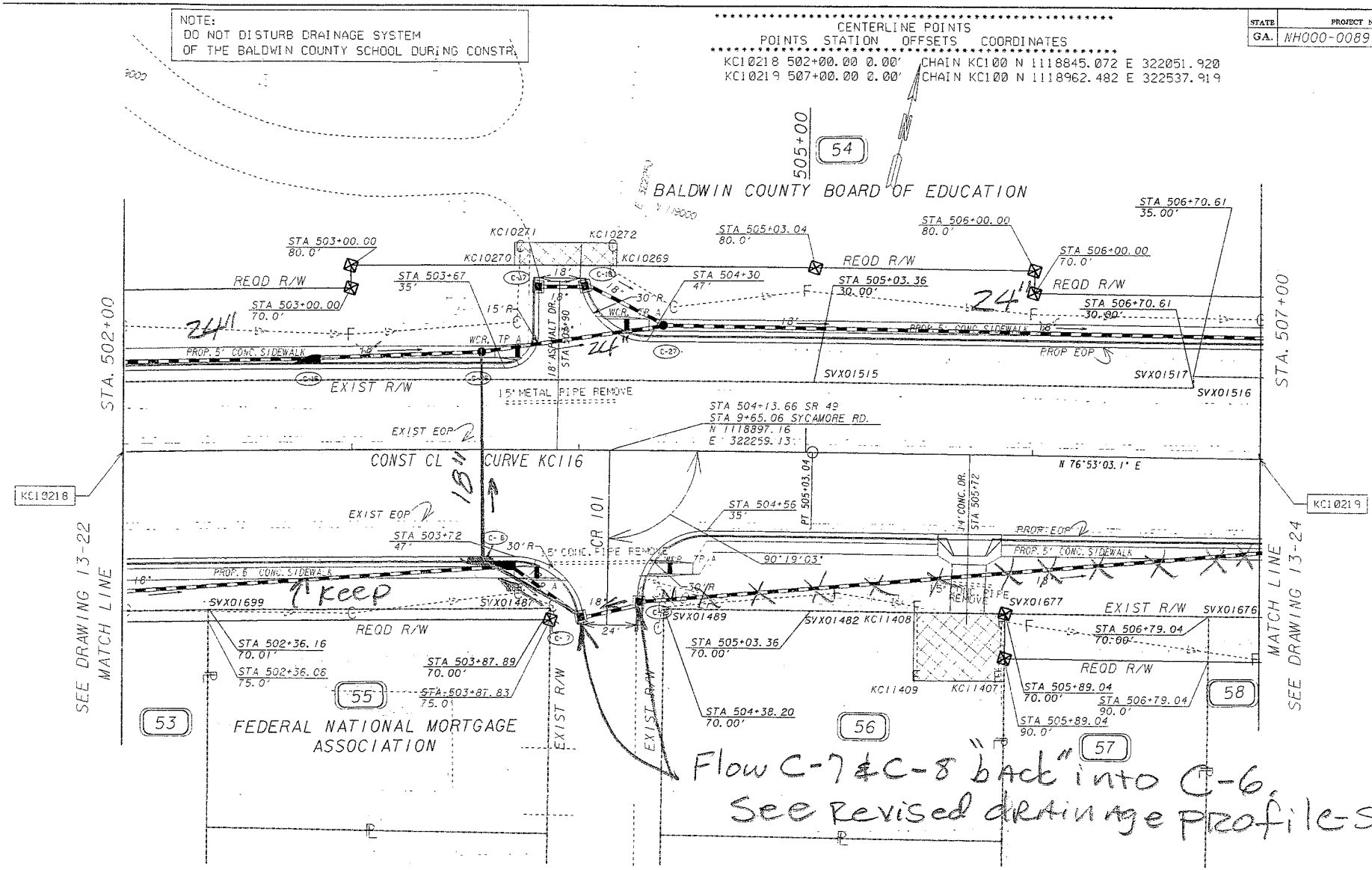
Sta. 3+79

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

NOTE:
DO NOT DISTURB DRAINAGE SYSTEM
OF THE BALDWIN COUNTY SCHOOL DURING CONSTR.

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10218	502+00.00	0.00'	CHAIN KC100 N 1118845.072 E 322051.920
KC10219	507+00.00	0.00'	CHAIN KC100 N 1118962.482 E 322537.919



TY AND EXISTING R/W LINE
TO R/W LINE
BEGIN LIMIT OF ACCESS
END LIMIT OF ACCESS

DATE	REVISIONS	DATE	REVISIONS

GEORGIA

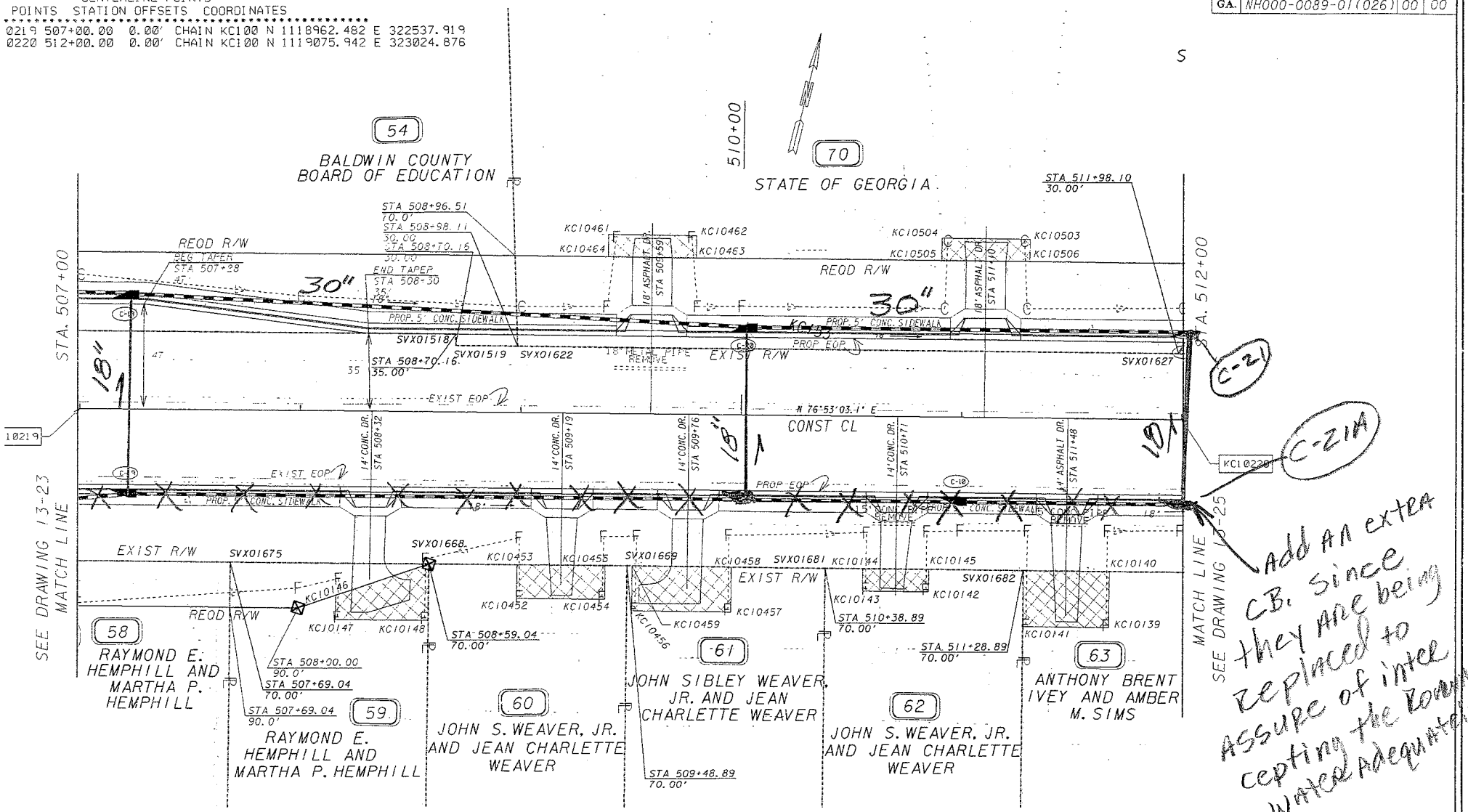
SR49 Baldwin Co. Sketch Alt. D-1

Sht 4 of 9

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
0219	507+00.00	0.00'	CHAIN KC100 N 1118962.482 E 322537.919
0220	512+00.00	0.00'	CHAIN KC100 N 1119075.942 E 323024.876



Add an extra CB. Since they are being replaced to assure of inter cepting the roadway water adequately.

TY AND EXISTING R/W LINE ----R----
BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA

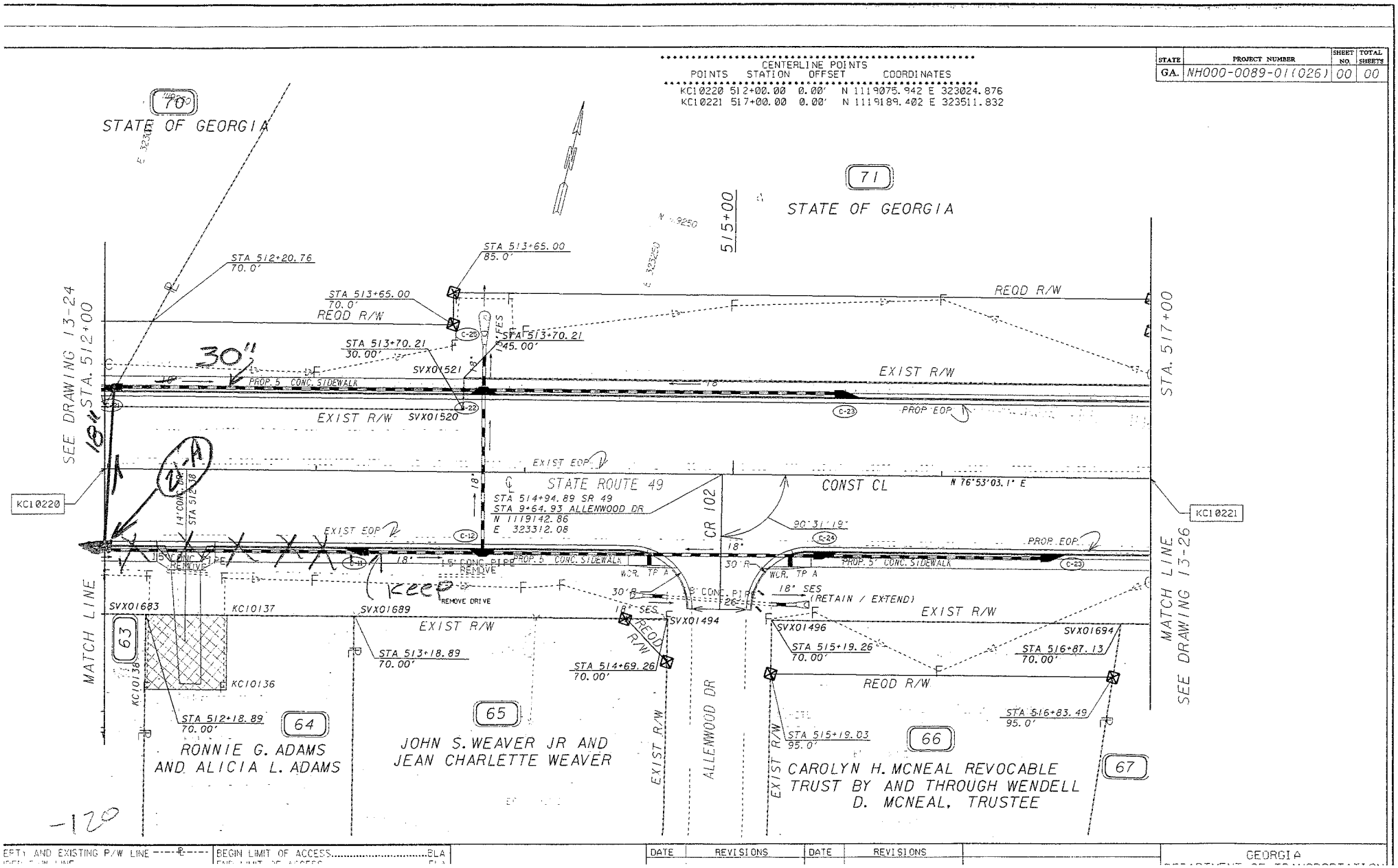
DATE	REVISIONS	DATE	REVISIONS

GEORGIA

SR 49 Baldwin Co. Sketch

Alt. D-1

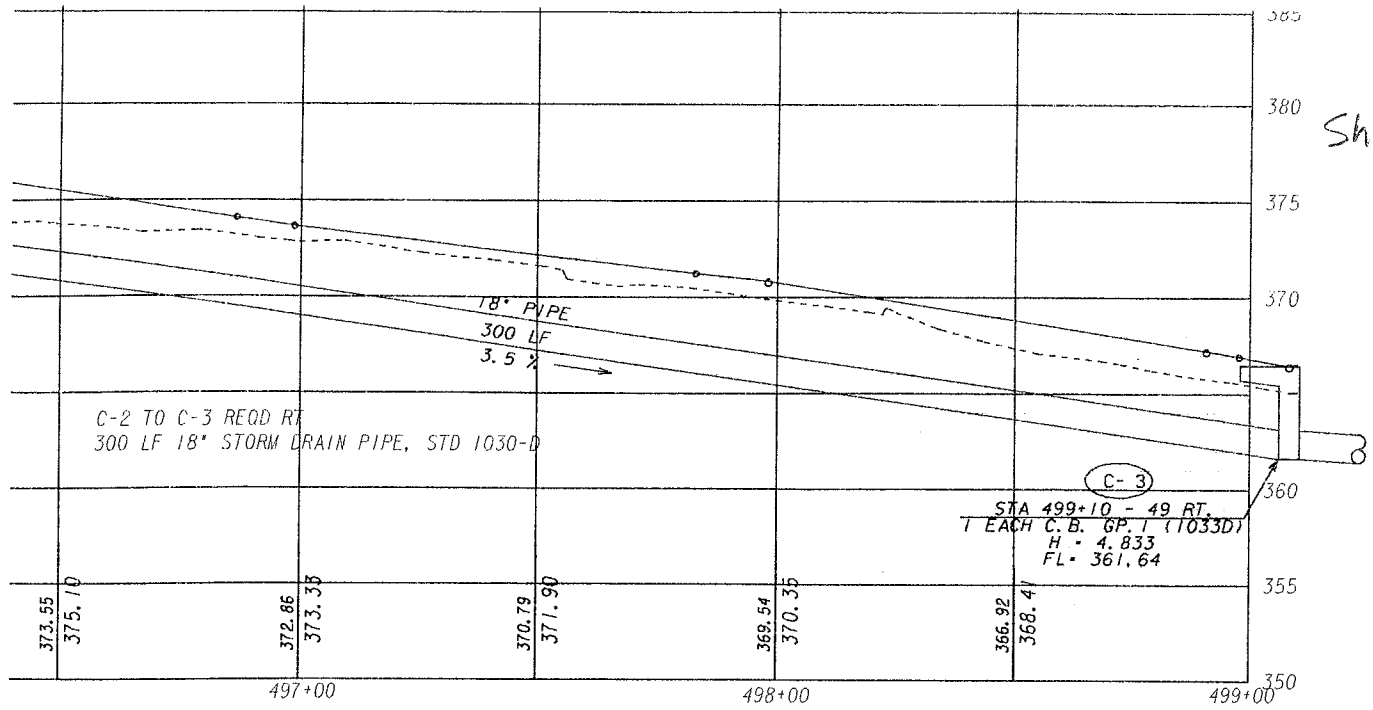
Sht 4 of 9

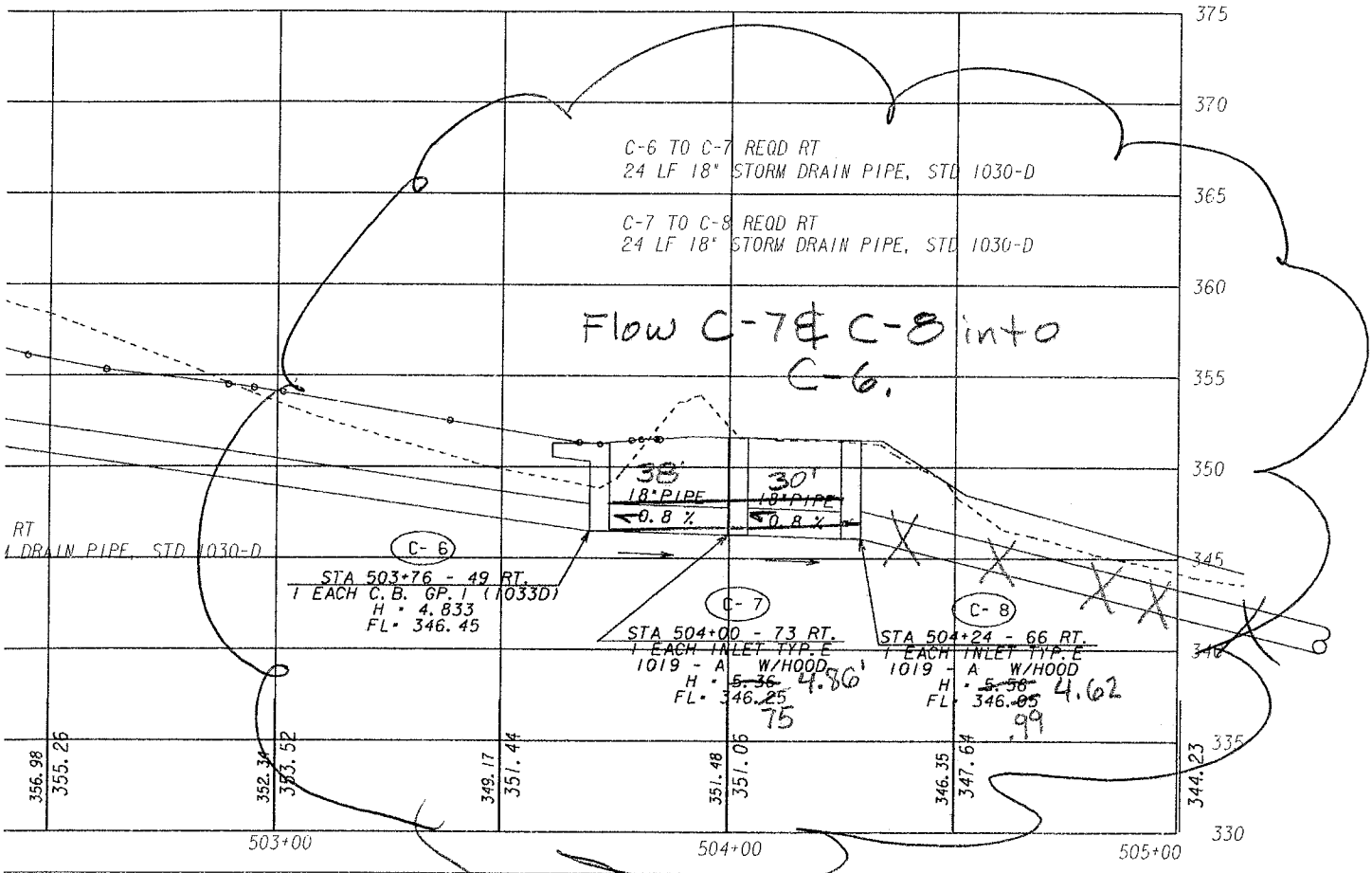


SR49 Baldwin Co. Sketch Alt. D-1

Sht. 6 of 9

Sht. 7 of 9





A ORTATION GN	DRAINAGE PROFILES - SR 49 - SYSTEM "C" SOUTH	DRAWING NO. 22-7

C:\231450\dgn\22-7 8 URBAN SYSTEM C SOUTH SIDE.DGN

SR49 Baldwin Co.

Sketch Alt. D-1

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-1**

SHEET NO.: **8 of 9**

Length of Original design 18 in. Storm Drain pipe saved = **1,860 LF**

Additional Alternate design 18 in storm cross-drain pipe required = **590 LF**

Requires one **(1)** additional 1033D catch basin.

Requires increasing 18 in. to 24 in. storm drain pipe = 1340 LF Price diff. = ($53.55/LF-$43.4/LF) = **$10.15/LF**

Requires increasing 18 in. to 30 in. storm drain pipe = 360 LF Price diff. = ($71.25/LF-$43.4/LF) = **$27.85/LF**

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-1**

SHEET NO.: **9 of 9**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
18 in. Strom drain pipe saved	LF	1,860	$43.40	$80,724			
Alt Add'l 18 in. storm drain pipe	LF				590	$43.40	$25,606
Alt Add'l 1033D Catch Basin	EA				1	$2,000.00	$2,000
Diff of 18" to 24" storm dr. pipe	LF				1,340	$10.15	$13,601
Diff of 18" to 30" storm dr. pipe	LF				360	$27.85	$10,026
Subtotal				80,724			51,233
Markup (%) at							
TOTAL				80,724			51,233
TOTAL (ROUNDED)				81,000			51,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-2**

DESCRIPTION: **DELETE 18 IN. CROSS-DRAIN AT STA. 530+25 AND DISCHARGE FROM CATCH BASIN ON THE SOUTH SIDE OF THE ROAD DIRECTLY INTO EXISTING DITCH**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The current drainage design uses an 18 in. storm cross-drain pipe at Sta. 530+25 to discharge the catch basin (H-7) located at Sta. 530+36 offset to the right.

ALTERNATIVE: (sketch attached)

Eliminate the 18 in. cross-drain at Sta. 530+25 and discharge the right side catch basin (H-7) directly into the existing ditch on the south side.

ADVANTAGES:

- Reduces labor and material requirements
- Facilitates construction staging and maintaining traffic control
- Provides the most efficient drainage design at this location

DISADVANTAGES:

- None apparent

DISCUSSION:

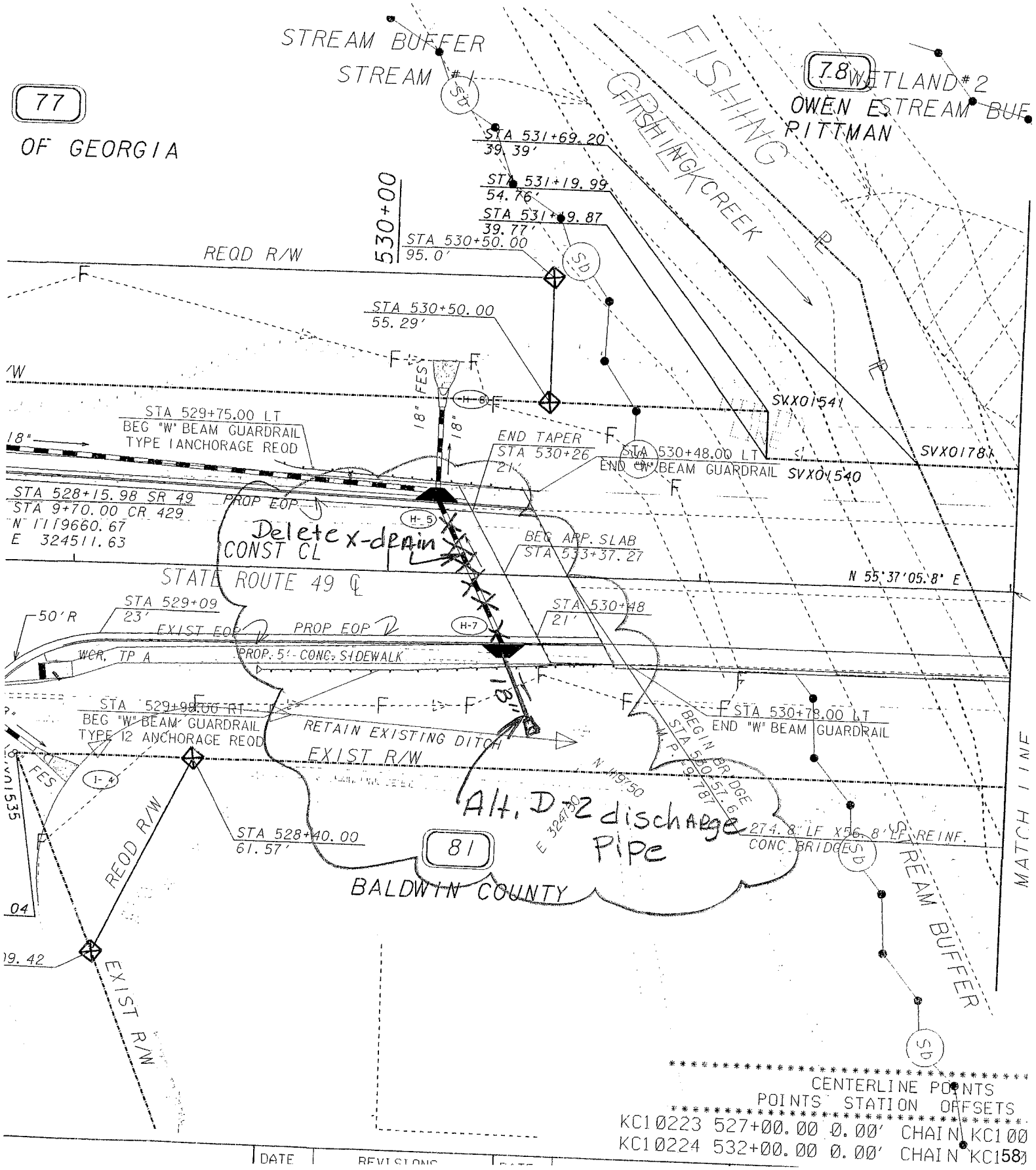
There are no disadvantages to incorporating Alt. No. D-2 into the drainage design. The recommended outfall discharge for this catch basin (H-7) is into an existing ditch which flows into the adjacent creek. The cost savings is not much from a financial point of view, but it is the correct design and is still less expensive.

