



Georgia Department of Transportation

Sardis Church Road Widening

STP-0000-00(566) Bibb County

P.I. No. 0000566

Value Engineering Study Report

60% Design Stage

June 2007

Designer
Kimley-Horn and Associates, Inc.

Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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June 28, 2007

Ms. Lisa L. Myers
Design Review Engineer Manager
State of Georgia Department of Transportation, General Office
No. 2 Capitol Square, Room 266
Atlanta, Georgia 30334-1002

re: Project Number STP-0000-00(566)
Sardis Church Road Extension from East of Skipper Road to U.S. 129/S.R. 247
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to submit four hard copies and one electronic copy of the referenced report. The report contains 17 alternatives that could reduce the project cost, two that could result in a slight increase in cost but reduce GDOT's long term maintenance requirements, and one design suggestion that will improve the value of the project by enhancing safety. Specific project elements that drive the project's cost and are addressed in the report include the amount of pavement being provided, the type of curb and gutter being used, the amount and type of sidewalk being provided, and the need to provide bicycle lanes. The configuration of the bridges is also analyzed to illustrate opportunities to reduce their cost.

We thank you for your hospitality and for providing the information necessary for the VE team to generate creative, alternative solutions for this project.

We are available to answer any questions you may have as you review this report and determine implementation.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

Howard B. Greenfield, PE, CVS
Vice President

Attachment

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PROJECT DESCRIPTION

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EXECUTIVE SUMMARY

INTRODUCTION

This report documents the events and results of the value engineering study conducted by Lewis & Zimmerman Associates, Inc. for the Georgia Department of Transportation (GDOT). The subject of the study was the Sardis Church Road Extension from just east of Skipper Road to U.S. 129/S.R. 247 which is being designed by Kimley-Horn Associates, Inc. The project was at the 60% final design completion stage at the time of the VE workshop, which was performed June 11 – 14, 2007 at GDOT headquarters in Atlanta.

The VE study team was comprised of a Certified Value Specialist and specialists in highway and bridge design and construction cost estimating. The team used the following six-phase VE Job Plan to guide its deliberations:

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

PROJECT DESCRIPTION

The Sardis Church Road Extension project runs from just east of Skipper Road at I-75, easterly then southeasterly, south, southeasterly, and finally east on a new and existing location to U.S. 129/S.R. 247 for a total of 6.3 miles. The project provides an east-west arterial to accommodate future growth in the Bibb County, City of Macon corridor and to improve access from I-75 to the Middle Georgia Regional Airport, its associated industrial park and Robins Air Force Base. The connector will also improve access for the traveling public and emergency vehicles by providing two grade separated railroad crossings. The rail corridor at U.S. 129/S.R. 247 is a future passenger rail corridor to be used by the Georgia Passenger Rail Authority.

This project widens existing Sardis Church Road from 1,100 ft. east of Skipper Road, where another project that adds an interchange with I-75 and expands Sardis Church Road ends, east approximately 0.85 mile. From this point, the alignment continues easterly on a new location bridging the Central of Georgia Railroad and Industrial Highway/US 41, then turns east and connects with existing Avondale Mill Road. The alignment follows Avondale Mill Road for the next 1.7 miles and terminates at the intersection of Avondale Mill Road and U.S. 129/S.R. 247 where a trumpet interchange will be constructed.

The typical section will consist of two, 12-ft. lanes in each direction with 4-ft. bike lanes on each side, a 20-ft. wide raised median, 2.5-ft. curb and gutter, and a grass median and 5-ft. wide sidewalk on each side. Included will be bridges for Sardis Church Road Extension over the Norfolk Southern

Railroad, Industrial Highway, and Norfolk Southern Railroad and U.S. 129/S.R. 247. At U.S. 129/S.R. 247 ramps to and from the southbound lanes to Sardis Church Road Extension will have confined earth sections between the railroad and highway using mechanically stabilized earth (MSE) walls leading to a curved bridge over the railroad.

Other items included in the project are:

- Storm water drainage
- Precast concrete bridge culverts for conveying water courses from one side of the new highway to the other
- Two noise walls
- Four signalized intersections
- Provisions for making U-turns approximately every ½ mile

The project is being designed for 45 miles per hour. Construction of the project is estimated to cost about \$46.4 million, plus right-of-way costs of about \$22 million.

CONCERNS AND OBJECTIVES

This project has been around for a long time and has recently been moved to the final design phase. Because the project is so far along in its design, the alignment is set and right-of-way is in the process of being purchased, so there is a desire to remain within the current proposed right-of-way lines. The current design has a requirement for about 500,000 cubic yards of borrow material that will have to be trucked to the project. There have also been access commitments made to the community that have driven the project's development. However, the cost has risen and is expected to rise further as more up-to-date information is available for estimating its cost.

GDOT has a variety of projects competing for limited funds and thus desires to obtain the maximum value for each dollar it spends. The objective of this study is to identify specific changes to the project that will reduce cost yet allow the project to meet its goal of connecting I-75 with U.S. 129/S.R. 247 with a safe and efficient arterial.

RESULTS OF THE STUDY

The VE team developed 19 alternatives with cost implications and one design suggestion that will enhance the safety of the roadway users, as indicated on the following Summary of Potential Cost Savings table and detailed in the Study Results section of the report. Some of the alternatives are mutually exclusive or interrelated so that the total cost savings achievable will be dependent upon the combination of alternatives selected for implementation. The following describes the themes addressed by the alternatives.

The typical urban road section is very expensive to construct and the current road profile results in the need for a significant amount of borrow material. Several alternatives seek to reduce this by reducing the width of the typical section. Deleting all of the bicycle lanes or part of the bicycle lanes will accomplish this, as indicated on Alternative Numbers (Alt. Nos.) R-4 and R-5, respectively. Although Alt. No. R-3 deletes this amenity entirely, Alt. No. R-4 responds to the fact that there is no place for the bike lanes to connect to east of South Walden Road (even Avondale Road leads to

Industrial Highway where there will be no provisions for bicyclists), so that constructing them builds bike lanes to nowhere. By building the bike lanes from the start of the project to South Walden Road, bicyclists can turn into South Walden Road to use the local road network to continue on.

Alternatively, an asphalt concrete multi-use path could replace one of the sidewalks to save even a little more money and provide a path for the bicycles as well as pedestrians as shown in Alt. No. SB 4. It should be noted that most of the 6.8 miles of this stretch of road is currently undeveloped and much of the future development will be industrial in nature. Thus, opportunities for locals to use the sidewalks and bicycle paths is limited. If they are not going to be used for a long time, installing them now is not cost-effective and adds maintenance for unused facilities. Thus, in addition, Alt. Nos. SB-2 and SB-3 delete some or all of the sidewalks until needed.

Alt. No. R-3 suggests reducing the lane widths from 12 ft. to 11 ft. to save pavement costs. Eleven feet should be acceptable in this area because truck traffic is expected to be only 4% of the total, and the left lanes are bounded by 2-ft. wide gutter pans on the median side, and the right lanes are bounded by 4-ft. wide bicycle lanes creating wide maneuvering areas.

To substantially reduce the amount of borrow material, Alt. No. R-11/R-12 suggests lowering the road profile from Station 200+50 to Station 310+00.

From a bridge perspective, long bridges with sloped paving in front of the end bents are used at all the bridges. Using end bents behind mechanically stabilized earth walls will allow the bridges to be shortened, saving substantial costs as illustrated in Alt. Nos. B-1-1, B-1-2, B-1-3 and B-5. In some cases the walls will be adjacent to a railroad, and in other cases, there is a very wide opening for the road in the new end span, thus a spillway design is not needed.



SUMMARY OF POTENTIAL COST SAVINGS

draft

PROJECT SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247

Georgia Department of Transportation

PRESENT WORTH OF COST SAVINGS

| ALT. NO. | DESCRIPTION | ORIGINAL COST | ALTERNATIVE COST | INITIAL COST SAVINGS | RECURRING COST SAVINGS | TOTAL PW LCC SAVINGS |
|--|---|---------------|------------------|----------------------|------------------------|----------------------|
| ROADWAY (R) | | | | | | |
| R-3 | Narrow the travel lanes from 12-ft. wide to 11-ft. wide | \$ 29,870,177 | \$ 27,870,177 | \$ 2,000,000 | | \$ 2,000,000 |
| R-4 | Delete the bicycle lanes | \$ 29,870,177 | \$ 25,870,177 | \$ 4,000,000 | | \$ 4,000,000 |
| R-5 | Delete the bicycle lanes east of South Walden Road | \$ 29,870,177 | \$ 27,014,160 | \$ 2,856,017 | | \$ 2,856,017 |
| R-9 | Use a reduced depth pavement section for side roads being modified to tie in the new road | \$ 991,018 | \$ 610,517 | \$ 380,501 | | \$ 380,501 |
| R-11/ R-12 | Lower the profile of Sardis Church Road Extension from station 200+50 to station 310+00 | \$ 1,577,870 | | \$ 1,577,870 | | \$ 1,577,870 |
| R-13 | Delete the left turn lane for a U-turn at Fairystone Drive | \$ 20,680 | | \$ 20,680 | | \$ 20,680 |
| R-14 | Delete the left turn lane for a U-turn at the intersection of the Industrial Highway Connector road | \$ 20,680 | | \$ 20,680 | | \$ 20,680 |
| R-16 | Add an additional six feet of pavement adjacent to the bike lane in the two areas where several residential driveways connect to the main route | | | | | |
| | | | | | | |
| CURB & GUTTER (CG) | | | | | | |
| CG-1 | Use a 1-ft. wide gutter pan in lieu of a 2-ft. wide gutter pan on the median side of the road | \$ 893,113 | \$ 686,962 | \$ 206,151 | | \$ 206,151 |
| CG-2 | Use a 1-ft. wide gutter pan in lieu of a 2-ft. wide gutter pan on the outside side of the roadway | \$ 962,181 | \$ 645,988 | \$ 316,193 | | \$ 316,193 |
| | | | | | | |
| SIDEWALKS & BIKE LANES (SB) | | | | | | |
| SB-1 | Substitute an asphalt concrete multi-use path on one side of the road for sidewalks on both sides of the road | \$ 1,014,464 | \$ 541,794 | \$ 472,670 | | \$ 472,670 |
| SB-2 | Build a concrete sidewalk on only one side of the road | \$ 1,014,464 | \$ 512,259 | \$ 502,205 | | \$ 502,205 |
| SB-3 | Delete the sidewalks on both sides of the road from South Walden Road to Avondale Mill Road except between the two bridges | \$ 1,014,464 | \$ 566,610 | \$ 447,854 | | \$ 447,854 |
| SB-4 | Use a multi-use path on one side of the road and a sidewalk on the other side and delete the bike lanes | \$ 33,871,659 | \$ 29,506,221 | \$ 4,365,438 | | \$ 4,365,438 |
| | | | | | | |

DESIGN SUGGESTION



SUMMARY OF POTENTIAL COST SAVINGS

draft

PROJECT SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247

Georgia Department of Transportation

PRESENT WORTH OF COST SAVINGS

| ALT. NO. | DESCRIPTION | ORIGINAL COST | ALTERNATIVE COST | INITIAL COST SAVINGS | RECURRING COST SAVINGS | TOTAL PW LCC SAVINGS |
|--------------------|--|---------------|------------------|----------------------|------------------------|----------------------|
| BRIDGES (B) | | | | | | |
| B-1-1 | Reduce the length of the bridge over the Norfolk Southern Railroad by using single girder spans on pile supported end bents behind mechanically stabilized earth walls | \$ 2,065,800 | \$ 1,507,838 | \$ 557,962 | | \$ 557,962 |
| B-1-2 | Reduce the length of the bridge over Industrial Highway by using single girder spans on pile supported end bents behind mechanically stabilized earth walls | \$ 2,972,508 | \$ 2,284,796 | \$ 687,712 | | \$ 687,712 |
| B-1-3 | Reduce the length of the bridge over the Norfolk Southern Railroad and US 129/SR 247 by deleting the end spans and use pile supported end bents behind mechanically stabilized earth walls | \$ 1,382,014 | \$ 690,399 | \$ 691,615 | | \$ 691,615 |
| B-4-A | Substitute a single span concrete girder bridge with extended confined earth ramp section for the curved steel girder bridge for Ramp A over the Norfolk Southern Railroad | \$ 2,214,784 | \$ 2,408,324 | \$ (193,540) | | \$ (193,540) |
| B-4-B | Substitute a single span concrete girder bridge with extended confined earth ramp section for the curved steel girder bridge for Ramp B over the Norfolk Southern Railroad | \$ 2,214,784 | \$ 2,408,324 | \$ (193,540) | | \$ (193,540) |
| B-5 | Substitute a two-span bridge for the three-span Ramp A curved steel girder bridge and convert the end span of the Sardis Church Road Extension bridge to an earth fill section with a mechanically stabilized earth wall at the bridge end bents | \$ 1,523,940 | \$ 770,380 | \$ 753,560 | | \$ 753,560 |
| | | | | | | |
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STUDY RESULTS

INTRODUCTION

The results are the major feature of this value engineering study since they portray the benefits that can be realized by GDOT, the users and Kimley-Horn and Associates, the designer. The results will directly affect the project design and will require coordination between GDOT and the design team to determine the disposition of each alternative.

During 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 GDOT'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 are 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, cost databases from GDOT and team members were consulted. A markup of 10% for engineering and construction services during construction was used to generate an all-inclusive project cost for the construction items being compared.

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, safety enhancements, 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.) that can be tracked through the value engineering process, 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 |
|--------------------------|---------------|
| Roadway | R |
| Curb and Gutter | C |
| Sidewalks and Bike Lanes | SB |
| Bridges | B |

Summaries of the alternatives and design suggestions are provided on the Summary of Potential Cost Savings tables. The tables are divided into project elements 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 has been around for a long time and has recently been moved to the final design phase. Because the project is so far along in its design, the alignment is set and right-of-way is in the process of being purchased, so that there is a desire to remain within the current proposed right-of-way lines. The current design has a requirement for about 500,000 cubic yards of borrow material that will have to be trucked to the project. There have also been access commitments made to the community that have driven the project’s development. However, the cost has risen and is expected to rise further as more up-to-date information is available for estimating its cost.

The VE team also determined that the provisions for bicycle lanes and sidewalks are adding significantly to the project’s cost and yet they are either serving a mainly industrial area or terminating at a location that cannot be connected to other similar facilities.

STUDY OBJECTIVES

GDOT has a variety of projects competing for limited funds and thus desires to obtain the maximum value for each dollar it spends. The objective of this study is to identify specific changes to the project that will reduce cost yet allow the project to meet its goal of connecting I-75 with U.S. 129/S.R. 247 with a safe and efficient arterial.

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of 17 alternatives with identified cost saving opportunities and one design suggestion intended to enhance the safety of the residents that will exit and enter the high speed roadway from driveways for consideration by GDOT and the design team. Two other alternatives concerning the ramp bridges may add minor costs to the project but will allow the use of precast, prestressed concrete girders in lieu of curved steel girders. This will have a payback in the future

because it eliminates the need to periodically paint the steel. The following highlights the alternatives with significant cost impacts that are detailed in the remainder of this section.

The typical urban road section is very expensive to construct and the current road profile results in the need for a significant amount of borrow material. Several alternatives seek to reduce this by reducing the width of the typical section. Deleting all of the bicycle lanes or part of the bicycle lanes will accomplish this, as indicated on Alternative Number (Alt. Nos.) R-4 and R-5, respectively. Although Alt. No. R-3 deletes this amenity entirely, Alt. No. R-4 responds to the fact that there is no place for the bike lanes to connect to east of South Walden Road (even Avondale Road leads to Industrial Highway where there will be no provisions for bicyclists), so that constructing them builds bike lanes to nowhere. By building the bike lanes from the start of the project to South Walden Road, bicyclists can turn into South Walden Road to use the local road network to continue on.

Alternatively, an asphalt concrete multi-use path could replace one of the sidewalks to save even a little more money and provide a path for the bicycles as well as pedestrians, as shown in Alt. No. SB-4. It should be noted that most of the 6.8 miles of this stretch of road is currently undeveloped and much of the future development will be industrial in nature. Thus, opportunities for local people to use sidewalks and bicycle paths is very limited. If they are not going to be used for a long time, installing them now is not cost-effective and adds maintenance for unused facilities. Thus, in addition, Alt. Nos. SB-2 and SB-3 delete some or all of the sidewalks until needed.

Alt. No. R-3 suggests reducing the lane widths from 12 ft. to 11 ft. to save pavement costs. Eleven feet should be acceptable in this area because truck traffic is expected to be only 4% of the total and the left lanes are bounded by 2-ft. wide gutter pans on the median side and the right lanes are bounded by 4-ft. wide bicycle lanes creating wide maneuvering areas.

To substantially reduce the amount of borrow material, Alt. No. R-11/R-12 suggests lowering the road profile from Station 200+50 to Station 310+00.

From a bridge perspective, long bridges with sloped paving in front of the end bents are used at all the bridges. Using end bents behind mechanically stabilized earth walls will allow the bridges to be shortened saving substantial costs, as illustrated in Alt. Nos. B-1-1, B-1-2, B-1-3 and B-5. In some cases, the walls will be adjacent to a railroad and in other cases there is a very wide opening for the road in the new end span, thus a spillway design is not needed.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

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

All alternatives and design suggestions were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some 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.

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



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**

Georgia Department of Transportation

PRESENT WORTH OF COST SAVINGS

| ALT. NO. | DESCRIPTION | ORIGINAL COST | ALTERNATIVE COST | INITIAL COST SAVINGS | RECURRING COST SAVINGS | TOTAL PW LCC SAVINGS |
|--|---|-------------------|------------------|----------------------|------------------------|----------------------|
| ROADWAY (R) | | | | | | |
| R-3 | Narrow the travel lanes from 12-ft. wide to 11-ft. wide | \$ 29,870,177 | \$ 27,870,177 | \$ 2,000,000 | | \$ 2,000,000 |
| R-4 | Delete the bicycle lanes | \$ 29,870,177 | \$ 25,870,177 | \$ 4,000,000 | | \$ 4,000,000 |
| R-5 | Delete the bicycle lanes east of South Walden Road | \$ 29,870,177 | \$ 27,014,160 | \$ 2,856,017 | | \$ 2,856,017 |
| R-9 | Use a reduced depth pavement section for side roads being modified to tie in the new road | \$ 991,018 | \$ 610,517 | \$ 380,501 | | \$ 380,501 |
| R-11/ R-12 | Lower the profile of Sardis Church Road Extension from station 200+50 to station 310+00 | \$ 1,577,870 | | \$ 1,577,870 | | \$ 1,577,870 |
| R-13 | Delete the left turn lane for a U-turn at Fairystone Drive | \$ 20,680 | | \$ 20,680 | | \$ 20,680 |
| R-14 | Delete the left turn lane for a U-turn at the intersection of the Industrial Highway Connector road | \$ 20,680 | | \$ 20,680 | | \$ 20,680 |
| R-16 | Add an additional six feet of pavement adjacent to the bike lane in the two areas where several residential driveways connect to the main route | DESIGN SUGGESTION | | | | |
| CURB & GUTTER (CG) | | | | | | |
| CG-1 | Use a 1-ft. wide gutter pan in lieu of a 2-ft. wide gutter pan on the median side of the road | \$ 893,113 | \$ 686,962 | \$ 206,151 | | \$ 206,151 |
| CG-2 | Use a 1-ft. wide gutter pan in lieu of a 2-ft. wide gutter pan on the outside side of the roadway | \$ 962,181 | \$ 645,988 | \$ 316,193 | | \$ 316,193 |
| SIDEWALKS & BIKE LANES (SB) | | | | | | |
| SB-1 | Substitute an asphalt concrete multi-use path on one side of the road for sidewalks on both sides of the road | \$ 1,014,464 | \$ 541,794 | \$ 472,670 | | \$ 472,670 |
| SB-2 | Build a concrete sidewalk on only one side of the road | \$ 1,014,464 | \$ 512,259 | \$ 502,205 | | \$ 502,205 |
| SB-3 | Delete the sidewalks on both sides of the road from South Walden Road to Avondale Mill Road except between the two bridges | \$ 1,014,464 | \$ 566,610 | \$ 447,854 | | \$ 447,854 |
| SB-4 | Use a multi-use path on one side of the road and a sidewalk on the other side and delete the bike lanes | \$ 33,871,659 | \$ 29,506,221 | \$ 4,365,438 | | \$ 4,365,438 |

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **R-3**

DESCRIPTION: **NARROW THE TRAVEL LANES FROM 12 FT. WIDE TO 11 FT. WIDE** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The typical roadway section has two 12-ft. wide travel lanes, a 4-ft. wide bike lane, and 2-ft. wide gutter pans on each side; 12-ft. wide turn lanes are added where necessary. This results in a 32-ft. wide travel path in the typical section.

ALTERNATIVE: (Sketch attached)

Reduce the lane widths to 11 ft. wide, thus reducing the travel path to 30 ft. wide.

ADVANTAGES:

- Saves substantial construction costs
- Reduces construction time
- Could save right-of-way costs in high fill and low cut areas because the area of disturbance is reduced

DISADVANTAGES:

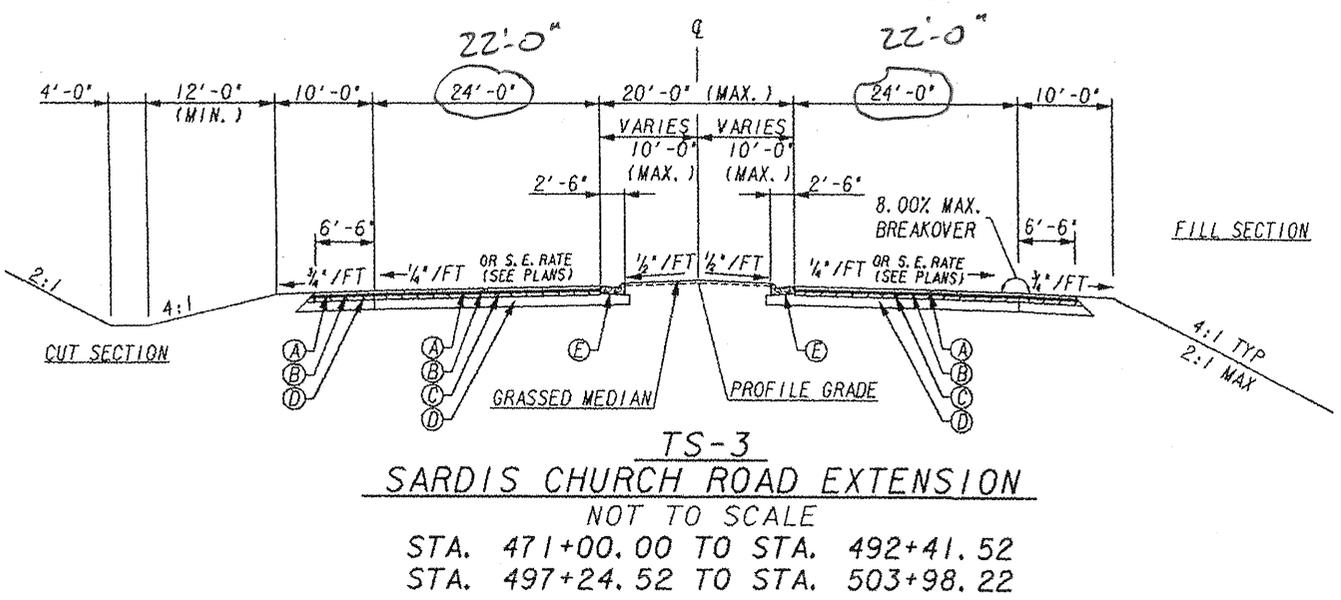
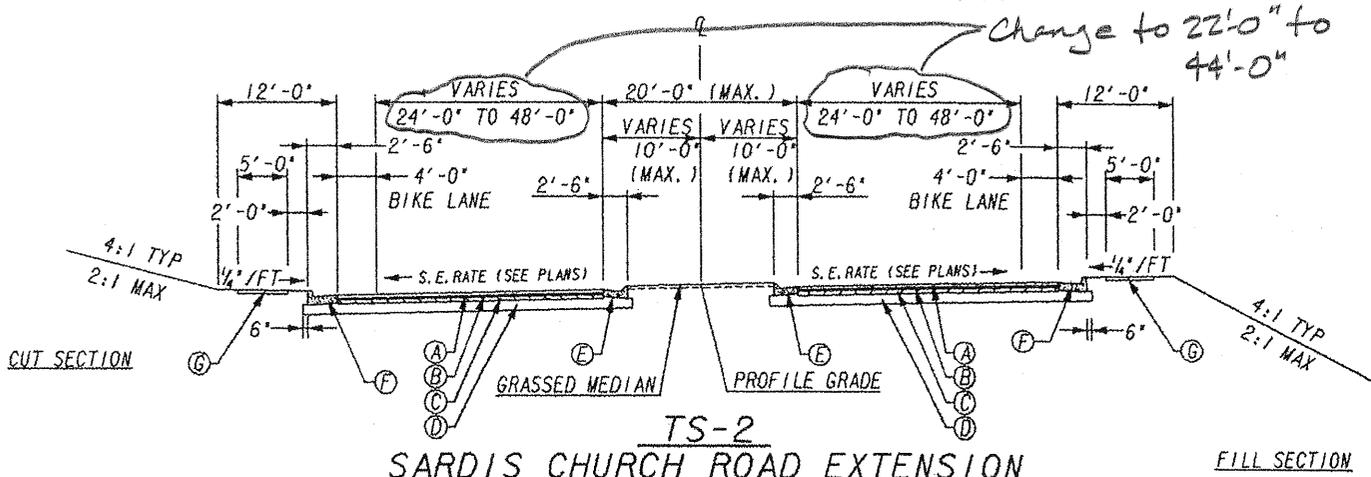
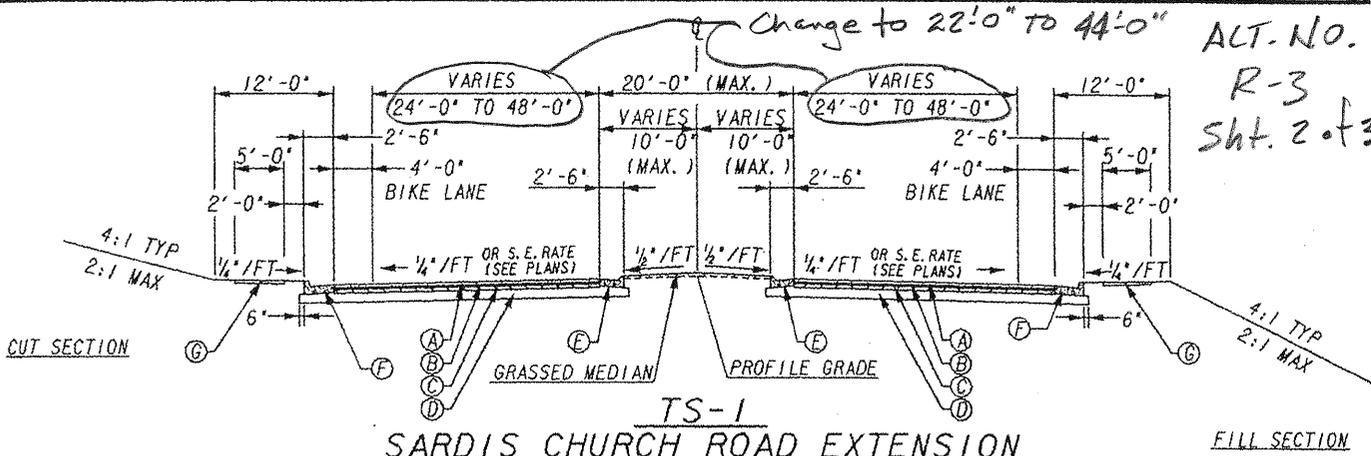
- Less room for vehicles, perceived decrease in safety