In fact, if it is decided to keep the 18 in. cross-drain pipe, then the outfall for structures H-5 and H-7 should still be to the south side (as the alternative recommends) and into an existing ditch.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 2,200	—	$ 2,200
ALTERNATIVE	$ 900	—	$ 900
SAVINGS (Original minus Alternative)	$ 1,300	—	$ 1,300

Sketch Alt. D2 2/4

SR 49 Baldwin County



CALCULATIONS

PROJECT:	**SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS** *Baldwin County, Georgia*	ALTERNATIVE NO.: **D-2** SHEET NO.: **3 of 4**

Original design uses **50 LF** of 18 in. storm drain pipe for cross-drain at Sta 533+25.

Alt D-2 drainage design proposes **20 LF** of 18 in. storm drain pipe to discharge catch basin H-7 .

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**

Baldwin County, Georgia

ALTERNATIVE NO.: **D-2**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
save 18 in. storm drain pipe	LF	50	$43.40	$2,170			
save 18 in. storm drain pipe	LF				20	$43.40	$868
Subtotal				2,170			868
Markup (%) at							
TOTAL				2,170			868
TOTAL (ROUNDED)				2,200			900

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-3**

DESCRIPTION: **ELIMINATE 18 IN. STORM DRAIN PIPE FROM MANHOLE H-4 TO H-5 AND DISCHARGE STORMWATER DIRECTLY INTO DITCH THAT FLOWS DIRECTLY TO CREEK FROM EXISTING SWALE**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The current drainage design uses 390 linear feet (LF) of 18-in.-diameter storm drain pipe to outfall drainage structure H-4 into H -5.

ALTERNATIVE: (sketch attached)

Use 90 LF of 18-in.-diameter storm drain pipe to outfall the flow from structure H-4 into a ditch which flows toward the adjacent creek.

ADVANTAGES:

- Reduces labor and material requirements
- Reduces right-of-way cost

DISADVANTAGES:

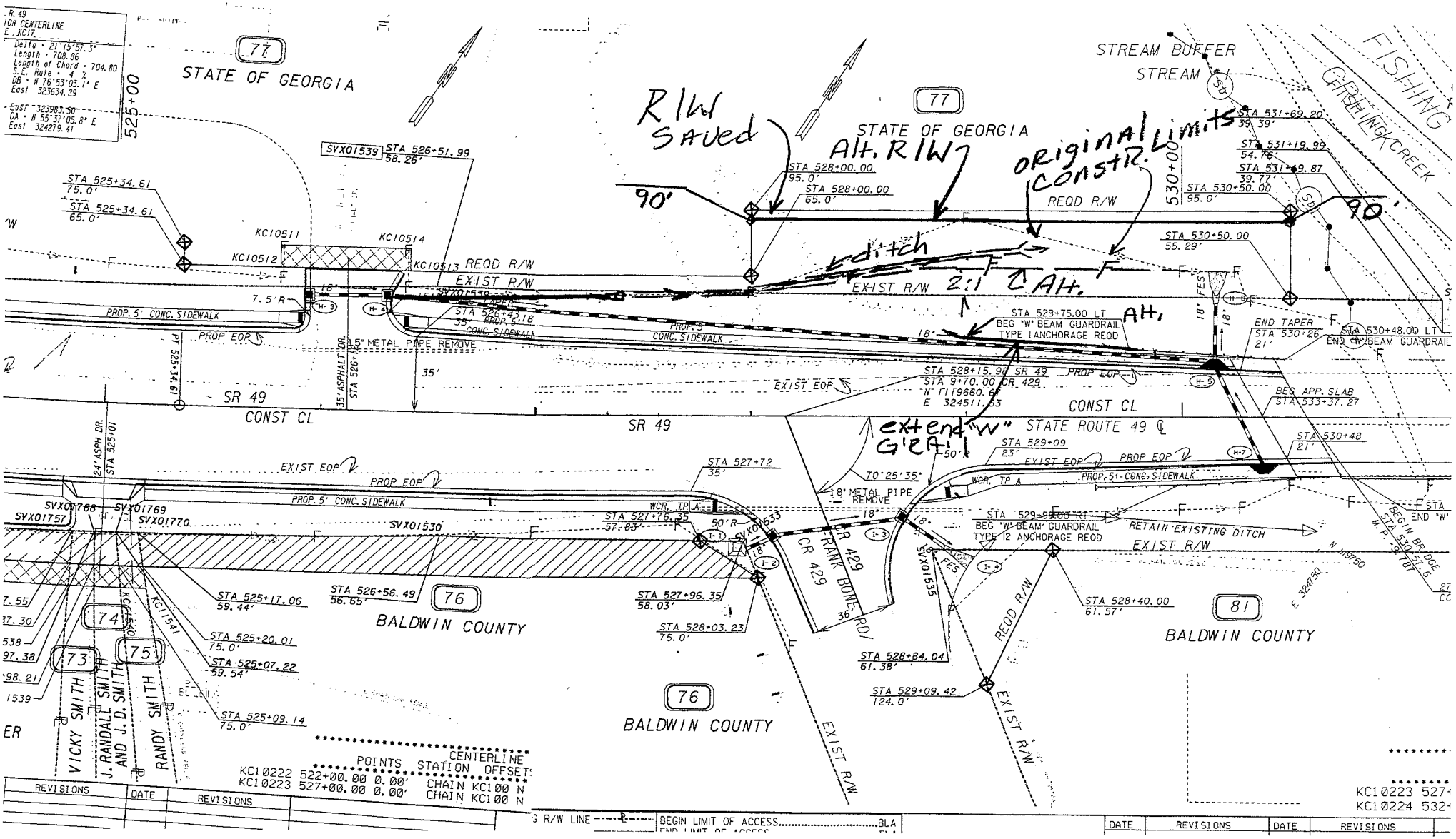
- None apparent

DISCUSSION:

The current drainage design uses 390 LF of 18-in.-diameter storm drain pipe to discharge structure H-4. There are not any other drainage structures that are using this length of pipe for discharge. Therefore it is not necessary to run this flow in a closed system for such a long length, especially since it is outfalling into an adjacent creek.

The alternate design proposes to outfall the driveway drainage structures into a ditch that flows down to the existing swale that flows into the creek. The existing driveway stormwater flows in this same manner by way of an existing swale that is being "covered over" by the widened roadway. This alternate drainage design will replace the existing ditch. It is important to note that this design will move the construction limits "in" and save some right-of-way. The alternate design will require extending the guardrail 75 LF to protect 2:1 slopes with over 6 ft. of fill.

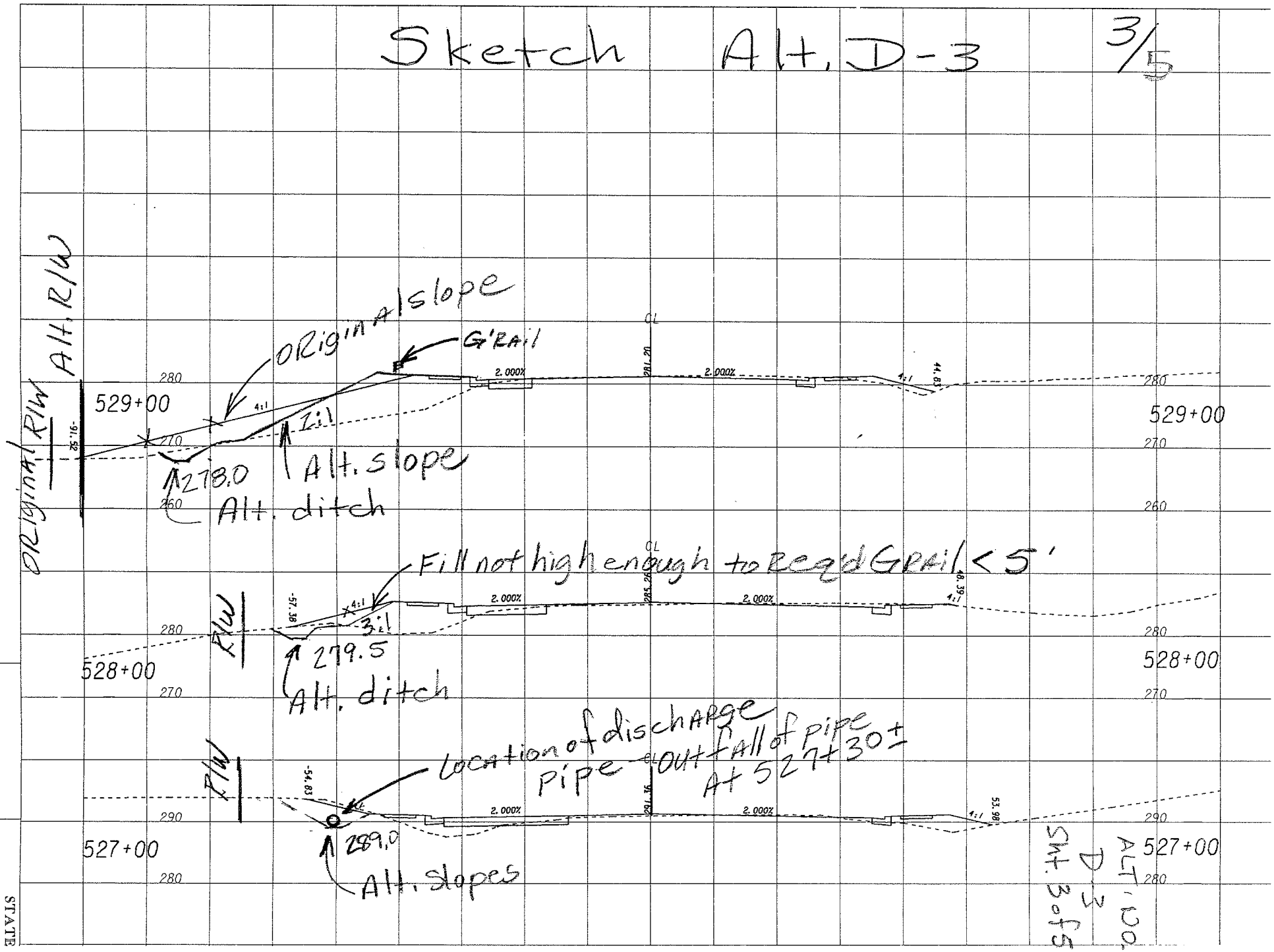
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 20,000	—	$ 20,000
ALTERNATIVE	$ 4,00	—	$ 4,00
SAVINGS (Original minus Alternative)	$ 16,000	—	$ 16,000



Sketch Alt. D-3

2/5

SR 49 CROSS SECTIONS



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PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-3**

SHEET NO.: **4 of 5**

Original 18 in. storm drain pipe that would be saved = **390 LF**

R/W saved (Parcel 77) = (5' x 250')/43,560sf/ac = **0.029 AC**

Use $59,000/ac (from GaDOT R/W cost estimate for Parcel 77)

Alternate costs:

18 in. storm drain pipe = **90 LF**

Add'l "W" beam guardrail = **75 LF** (for 2:1 slopes with fill over 6 ft.)

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-3**

SHEET NO.: **5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
18 in. storm drain pipe	LF	390	$43.40	$16,926			
Original R/W saved	AC	0.029	$59,000.00	$1,711			
R/W Markup for Acquistion 100%	LS	1	$1,711.00	$1,711			
Markup IAW GaDOT Estimate							
Alt. cost 18 in. storm drain pipe	LF				90	$43.40	$3,906
Subtotal				20,348			3,906
Markup (%) at							
TOTAL				20,348			3,906
TOTAL (ROUNDED)				20,000			4,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-4**

DESCRIPTION: **INSTALL A NEW DRAINAGE STRUCTURE AT STA. 445+52 TO ELIMINATE THREE CONCRETE FLUMES**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design has multiple concrete flumes for the asphalt paved shoulder with curb for the guardrail installation to prevent erosion of the front slope.

ALTERNATIVE: (sketch attached)

Install one drainage structure to eliminate three concrete flumes.

ADVANTAGES:

- Reduces material and labor requirements
- Reduces drainage structure installations
- Reduces construction schedule
- Eliminates proposed manhole
- Provides better grade for pipe at structure tie-in

DISADVANTAGES:

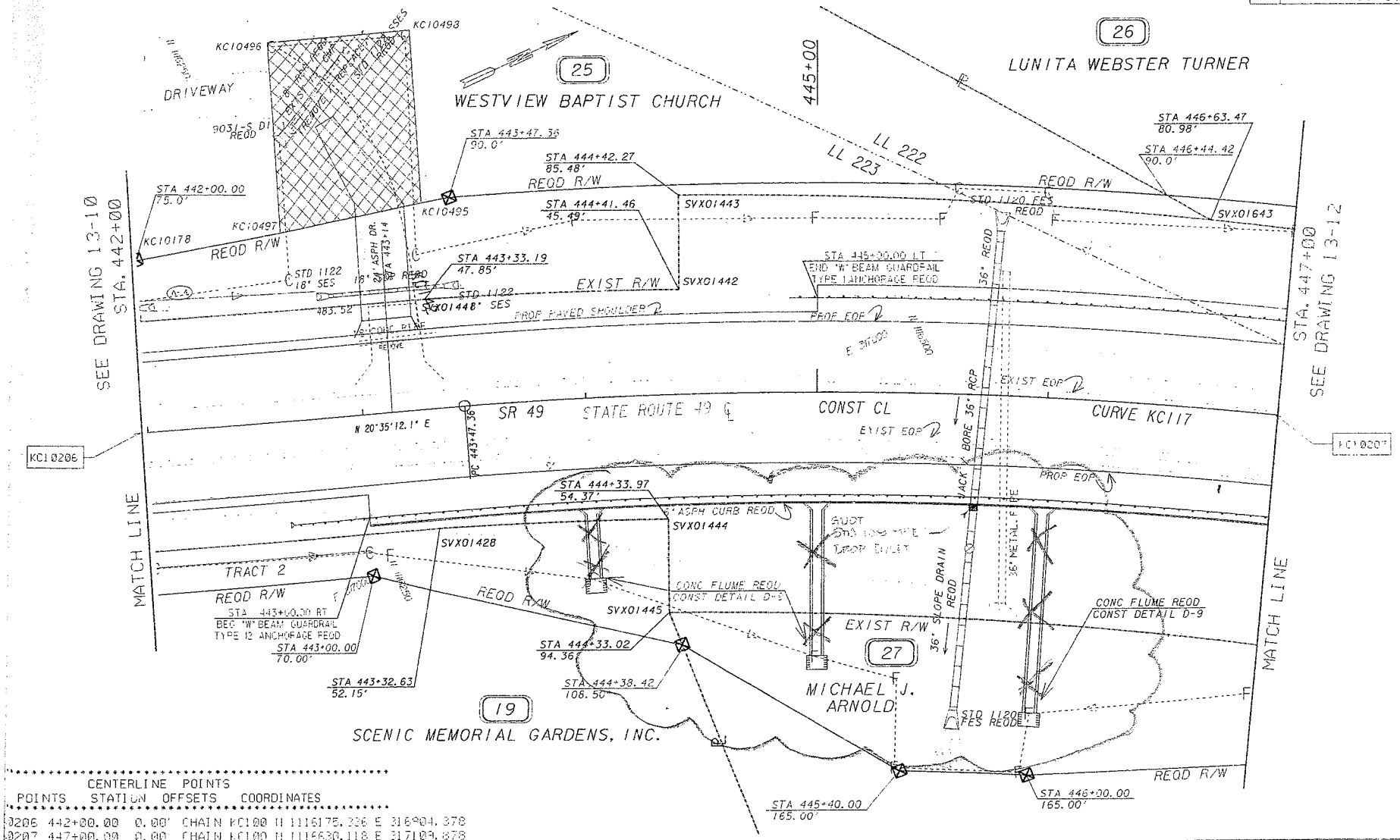
- None apparent

DISCUSSION:

This alternative will provide a reduction in material and labor requirements eliminating the three concrete flume installations. It will reduce the 44.23% grade to 35.83%, an 8.40% reduction for the slope drain pipe. This will also place the pipe on natural ground reducing future potential for erosion under the pipe versus the original design.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 25,000	—	$ 25,000
ALTERNATIVE	$ 4,000	—	$ 4,000
SAVINGS (Original minus Alternative)	$ 21,000	—	$ 21,000

STATE	PROJECT NUMBER	SHEET NO.	TOT SHE
GA.	NH000-0089-01(026)	001	0



CENTERLINE POINTS

POINTS	STATION	OFFSETS		COORDINATES
0206	442+00.00	0.00'	CHAIN	KC100 N 1116175.226 E 316904.378
0207	447+00.00	0.00	CHAIN	KC100 N 1116630.118 E 317109.878

TY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA
D R/W LINE	END LIMIT OF ACCESS ..... ELA
UCTION LIMITS	LIMIT OF ACCESS
NT FOR CONSTR	REQUIRED R/W AND LIMIT OF ACCESS

SCALE IN FEET

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATI
CONSTRUCTION PLAN

ALT. No. D-4
Sht. 2 of 4

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-4**

INSTALL NEW DRAINAGE STRUCTURE AT STA 445+52 TO ELIMINATE CONCRETE FLUMES

SHEET NO.: **3 of 4**

Drainage Structures and Drainage Structure Reductions:

Added Drainage Structure:

Sta 445+72.50 RT, 48' RT.
1 EA - GDOT STD 1019 TP "E" Drop Inlet
Cost $2,309.13

Total Depth of Structure = 16 Ft.
Additional Depth = 10 Ft.
Additional Depth Costs: $131.00 LF x 1FT' = $1,310.00
Total Cost $3,619.13

Concrete Flume Removal

Sta. 444+00 RT - Length - 25'
Cl. A Conc. - 5.855 CY x 671.56 = $3,931.98
Reinf. Steel – 74.40 LBS x $1.04 = $77.37
Sand Cement Bag Rip Rap – 2.33 SY x $108.79 = $253.81

Sta. 445+00 RT - Length - 60'
Cl. A Conc. - 10.426 CY x 671.56 = $7,001.68
Reinf. Steel – 121.16 LBS x $1.04 = $126.01
Sand Cement Bag Rip Rap – 2.33 SY x $108.79 = $253.81

Sta. 446+00 RT - Length - 60'
Cl. A Conc. - 13.038 CY x 671.56 = $8,755.80
Reinf. Steel – 147.88 LBS x $1.04 = $153.80
Sand Cement Bag Rip Rap – 2.33 SY x $108.79 = 253.81

Total Amount Cl. A Conc. = $19,689.46
Total Amount Reinf. Steel = $357.18
Total Amount Sand Cement Bag Rip Rap = $761.43

REMOVE AT STA 454+81, 68 FT., RT
1 EA - GDOT STD 1011-A, Man Hole GP 1
AMT. = $2,250.50

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia
INSTALL NEW DRAINAGE STRUCTURE AT STA 445+52 TO ELIMINATE CONCRETE FLUMES

ALTERNATIVE NO.: **D-4**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
500-3101 Cl A Conc	CY	29	671.56	19,475			
511-1000 Bar Reinf Steel	LBS	343	1.04	357			
603-6006 Sand Cement Bag Rip Rap, 6 In	SY	7	108.79	762			
668-4300 Storm Sewer Man Hole, GP 1	EA	1	2,250.50	2,251			
668-4300 Storm Sewer ManHole, TP 1,	LF		267.39				
A DEP, CL 1							
668-2100 Drop Inlet, GP 1	EA				1	2,309.13	2,309
668-2110 Drop Inlet, GP 1, Addl Depth	LF				10	131.00	1,310
Subtotal				22,845			3,619
Markup (%) at 10.00%				2,285			362
TOTAL				25,130			3,981
TOTAL (ROUNDED)				25,000			4,000

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-5**

DESCRIPTION: **INSTALL A NEW DRAINAGE STRUCTURE AT STA 458+20 TO ELIMINATE TWO CONCRETE FLUMES**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

The original design provides multiple concrete flumes for the asphalt paved shoulder with curb for guardrail to prevent erosion of the front slope.

ALTERNATIVE: (sketch attached)

Install one drainage structure to eliminate two concrete flumes.

ADVANTAGES:

- Reduces material and labor requirements
- Reduces drainage structure installations
- Reduces construction schedule
- Eliminates proposed manhole
- Provides better grade for pipe at structure tie-in

DISADVANTAGES:

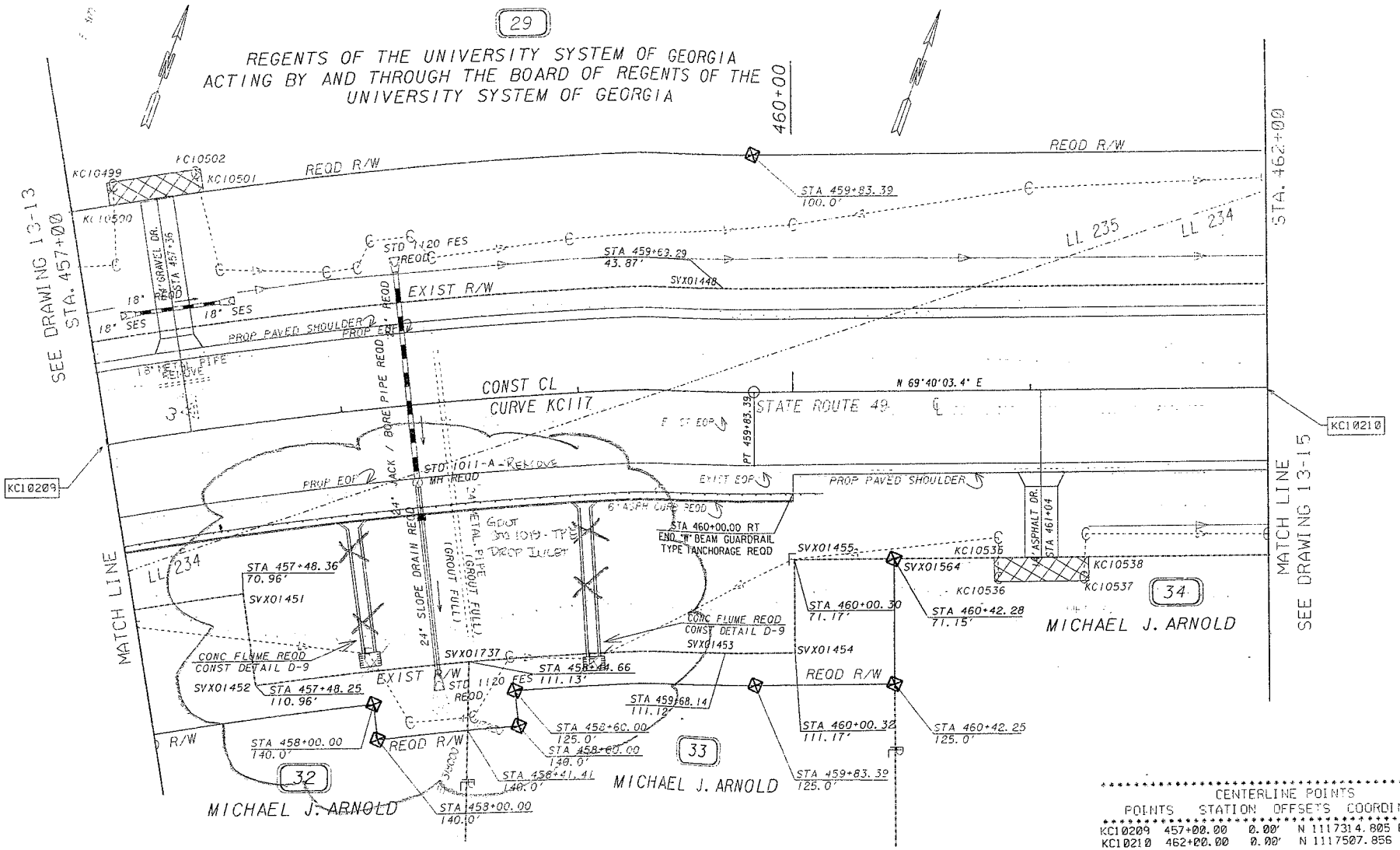
- None apparent

DISCUSSION:

This alternative will provide a reduction in costs by eliminating one or more concrete flume installations. This will also place the pipe on natural ground reducing future potential for erosion under the pipe versus the original design.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 15,000	—	$ 15,000
ALTERNATIVE	$ 3,000	—	$ 3,000
SAVINGS (Original minus Alternative)	$ 12,000	—	$ 12,000

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	WH000-0089-01(026)	00	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10209	457+00.00	0.00'	N 1117314.805 E 317823.016
KC10210	462+00.00	0.00'	N 1117507.856 E 318283.596

PROPERTY AND EXISTING R/W LINE
PROPOSED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR

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

SCALE IN FEET

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

ALT. NO. D-5 Sht 2 of 4

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **D-5**

INSTALL NEW DRAINAGE STRUCTURE AT STA 458+20 TO ELIMINATE CONCRETE FLUMES

SHEET NO.: **3 of 4**

Drainage Structures and Drainage Structure Reductions:

Added Drainage Structure:

Sta 458+20 RT, 46' RT.
1EA -GDOT STD 1019 TP "E" Drop Inlet
Cost $2,309.13

Total Depth 10 Ft.
Additional Depth 4 Ft.
Additional Depth $131. LF x 4' = $525.56
Total Cost $2,834.69

Concrete Flume Removal

Sta. 458+00 RT - Length - 50'
Cl. A Conc. - 9.12 CY x 671.56 = $6,124.63
Reinf. Steel – 107.80 LBS x $1.04 = $112.11
Sand Cement Bag Rip Rap – 2.33 SY x $108.79 = 253.81

Sta. 459+00 RT - Length - 21'
Cl. A Conc. - 5.33 CY x 671.56 = $3,579.41
Reinf. Steel – 69.06 LBS x $1.04 = $71.82
Sand Cement Bag Rip Rap – 2.33 SY x $108.79 = 253.81

Total Amount Cl. A Conc. = $9,704.04
Total Amount Reinf. Steel = $183.93
Total Amount Sand Cement Bag Rip Rap = $507.62

REMOVE AT STA. 458+42, 34 FT., RT
1 EA - GDOT STD 1011-A, Man Hole GP 1
AMT. = $2,250.50
Storm Sewer Man Hole TP 1, A Dep, CL 1
4 LF x $267.39 = 1069.56
Total Amount for Removal of Man Hole
$3,320.06

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia
INSTALL NEW DRAINAGE STRUCTURE AT STA 458+20 TO ELIMINATE CONCRETE FLUMES

ALTERNATIVE NO.: **D-5**

SHEET NO.: **4 of 4**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
500-3101 Cl A Conc	CY	15	671.56	9,738			
511-1000 Bar Reinf Steel	LBS	177	1.04	184			
603-6006 Sand Cement Bag Rip Rap, 6 In	SY	5	108.79	544			
668-4300 Storm Sewer Man Hole, GP 1	EA	1	2,250.50	2,251			
668-4300 Storm Sewer ManHole, TP 1,	LF	4	267.39	1,070			
A DEP, CL 1							
668-2100 Drop Inlet, GP 1	EA				1	2,309.13	2,309
668-2110 Drop Inlet, GP 1, Addl Depth	LF				4	131.39	526
Subtotal				13,787			2,835
Markup (%) at 10.00%				1,379			284
TOTAL				15,166			3,119
TOTAL (ROUNDED)				15,000			3,000

SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
NH000-0089-01(026) Baldwin County

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	PRESENT WORTH OF COST SAVINGS: INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
EARTHWORK						
E-1	Retain the existing vertical profile on sr 49 from sta. 513+00 to sta. 522+00 and request a design Exception for the design speed in this area	$165,000	$0	$165,000		$165,000
E-2	Retain the existing vertical profile from Sta. 513+00 to Sta. 513+50 and raise the proposed profile from Sta. 518+50 to Sta. 523+00 to correct the existing vertical profile for design speed	$107,000	$0	$107,000		$107,000
SIDEWALK						
S-1	Do not Modify bridge and do not add sidewalk on the south side of SR 49 from Frank bone road east	$367,000	$0	$367,000		$367,000
S-2	Extend the sidewalk construction on both sides of the road to the end of the existing sidewalks east of Lake Drive	DESIGN SUGGESTION				

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **E-1**

DESCRIPTION: **RETAIN THE EXISTING VERTICAL PROFILE ON SR 49 FROM STA. 513+00 TO STA. 522+00 AND REQUEST A DESIGN EXCEPTION FOR THE DESIGN SPEED IN THIS AREA**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (sketch attached)

The current geometric design corrects the existing profile grade from Sta. 513+00 to Sta. 522+00 to obtain a design speed of 45 mph, which requires full-depth pavement between these stations.