DISCUSSION:

It is common practice to use 11-ft. wide travel lanes in urban areas. This stretch of roadway will only have 4% truck traffic, and combined with the fact that the left lane has a 2-ft. wide gutter and a 4-ft. wide bicycle lane adjacent to the right lane means that the narrower travel lane is not a significant safety issue.

When the pavement width is decreased, there is also a corresponding decrease in the grading, cross-drains and bridge costs, a substantial amount.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|---------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 29,870,177 | — | \$ 29,870,177 |
| ALTERNATIVE | \$ 27,870,177 | — | \$ 27,870,177 |
| SAVINGS | \$ 2,000,000 | — | \$ 2,000,000 |



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

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-3**

SHEET NO.: **3 of 3**

As designed, cost for $(4' + 12' + 12') \times 2 = 56'$ wide pavement

| | | |
|------------------|------------|-----------------------|
| Pavement : | 14,421,950 | |
| Grading : | 4,678,600 | |
| Storm Drainage : | 4,499,627 | |
| Bridge | 3,247,500 | (over NSRR & US 129) |
| Bridge | 1,792,500 | (over Industrial Hwy) |
| Bridge | 1,230,000 | (over NSRR) |

Total: 29,870,177

The cost for one foot of width of road = $\frac{29,870,177}{56} = 533,396$

If we include medians, turning lanes & side roads, the approximate cost for one foot of roadway width will be about \$500,000.

Since we will be saving 4' (2' on each side), the total savings will be $500,000 \times 4 = \$2$ million.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-4**

DESCRIPTION: **ELIMINATE THE BICYCLE LANES**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The typical section has 4-ft. wide bicycle lanes in each direction of the new road. The travel way in each direction is 32 ft.

ALTERNATIVE: (Sketch attached)

Delete the bicycle lanes and reduce the travel way to 28 ft..

ADVANTAGES:

- Saves substantial construction costs
- Reduces construction time
- Reduces the limit of disturbance and possibly right-of-way requirements in high fill and low cut areas

DISADVANTAGES:

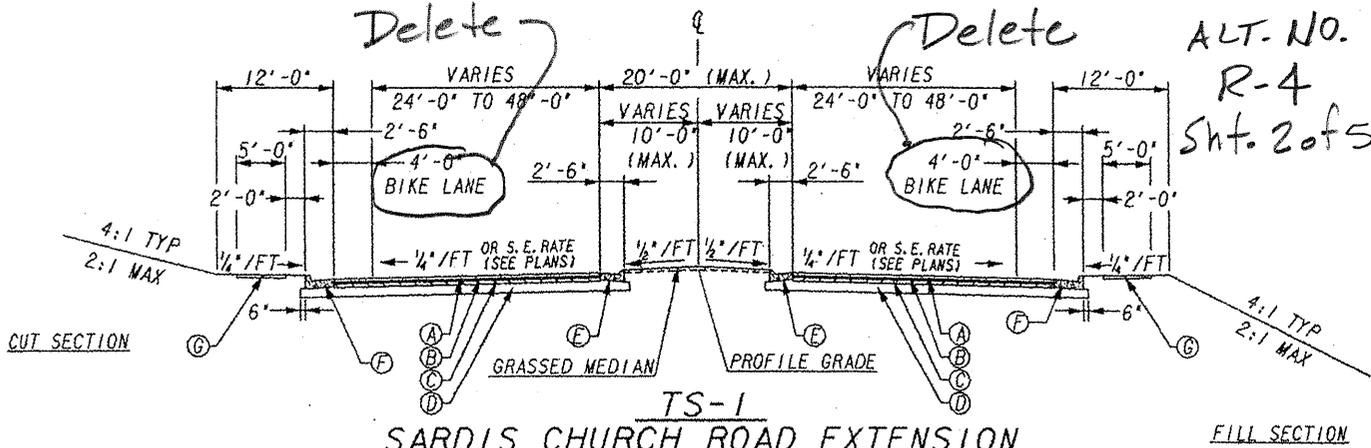
- Deletes an amenity; there is no dedicated bikeway to protect bicyclists

DISCUSSION:

This road passes mostly through industrial areas, wetlands, and land planned for industrial use. At the east end, the road connects to US 129/SR 247, which will not have bike lanes or paths, thus the bike lanes lead to a dead end. Eliminating them from this project does not remove a significant amenity, yet saves significant costs.

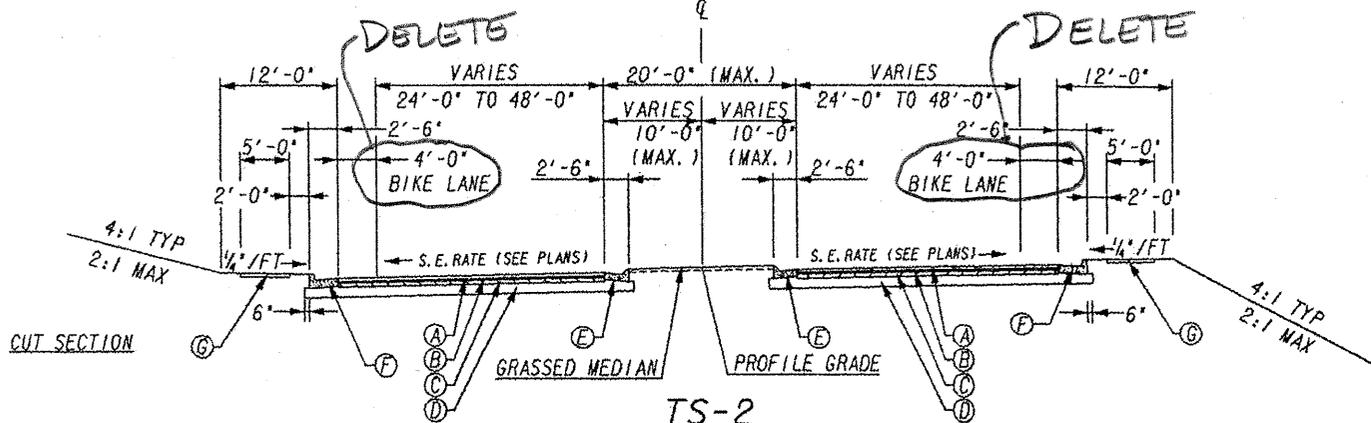
The 8-ft. reduction in pavement width results in a 12.5% decrease in full-depth asphalt pavement section in addition to a reduction in grading, earthwork, storm water drainage, bridge, etc. costs.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|---------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 29,870,177 | — | \$ 29,870,177 |
| ALTERNATIVE | \$ 25,870,177 | — | \$ 25,870,177 |
| SAVINGS | \$ 4,000,000 | — | \$ 4,000,000 |