ALTERNATIVE: (sketch attached)

Retain the existing vertical profile from Sta. 513+00 to Sta. 522+00 and overlay the existing pavement in lieu of building a full-depth pavement as required by the plans Typical Sections No. 5 and 6.

ADVANTAGES:

- Reduces labor and material requirements
- Slightly reduces the right-of-way impacts
- Reduces construction time
- Facilitates the maintenance of traffic and construction staging

DISADVANTAGES:

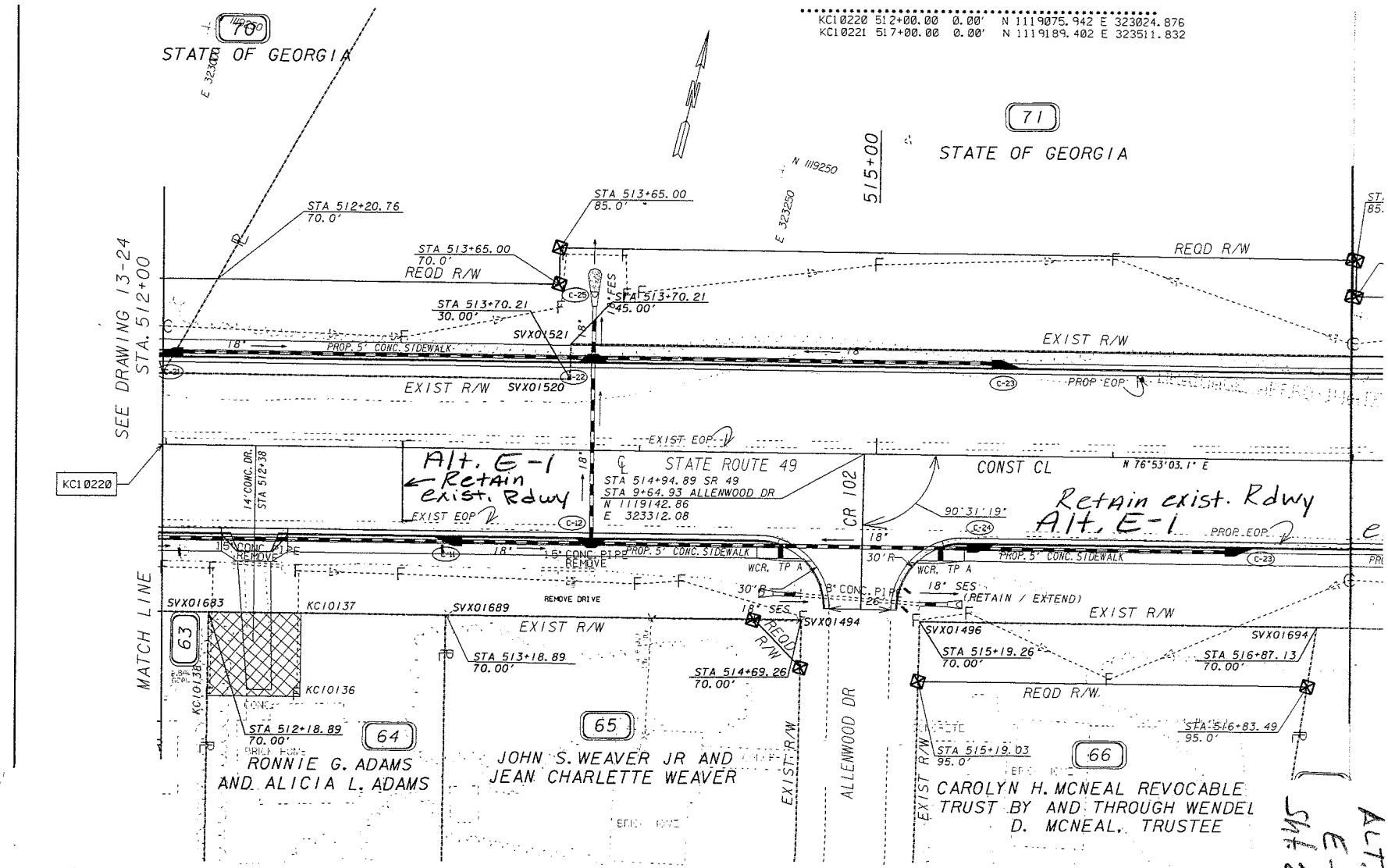
- Reduces the design Speed
- Requires a design Exception for speed design

DISCUSSION:

The only section of roadway that is not being retained and overlayed is from Sta. 513+00 to Sta. 522+00 because the vertical profile does not meet the design criteria for 45 mph. It is suggested to retain this profile in order to reduce the project's cost. It would also eliminate the requirement to undercut the existing pavement, therefore facilitating the construction staging and traffic control for the maintenance of traffic. A design exception would be required to retain the existing profile grade. It is important to note that adjacent to this area another vertical curve is being retained even though it only meets the 35 mph design criteria.

It is recommended that driveways at Sta. 519+70/Lt and Sta. 520+89/Lt be signed and marked for a right-in and right-out only traffic movement. The right-in and right-out only drives are due to the intersection sight distance looking to the right, and also the nearness of these drives to the US 441 intersection and left turn lane on SR 49. The right-in and right-out only drives would also provide for mitigation for the design exception approval to alleviate the limited sight distance to the right for these two driveways.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 165,000	—	$ 165,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 165,000	—	$ 165,000



PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA	SCALE IN FEET 0 20 40 80	DATE	REVISIONS	DATE	REVISIONS
REQUIRED R/W LINE	END LIMIT OF ACCESS ..... ELA					
CONSTRUCTION LIMITS	LIMIT OF ACCESS					
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	REQUIRED R/W AND LIMIT OF ACCESS					
EASEMENT FOR CONSTR OF SLOPES						
EASEMENT FOR CONSTR OF DRIVES						

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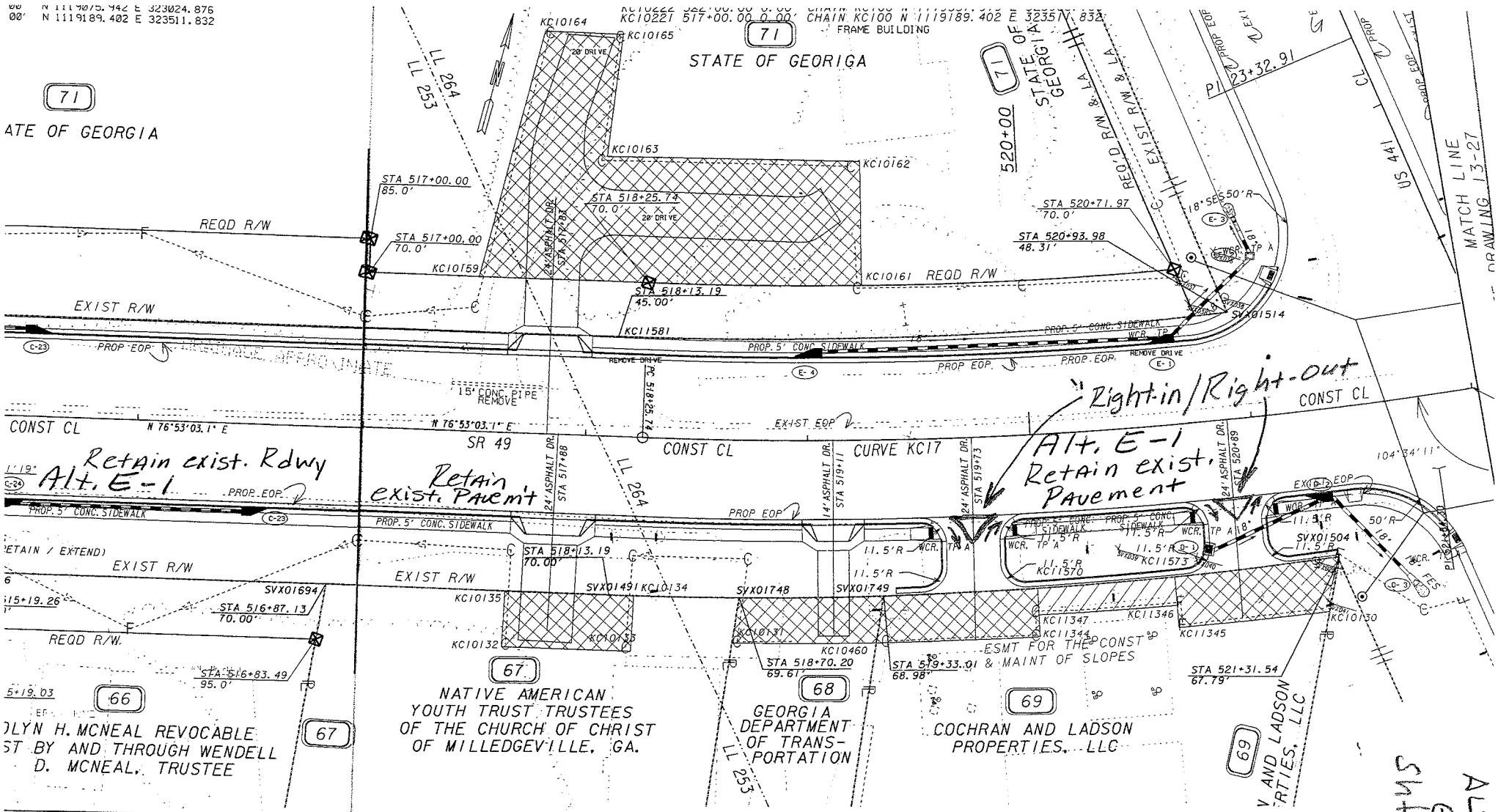
ALT. NO. E-1 Sht 2 of 6



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LINE
BEGIN LIMIT OF ACCESS ..... BLA
END LIMIT OF ACCESS ..... ELA
LIMIT OF ACCESS
REQUIRED R/W AND LIMIT OF ACCESS
SLOPES
DRIVES

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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ALT. NO. E-1 Sht. 3 of 6

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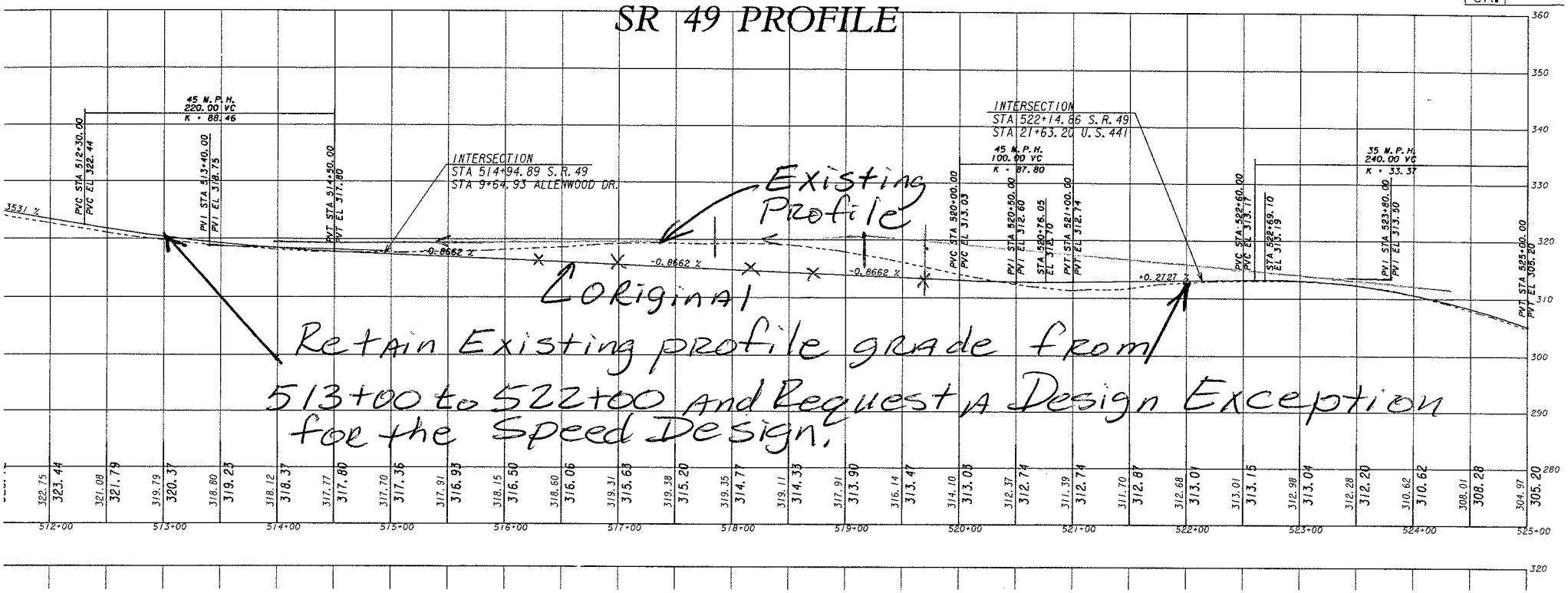
SR 49 PROFILE



Sketch Alt. E-1

SR49 Baldwin County

ALT. NO. E-1
SHT. 4 of 6

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **E-1**

SHEET NO.: **5 of 6**

Retain the existing profile grade from Sta 513+00 to Sta 522+00 and overlay exiting pavement and widen roadway.

Full depth pavement saved = (900 ft x 40 ft)/9 sf/sy = **4000 SY**

Mainline SR 49 Full Depth Pavement Unit Cost ($/SY):

12.5mm:	165#/SY x Ton/2,000# x $65/Ton	=	$5.36/SY
19mm:	220#/SY x Ton/2,000# x $65/Ton	=	$7.15/SY
25mm:	440#/SY x Ton/2,000# x $60/Ton	=	$13.20/SY

12" GAB: 1ft x 147#/CF x Ton/2,000# x 9SF/SY x $18/Ton = $11.91SY

Total Pavement Unit Cost = $37.62/SY

The above prices per ton are taken from the GaDOT Project Cost estimate.

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **E-1**

SHEET NO.: **5 of 6**

Retain the existing profile grade from Sta 513+00 to Sta 522+00 and overlay exiting pavement and widen roadway.

Full depth pavement saved = (900 ft x 40 ft)/9 sf/sy = **4000 SY**

Mainline SR 49 Full Depth Pavement Unit Cost ($/SY):

12.5mm:	165#/SY x Ton/2,000# x $65/Ton	=	$5.36/SY
19mm:	220#/SY x Ton/2,000# x $65/Ton	=	$7.15/SY
25mm:	440#/SY x Ton/2,000# x $60/Ton	=	$13.20/SY

12" GAB: 1ft x 147#/CF x Ton/2,000# x 9SF/SY x $18/Ton = $11.91SY

Total Pavement Unit Cost = $37.62/SY

The above prices per ton are taken from the GDOT Project Cost estimate.

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **E-1**

SHEET NO.: **6 of 6**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Full Depth pavement saved & Original Cost ssaved							
Full Depth Pavement Section	SY	4,000	$37.62	150,480			
Traffic Control Costs saved by	LS	1	15,000.00	15,000			
eliminating lowering the profile							
Subtotal				165,480			
Markup (%) at							
TOTAL				165,480			
TOTAL (ROUNDED)				165,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **E-2**

DESCRIPTION: **RETAIN THE EXISTING VERTICAL PROFILE FROM STA. 513+00 TO STA. 518+50 AND RAISE THE PROPOSED PROFILE FROM STA. 518+50 TO STA. 523+00 TO CORRECT THE EXISTING VERTICAL PROFILE FOR DESIGN SPEED**

SHEET NO.: **1 of 7**

ORIGINAL DESIGN: (sketch attached)

The current geometric design corrects the existing profile grade from Sta. 513+00 to Sta. 522+00 to obtain a design speed of 45 mph which requires full-depth pavement between these stations.

ALTERNATIVE: (sketch attached)

Retain the existing vertical profile from Sta. 513+00 to Sta. 518+50 and overlay the existing pavement in lieu of installing full depth pavement and raise the profile from Sta. 518+50 to Sta. 523+00 to obtain a design speed of 45 mph.

ADVANTAGES:

- Reduces labor and material requirements
- Slightly reduces the right-of-way impacts
- Reduces construction time
- Facilitates the maintenance of traffic and construction staging
- Meets the design speed criteria for 45 mph
- May not require new drainage facilities in this area to save additional costs

DISADVANTAGES:

- None apparent

DISCUSSION:

The only section of roadway that is not being retained and overlayed is from Sta. 513+00 to Sta. 522+00, because the vertical profile does not meet the design criteria for 45 mph. It is suggested to retain as much of the existing profile as possible and still meet 45 mph speed design. The existing profile would be retained from Sta. 513+00 to Sta. 518+50 and the profile would be raised from Sta. 518+50 to Sta. 523+00 to meet the 45 mph design criteria. It would also eliminate the requirement to undercut the existing pavement, therefore facilitating the construction staging and traffic control for the maintenance of traffic.

A design exception would *not* be required with the Alt. No. E-2 design. Raising the profile grade will improve the intersection sight distances for the driveways at Sta. 519+11/Lt; Sta. 519+70/Lt and Sta. 520+89/Lt. It is recommended that driveways at Sta. 519+70/Lt and Sta. 520+89/Lt be signed and marked for a right-in and right-out only traffic movement. The right-in and right-out only drives are due to their close proximity to the US 441 intersection and left turn lane on SR 49.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	**$ 107,000**	—	**$ 107,000**
ALTERNATIVE	**$ 0**	—	**$ 0**
SAVINGS (Original minus Alternative)	**$ 107,000**	—	**$ 107,000**

Alt. E-2

KC10220 512+00.00 0.00' N 1119075.942 E 323024.876
KC10221 517+00.00 0.00' N 1119189.402 E 323511.832

70 STATE OF GEORGIA

71 STATE OF GEORGIA

SEE DRAWING 13-24 STA. 512+00

MATCH LINE

KC10220

STA 512+20.76 70.0'

STA 513+65.00 85.0'

STA 513+65.00 70.0' REQD R/W

STA 513+70.21 30.00'

STA 513+70.21 45.00'

SVX01521

SVX01520

PROP. 5' CONC. SIDEWALK

EXIST R/W

REQD R/W

PROP. EOP

EXIST EOP

14' CONC. DR. STA 512+38

Alt. E-1 ← Retain exist. Rdwy

STATE ROUTE 49
STA 514+94.89 SR 49
STA 9+64.93 ALLENWOOD DR
N 1119142.86
E 323312.08

CR 102

CONST CL

N 76°53'03.1" E

90°31'19"

Retain exist. Rdwy Alt. E-1

15" CONC. PIPE REMOVE

18" 15" CONC. PIPE REMOVE

REMOVE DRIVE

WCR. TP A

30' R

18" CONC. PIPE

18" SES (RETAIN / EXTEND)

18" SES

SVX01683

KC10137

SVX01689

SVX01494

SVX01496

SVX01694

STA 513+18.89 70.00'

STA 514+69.26 70.00'

STA 515+19.26 70.00'

STA 516+87.13 70.00'

STA 516+83.49 95.0'

STA 515+19.03 95.0'

KC10136

KC10138

STA 512+18.89 70.00'

63

64 RONNIE G. ADAMS AND ALICIA L. ADAMS

65 JOHN S. WEAVER JR AND JEAN CHARLETTE WEAVER

66 CAROLYN H. MCNEAL REVOCABLE TRUST BY AND THROUGH WENDEL D. MCNEAL, TRUSTEE

EXIST R/W

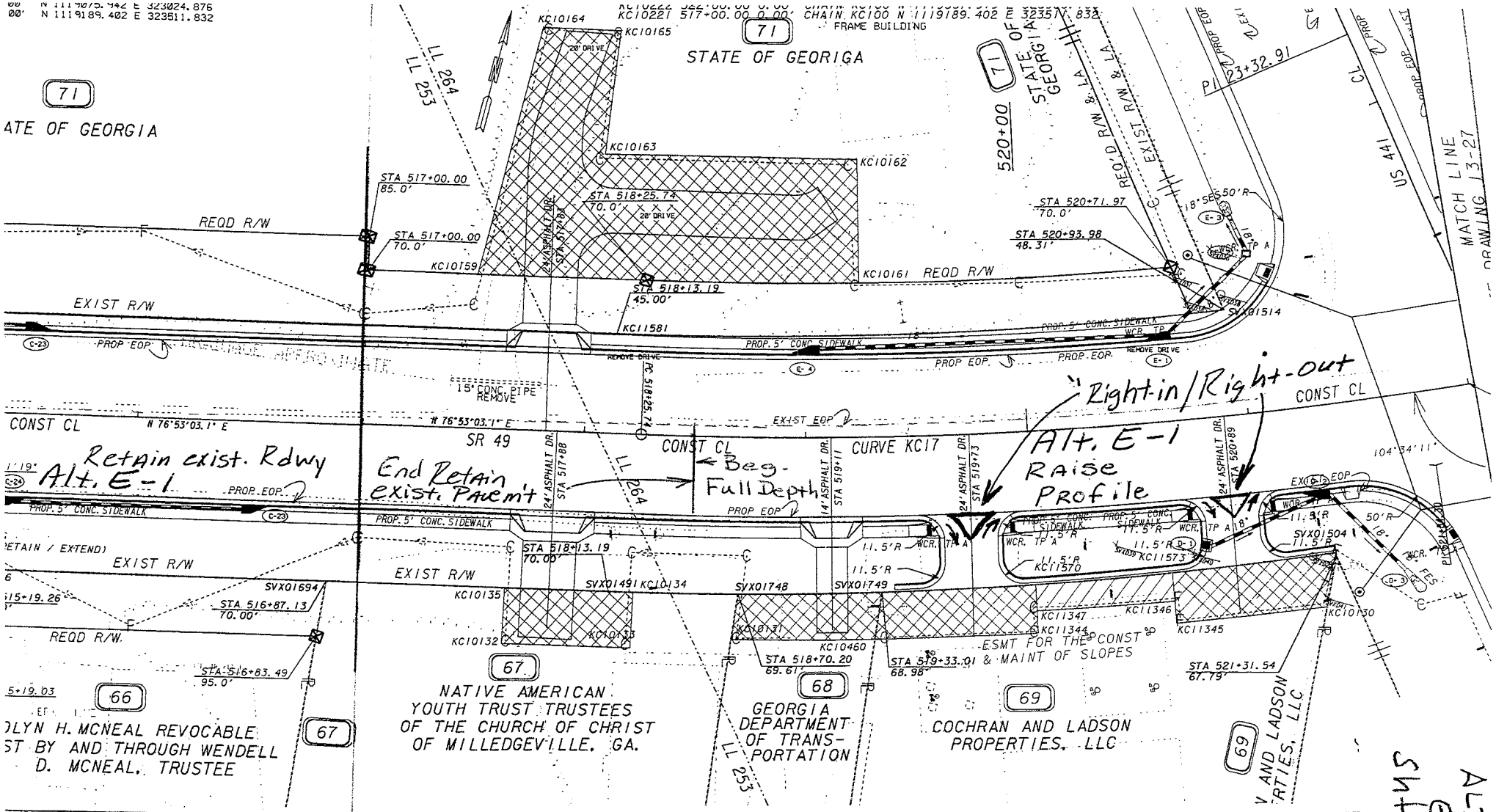
ALLENWOOD DR

PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ... BLA	SCALE IN FEET	
REQUIRED R/W LINE	END LIMIT OF ACCESS ... ELA	0 20 40 80	
CONSTRUCTION LIMITS	LIMIT OF ACCESS		
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	REQUIRED R/W AND LIMIT OF ACCESS		
EASEMENT FOR CONSTR OF SLOPES			
EASEMENT FOR CONSTR OF DRIVES			

DATE	REVISIONS	DATE	REVISIONS

C:\231450\DGN\231450S25.DGN

ALT. NO. E-2 Sht 2 of 7



REVISIONS	

LINE
BEGIN LIMIT OF ACCESS ..... BLA
END LIMIT OF ACCESS ..... ELA
LIMIT OF ACCESS
REQUIRED R/W AND LIMIT OF ACCESS
SLOPES
DRIVES

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

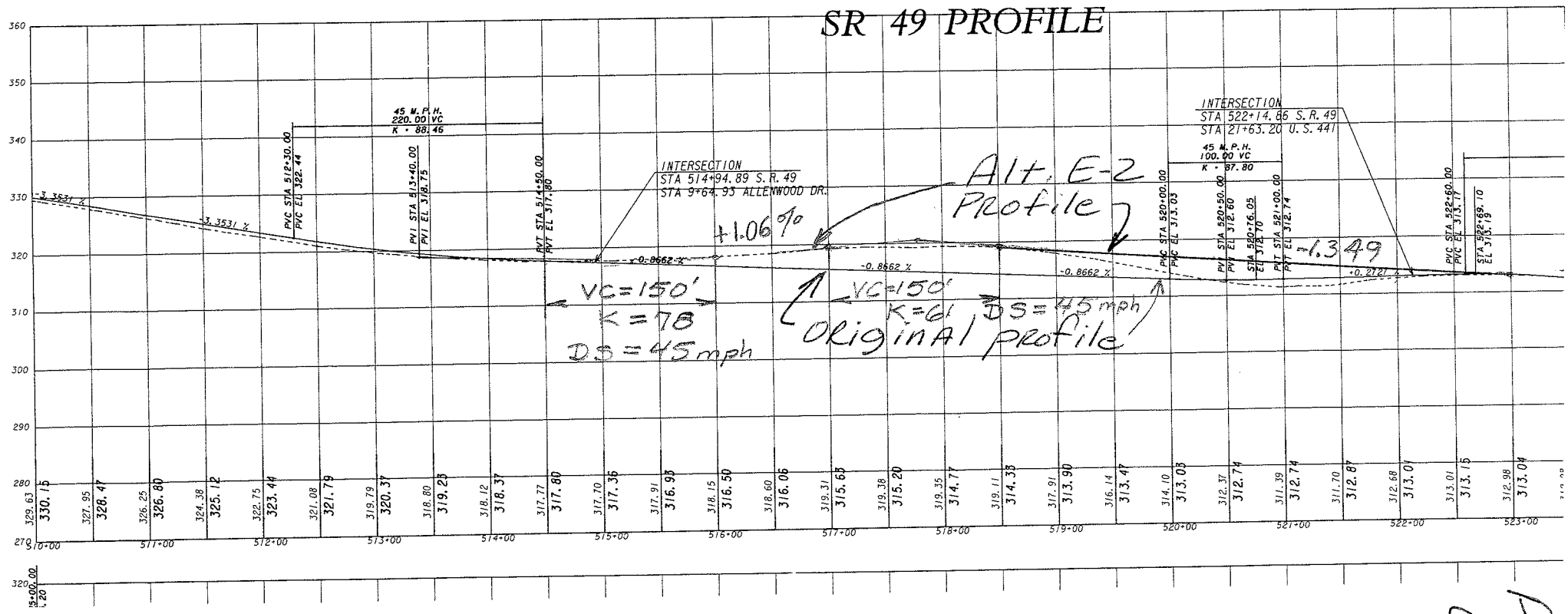
\231450S25.DGN

C:\231450\dgn\231450s26.dgn

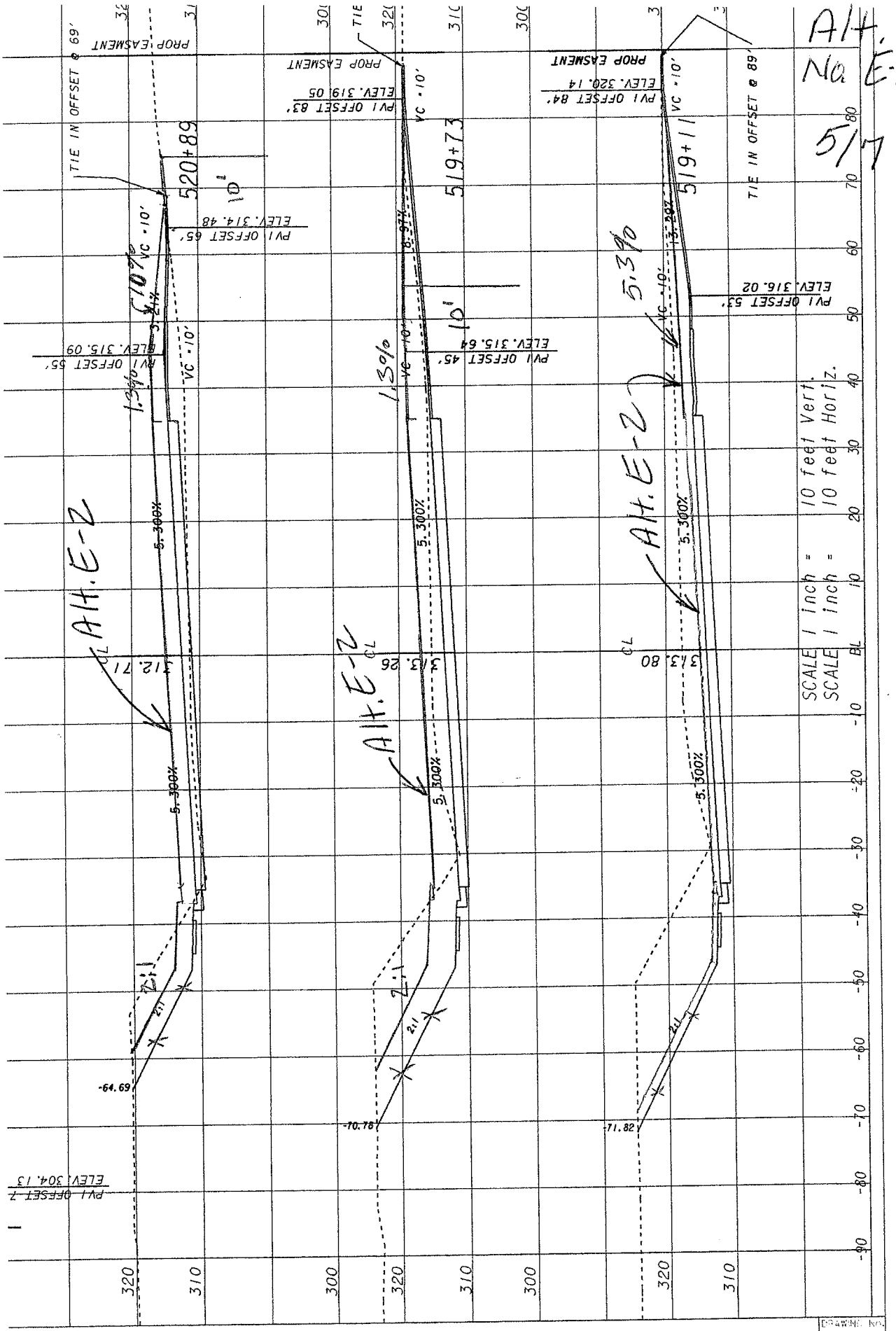
ALT. NO. E-2
Sht. 3 of 7

Alternate & Original Profiles

SR49 Baldwin County



Alt. E-2 4/7



SR 49 DRIVEWAY PROFILES

DRAWING NO. 17-5

C:\231450\dgn\231450dr101.DGN

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **E-2**

SHEET NO.: **6 of 7**

Retain the existing profile grade from Sta 513+00 to Sta 518+50 and overlay existing pavement and widen roadway.

Full depth pavement saved = (550 ft x 40 ft)/9 sf/sy = **2,450 SY**

Mainline SR 49 Full Depth Pavement Unit Cost ($/SY):

12.5mm:	165#/SY x Ton/2,000# x $65/Ton	=	$5.36/SY
19mm:	220#/SY x Ton/2,000# x $65/Ton	=	$7.15/SY
25mm:	440#/SY x Ton/2,000# x $60/Ton	=	$13.20/SY

12" GAB: 1ft x 147#/CF x Ton/2,000# x 9SF/SY x $18/Ton = $11.91SY

Total Pavement Unit Cost = $37.62/SY

The above prices per ton are taken from the GaDOT Project Cost estimate.

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**

Baldwin County, Georgia

ALTERNATIVE NO.: **E-2**

SHEET NO.: **7 of 7**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Full Depth pavement saved & Original Cost ssaved							
Full Depth Pavement Section	SY	2,450	$37.62	$92,169			
Traffic Control for Maintenance of Traffic saved	LS	1	$15,000.00	$15,000			
Subtotal				107,169			
Markup (%) at							
TOTAL				107,169			
TOTAL (ROUNDED)				107,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **S-1**

DESCRIPTION: **DO NOT MODIFY BRIDGE AND DO NOT ADD SIDEWALK ON THE SOUTH SIDE OF SR 49 FROM FRANK BONE ROAD EAST**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:.

Reconstruct the existing bridge over Fishing Creek to add a 6 ft. 5-in.-wide sidewalk and a vertical face barrier to the south side of the bridge. Add a 5-ft.-wide sidewalk from Frank Bone Drive to the bridge and continue the sidewalk from the bridge to Lake Drive. Note there is an existing sidewalk on the north side of the existing bridge. Five-ft.-wide bicycle lanes are striped on the bridge in each direction on SR 49.

ALTERNATIVE:

Do not modify the existing bridge to add the sidewalk on the southern side of the bridge. Do not add the additional sidewalk on southern side of the road from Frank Bone Drive to Lake Drive. Keep the 5 ft. bicycle lanes on the bridge in each direction on SR 49.

ADVANTAGES:.

- Saves construction time
- Saves traffic control savings
- Minor bridge spall repair and crack repair can be performed under a maintenance contract

DISADVANTAGES:

- Pedestrians will have to cross SR 49 to use the sidewalk on the north side of the bridge

DISCUSSION:

The existing bridge at Fishing Creek has an existing sidewalk on the north side of the bridge. Pedestrians needing to cross the bridge can use the sidewalk on the north side of the bridge. Also with no sidewalk on the south side of the bridge, remove the sidewalk from Frank Bone Drive to Lake Drive on the south side of SR49. Stripe the bridge for the 5 ft. bicycle lanes. This area is very rural and probably has very low pedestrian traffic. Therefore the additional sidewalk on the south side of SR 49 is not warranted.

The minor spall repair and crack repair on the bridge can be performed under a maintenance contract.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	$ 367,000	—	$ 367,000
ALTERNATIVE	$ 0	—	$ 0
SAVINGS (Original minus Alternative)	$ 367,000	—	$ 367,000

COST WORKSHEET

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**

Baldwin County, Georgia

ALTERNATIVE NO.: **S-1**

SHEET NO.: **2 of 2**

PROJECT ITEM		ORIGINAL ESTIMATE			ALTERNATIVE ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Partial Removal of Existing Bridge	LS	1	78,500.00	78,500			
Recontruct Bridge to add Sidewalk	LS	1	267,000.00	267,000			
Temporary Barrier on Bridge & App	LF	315	46.58	14,657			
5ft Sidewalk on West side of Bridge	SY	106	25.00	2,639			
5ft Sidewalk on East side of Bridge	SY	167	25.00	4,167			
Subtotal				366,963			
Markup (%) at							
TOTAL				366,963			
TOTAL (ROUNDED)				367,000			

VALUE ENGINEERING ALTERNATIVE

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

ALTERNATIVE NO.: **S-2**

DESCRIPTION: **EXTEND THE SIDEWALK CONSTRUCTION ON BOTH SIDES OF THE ROAD TO THE END OF THE EXISTING SIDEWALKS EAST OF LAKE DRIVE**

SHEET NO.: **1 of 1**

ORIGINAL DESIGN:

The proposed sidewalks on SR 49 stop at Lake Drive on the east end of the project. The existing sidewalk on the south side ends about 190 ft. east of Lake Drive and the existing sidewalk on the north side ends about 250 ft. east of Lake Drive at Richmond Street.

ALTERNATIVE:

Extend sidewalks to meet with the existing sidewalks past Lake Drive on the east end of the project.

ADVANTAGES:

- Completes the sidewalk system on both sides of the road

DISADVANTAGES:

- Adds minor costs

DISCUSSION:

Extending the sidewalks to meet with the existing sidewalks on the east end of the project past Lake Drive completes the sidewalk system in this area and justifies adding the new sidewalk on the south side that requires modifying the existing bridge.

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

SECTION THREE – PROJECT DESCRIPTION

SR 49 is a primary north-south corridor in Central Georgia, connecting the city of Milledgeville in Baldwin County to the city of Macon in Bibb County and on to the city of Americus in Sumter County. Project NH-000-089-01(026) widens and reconstructs SR 49, an urban principal arterial, to four lanes with opposing lanes divided by a 14 ft. flush median from just west of Felton Drive (Sta. 391+73.56) to just east of US 441/SR 29, the Milledgeville Bypass (Sta. 536+56.49), for a total length of 2.73 miles. Land use near the intersection of SR 49 and US 441/SR 29 is commercial including a vocational school and a high school. Beyond the intersection with US 441, land use along this section is rural in nature with scattered commercial and residential development.

Starting at the west end of the project, Sta. 391+73.56, there are two eastbound lanes and one westbound lane. An eastbound right turn lane is added for Felton Drive and to the east of Felton Drive the roadway is widened to the north and south to create a left turn lane for westbound SR 49 to Felton Drive. Four-foot-wide paved shoulders are also provided, except where guardrail is required at embankment areas with 2 horizontal to 1 vertical (2:1) slopes and the paved shoulder is expanded to 15 ft. 6 in. with an asphalt concrete curb at the edge. This occurs throughout the rural section of the project.

The roadway then narrows to one 12-ft.-wide westbound lane and one 12-ft.-wide eastbound lane plus 10-ft.-wide shoulders with 4 ft. of paving before widening to two 12-ft.-wide westbound lanes and one 12-ft.-wide eastbound lane. Approaching the Horace Veal Road/Allen Memorial Drive intersection, the roadway widens to create an eastbound left turn lane and right turn lane. To the east of the intersection are two through lanes in each direction and a westbound left turn lane which turns into a 14-ft.-wide dual left turn lane further east. At this point the roadway section consists of two 12-ft.-wide lanes in each direction with a 14-ft.-wide flush median.

An eastbound right turn lane is added at the County Road (CR) 426 intersection and the flush median is striped for a dedicated left turn in the westbound direction. To the west of CR 426 the speed limit is 55 miles per hour (mph) and to the east it is 45 mph with the exception of a short 30 mph zone at the high school. A right turn lane is provided eastbound and a striped westbound left turn lane in the flush median for the Spaces Road West intersection. A 5-ft.-wide concrete sidewalk placed 2 ft. behind a 2 ft. 6-in.-wide concrete curb and gutter section on the south side of the roadway extends from the Spaces Road to the east end of the project. A 4-ft.-wide bike lane is added to the eastbound curb lane to the east end of the project.

In the eastbound direction, a right turn lane is provided for the Bay Valley Drive (CR 357) intersection with SR 49. A striped eastbound left turn lane is provided in the flush median for the intersection with Blandy Road, which will be signalized. To the east of Blandy Road there will be a westbound right turn lane. A 5-ft.-wide concrete sidewalk set 2 ft. behind a 2-ft. 6-in.-wide concrete curb and gutter will be added to the north side of SR 49 from this point to the east end of the project. A 4-ft.-wide bicycle lane will also be added to the westbound curb lane.

An eastbound right turn lane will be provided for the intersections with Maplewood Avenue and Sycamore Road with striped westbound turn lanes in the flush median. A westbound right turn lane

for the road leading to the high school will also be constructed. An eastbound right turn lane will be provided for Allenwood Drive and then the US 441/SR 29 intersection where a striped left turn lane will also be provided in the flush median. The signals at the intersection will be replaced. In addition, the vertical profile of SR 49 will be modified between Allenwood Lane and the US 441/SR 29 intersection to correct a deficiency. This will necessitate staging the work since the profile is being lowered about 5 ft. There will also be some modifications on US 441/SR 29 including widening on each side of SR 49 to provide for turning lanes.

To the east of the intersection there will be a westbound right turn lane, through lane, and left turn lane and an eastbound through lane and right turn lane for the Frank Bone Road (CR 429) intersection. To the east of this intersection will be an eastbound through lane with a bicycle lane, 14-ft.-wide flush median and a westbound through lane with a bicycle lane. A striped eastbound left turn lane in the flush median will be provided for the intersection with Lake Drive.

The bridge between Frank Bone Road and Lake Drive over Fishing Creek will have its eastbound barrier removed and replaced with a rectangular barrier and 6-ft. 5-in. wide raised concrete sidewalk.

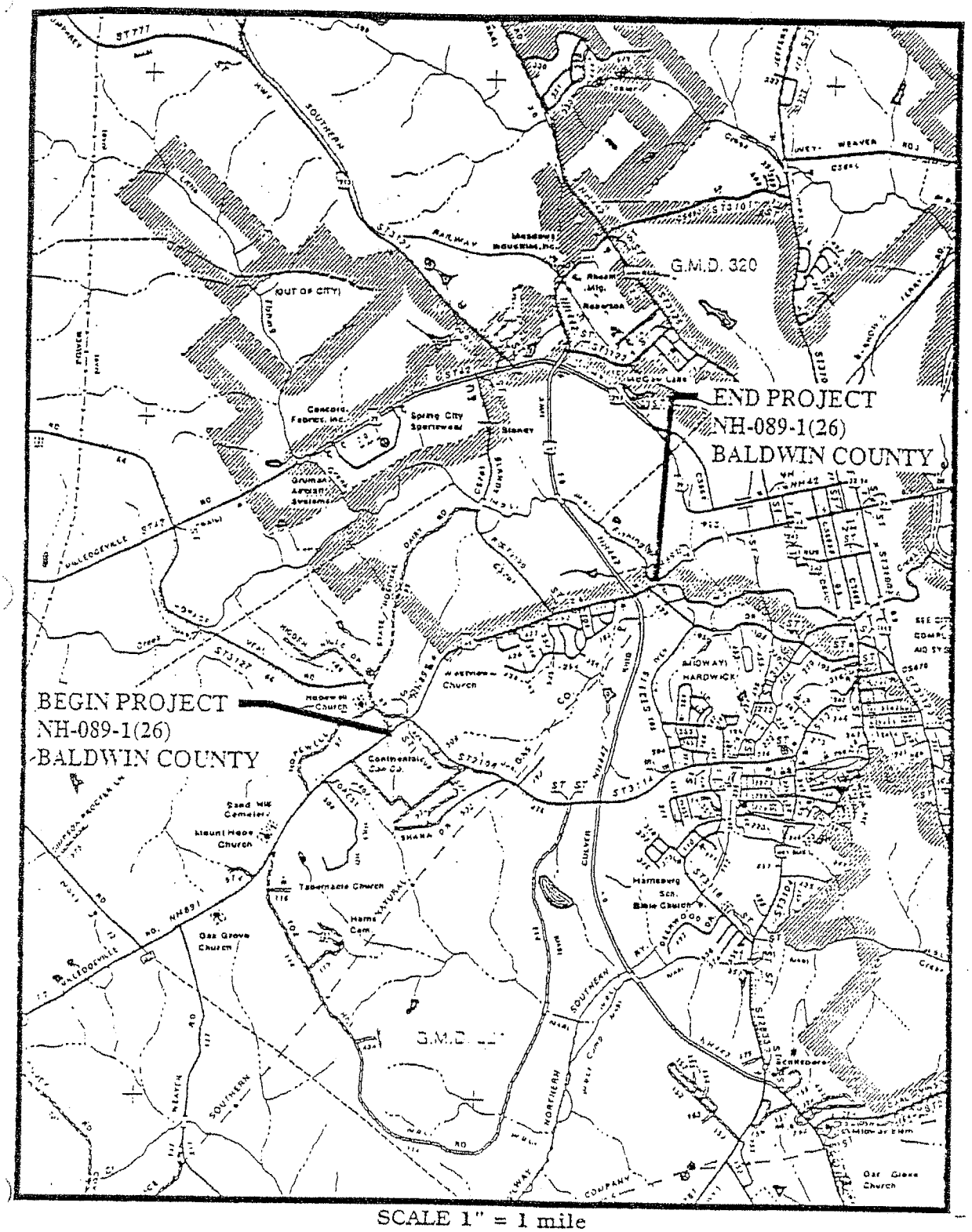
Along the curb and gutter section of roadway, a closed, piped drainage system will be installed with curb inlets and longitudinal reinforced concrete storm water pipes. Existing pipe culverts running across the roadway will either be extended or replaced because of new fills. In the rural section, an existing box culvert will be extended and two jack or bored cross culverts will be installed. In the fill section where guardrail is added, concrete flumes discharging into rip rap will extend down from the shoulder of the road. Driveways into properties will be reconstructed as required.

The estimated cost of the construction is approximately $7.7 million with the right-of-way estimated at $5.7 million.

Selected project drawings follow.

P.I. NO. 231450

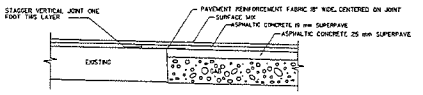
PROJECT MAP - Project No. : NH-089-1(26)



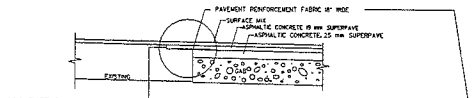
SCALE 1" = 1 mile

PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
NH000-0089-01(026)		

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



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



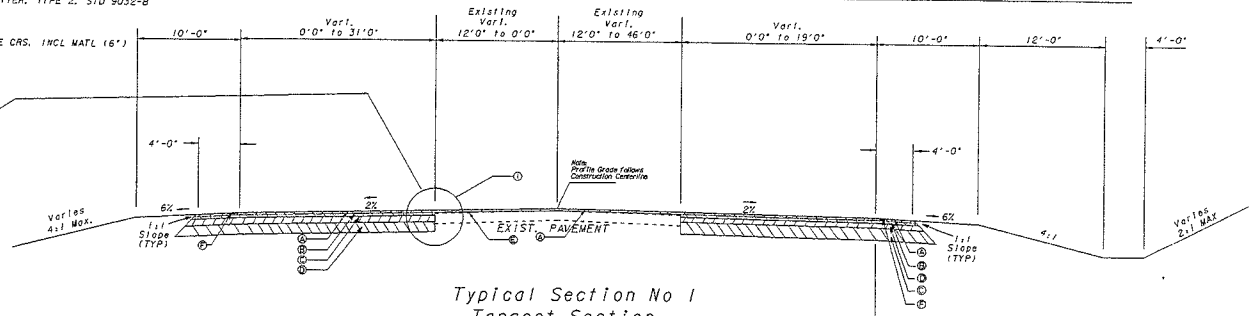
MILL EXISTING LANE ONE FOOT WIDE TO DEPTH OF ADJOINING LAYER TO BE PLACED. COST OF MILLING FOR THIS WORK TO BE INCLUDED IN THE UNIT PRICE BID FOR PAVEMENT REINFORCING FABRIC.