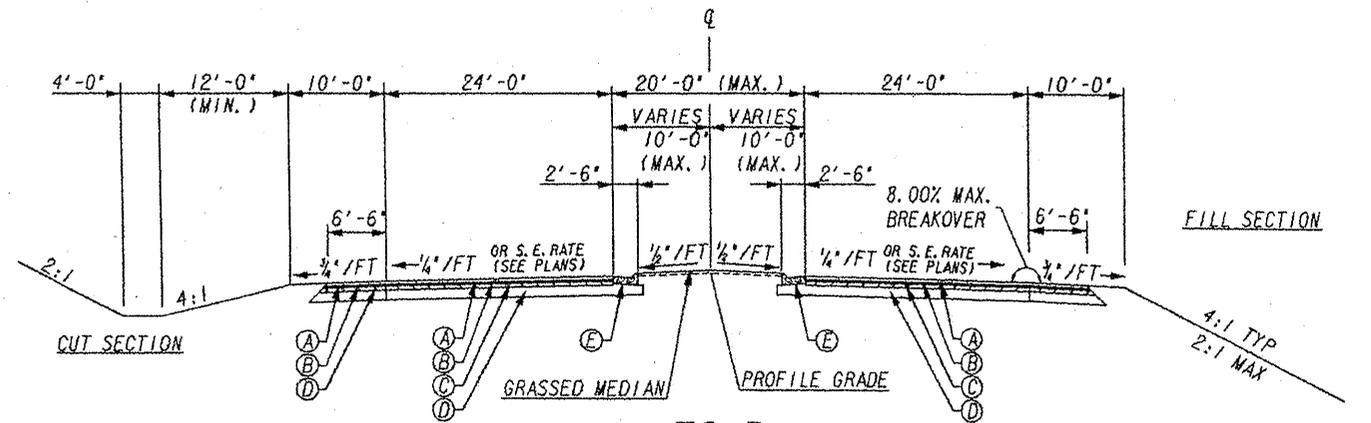
TS-1
SARDIS CHURCH ROAD EXTENSION
TANGENT SECTION

NOT TO SCALE
 STA. 161+43.57 TO STA. 324+36.44
 STA. 326+60.94 TO STA. 329+18.63
 STA. 332+17.13 TO STA. 471+00.00



TS-2
SARDIS CHURCH ROAD EXTENSION
SUPERELEVATED SECTION

NOT TO SCALE
 SEE PLANS FOR STATION RANGES



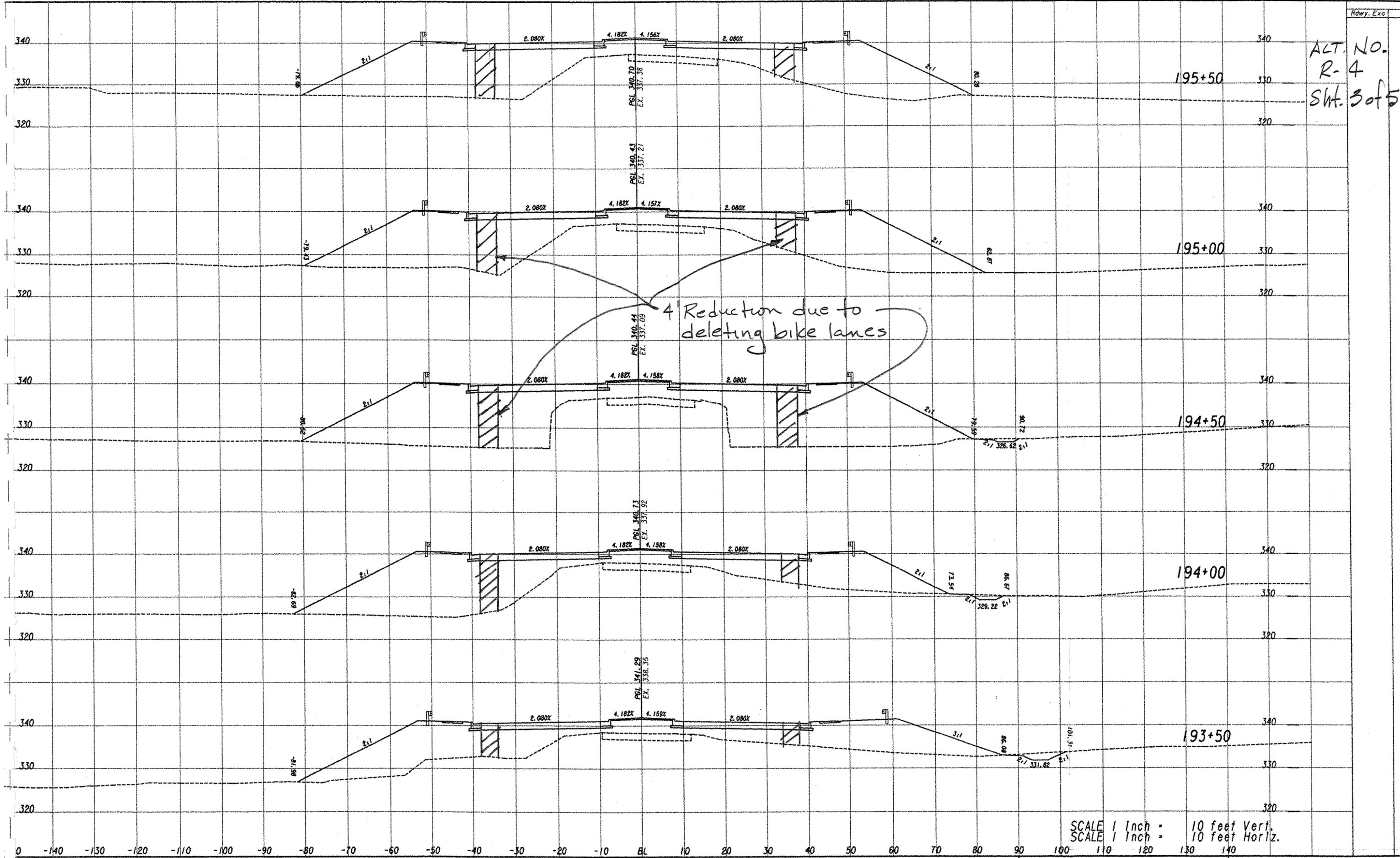
TS-3
SARDIS CHURCH ROAD EXTENSION

NOT TO SCALE
 STA. 471+00.00 TO STA. 492+41.52
 STA. 497+24.52 TO STA. 503+98.22

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

Rdwy. Exc.

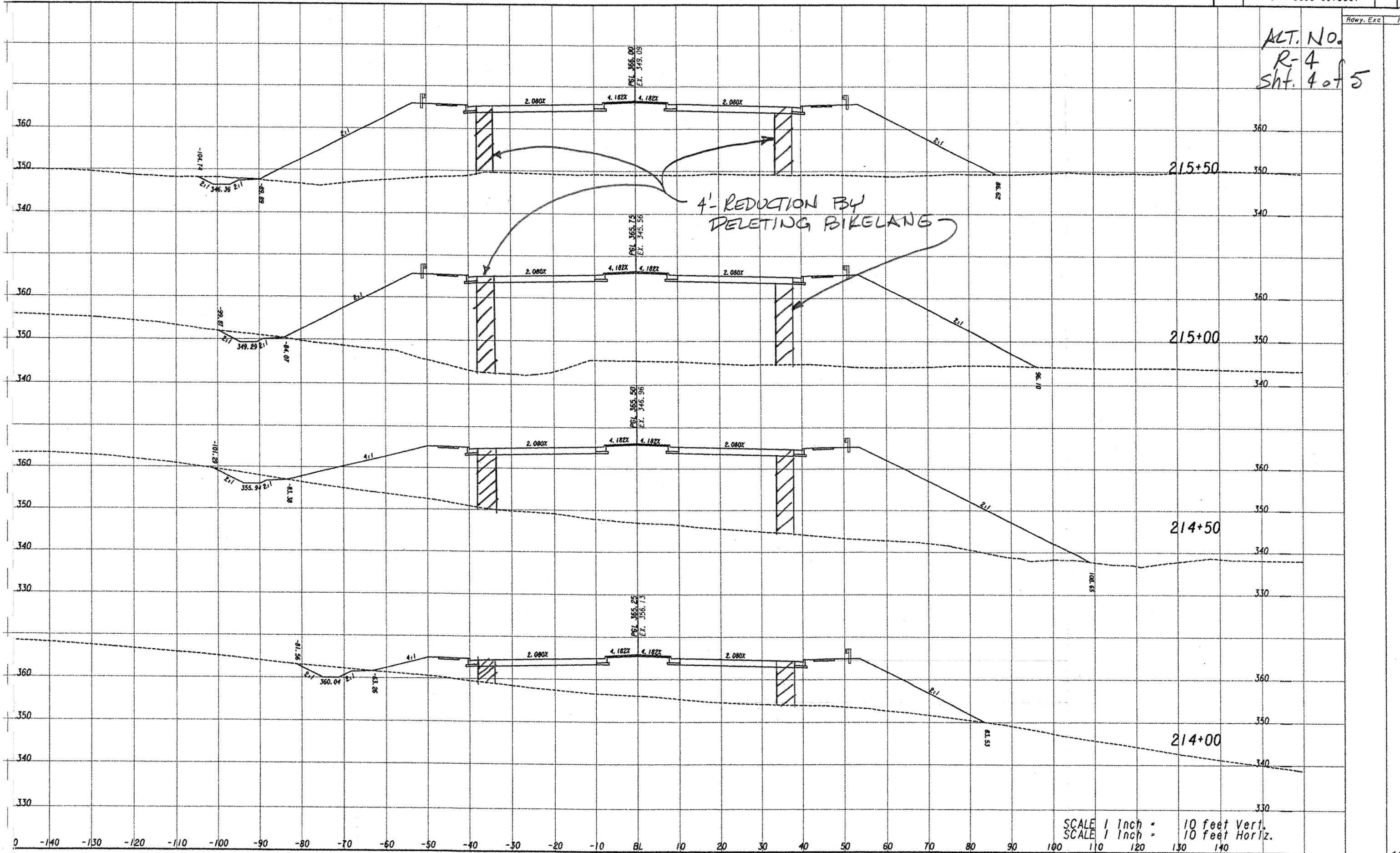
ACT. NO.
R-4
Sht. 3 of 5



SCALE 1 Inch = 10 feet Vert.
SCALE 1 Inch = 10 feet Horiz.

Rdwy. Exo

ALT. No.
R-4
Sht. 4 of 5



CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-4**

SHEET NO.: **5 of 5**

Per ^{ALT.} R-3 calculations, the total cost of the pavement, grading, storm drainage & bridges = \$29,870,177. The approximate cost of one foot wide roadway is half-a-million dollars.

Thus, 8' reduction in lane width will result in $500,000 \times 8' = \$4$ million.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-5**

DESCRIPTION: **DELETE THE BICYCLE LANES EAST OF SOUTH WALDEN ROAD**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN: (See Alt. No. R-4 for sketches)

Bicycle lanes are provided in each direction for the full length of the new road.

ALTERNATIVE: (See Alt. No. R-4 for sketches)

Delete the bicycle lanes east of South Walden Road.

ADVANTAGES:

- Reduces costs
- Reduces construction time
- Reduces the limit of disturbance and possibly right-of-way requirements in high fill and low cut areas

DISADVANTAGES:

- Deletes part of an amenity; there is no dedicated bikeway to protect bicyclists for this stretch of roadway

DISCUSSION:

This road passes mostly through industrial areas, wetlands, and land planned for industrial use. At the east end, the road connects to US 129/SR 247, which will not have bike lanes or paths, thus the bike lanes lead to a dead end. By terminating the bicycle lanes at South Walden Road, riders can use the local road network to travel to various places. Eliminating them from this point to the eastern end of the project does not remove a significant amenity because it only leads to a dead end, yet saves significant costs for the project.

Deleting the bike lanes eliminates full-depth asphalt pavement, earthwork, clearing and grubbing, drainage and bridge costs. It could also affect the amount of right-of-way purchased in areas where there are high fills or deep cuts because the area of disturbance is reduced.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|---------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 29,870,177 | — | \$ 29,870,177 |
| ALTERNATIVE | \$ 27,014,160 | — | \$ 27,014,160 |
| SAVINGS | \$ 2,856,017 | — | \$ 2,856,017 |

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: R-5

SHEET NO.: 2 of 2

The length from east of South Walden Road to the end of the project is $51,551 - 26,410 = 25,141'$

The total length of the project is 6.7059 miles or 35,139'
Thus, the % of the length of roadway for which bike lanes are proposed to be eliminated is 71.40%.

Per R-4, the total savings for complete elimination of bike lanes is 4 million dollars.

Thus, the savings for just 71.40% reduction in bike lanes will be : $0.714 \times 4,000,000 = \$2,856,017$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-9**

DESCRIPTION: **USE A REDUCED DEPTH PAVEMENT SECTION FOR SIDE
ROADS BEING MODIFIED TO TIE INTO THE NEW ROAD**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The typical section for the side roads that are being modified to tie into the new Sardis Church Road and Sardis Church Road Extension shows full-depth pavement sections to match the new road.

ALTERNATIVE: (Sketch attached)

Use thinner pavement sections for the intersecting roads being modified.

ADVANTAGES:

- Reduces costs

DISADVANTAGES:

- None apparent

DISCUSSION:

Most of the side roads will have less traffic than Sardis Church Road or the Sardis Church Road extension and very few trucks. Thus, reducing the pavement section will save costs without impacting pavement performance.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|----------------------------------|----------------------------------|
| ORIGINAL DESIGN | \$ 991,018 | — | \$ 991,018 |
| ALTERNATIVE | \$ 610,517 | — | \$ 610,517 |
| SAVINGS | \$ 380,501 | — | \$ 380,501 |



PROJECT:

SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247

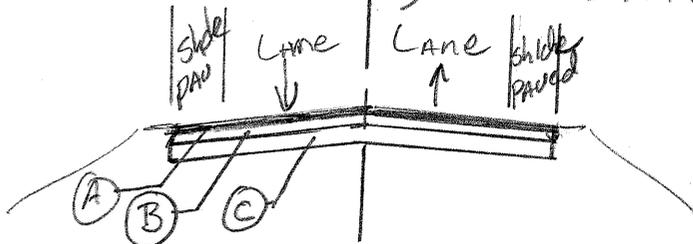
ALTERNATIVE NO.: R-9

Georgia Department of Transportation

USE A DIFFERENT PAVEMENT SECTION FOR MINOR SIDE ROADS

SHEET NO.: 2 of 5

At: Goodall Mill Rd, Avondale Mill Rd, Access Rd @ 4835th Rd.

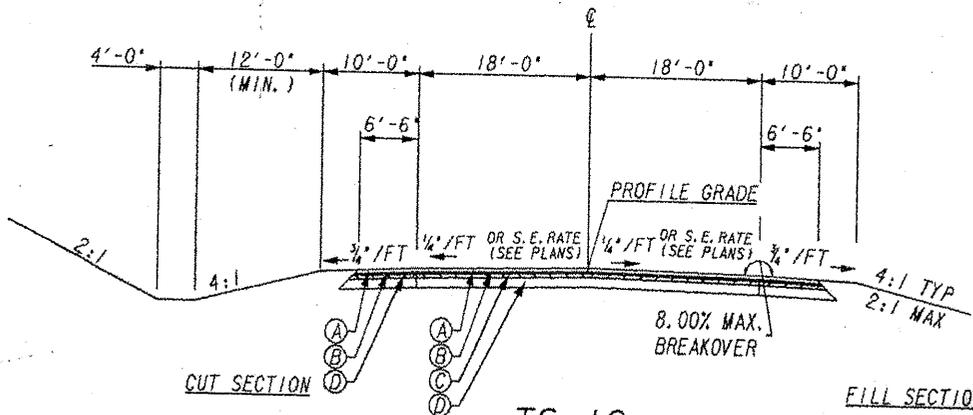


Low TRAFFIC VOLUMES

(ALTERNATIVE)

(BASED ON TRAFFIC)

- (A) 12.5mm Superpave 165#/sy
- (B) 19mm Superpave 220#/sy
- (C) GAB - 8"



(Based on TRAFFIC)

TS-10
INDUSTRIAL HIGHWAY CONNECTOR

- (A) 12.5mm Superpave 165#/sy
- (B) 19mm Superpave 220#/sy
- (C) 25mm Superpave 330#/sy
- (D) GAB - 10"

(ALTERNATIVE)

As Designed in Plans All Roadways have the following Rdwy PAVEMENT SECTION

- (A) 12.5mm Superpave 165#/sy
- (B) 19mm Superpave 220#/sy
- (C) 25mm Superpave 660#/sy
- (D) GAB - 12"

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-9**

As Designed (Original)