(A) RECYCLED ASPHALTIC CONCRETE SUPERPAVE. (12.5 mm) (165# / SQ YD)
(B) RECYCLED ASPHALTIC CONCRETE. SUPERPAVE (19mm) (220# / SQ YD)
(C) RECYCLED ASPHALTIC CONCRETE. SUPERPAVE (25mm) (440# / SQ YD)
(D) 12" GRADED AGGREGATE BASE CRS. INCL MATL
(E) ASPHALTIC CONCRETE LEVELING (AS REQD)
(F) INDENTATED RUMBLE STRIPS (GROUND-IN-PLACE) (SKIP)
(G) V-GUTTER. GDOT DETAIL D-33
(H) 8" X 30" CURB AND GUTTER. TYPE 2. STD 9032-B
(I) PAVEMENT FABRIC
(J) GRADED AGGREGATE BASE CRS. INCL MATL (6")

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

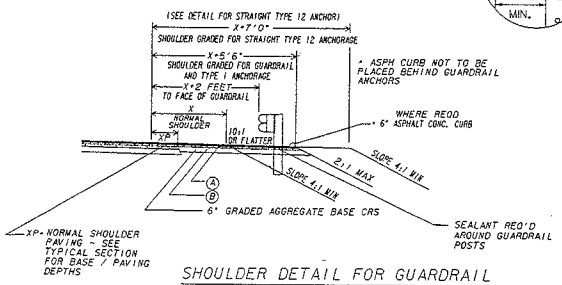
GUARDRAIL REQD ON FILL SECTIONS WITH SLOPES STEEPER THAN 4:1

Typical Section # 1



Typical Section No 1
Tangent Section

This Section Applies From Sta 391+73.56 to Sta 423+23.96 Lt & Rt
Sta 436+66.90 to Sta 442+58.70 Lt & Rt
Sta 460+72.04 to Sta 476+55 Lt & Rt
Sta 476+55 to Sta 492+50 Lt



SHOULDER DETAIL FOR GUARDRAIL
SEE PLAN FOR LOCATION

(A) SAME AS TYPICAL SECTION
(B) SAME AS TYPICAL SECTION

Typical Section # 2

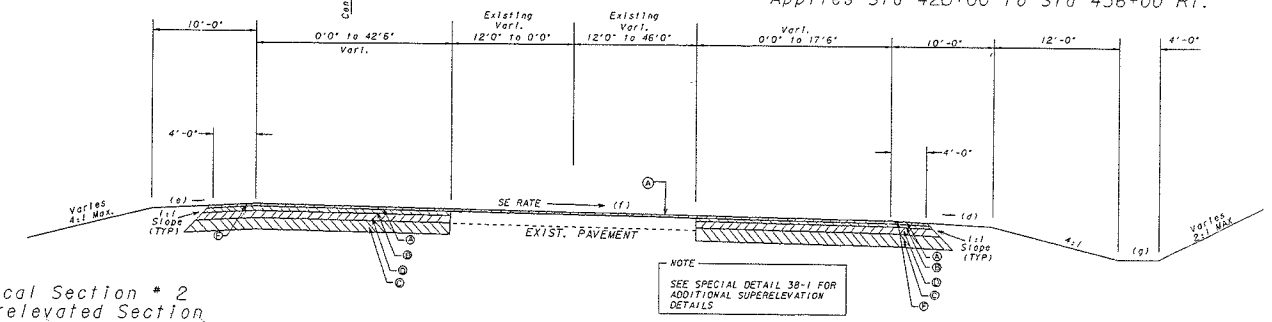
(d) RATE OF S.E. OR SHOULDER SLOPE WHICHEVER IS GREATER (BUT NOT LESS THAN ¾ % PER FOOT FOR UNPAVED SHOULDERS)

(e) ALGEBRAIC DIFFERENCE IN PAVING SLOPE AND SHOULDER SLOPE NOT TO EXCEED .08'/FT.

(f) SLOPED AT THE RATE FO S.E.

(g) DESIRED MINIMUM DITCH DEPTHS: 2-FT. ON S.E. LOW SIDE. 3-FT ON HIGH SIDE

Shoulder Detail
Applies Sta 425+00 to Sta 436+00 Rt.



NOTE
SEE SPECIAL DETAIL 38-1 FOR ADDITIONAL SUPERELEVATION DETAILS

Typical Section # 2
Superelevated Section

This Section Applies From:
Sta 423+23.96 to Sta 436+66.90 Lt & Rt
Sta 442+58.70 to Sta 460+72.04 Lt & Rt

NOT TO SCALE

GEORGIA
DEPARTMENT OF TRANSPORTATION

REVISION DATES		

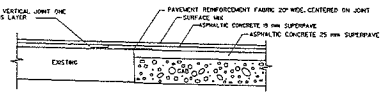
STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: DISTRICT TWO

TYPICAL SECTIONS
SR 49

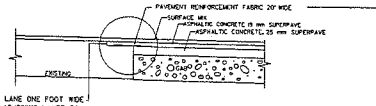
DRAWING NO. 5-01

PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
NH000-0089-01(026)		

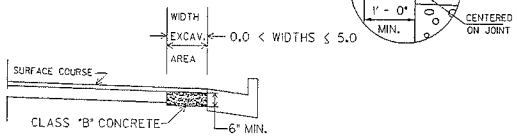
TYPICAL SECTION DETAIL TO BE USED WHEN EXISTING PAVEMENT IS TO BE RESURFACED WITH TWO INCHES OR MORE OF ASPHALTIC CONCRETE



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



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



NO SCALE
CLASS "B" CONCRETE BASE OR PAVEMENT WIDENING
Item Code 500-9999 - Cu. Yds.

In excavated areas between the existing paving and new curb and gutter that are 5'-0" or less in width, Class "B" concrete shall be placed in lieu of the base and paving specified by the typical section. Payment will be made under "Class B Concrete Base and Pavement Widening".

In excavated areas greater than 5'-0" in width, the Contractor shall place base and paving as specified on the typical section.

See plans for details of curb and gutter construction.

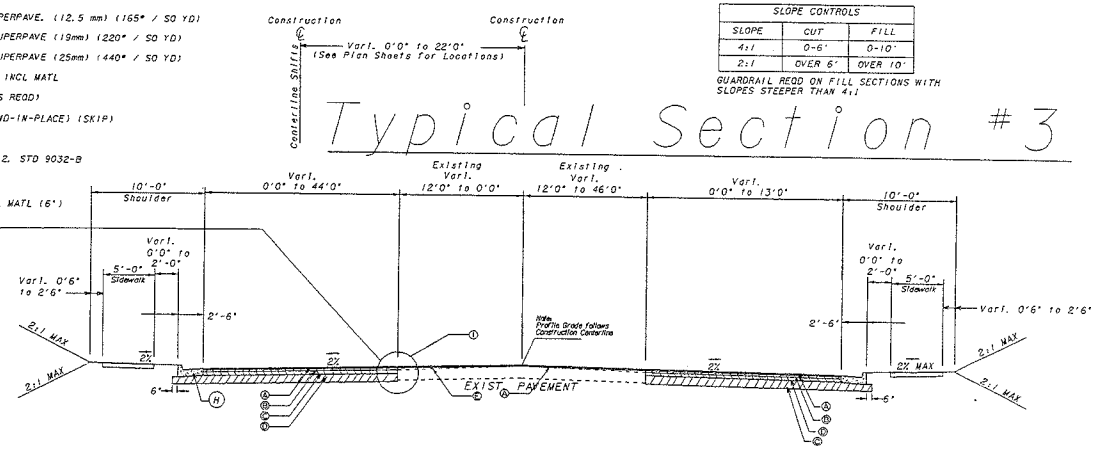
CLASS "B" CONCRETE BASE OR WIDENING DETAIL

(A) RECYCLED ASPHALTIC CONCRETE SUPERPAVE. (12.5 mm) (165# / SQ YD)
(B) RECYCLED ASPHALTIC CONCRETE. SUPERPAVE (19mm) (220# / SQ YD)
(C) RECYCLED ASPHALTIC CONCRETE. SUPERPAVE (25mm) (440# / SQ YD)
(D) 12" GRADED AGGREGATE BASE CRS. INCL MATL
(E) ASPHALTIC CONCRETE LEVELING (AS REQD)
(F) INDENTATED RUMBLE STRIPS (GROUND-IN-PLACE) (SKIP)
(G) V-GUTTER. GDOT DETAIL D-33
(H) 8" X 30" CURB AND GUTTER. TYPE 2. STD 9032-B
(I) PAVEMENT FABRIC
(J) GRADED AGGREGATE BASE CRS. INCL MATL (6")

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

GUARDRAIL REQD ON FILL SECTIONS WITH SLOPES STEEPER THAN 4:1

Typical Section #3

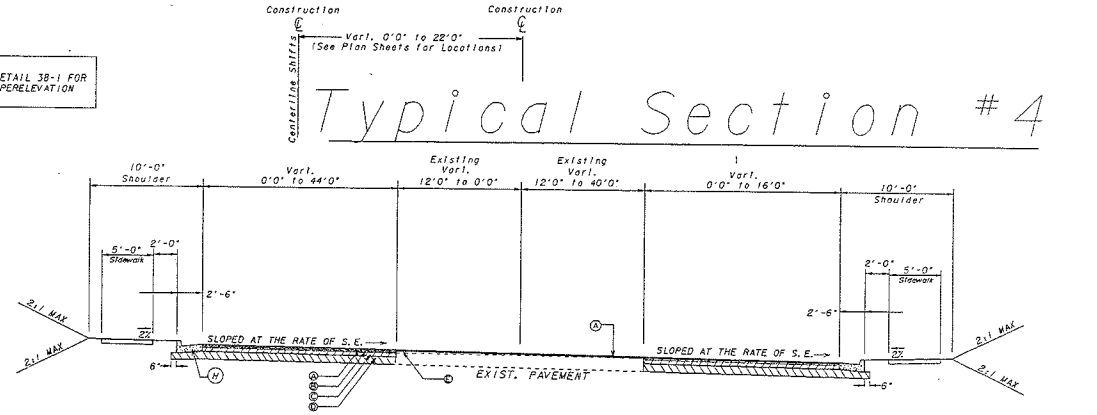


Tangent Section

This Section Applies From Sta 476+55 to Sta 513+00 Rt
Sta 492+50 to Sta 513+00 Lt
Sta 526+23.26 to Sta 536+56.49 Lt & Rt

NOTE
SEE SPECIAL DETAIL 38-1 FOR ADDITIONAL SUPERELEVATION DETAILS

Typical Section #4



Superelevated Section

This Section Applies From Sta 522+00 to Sta 526+23.26 Lt & Rt

NOT TO SCALE

GEORGIA DEPARTMENT OF TRANSPORTATION	REVISION DATES	STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION
		OFFICE:
		TYPICAL SECTIONS
		SR 40

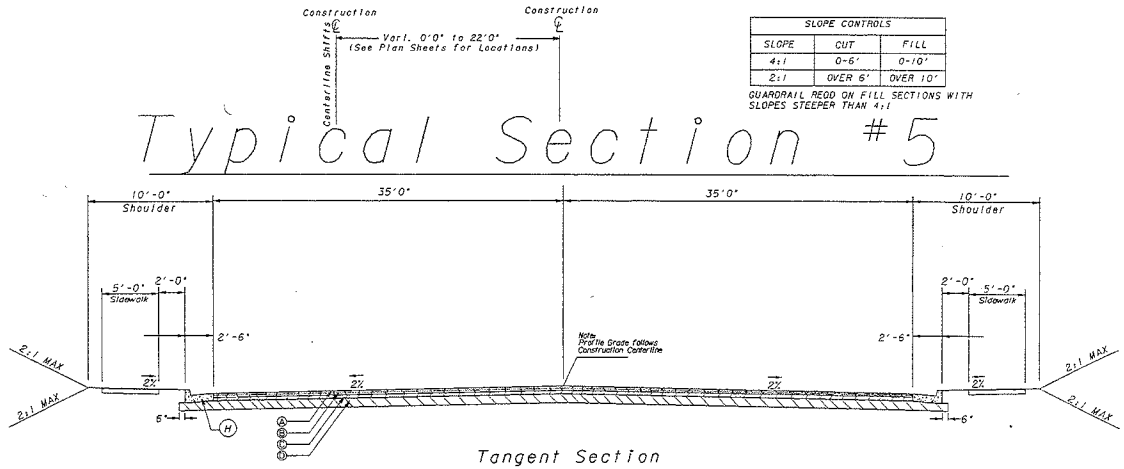
PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
NH000-0089-01(026)		

(A) RECYCLED ASPHALTIC CONCRETE SUPERPAVE. (12.5 mm) (165# / SQ YD)
(B) RECYCLED ASPHALTIC CONCRETE. SUPERPAVE (19mm) (220# / SQ YD)
(C) RECYCLED ASPHALTIC CONCRETE. SUPERPAVE (25mm) (440# / SQ YD)
(D) 12" GRADED AGGREGATE BASE CRS. INCL MATL
(E) ASPHALTIC CONCRETE LEVELING (AS REQD)
(F) INDENTATED RUMBLE STRIPS (GROUND-IN-PLACE) (SKIP)
(G) V-GUTTER. GDOT DETAIL D-33
(H) 8" X 30" CURB AND GUTTER. TYPE 2. STD 9032-B
(I) PAVEMENT FABRIC
(J) GRADED AGGREGATE BASE CRS. INCL MATL (6")

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

GUARDRAIL REQD ON FILL SECTIONS WITH SLOPES STEEPER THAN 4:1

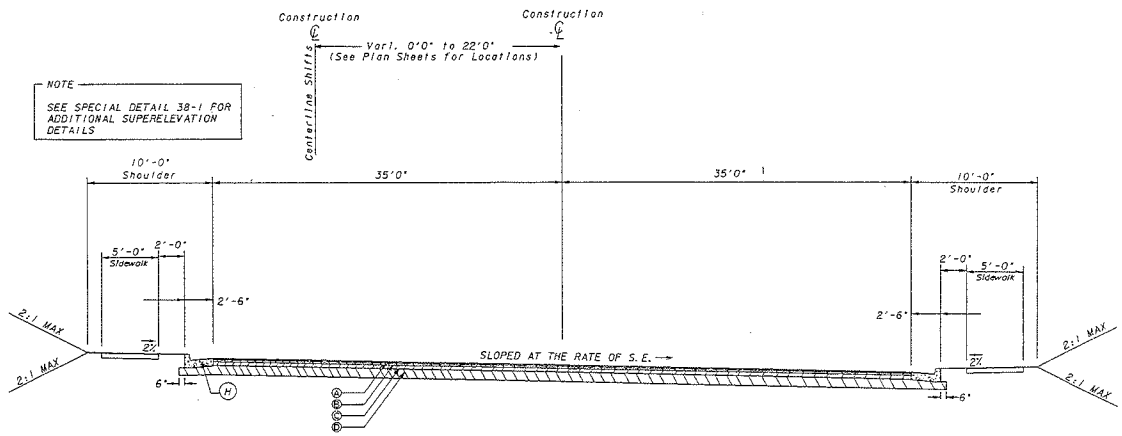
Typical Section #5



Tangent Section

This Section Applies From Sta 513+00 to Sta 517+37.08 Lt & Rt

Typical Section #6



NOTE
SEE SPECIAL DETAIL 38-1 FOR ADDITIONAL SUPERELEVATION DETAILS

Superelevated Section

This Section Applies From Sta 517+37.08 to Sta 522+00 Lt & Rt

NOT TO SCALE

GEORGIA
DEPARTMENT OF TRANSPORTATION

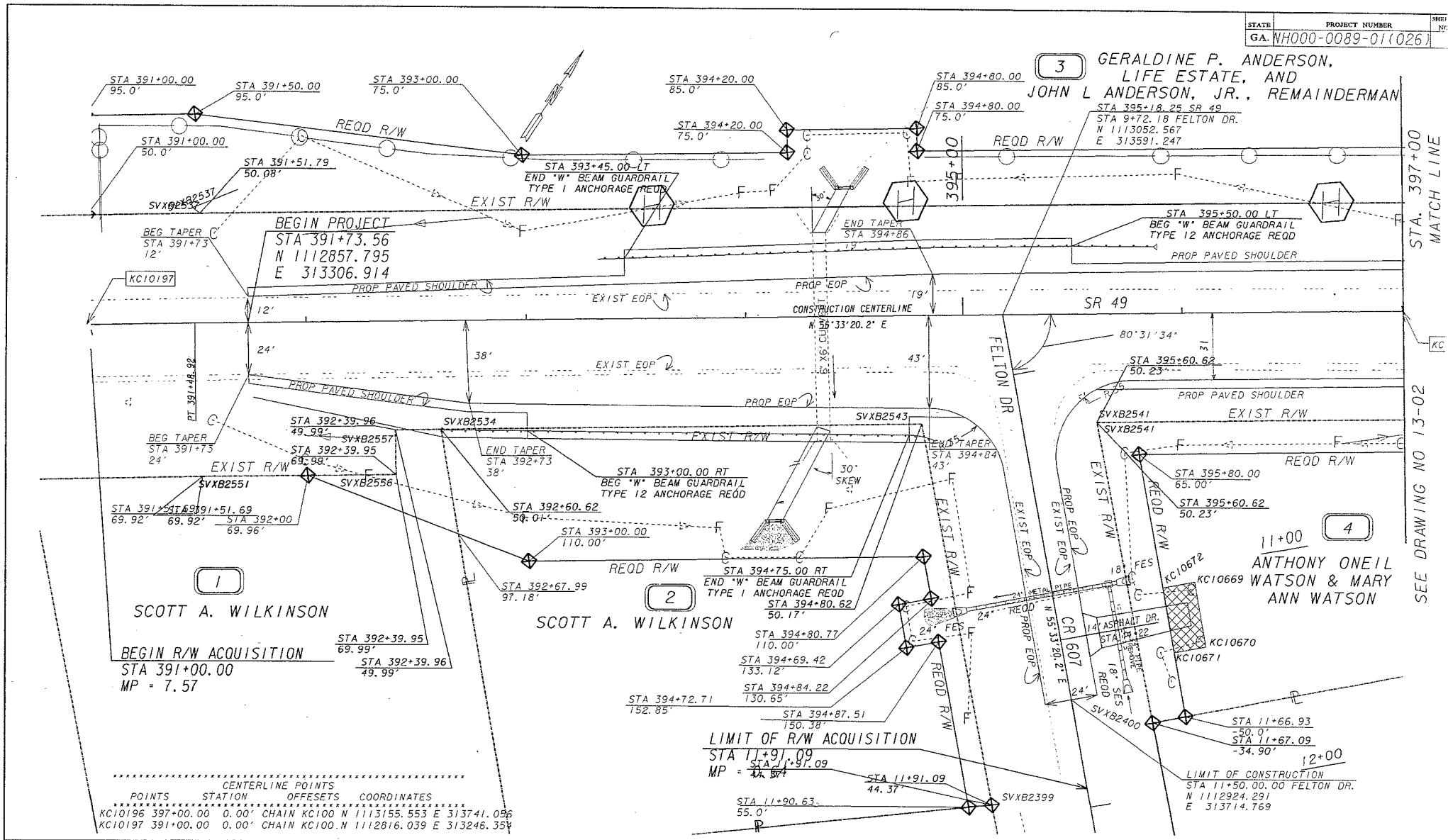
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: DISTRICT TWO

TYPICAL SECTIONS
SR 49

DRAWING NO. 5-03

STATE	PROJECT NUMBER	SHEET NO.
G.A.	WH000-0089-01(026)	



PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE

BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA

SCALE IN FEET

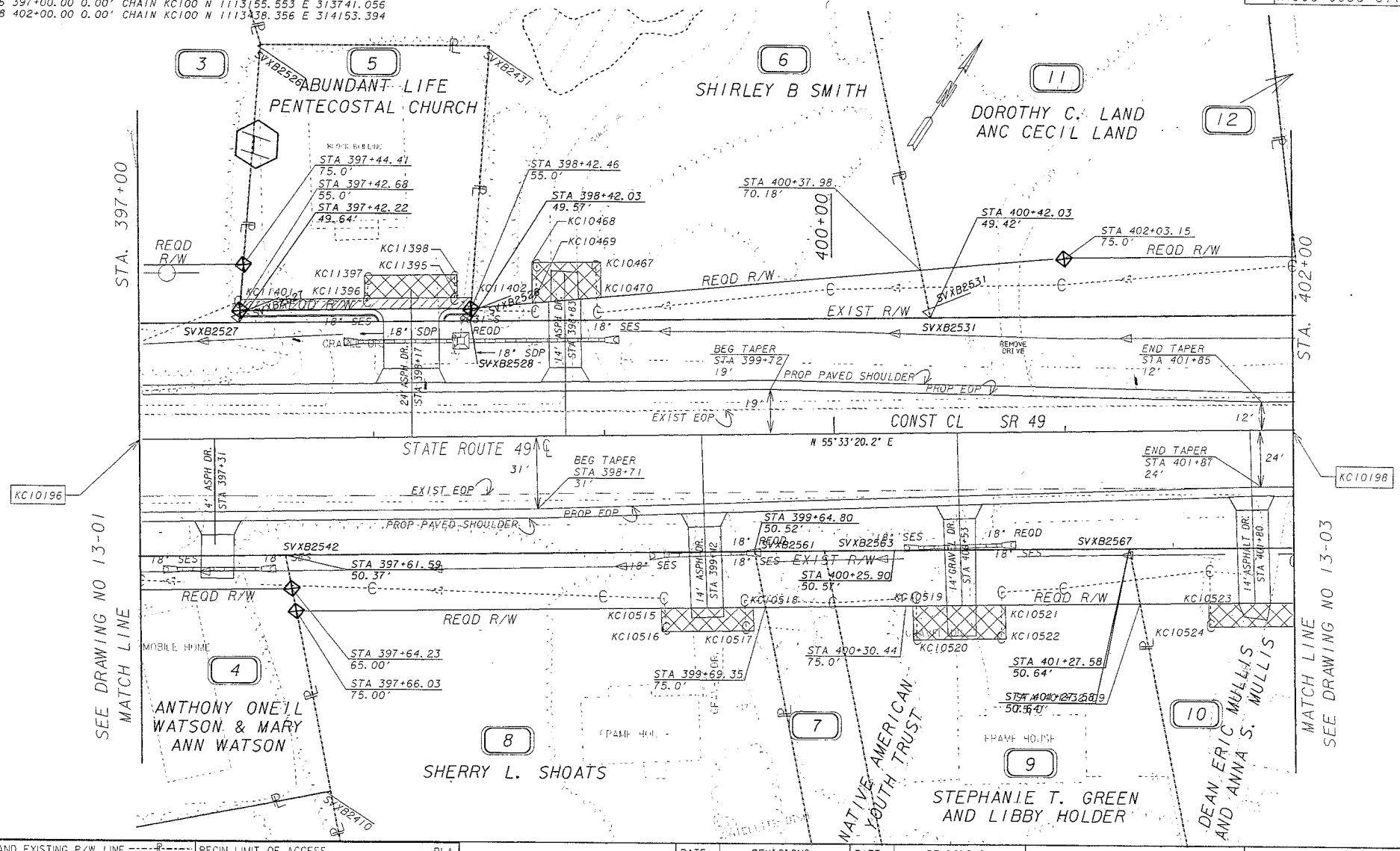
DATE	REVISIONS	DATE	REVISIONS

GEORGIA DEPARTMENT OF TRANSPORTA

STATE	PROJECT NUMBER	SHEET NO.
GA.	NH000-0089-01(026)	00

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10196	397+00.00	0.00'	CHAIN KC100 N 1113155.553 E 313741.056
KC10198	402+00.00	0.00'	CHAIN KC100 N 1113438.356 E 314153.394



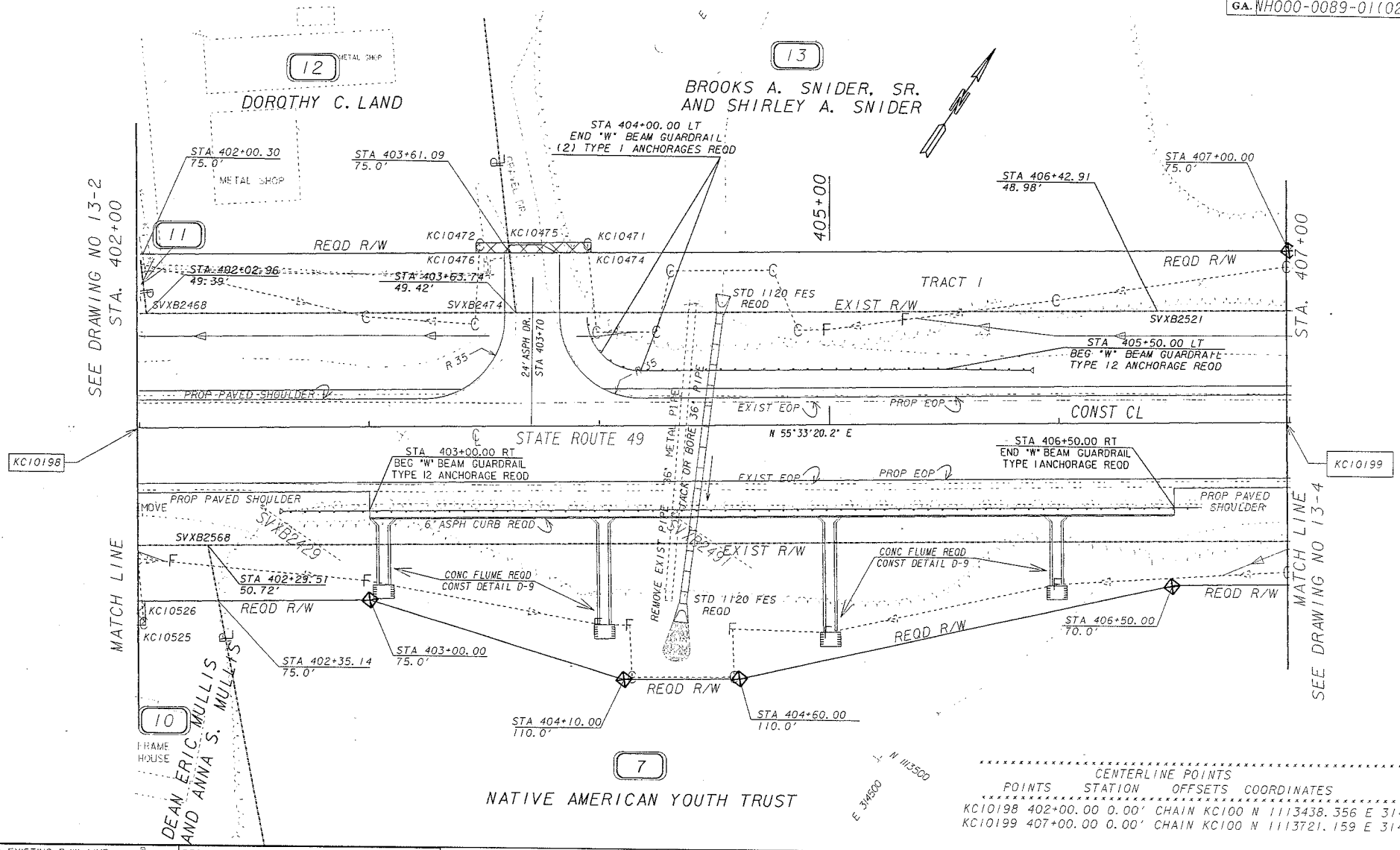
PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS ..... ELA
CONSTRUCTION LIMITS	LIMIT OF ACCESS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	REQUIRED R/W AND LIMIT OF ACCESS

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATI
CONSTRUCTION PLA

STATE	PROJECT NUMBER	SHEET NO.
GA.	NH000-0089-01(026)	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10198	402+00.00	0.00'	CHAIN KC100 N 1113438.356 E 314153.3
KC10199	407+00.00	0.00'	CHAIN KC100 N 1113721.159 E 314565.7

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

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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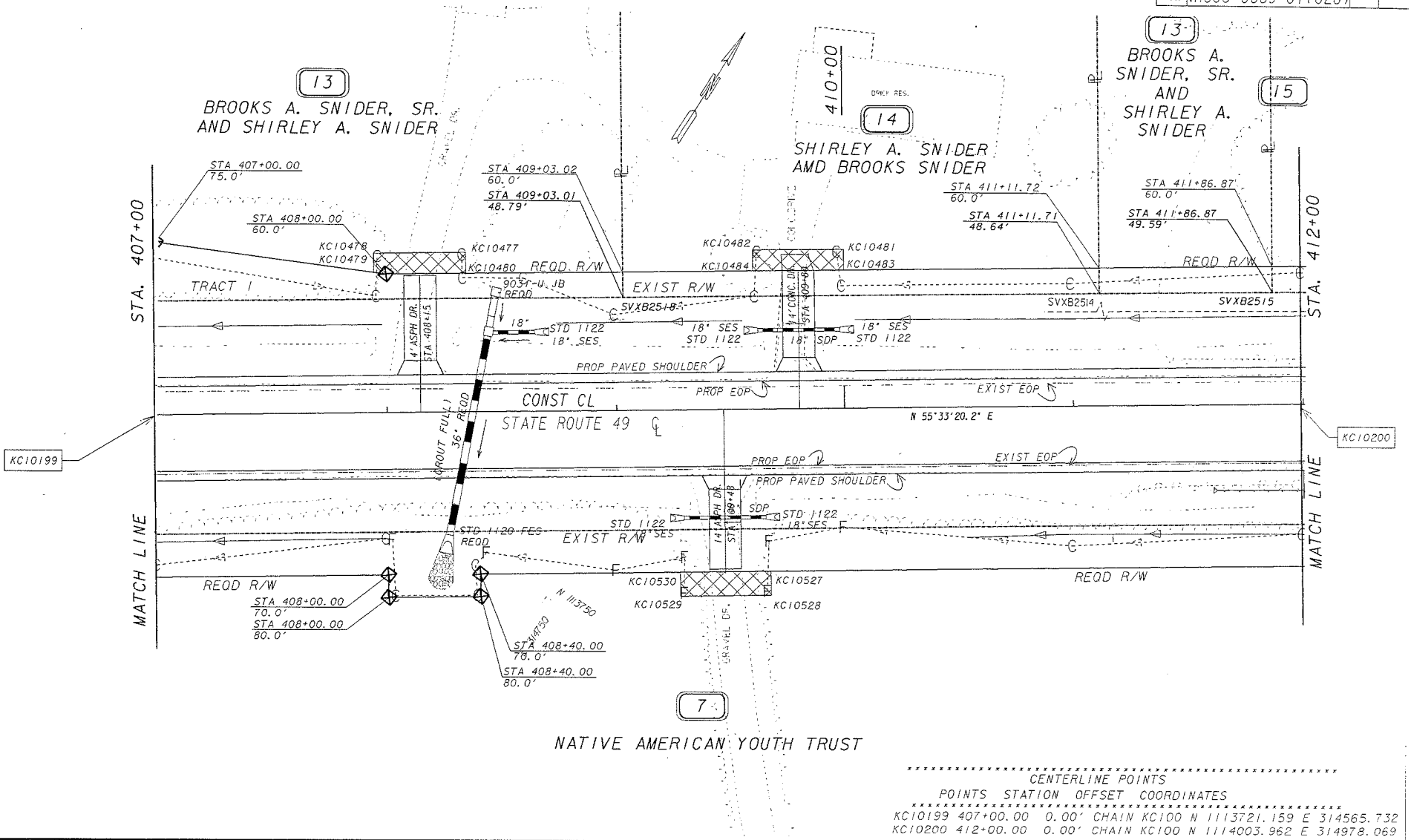
DEPARTMENT OF TRANSPORTAT
CONSTRUCTION PLA
SR 40

DRAWING

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)		



CENTERLINE POINTS

POINTS	STATION	OFFSET	COORDINATES
KC10199	407+00.00	0.00'	CHAIN KC100 N 1113721.159 E 314565.732
KC10200	412+00.00	0.00'	CHAIN KC100 N 1114003.962 E 314978.069

PERTY AND EXISTING R/W LINE
JIRED R/W LINE
STRUCTION LIMITS
EMENT FOR CONSTR
MAINTENANCE OF SLOPES

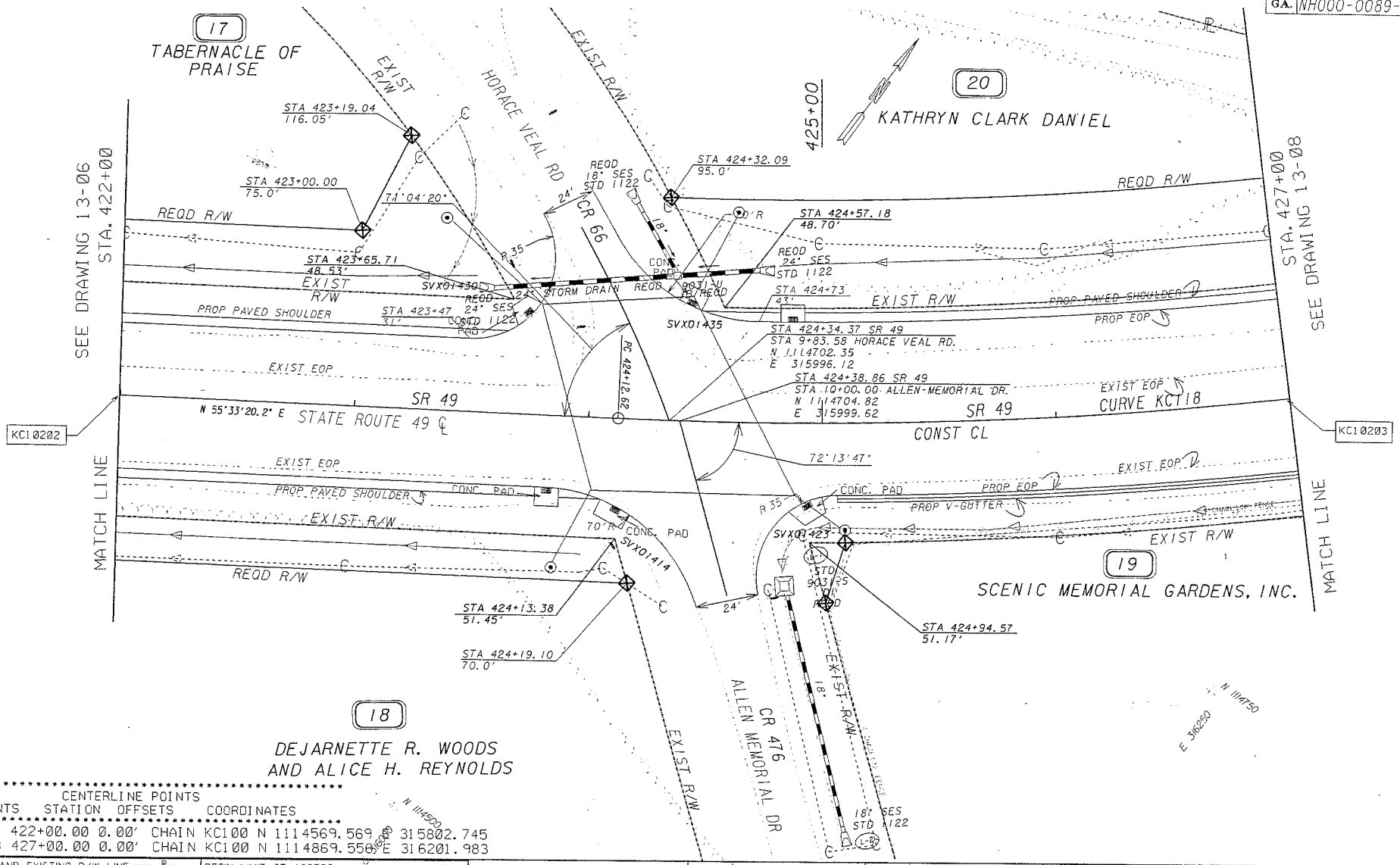
BEGIN LIMIT OF ACCESS ..... BLA
END LIMIT OF ACCESS ..... ELA
LIMIT OF ACCESS
REQUIRED R/W AND LIMIT OF ACCESS

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
G.A.	NH000-0089-01(026)	00	00



CENTERLINE POINTS

POINNTS	STATION	OFFSETS	COORDINATES
0202	422+00.00	0.00'	CHAIN KC100 N 1114569.569 E 315802.745
0203	427+00.00	0.00'	CHAIN KC100 N 1114869.556 E 316201.983

ERTY AND EXISTING R/W LINE	
RED R/W LINE	
TRUCTION LIMITS	
MENT FOR CONSTR	
AINTENANCE OF SLOPES	

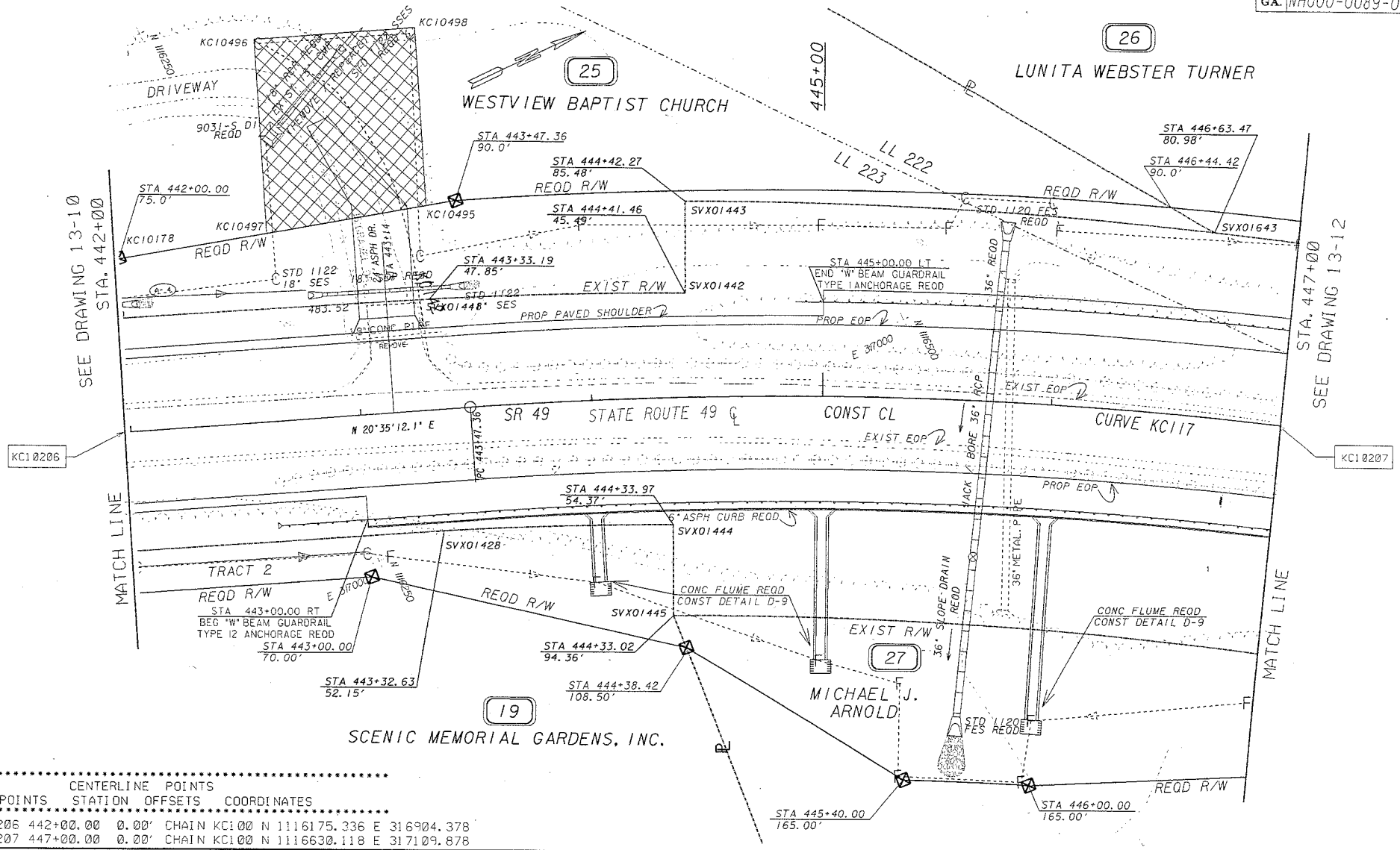
BEGIN LIMIT OF ACCESS	BLA
END LIMIT OF ACCESS	ELA
LIMIT OF ACCESS	
REQUIRED R/W AND LIMIT OF ACCESS	

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10206	442+00.00	0.00'	CHAIN KC100 N 1116175.336 E 316904.378
KC10207	447+00.00	0.00'	CHAIN KC100 N 1116630.118 E 317109.878

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

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

GEORGIA
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CONSTRUCTION PLAN
SR 49

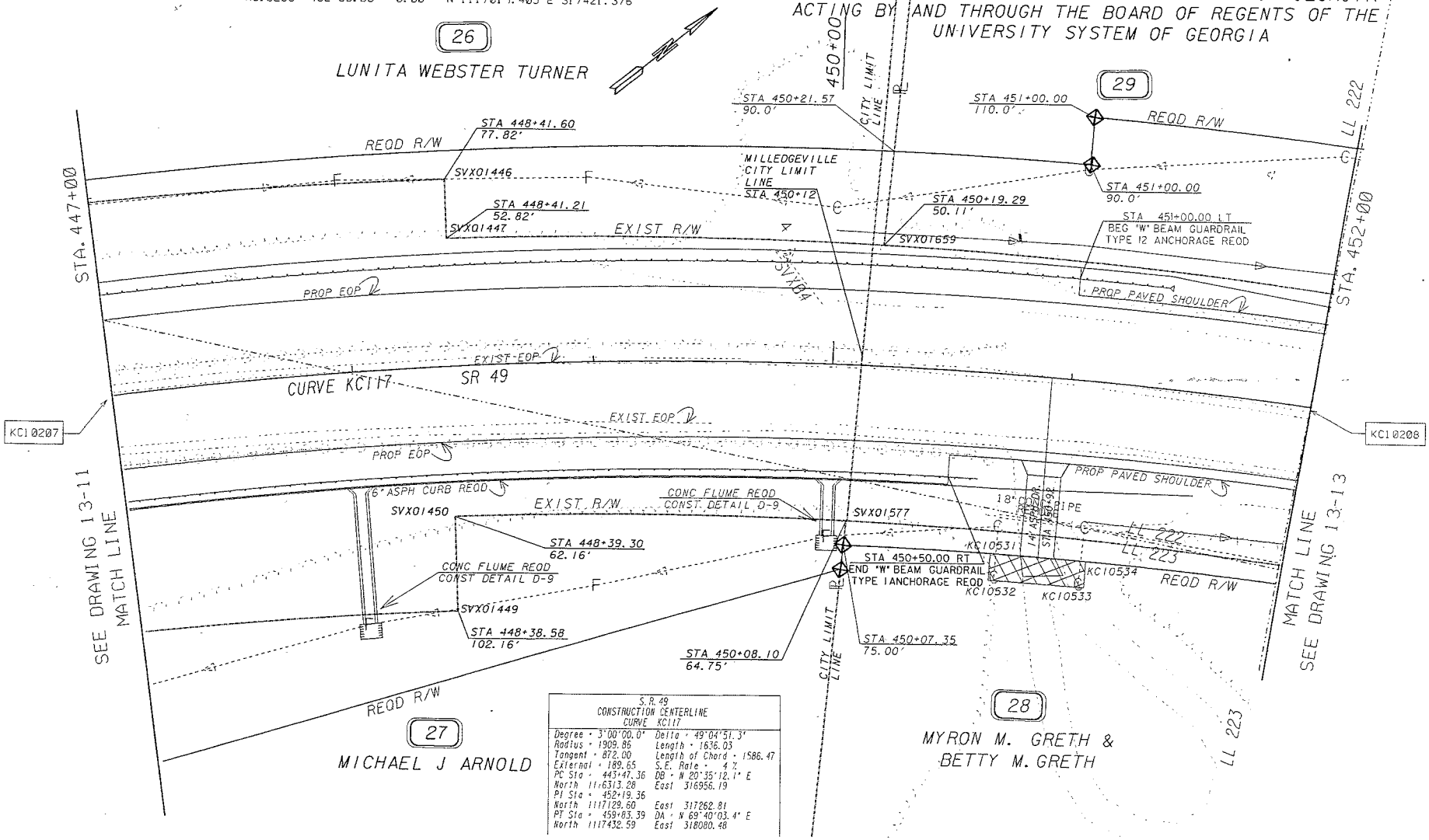
DRAWING NO. 13-11

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

REGENTS OF THE UNIVERSITY SYSTEM OF GEORGIA
ACTING BY AND THROUGH THE BOARD OF REGENTS OF THE
UNIVERSITY SYSTEM OF GEORGIA

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10207	447+00.00	0.00'	N 1116630.118 E 317109.878
KC10208	452+00.00	0.00'	N 1117019.405 E 317421.376



S.R. 49
CONSTRUCTION CENTERLINE
CURVE KC117

Degree = 3°00'00.0"	Delta = 49°04'51.3"
Radius = 1909.86	Length = 1636.03
Tangent = 872.00	Length of Chord = 1586.47
External = 189.65	S.E. Rate = 4 %
PC Sta = 443+47.36	DB = N 20°35'12.1" E
North 1116313.28	East 316956.19
PI Sta = 452+19.36	
North 1117129.60	East 317262.81
PT Sta = 459+83.39	DA = N 69°40'03.4" E
North 1117432.59	East 318080.48

ERTY AND EXISTING R/W LINE
IRED R/W LINE
TRUCTION LIMITS
MENT FOR CONSTR
MAINTENANCE OF SLOPES
MENT FOR CONSTR OF SLOPES

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN

STATE	PROJECT NUMBER	SHEET NO.	TOT SHE
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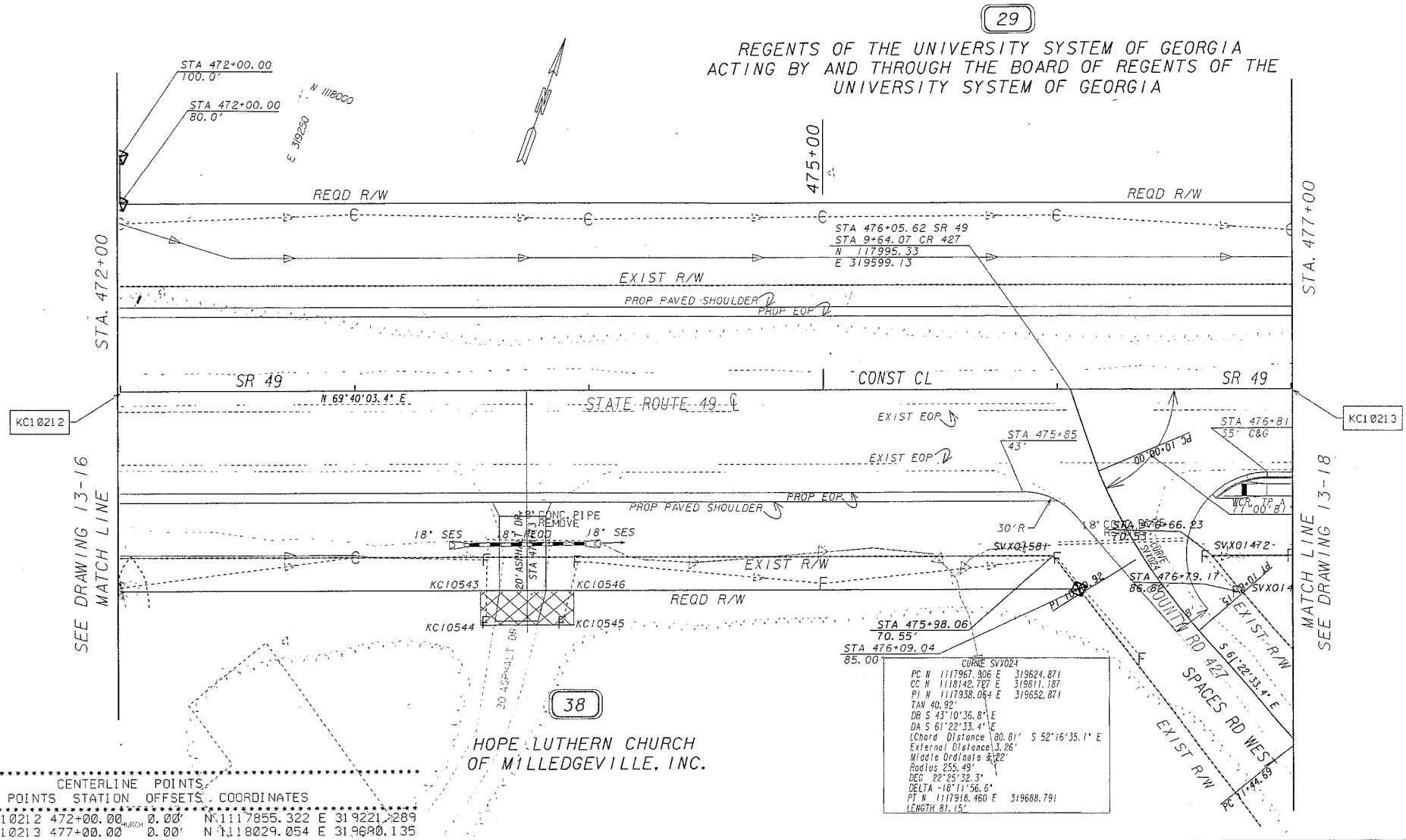

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10212	472+00.00	0.00'	N 1117855.322 E 319221.289
KC10213	477+00.00	0.00'	N 1118029.054 E 319690.135

PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS ..... ELA
CONSTRUCTION LIMITS	LIMIT OF ACCESS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	REQUIRED R/W AND LIMIT OF ACCESS