1 1/2" x 2 1/2" x 12"

SHEET NO.: **3** of **5**

Goodall Mill Rd = 18,900 SF
 (12.5mm) 180 tons
 (19mm) 240 tons
 (25mm) $18,900 \text{ SF} \times .5' \times .076 \text{ T/CF} = 719 \text{ tons}$
 GAB $18,900 \text{ SF} \times 1' \times .076 \text{ T/CF} = 1,437 \text{ tons}$

Auondale Mill Rd = 16,632 SF
 (12.5mm) 158 tons
 (19mm) 211 tons
 (25mm) $16,632 \text{ SF} \times .5' \times .076 \text{ T/CF} = 632 \text{ tons}$
 GAB $16,632 \text{ SF} \times 1' \times .076 \text{ T/CF} = 1,264 \text{ tons}$

Access Rd @ 483+00 Pt. = 21,360 SF
 (12.5mm) 203 tons
 (19mm) 271 tons
 (25mm) $21,360 \text{ SF} \times .5' \times .076 \text{ T/CF} = 812 \text{ tons}$
 GAB $21,360 \text{ SF} \times 1' \times .076 \text{ T/CF} = 1,624 \text{ tons}$

Industrial Hwy Collector = 92,365 SF
 (12.5mm) 878 tons
 (19mm) 1173 tons
 (25mm) $92,365 \text{ SF} \times .5' \times .076 \text{ T/CF} = 3,510 \text{ T/CF}$
 GAB $92,365 \text{ SF} \times 1' \times .076 \text{ T/CF} = 7,020 \text{ T/CF}$

Original totals (As Designed)
 (12.5mm = 1,419 tons) (19mm = 1,895 tons)
 (25mm = 5,673 tons) (GAB = 11,345 tons)

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-9**

(Alternate = Proposed) Quantities SHEET NO.: 4 of 5

Goodall Mill Rd. (Refer to x-sections for Full depth)
 (SF) = $[(250' \times 36') + (275' \times 36')] = 18,900 \text{ SF (Full depth)}$

(12.5mm) $18,900 \text{ SF} \times .125' \times \frac{.076 \text{ Tons}}{\text{CF}} = 180 \text{ tons}$

(19mm) $18,900 \text{ SF} \times .167' \times \frac{.076 \text{ Tons}}{\text{CF}} = 240 \text{ tons}$

GR Aggr Base $18,900 \text{ SF} \times .67' \times \frac{.076 \text{ Tons}}{\text{CF}} = 959 \text{ tons}$

Proposed Avondale Mill Rd. - Full depth

(SF) = $[(168' \times 24') + (180' \times (\frac{24' + 36'}{2})) + (200' \times 36')] = 16,632 \text{ SF}$

(12.5mm) $16,632 \text{ SF} \times .125' \times \frac{.076 \text{ Tons}}{\text{CF}} = 158 \text{ tons}$

(19mm) $16,632 \text{ SF} \times .167' \times \frac{.076 \text{ Tons}}{\text{CF}} = 211 \text{ tons}$

GR Aggr Base $16,632 \text{ SF} \times .67' \times \frac{.076 \text{ Tons}}{\text{CF}} = 847 \text{ tons}$

Access Rd @ 483+00 Rt. (Full depth)

(SF) = $(24' \times 890') = 21,360 \text{ SF}$

(12.5mm) $21,360 \text{ SF} \times .125' \times \frac{.076 \text{ Tons}}{\text{CF}} = 203 \text{ tons}$

(19mm) $21,360 \text{ SF} \times .167' \times \frac{.076 \text{ Tons}}{\text{CF}} = 271 \text{ tons}$

GAB $21,360 \text{ SF} \times .67' \times \frac{.076 \text{ Tons}}{\text{CF}} = 1,088 \text{ tons}$

Industrial Hwy Connector

(SF) = $(36' + 13') \times 1,885' = 92,365 \text{ SF}$

(12.5mm) $92,365 \text{ SF} \times .125' \times \frac{.076 \text{ Tons}}{\text{CF}} = 878 \text{ tons}$

(19mm) $92,365 \text{ SF} \times .167' \times \frac{.076 \text{ Tons}}{\text{CF}} = 1,173 \text{ tons}$

(25mm) $92,365 \text{ SF} \times .25' \times \frac{.076 \text{ Tons}}{\text{CF}} = 1,755 \text{ tons}$

GAB $92,365 \text{ SF} \times .833' \times \frac{.076 \text{ Tons}}{\text{CF}} = 5,848 \text{ tons}$

Alternate (Proposed totals)

(12.5mm = 1,419 tons) (19mm = 1,895 tons)

(25mm = 1,755 tons) (GAB = 8,742 tons)

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **R-11/R-12**

DESCRIPTION: **LOWER THE ROADWAY PROFILE FROM STATION 200+50 TO STATION 310+00** SHEET NO.: **1 of 13**

ORIGINAL DESIGN: (Sketch attached)

The roadway profile from approximately Station 200+50 to approximately Station 310+00 is set so that a significant amount of fill borrow material is required.

ALTERNATIVE: (Sketch attached)

Lower the profile in this area and revise the storm water drainage where required.

ADVANTAGES:

- Reduces costs by significantly reducing the borrow material requirements
- Could result in some right-of-way savings in areas of high fills because line of disturbance is moved closer to the edge of the pavement
- Flattens slopes and eliminates the need for guardrail – reduces maintenance and warrantees
- Saves construction time
- Reduces disturbance along Houston Road

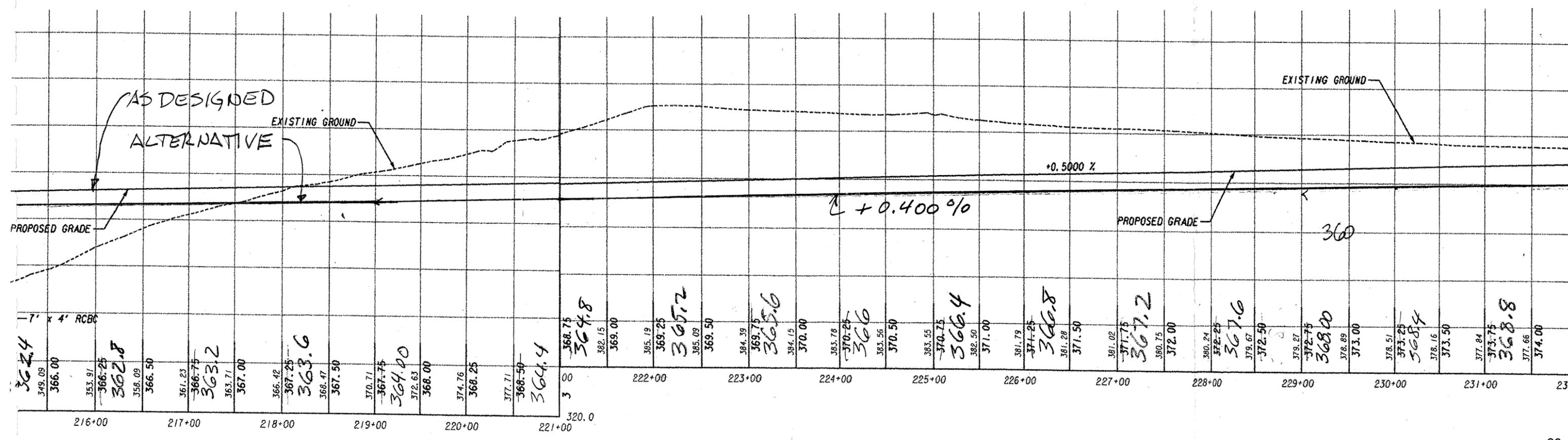
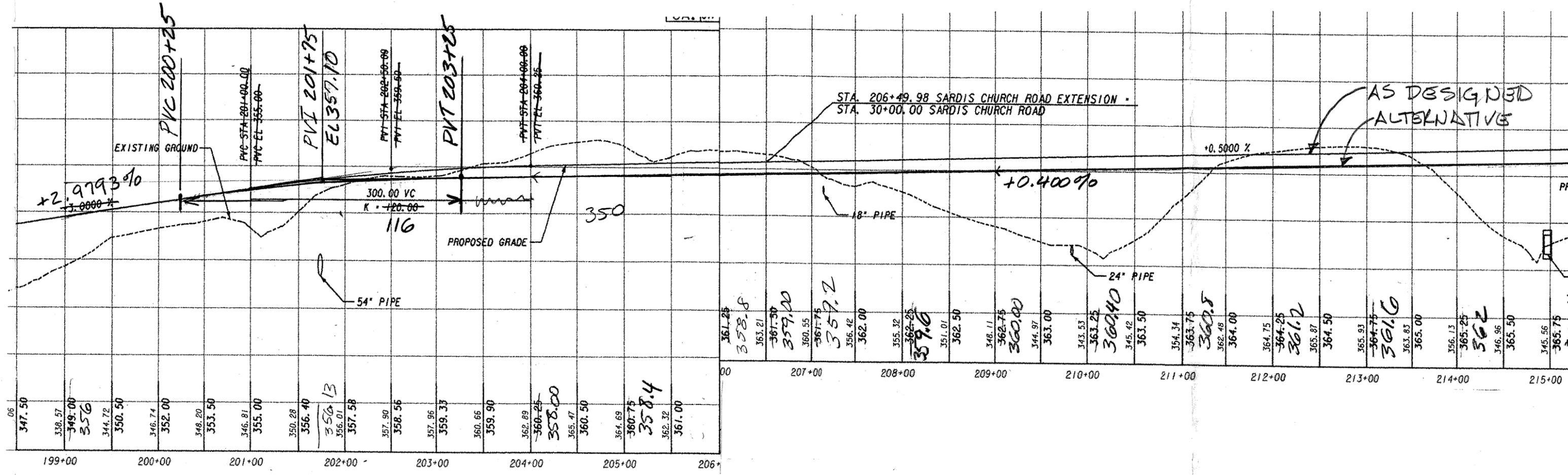
DISADVANTAGES:

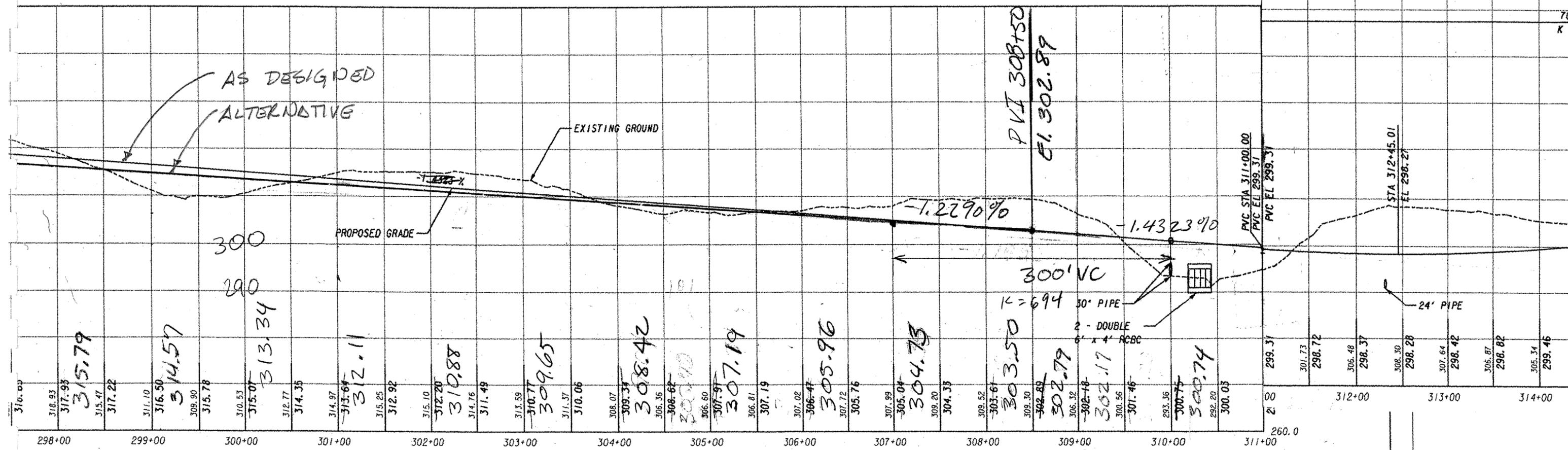
- Redesign required

DISCUSSION:

This project has a significant need for borrow material. By lowering the road profile between these stations a substantial amount of fill can be eliminated, thus saving construction time and costs. However, it will be necessary to redo some of the storm water drainage to allow the re-profiling of the road.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,577,870 | — | \$ 1,577,870 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 1,577,870 | — | \$ 1,577,870 |