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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DEPARTMENT OF TRANSPORTATI
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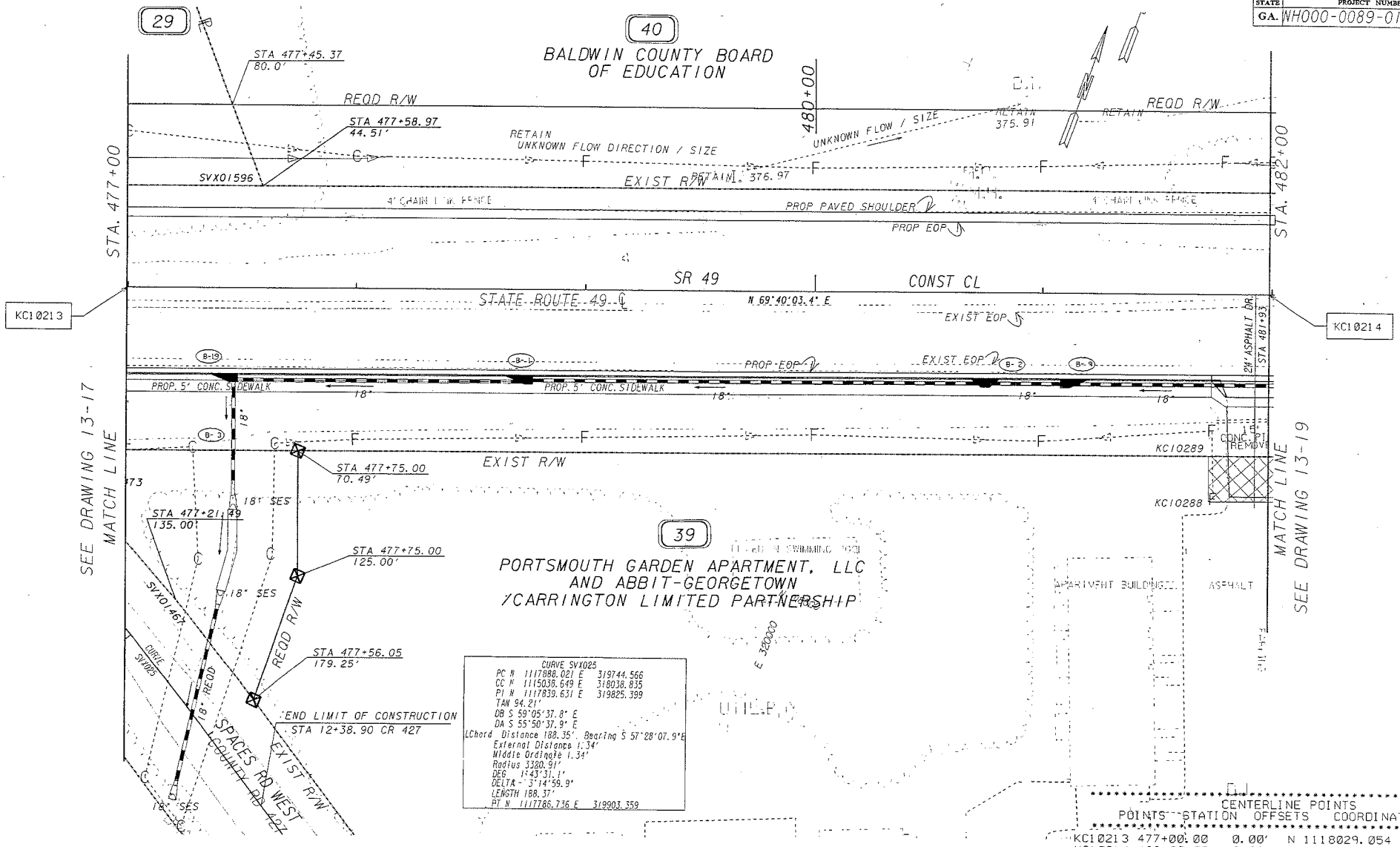
SR 49

STATE	PROJECT NUMBER	SHEET NO.
GA.	NH000-0089-01(026)	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10213	477+00.00	0.00'	N 1118029.054 E 319690.1
KC10214	482+00.00	0.00'	N 1118202.787 E 320158.9

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR

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

SCALE IN FEET

DATE	REVISIONS	DATE	REVISIONS

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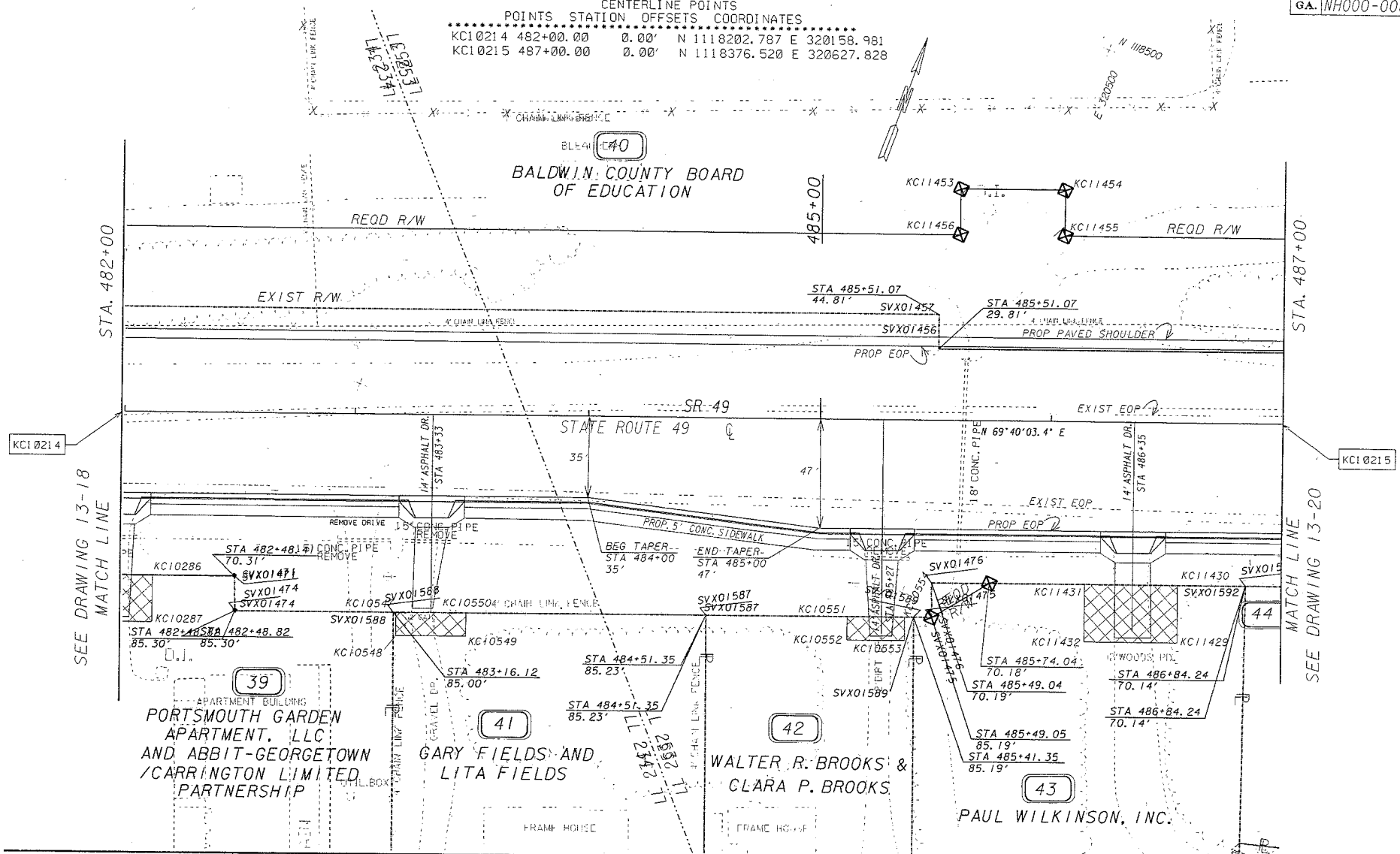
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10214	482+00.00	0.00'	N 1118202.787 E 320158.981
KC10215	487+00.00	0.00'	N 1118376.520 E 320627.828



ERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA
RED R/W LINE	END LIMIT OF ACCESS ..... ELA
TRUCTION LIMITS	LIMIT OF ACCESS
MENT FOR CONSTR	REQUIRED R/W AND LIMIT OF ACCESS
AINTENANCE OF SLOPES	
MENT FOR CONSTR OF SLOPES	

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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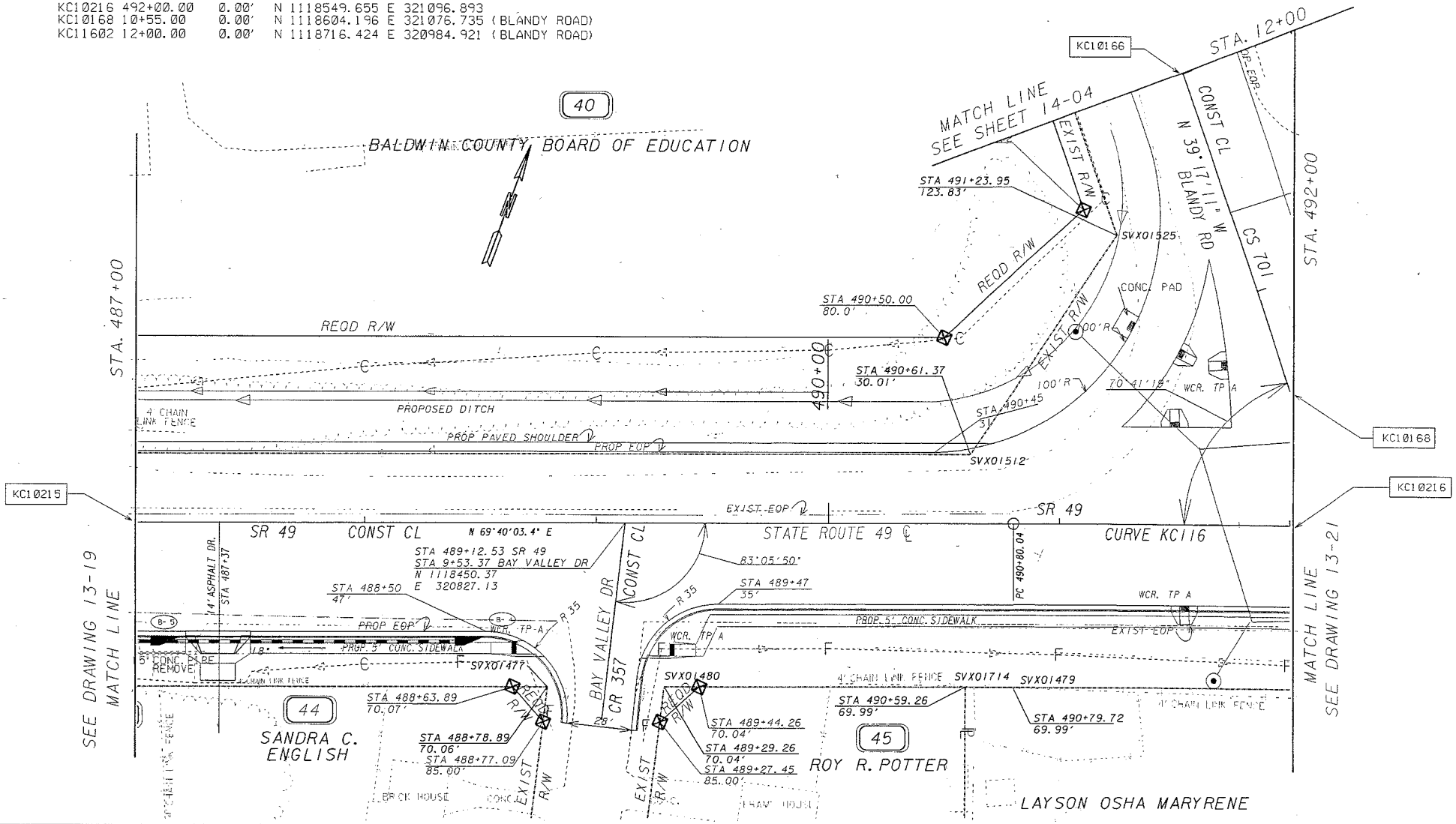
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH000-0089-01(026)	00	00

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10215	487+00.00	0.00'	N 1118376.520 E 320627.828
KC10216	492+00.00	0.00'	N 1118549.655 E 321096.893
KC10168	10+55.00	0.00'	N 1118604.196 E 321076.735 (BLANDY ROAD)
KC11602	12+00.00	0.00'	N 1118716.424 E 320984.921 (BLANDY ROAD)



PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS ..... ELA
CONSTRUCTION LIMITS	LIMIT OF ACCESS
EASEMENT FOR CONSTR. & MAINTENANCE OF SLOPES	REQUIRED R/W AND LIMIT OF ACCESS

SCALE IN FEET 0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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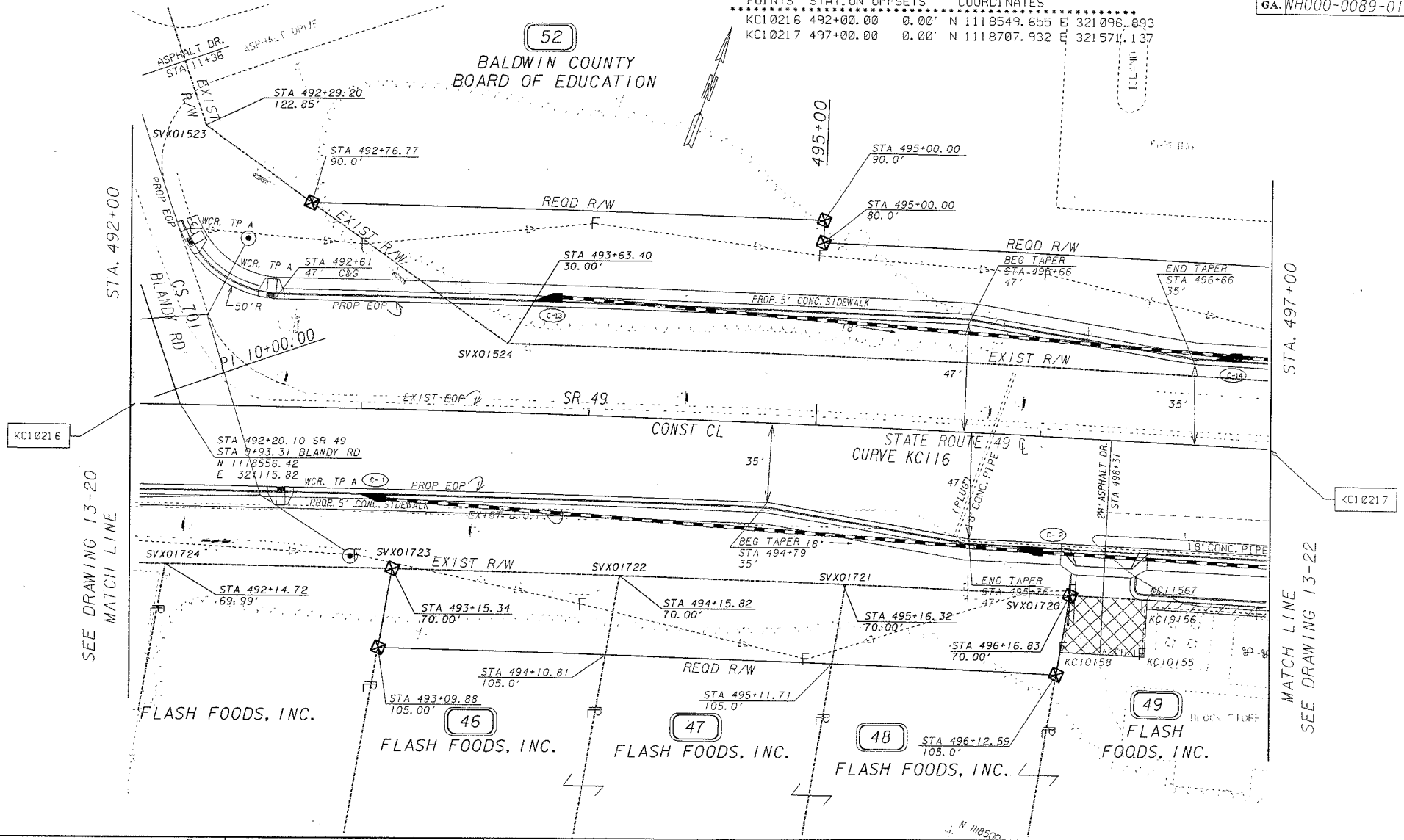
STATE	PROJECT NUMBER	SHEET NO.
GA.	WH000-0089-01(026)	00

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10216	492+00.00	0.00'	N 1118549.655 E 321096.893
KC10217	497+00.00	0.00'	N 1118707.932 E 321571.137



PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS ..... BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS ..... ELA
CONSTRUCTION LIMITS	LIMIT OF ACCESS
EASEMENT FOR CONSTR	REQUIRED R/W AND LIMIT OF ACCESS

SCALE IN FEET

DATE	REVISIONS	DATE	REVISIONS

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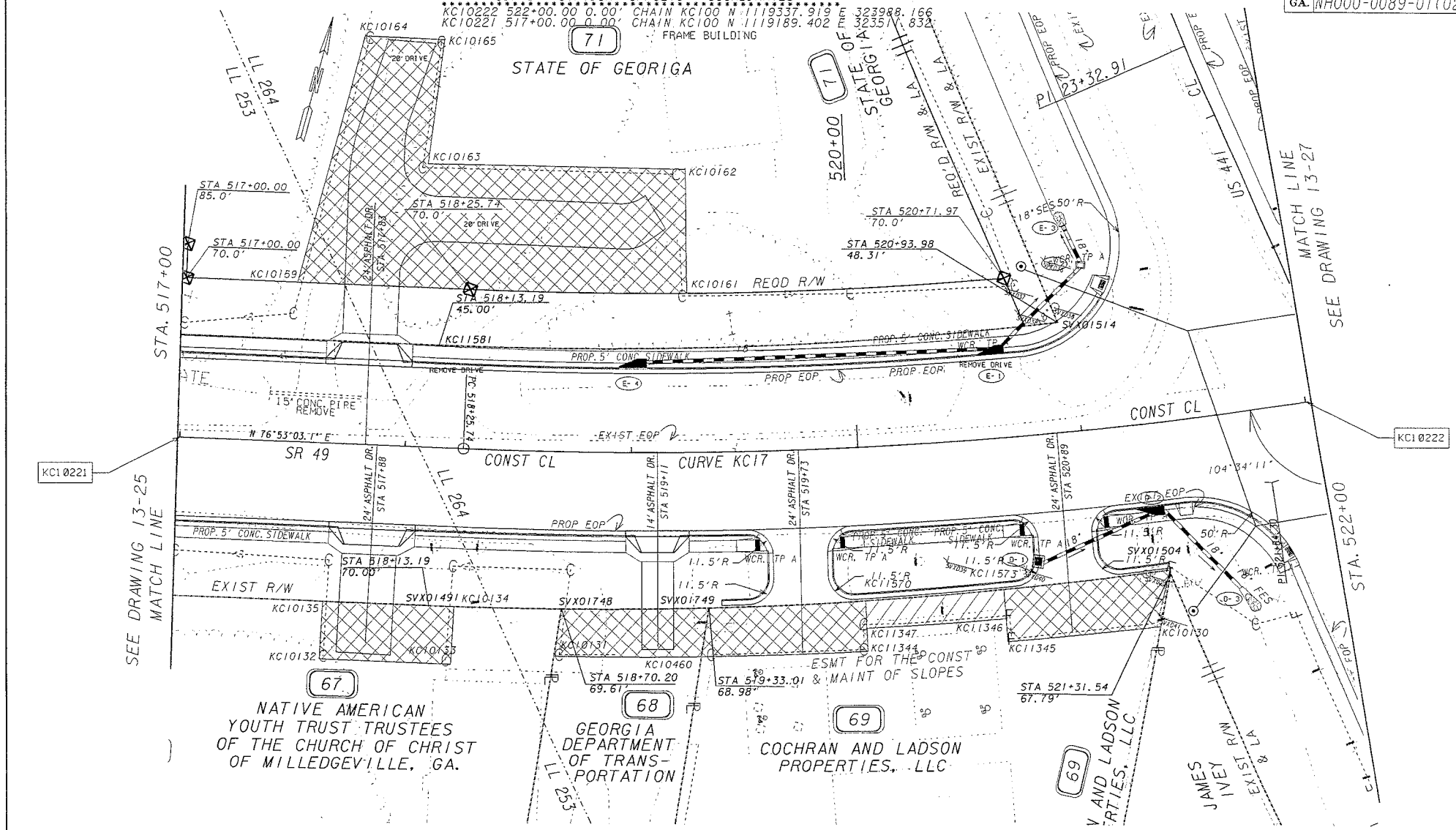
STATE	PROJECT NUMBER	SHEET NO.
GA.	NH000-0089-01(026)	

CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10222	522+00.00	0.00'	CHAIN KC100 N 1119337.919 E 323988.166
KC10221	517+00.00	0.00'	CHAIN KC100 N 1119189.402 E 323515.832



PROPERTY AND EXISTING R/W LINE		BEGIN LIMIT OF ACCESS	BLA
REQUIRED R/W LINE		END LIMIT OF ACCESS	ELA
CONSTRUCTION LIMITS	--C--F--	LIMIT OF ACCESS	
EASEMENT FOR CONSTR		REQUIRED R/W AND LIMIT OF ACCESS	

SCALE IN FEET

DATE	REVISIONS	DATE	REVISIONS

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DEPARTMENT OF TRANSPORTAT
CONSTRUCTION PLA

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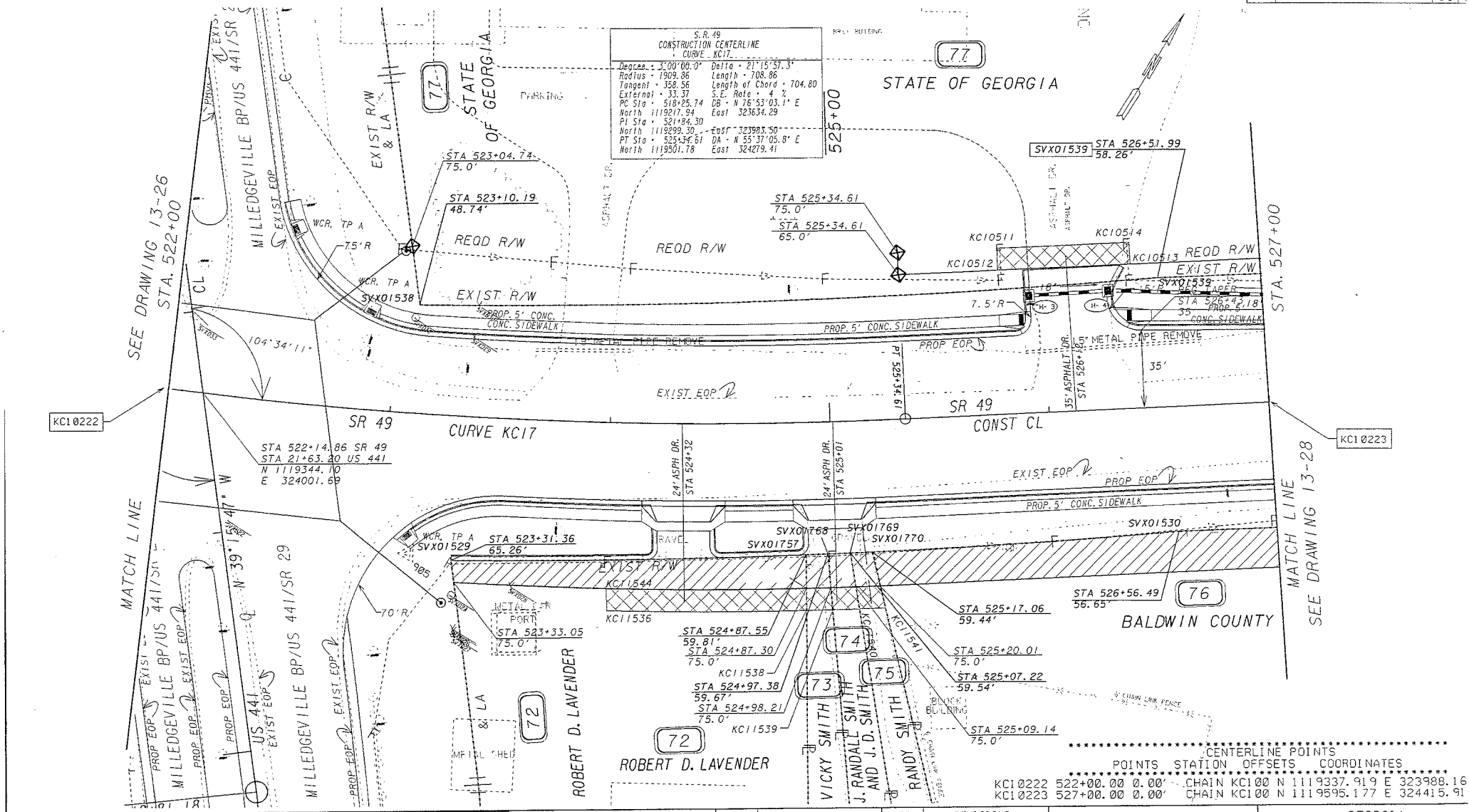

PROPERTY AND EXISTING R/W LINE	
REQUIRED R/W LINE	
CONSTRUCTION LIMITS	
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	
BEGIN LIMIT OF ACCESS	BLA
END LIMIT OF ACCESS	ELA
LIMIT OF ACCESS	
REQUIRED R/W AND LIMIT OF ACCESS	

SCALE IN FEET
0 20 40 80

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STATE	PROJECT NUMBER	SHEET NO.	TO SHE
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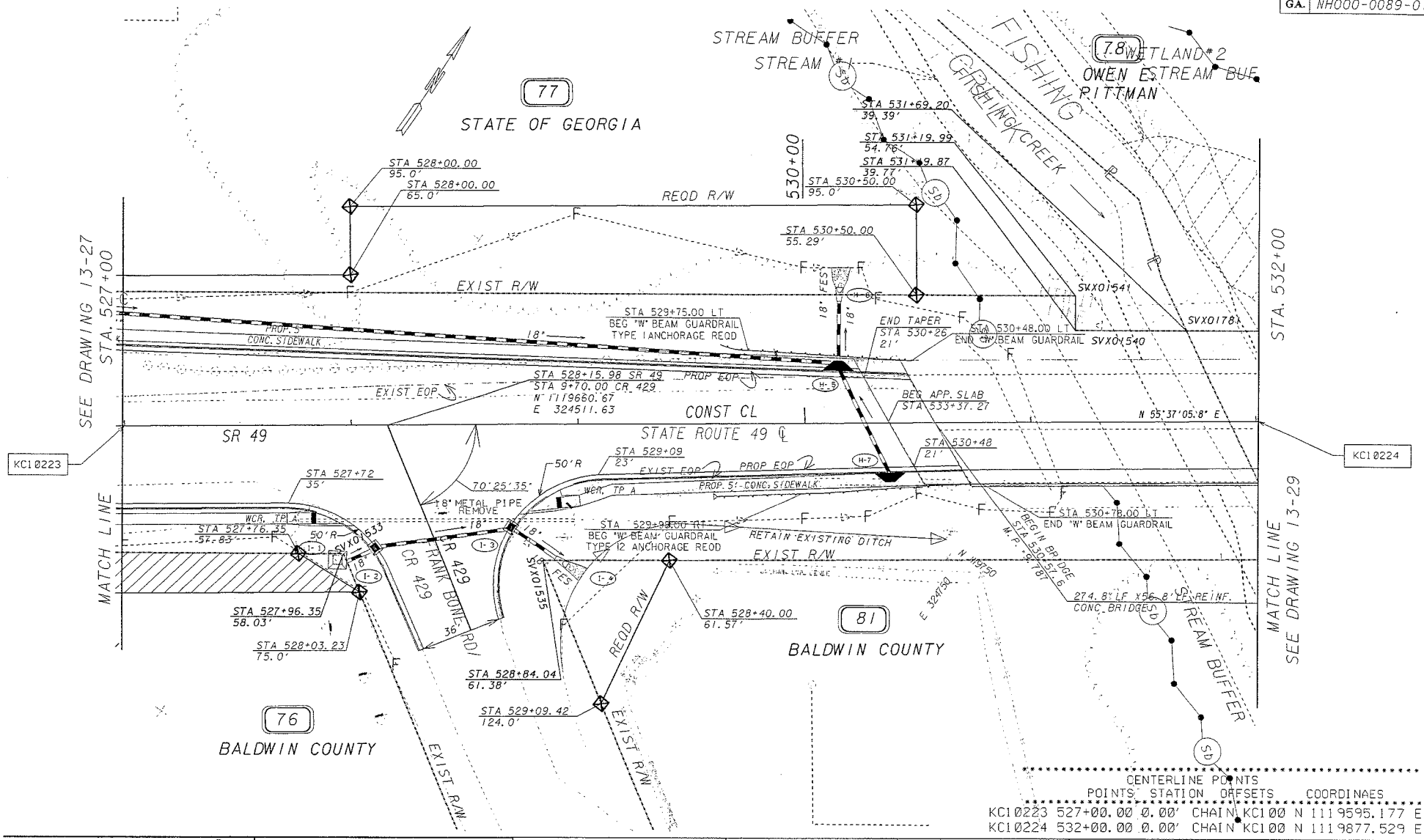

CENTERLINE POINTS

POINTS	STATION	OFFSETS		COORDINAES
KC10223	527+00.00	0.00'	CHAIN KC100	N 1119595.177 E 324415.91
KC10224	532+00.00	0.00'	CHAIN KC100	N 1119877.529 E 324828.55

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

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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DEPARTMENT OF TRANSPORTATI
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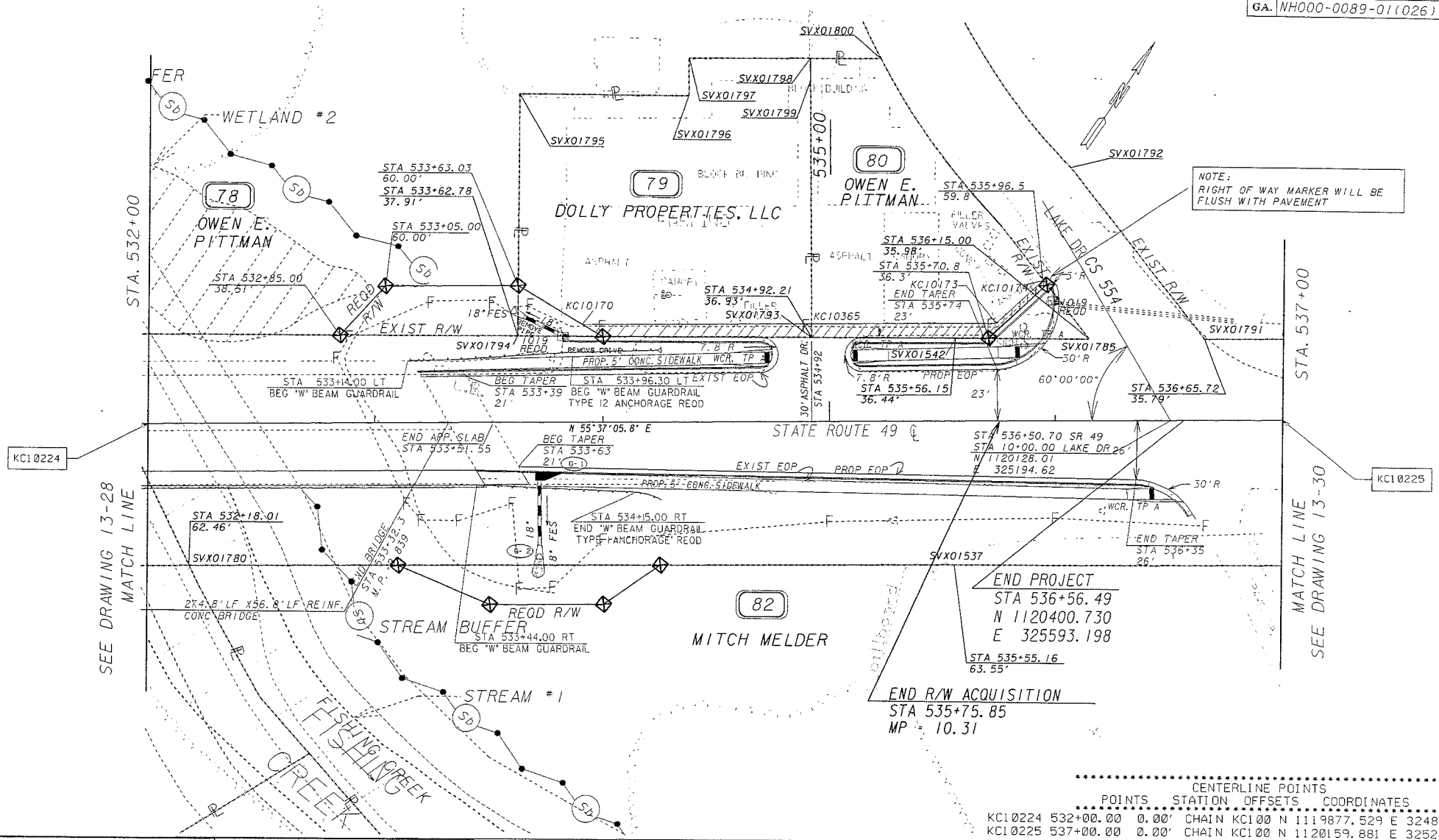
STATE	PROJECT NUMBER	SHEET NO.
GA.	NH000-0089-01(026)	00



CENTERLINE POINTS

POINTS	STATION	OFFSETS	COORDINATES
KC10224	532+00.00	0.00'	CHAIN KC100 N 1119877.529 E 324828.5
KC10225	537+00.00	0.00'	CHAIN KC100 N 1120159.881 E 325241.2

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

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

SCALE IN FEET
0 20 40 80

DATE	REVISIONS	DATE	REVISIONS

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SECTION FOUR – VALUE ANALYSIS AND CONCLUSIONS

GENERAL

This section describes the value analysis (VA) procedure used during the VE study conducted for the GDOT by Lewis & Zimmerman Associates, Inc. on the SR 49 From West of Felton Drive to East of Milledgeville Bypass (NH000-0089-01(026) project in Baldwin County. The workshop was performed at the approximately 60% design completion stage. GDOT District 2 has taken over the development of the project and has provided information for the VE team to use as the basis of the studies.

A systematic approach was used in the VE study, which was 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. Documents such as those listed below were used as the basis for generating VE alternatives and for determining the cost implications of the selected VE alternatives:

- SR 49 From West of Felton Drive to East of Milledgeville Bypass (NH000-0089-01(026) Design Drawings, dated 5/28/2009, prepared by McGee Partners, Inc.
- State Highway Job Detail Estimate SR 49 From West of Felton Drive to East of Milledgeville Bypass, dated 11/23/2010
- Right of Way Cost Estimate NH000-0089-01(026), Baldwin County, P.I. Number 0231450, dated January 21, 2011, prepared by GDOT
- Traffic Engineering Report, State Route 49 at City Street #710-Blandy Road, Baldwin County, Milledgeville, dated April 19, 2000, prepared by GDOT
- Traffic Signal Warrant Analysis TE Study Level 2 SR 49 at Allen Memorial Drive, Baldwin County, dated February 2003, prepared by GDOT
- Revised Project Concept Report, dated March 26, 2002, prepared by GDOT
- Federal Route No. U.S. 441, State Route No. S.R. 49, S.R. 29 Project Concept Report, NH-089-1(26), Baldwin County, P.I. No. 231450, dated 12/02/99, prepared by GDOT

Value Engineering Study Task Flow Diagram

Preparation Effort

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

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

→ **Construct Cost Models**
- Construct Cost Models
- Construct Graphic Function Analysis
- Outline High Cost Areas

→ **LCC Model**
- Roadway
- Bridges
- MOT
- Energy
- User Impact

Workshop Effort

Information Phase
- Introduction by VETL
- Project Description and Presentation by Designer
- Outline Owner Requirements
- Review Project Data
- Visit Project Site (Alt.)

→ **Function Identification and Analysis Phase**
- Analyze Project Costs and Energy Usage
- Perform Function Analysis and FAST Diagram
- Identify High Cost and Energy Areas
- Calculate Cost/Worth Ratios
- Identify Paradigms

List Ideas Generated During Function Analysis

→ **Speculation Phase**
- Introduction by VETL
- Creative Idea Listing:
  - Quantity of ideas
  - Association of Ideas
- Brainstorm
- Do Creative Thinking
  - Group Thinking
  - Individual Thinking
- Use Checklist for Ideas

→ **Evaluation Phase**
- Eliminate Impractical Ideas
- Rank Ideas with Advantages/ Disadvantages
- Evaluate Alternatives (Include Non-Economic considerations: Safety, Reliability, Environment, Aesthetics, O&M, etc.)
- Select Best Ideas for Implementation

→ **Development Phase**
- Develop Proposed Alternatives
- Prepare Alternative Design Sketches
- Estimate Costs
- Perform Life Cycle Comparison
  - Initial Cost
  - Redesign Cost
  - O&M Cost
  - LCC Cost

→ **Presentation Phase**
- Summarize Findings
- Present VE Ideas to Owner/ User/Designer
- Oral Presentation

Post-Workshop Effort

VE Study Report
- Develop Implementation VE Report
- Designer Prepares Responses to VE Report
- Owner Evaluates Recommendations

→ **Implementation Phase**
- Participate in Implementation Meeting with Owner/User/ Designer/ VE Team, as needed
- Prepare Final VE Report

→ **Final Acceptance**
- Redesign by Designer

Information 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 models for the project. The model was used to distribute the total project cost among the various elements of the project. The VE team used this model to identify the high-cost elements that drive the project and the element 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 three and one-half-day effort beginning with an orientation/kickoff meeting on Tuesday, February 8, 2011, and concluding with the final VE Presentation on Friday, February 11, 2011. During the workshop, the VE Job Plan was followed in compliance with the U.S. 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 of Creative Ideas Phase
- Alternative 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 the GDOT 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 models were identified.

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

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

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

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

As well as looking at areas with high cost/worth ratios, the team used the cost models 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.

The GDOT 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 during the opening presentation. 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 VE 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 Section Two of this report.

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

Presentation Phase

The goals of the last phase of the workshop were to summarize the results of the study, to prepare draft Summary of Potential Cost Saving worksheets to hand out at the presentation, and to present the key VE alternatives and design suggestions to GDOT. The presentation was held on Friday, February 11, 2011, at the GDOT Headquarters office in Atlanta, Georgia. 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 the owner 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 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, GDOT will decide which alternatives to implement.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise in the unique project elements involved with the SR 49 From West of Felton Drive to East of Milledgeville Bypass project. The multidisciplinary team comprised professionals with highway design and construction experience and a working knowledge of VE procedures. The following lists the VE team members:

Participant	Specialization	Affiliation
Joe Leoni, PE	Highway Design	ARCADIS U.S., Inc.
Michael Moilanen, PE	Bridge Design	ARCADIS U.S., Inc.
Harley Griffin	Constructability	Delon Hampton Associates
Howard B. Greenfield, PE, CVS	VE Team Leader	Lewis & Zimmerman Associates

DESIGNER'S PRESENTATION

An overview of the project was presented on Tuesday, February 8, 2011, by representatives from the GDOT District 2 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 PRESENTATION

A VE presentation was conducted by the VE team on Friday, February 11, 2011, at the GDOT Headquarters office in Atlanta, Georgia 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. Attendees checked off their names on the attendance list from the opening presentation.

GDOT VE STUDY SIGN-IN SHEET

Meeting Days

Project No.: NH000-0089-01(026) P.I. No. 231450

County: Baldwin

Date: Feb. 8-11, 2011

IN-BRIEF	OUT-BRIEF	NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
✓	✓	Lisa L. Myers		Engineering Services	404-631-1770	lmyers@dot.ga.gov
✓	✓	Matt Sanders		Engineering Services	404-631-1752	msanders@dot.ga.gov
	✓	Bill DuVall		GDOT Bridge Design	404-631-1883	bduvall@dot.ga.gov
✓	✓	Howard Greenfield		Lewis & Zimmerman Assoc.	410-381-1990x20	hgreenfield@lza.com
✓	✓	Joe Leoni		ARCADIS	770-384-8666	joe.leoni@arcadis-us.com
✓	✓	Mike Moilanen		ARCADIS	770-431-8666	michael.moilanen@arcadis-us.com
✓		Nabil Raad		GDOT	404-635-8126	nraad@dot.ga.gov
✓	✓	Harley Griffin		Delon Hampton & Assoc.	404-524-8030	hgriffin@delonhampton.com
✓	✓	Mar Jordan		GDOT Design	478-552-4638	mjordan@dot.ga.gov
✓		Sean Bush		GDOT Design	478-552-4641	sbush@dot.ga.gov
✓	✓	Alan smith		GDOT Design	478-552-4642	asmith@dot.ga.gov
✓	✓	Jim Kitching		GDOT Design	478-553-2283	jkitching@dot.ga.gov
	✓	George Brewer		Preconstruction Engineer	478-552-4629	gbrewer@dot.ga.gov

Check all that attend

11 Attended Project Overview (Day 1)
4 via video District #2

11 Attended Project Presentation (Day 4)
4 via video District #2

ECONOMIC DATA

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:	2010
Construction Start Date:	March 2014
Construction Completion Date:	March 2016
Planning Period (n):	20
Discount Rate (i):	3%

COST MODEL

The VE team prepared a Pareto Chart, or Cost Histogram, for the project that follows this page. This Cost Histogram displays the major construction elements identified in the cost estimate prepared by the designer in descending order of magnitude and thus identifies the high cost areas in the project. The high cost elements provide the VE team with one focus for its work during the study.

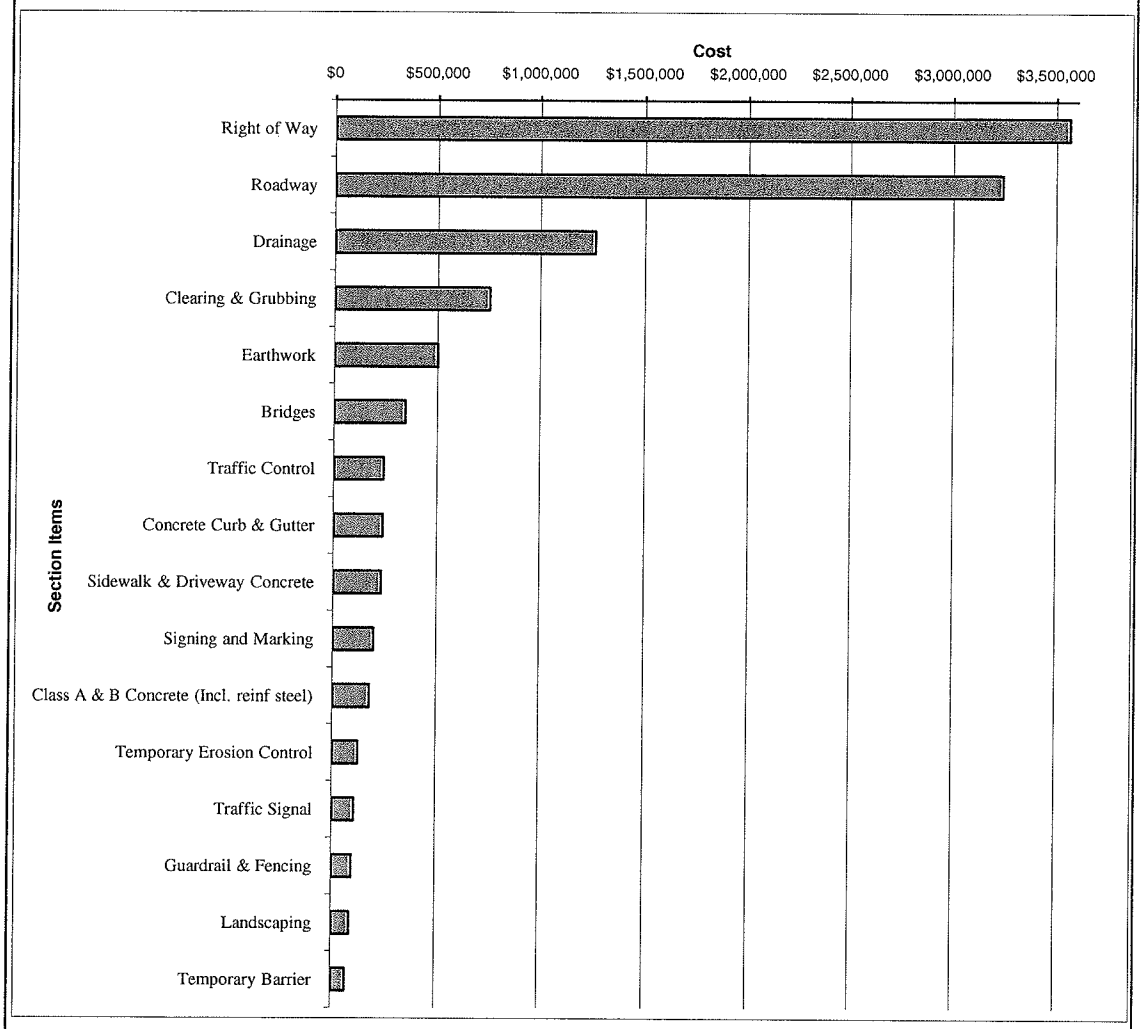
The project elements contributing most to the cost of the project include:

- Right-of-Way
- Pavement
- Drainage
- Clearing and Grubbing
- Earthwork

COST HISTOGRAM

Project: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

Project No. NH000-0089-01(026) P.I. Number 231450	COST	PERCENT	CUM. PERCENT
Right of Way	3,560,000	31.71%	31.71%
Roadway	3,243,327	28.89%	60.60%
Drainage 83%	1,263,538	11.25%	71.85%
Clearing & Grubbing	755,000	6.72%	78.58%
Earthwork	500,574	4.46%	83.04%
Bridges	345,500	3.08%	86.12%
Traffic Control	241,000	2.15%	88.26%
Concrete Curb & Gutter	236,904	2.11%	90.37%
Sidewalk & Driveway Concrete	230,947	2.06%	92.43%
Signing and Marking	197,515	1.76%	94.19%
Class A & B Concrete (Incl. reinf steel)	177,645	1.58%	95.77%
Temporary Erosion Control	122,820	1.09%	96.86%
Traffic Signal	105,000	0.94%	97.80%
Guardrail & Fencing	94,606	0.84%	98.64%
Landscaping	84,952	0.76%	99.40%
Temporary Barrier	65,216	0.58%	99.98%
Concrete Median	2,225	0.02%	100.00%
Construction Subtotal	**$ 11,226,769**	**100.00%**	
GRAND TOTAL	**$ 11,226,769**		



Costs in graph are not marked-up.

FUNCTION ANALYSIS

A function analysis was performed to (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic function(s) 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.

RANDOM FUNCTION ANALYSIS

PROJECT: **SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS**
Baldwin County, Georgia

SHEET NO.: **1 of 1**

DESCRIPTION		FUNCTION		
		VERB	NOUN	KIND
Project Functions		Enhance	Safety	HO
		Increase	Capacity	HO
		Accommodate	~~Bikes~~ Bicycles	HO
		Accommodate	Pedestrians	RS
Pavement	**$3.2 M**	Increase	Capacity	B
		Support	Vehicles	B
ROW	**$3.6 M**	Provide	Space	R/S
Drainage	**$1.3 M**	Collect	Stormwater	B
		Convey	Stormwater	B
Clearing and Grubbing	**$0.8 M**	Prepare	Area	R/S
Earthwork	**$0.5 M**	Establish	Elevations	B
Bridges	**$0.3 M**	Add	Sidewalk	B
Traffic Control		Assign	Temporary Right-of-Way to Vehicles	R/S
Concrete Curb and Gutter	**$0.24 M**	Define	Roadway	B
Right of Way Functions		Direct	Stormwater	B
Sidewalk and Driveway Concrete	**$2.3 M**	Accommodate	Pedestrians	B
Signing and Marking	**$0.35 M**	Inform	Drivers	B
Class A & B Concrete	**$.18 M**	Convey	Stormwater	B

Function defined as: Action Verb / Measurable Noun

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

CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

During the 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 ELEMENT	PREFIX
General	G
Right-of-Way	ROW
Roadway	R
Drainage	D
Sidewalk	S
Earthwork	E

The ideas were 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 responses of the owner. The following are the top value objectives for this project:

- Saves costs
- Maintains safety
- Increases capacity
- Reduces right of way impacts
- Enhances constructability

After discussing each idea, the team evaluated the ideas by consensus. This produced 13 ideas rated 4 or 5 and one design suggestion to research and develop into formal VE alternatives to be included in Section Two of the report. Highly rated ideas that were not developed further may have been combined with another related idea or discarded as a result of additional research indicating the concept as not being cost effective or technically feasible. The reader is encouraged to review the Creative Idea Listing and Evaluation worksheet since it may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING

PROJECT:	SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS *Baldwin County, Georgia*	SHEET NO.:	1 of 2

NO.	IDEA DESCRIPTION	RATING
	GENERAL (G)	
G-1	Start the project west of Horace Veal/Allen Memorial Drive at approximately STA. 415+00	5
G-2	Delete the center turn lane	1
	SIDEWALK (S)	
S-1	Delete the sidewalk on the south side of the road from Franklin Bone Road to Lake Drive and do not modify the bridge	4
S-2	Extend sidewalk construction on the east end to tie into the existing sidewalks east of Lake Drive	DS
	DRAINAGE (D)	
D-1	Use cross drains and reduce the amount of longitudinal pipe runs	4
D-2	Delete the cross drain on the west side of the bridge and discharge from the curb inlet on the south side directly to the creek	5
D-3	Delete 18-in.-diameter pipe from H-4 to H-5 and allow storm water to flow directly to the creek in the existing swale	5
D-4	Install a new drainage structure at STA. 445+52 to eliminate one or two concrete flumes	5
D-5	Install a new drainage structure at STA. 458+20 to eliminate one or two concrete flumes	5
D-6	Use HDPE pipe in lieu of concrete pipe	4
	EARTHWORK (E)	
E-1	Leave vertical curve as is and request a design exception	4
E-2	Retain the existing vertical profile from Sta. 513+00 to Sta. 518+50 and raise the proposed profile from Sta. 518+50 to Sta. 523+00	
	ROADWAY (R)	
R-1	Reduce the extent of driveway reconstruction	4
R-2	Reduce the lane widths to 11 ft. wide	5
R-3	Do not remove existing approach slab and overlay it with asphalt	5

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

CREATIVE IDEA LISTING

PROJECT:	**SR 49 FROM JUST WEST OF FELTON DRIVE TO EAST OF MILLEDGEVILLE BYPASS** *Baldwin County, Georgia*	SHEET NO.:	**2 of 2**

NO.	IDEA DESCRIPTION	RATING
	RIGHT OF WAY (ROW)	
ROW-1	Add retaining walls to reduce the right-of-way	4
ROW-2	Use curb and gutter and closed storm water drainage in lieu of swales to reduce the right-of-way	4
ROW-3	Use 2:1 fill slopes and guardrail to reduce the right-of-way	4
ROW-4	Slope the shoulders to the outside to reduce the right-of-way	4

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