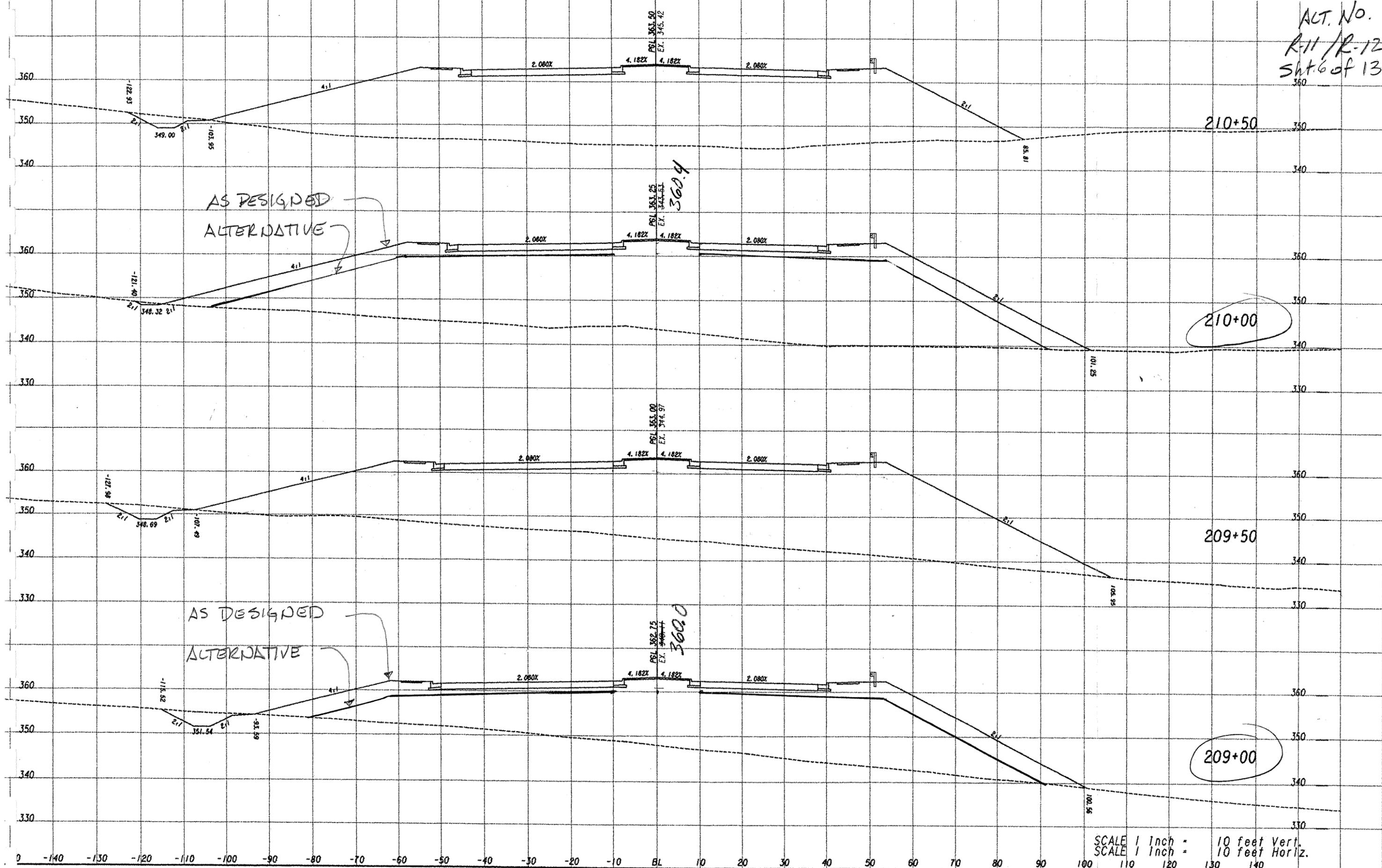




| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 316.93 | 317.98 | 315.47 | 317.22 | 311.10 | 316.50 | 308.90 | 315.78 | 310.53 | 315.07 | 312.77 | 314.35 | 314.97 | 313.67 | 312.11 | 315.25 | 312.92 | 315.10 | 312.20 | 310.88 | 314.76 | 311.49 | 313.59 | 310.77 | 309.65 | 311.37 | 310.06 | 308.07 | 309.37 | 308.42 | 308.36 | 308.67 | 306.60 | 307.97 | 307.19 | 306.81 | 307.19 | 307.02 | 306.47 | 305.96 | 307.72 | 305.76 | 307.99 | 305.04 | 304.73 | 309.20 | 304.33 | 309.52 | 303.61 | 303.50 | 302.89 | 302.79 | 306.32 | 302.18 | 302.17 | 300.56 | 301.46 | 293.36 | 300.75 | 300.74 | 292.20 | 300.03 | 299.31 | 301.73 | 298.72 | 306.48 | 298.37 | 308.30 | 298.28 | 307.64 | 298.42 | 306.87 | 298.82 | 305.34 | 299.46 |
| 298+00 | 299+00 | 300+00 | 301+00 | 302+00 | 303+00 | 304+00 | 305+00 | 306+00 | 307+00 | 308+00 | 309+00 | 310+00 | 311+00 | 312+00 | 313+00 | 314+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

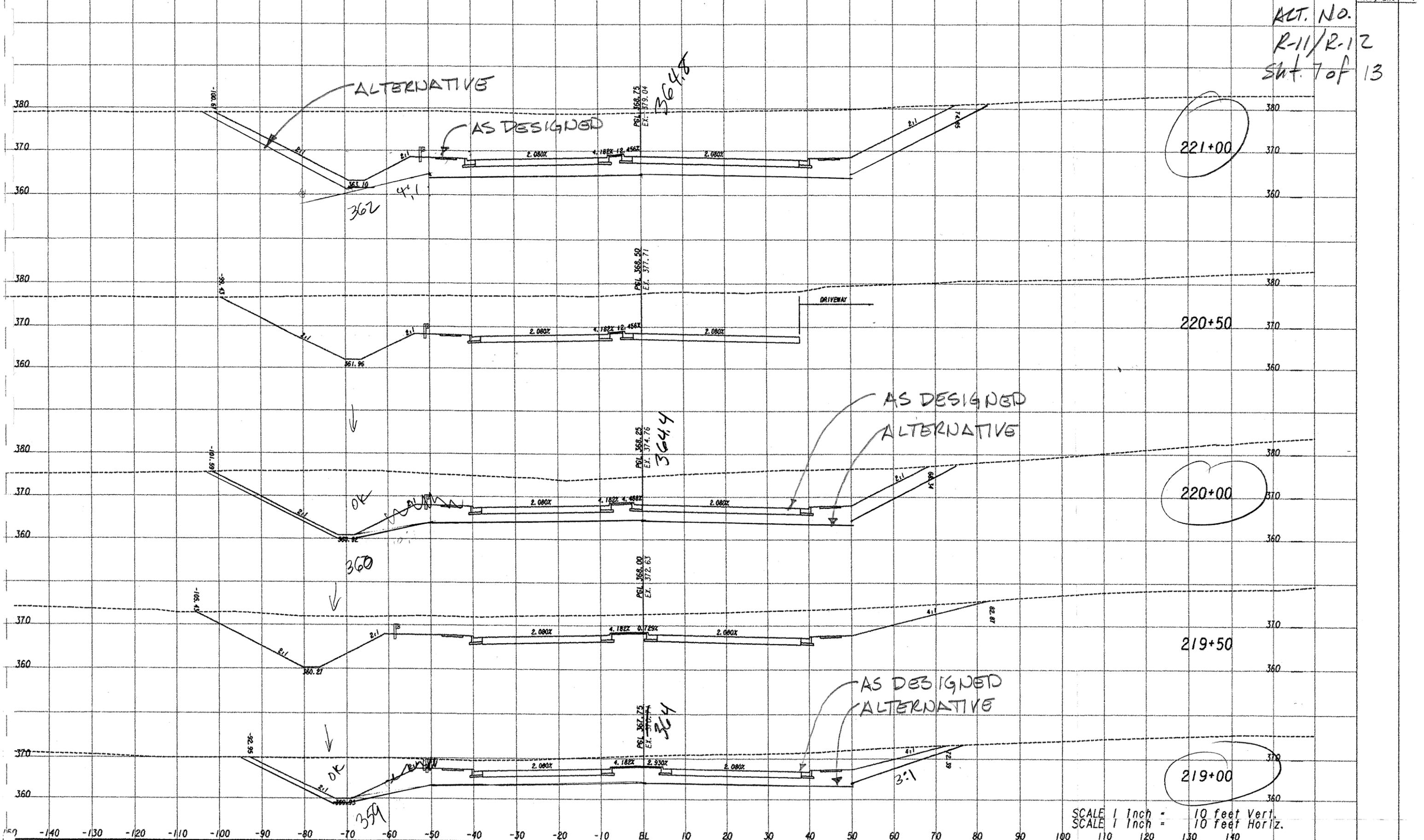
| | | | | |
|--|--------------------------------------|--|------------------------------|-------------|
| | SCALE: 1"=50' HORIZ. 1"=10' VERT. | STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION OFFICE OF URBAN DESIGN | SARDIS CHURCH ROAD EXTENSION | DRAWING No. |
| | | | | 15-05 |

ACT. NO.
R-11/R-12
Sht 6 of 13



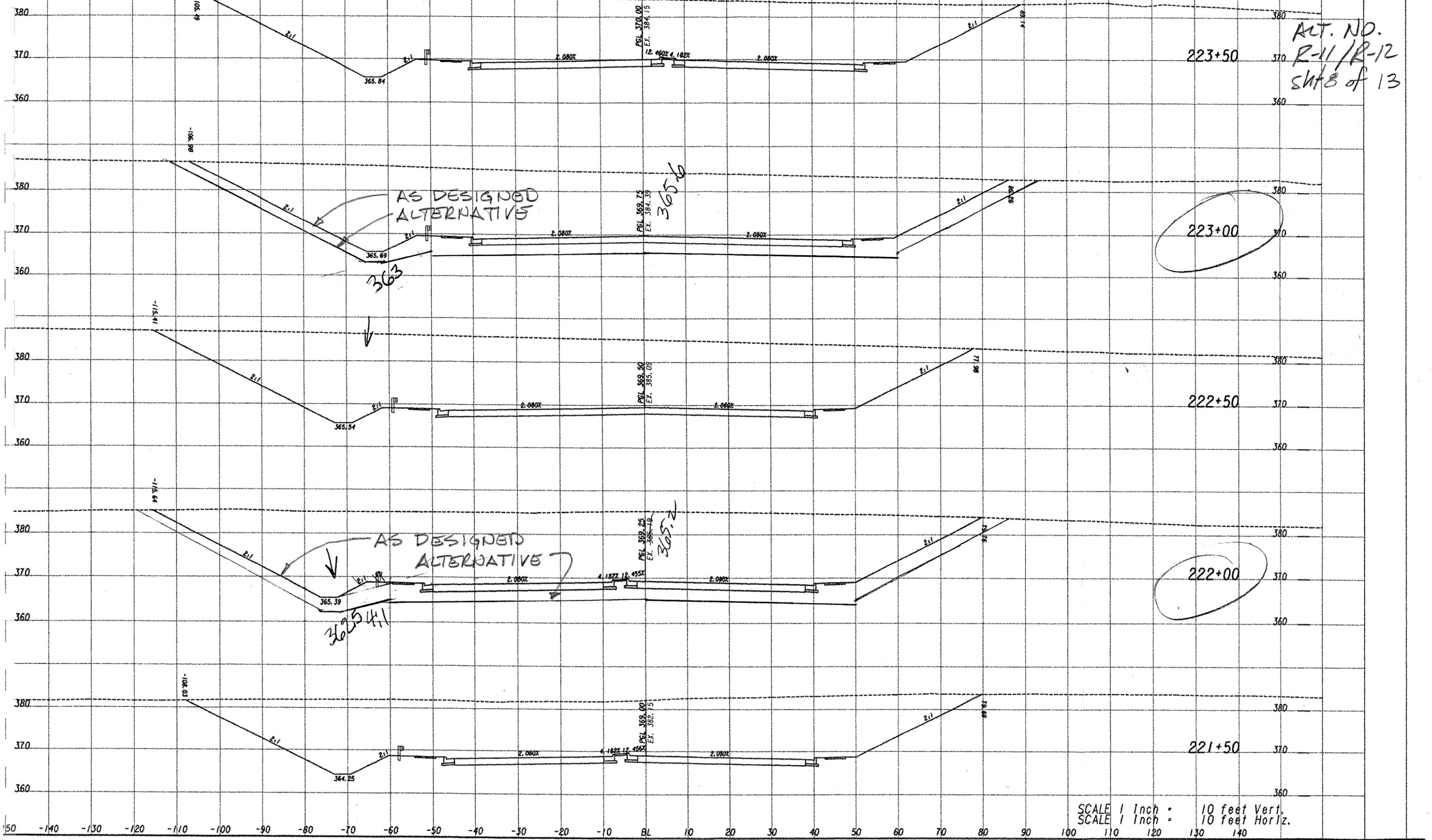
SCALE 1 Inch = 10 feet Vert.
SCALE 1 Inch = 10 feet Horiz.

| | |
|-------------------------|--------------------|
| SARDIS CHURCH ROAD EXT. | SARDIS CHURCH ROAD |
| CROSS SECTIONS | 23-19 OF 23-176 |



| | |
|-------------------------|--------------------|
| SARDIS CHURCH ROAD EXT. | SARDIS CHURCH ROAD |
| CROSS SECTIONS | 23-23 OF 23-176 |

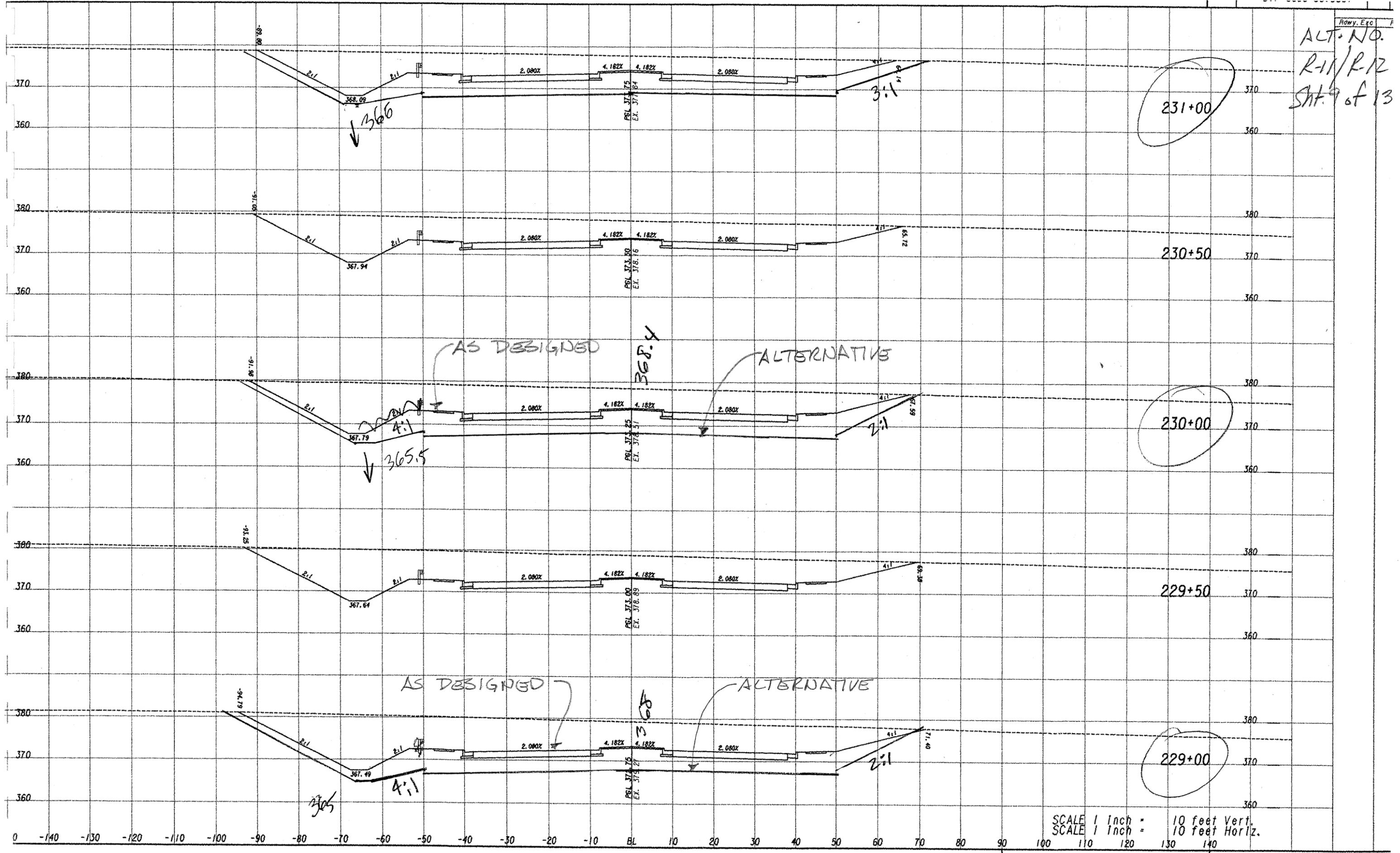
ALT. NO.
R-11/R-12
SHTS OF 13



SCALE 1 Inch = 10 feet Vert.
SCALE 1 Inch = 10 feet Horiz.

| | |
|-------------------------|--------------------|
| SARDIS CHURCH ROAD EXT. | SARDIS CHURCH ROAD |
| CROSS SECTIONS | 23-24 OF 23-176 |

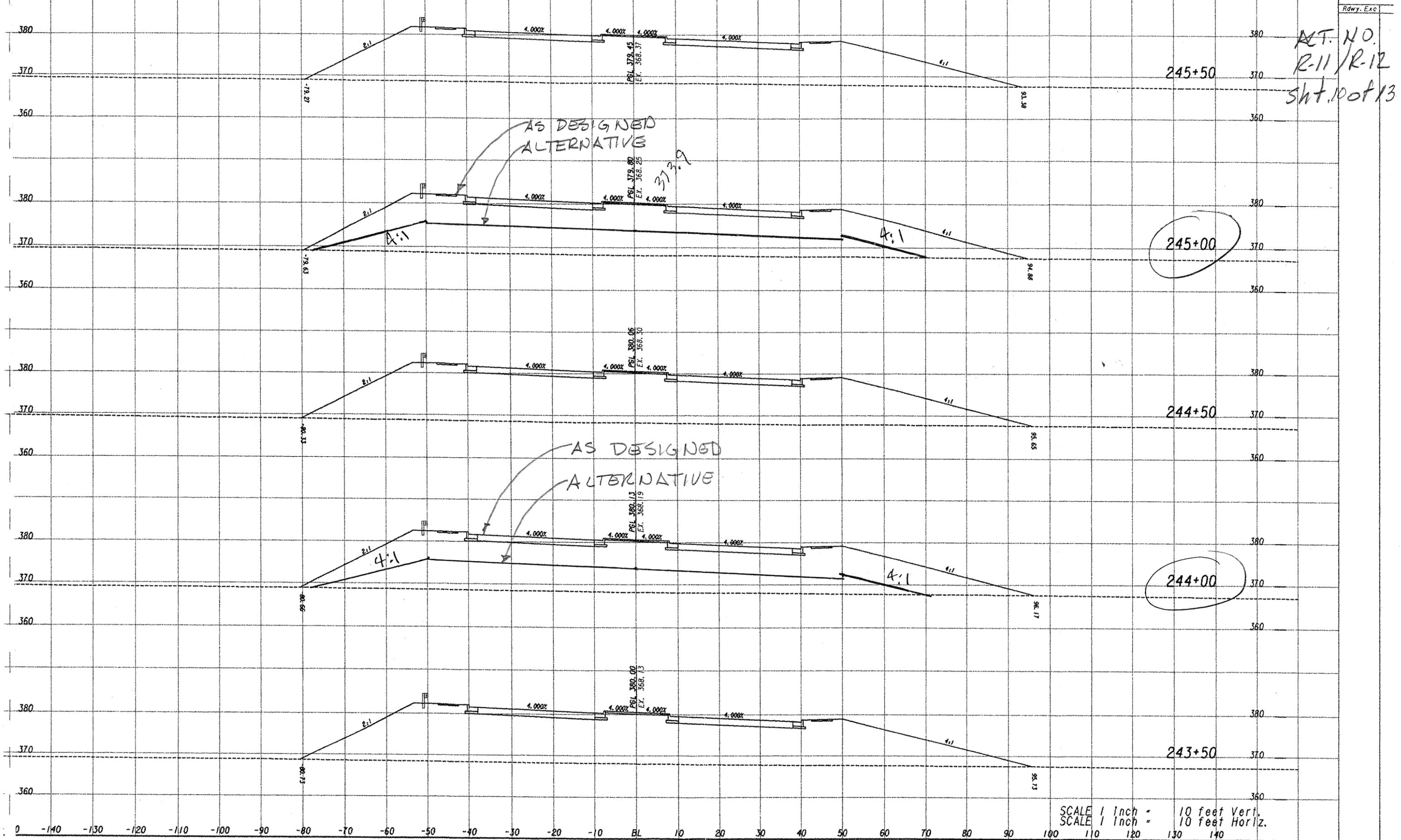
ALT. NO.
R-11/R-12
SHT. 9 of 13



SCALE 1 Inch = 10 feet Vert.
SCALE 1 Inch = 10 feet Horiz.

| | |
|-------------------------|--------------------|
| SARDIS CHURCH ROAD EXT. | SARDIS CHURCH ROAD |
| CROSS SECTIONS | 23-27 OF 23-176 |

ACT. NO.
R-11/R-12
Sht. 10 of 13



SCALE 1 Inch = 10 feet Vert.
SCALE 1 Inch = 10 feet Horiz.

| | |
|-------------------------|--------------------|
| SARDIS CHURCH ROAD EXT. | SARDIS CHURCH ROAD |
| CROSS SECTIONS | 23-32 OF 23-176 |

CALCULATIONS



PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: E-11/12

SHEET NO.: 11 of 13

Earthwork Savings in Borrow Quantity

$$\begin{aligned} \text{STA. } 201+50 &\rightarrow 244+20 \quad \left(\frac{6.4'}{2}\right) = \text{Avg ht.} = 3.2' \\ &\rightarrow \frac{3.2' \times 4270' \times 150' (\text{Avg.})}{27} \approx 76,000 \text{ c.y.} \checkmark \end{aligned}$$

$$\begin{aligned} \text{STA. } 244+20 &\rightarrow 247+00 \quad \left(\frac{6.4+4.4}{2}\right) = 5.4' (\text{Avg. ht.}) \\ &\rightarrow \frac{5.4' \times 280' \times 130' (\text{Avg.})}{27} \approx 8,000 \text{ c.y.} \checkmark \end{aligned}$$

$$\begin{aligned} \text{STA. } 247+00 &\rightarrow 264+00 \quad \left(\frac{4.4}{2}\right) = 2.2' (\text{Avg. ht.}) \\ &\rightarrow \frac{2.2' \times 1700' \times 120'}{27} \approx 17,000 \text{ c.y.} \checkmark \end{aligned}$$

$$\begin{aligned} \text{STA. } 264+00 &\rightarrow 284+00 \quad \left(\frac{4.8'}{2}\right) = 2.4' (\text{Avg. ht.}) \\ &\rightarrow \frac{2.4 \times 2000' \times 130'}{27} \approx 24,000 \text{ c.y.} \checkmark \end{aligned}$$

$$\begin{aligned} \text{STA. } 284+00 &\rightarrow 310+00 \quad \left(\frac{4.8}{2}\right) = 2.4' (\text{Avg. ht.}) \\ &\rightarrow \frac{2.4 \times 2600' \times 130'}{27} \approx 30,000 \text{ c.y.} \checkmark \end{aligned}$$

Total Earthwork Reduction: 155,000 c.y.

CALCULATIONS



PROJECT:

SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.:

R-11/R-12

SHEET NO.:

12 of 13

Remove
G' Rail (not warranted - 4:1 slopes)
(STA. 220+00 → 235+00) = 1,500'

(STA 240+00 - 249+75) = 975'

(1,500' + 975') = 2,475' (TPW)

TP 12 Anch. - 2 EA

TP 1 Anch - 2 EA.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247** ALTERNATIVE NO.: **R-13**
Georgia Department of Transportation

DESCRIPTION: **DELETE THE WESTBOUND LEFT TURN LANE FOR A U-TURN AT FAIRSTONE DRIVE** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

Fairystone Drive intersects with the Sardis Church Road Extension at a Tee intersection. A left turn lane in the median for the westbound direction is provided to permit U-turns at the intersection.

ALTERNATIVE: (Sketch attached)

Delete the westbound left-turn lane and the widening of the bike lane on the eastbound side to accommodate the U-turns.

ADVANTAGES:

- Reduces costs
- Maintains a longer stretch of wide median that could be landscaped
- Eliminates an opportunity crossing traffic accidents
- Simplifies construction at bike lanes

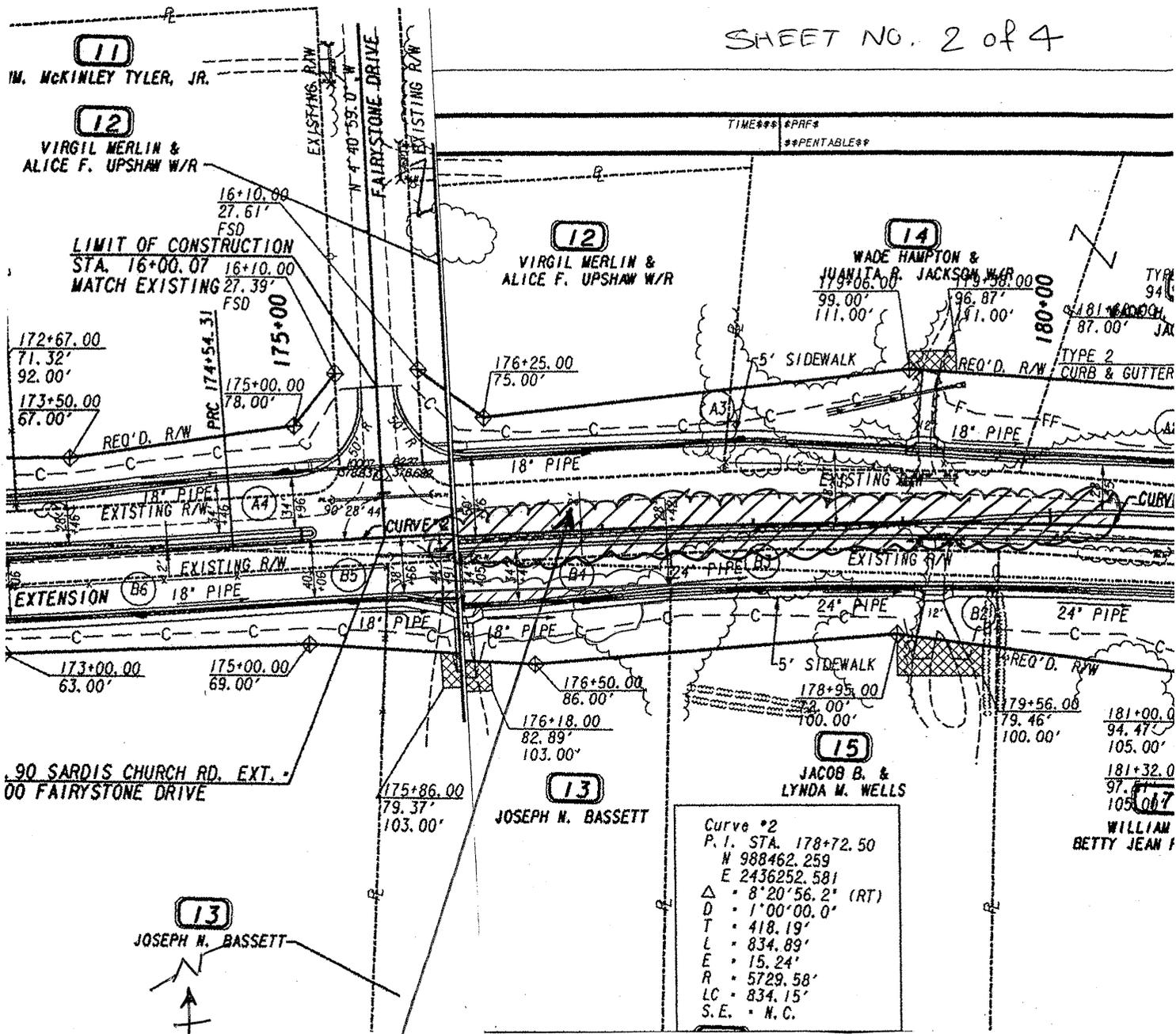
DISADVANTAGES:

- If U-turns are made at this location, there will be no dedicated deceleration lane
- Five property owners may be inconvenienced by having to travel an extra 800 ft. to make the U-turn

DISCUSSION:

For those traveling in the westbound direction desiring to make a U-turn at this location, there are other U-turn opportunities about 800 ft. to the west and 1200 ft. to the east. Eliminating the westbound U-turn at this location will only affect five property owners yet save project costs, enhance safety and increase the amount of median green space.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 20,680 | — | \$ 20,680 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 20,680 | — | \$ 20,680 |



TIME*** **PRF**
 ***PENTABLE**

11
 W. MCKINLEY TYLER, JR.

12
 VIRGIL MERLIN &
 ALICE F. UPSHAW W/R

12
 VIRGIL MERLIN &
 ALICE F. UPSHAW W/R

14
 WADE HAMPTON &
 JUANITA R. JACKSON W/R

90 SARDIS CHURCH RD. EXT.
 00 FAIRYSTONE DRIVE

13
 JOSEPH N. BASSETT

15
 JACOB B. &
 LYNDY M. WELLS

181+00.00
 94.47'
 105.00'
 181+32.00
 97.00'
 105.00'
 WILLIAM
 BETTY JEAN

Curve #2
 P. I. STA. 178+72.50
 N 988462.259
 E 2436252.581
 Δ = 8'20"56.2" (RT)
 D = 1'00"00.0"
 T = 418.19'
 L = 834.89'
 E = 15.24'
 R = 5729.58'
 LC = 834.15'
 S.E. = N.C.

13
 JOSEPH N. BASSETT



DELETE THIS WEST BOUND
 U-TURN LANE

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.:
R-13

SHEET NO.: 3 of 4

From STA. 176+00 to STA. 178+55, the U-turn lane is
12' wide or $255 \times 12 = 3,060$ sf

From STA. 178+55 to STA. 180+35, the U-turn lane goes
from 12' to zero. This area is $\frac{1}{2} \times 12 \times 180 = 1,080$ sf

By eliminating U-turn, the total paved area that we
will save is $3,060 + 1,080 = 4,140$ sf. or 460 sq. yards.

12.5 mm A.C. pavement weighs 165 lbs/sy

∴ Quantity of 12.5 mm A.C. pavement saved =
 $165 \times 460 = 75,900$ lbs or 38 tons

19 mm A.C. pavement weighs 220 lbs/sy

∴ Quantity saved = $220 \times 460 = 101,200$ lbs or 51 tons

25 mm A.C. pavement weighs 660 lbs/sy

∴ Quantity saved = $660 \times 460 = 303,600 = 158$ tons

Graded Aggregate Base is 12" thick & weighs 110 lbs/cy.

∴ Quantity saved = $(4,140 \text{ sf} \div 27) \times 110 = 16,867$ lbs or
8.43 tons

★ Calculations show that each square yard of new
pavement costs $20,680 \div 460 = \$45$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247** ALTERNATIVE NO.: **R-14**
Georgia Department of Transportation

DESCRIPTION: **DELETE THE WESTBOUND LEFT-TURN LANE FOR A U-TURN AT THE INDUSTRIAL HIGHWAY CONNECTOR INTERSECTION** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A westbound turn lane in the median is provided for U-turn movements at the Tee intersection of the Industrial Highway Connector Road and Sardis Church Road Extension.

ALTERNATIVE: (Sketch attached)

Delete the left-turn lane and the widening of the bike lane on the eastbound side to accommodate U-turns at this intersection.

ADVANTAGES:

- Reduces costs
- Increases median green space
- Reduces potential for accidents due to crossing traffic
- Simplifies construction at bike lanes

DISADVANTAGES:

- None apparent

DISCUSSION:

This U-turn only allows access to a wetland area on the southwest side of the road adjacent to the eastbound lanes that will never be developed. Over the life of the road there may be times that an emergency vehicle will have to use the opening for a U-turn, but this can still be accomplished with a small amount of risk because of the warning devices on these vehicles. Thus, eliminating the westbound U-turn at this location will save project costs and increase the amount of median green space.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 962,181 | — | \$ 962,181 |
| ALTERNATIVE | \$ 645,193 | — | \$ 645,193 |
| SAVINGS | \$ 316,193 | — | \$ 316,193 |

DGN

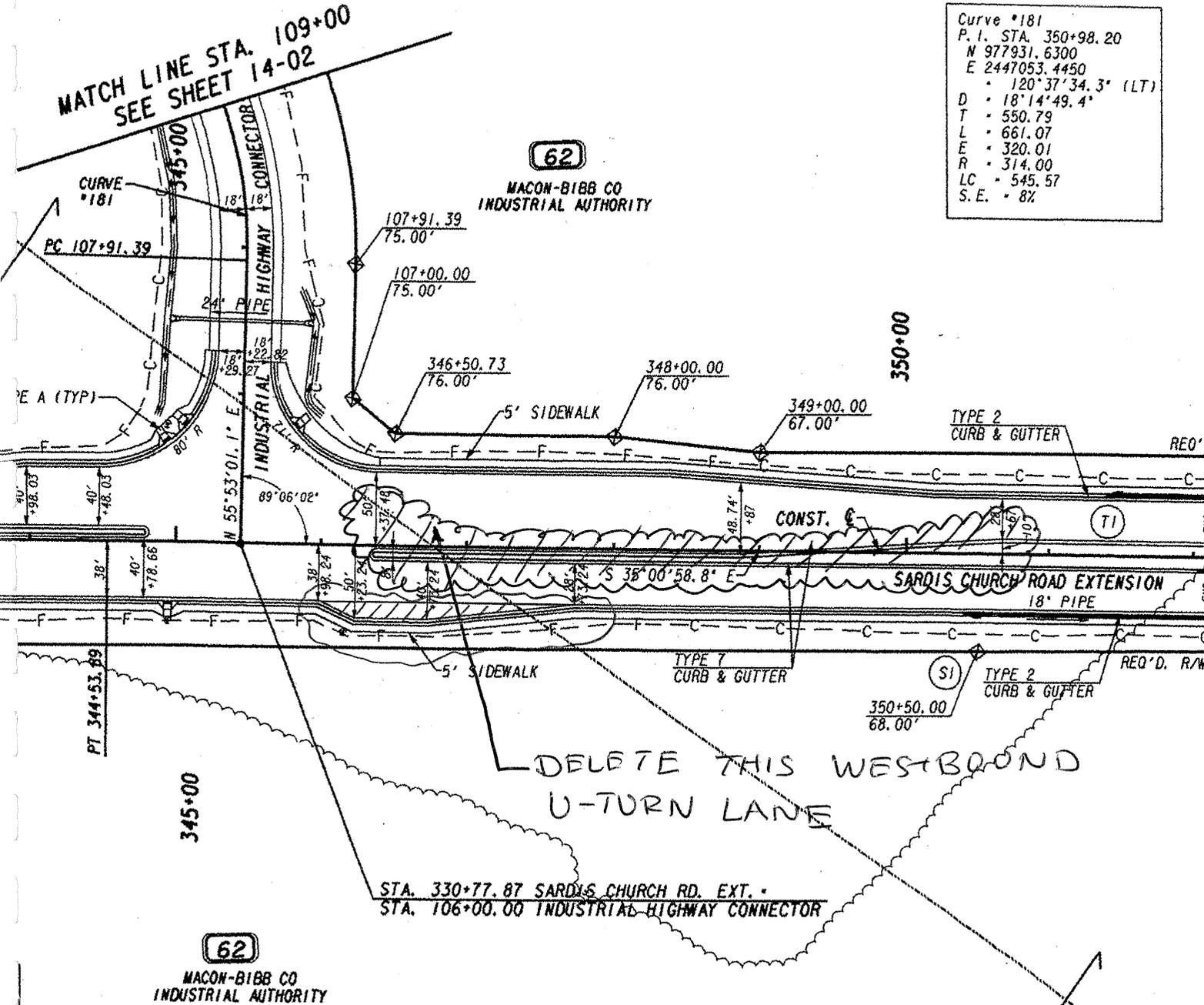


MATCH LINE STA. 109+00
SEE SHEET 14-02

| |
|----------------------|
| Curve #181 |
| P. I. STA. 350+98.20 |
| N 977931.6300 |
| E 2447053.4450 |
| • 120°37'34.3" (LT) |
| D • 18'14'49.4" |
| T • 550.79 |
| L • 661.07 |
| E • 320.01 |
| R • 314.00 |
| LC • 545.57 |
| S. E. • 8% |

62

MACON-BIBB CO
INDUSTRIAL AUTHORITY



62

MACON-BIBB CO
INDUSTRIAL AUTHORITY

ALL DRIVEWAY PIPES 18"
UNLESS OTHERWISE SPECIFIED

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: R-14

SHEET NO.: 3 of 4

From STA. 346+32 to STA. 348+87, the U-turn lane is 12' wide or $(34887 - 34632) \times 12' = 3,060$ sf.

From STA. 348+87, the U-turn lane tapers down to zero at STA. 350+67. This area is $\frac{1}{2} \times 12 \times 180 = 1,080$ sf.

Thus, by eliminating U-turn the total paved area saved will be : $3,060 + 1,080 = 4,140$ sf or 460 sq. yards.

The remaining calculations are exactly the same as that of R-13 alternative.

∴ The total amount saved = \$20,680

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation **ALTERNATIVE NO.:** **R-16**

DESCRIPTION: **ADD 6 FT. OF PAVEMENT TO THE BIKE LANES WHERE SEVERAL RESIDENTIAL DRIVEWAYS CONNECT TO THE MAIN ROAD TO PROVIDE A DEFACTO ACCELERATION AND DECELERATION LANE** **SHEET NO.:** **1 of 2**

ORIGINAL DESIGN: (Sketch attached)

From Station 161+43.57 at the beginning of the project to Goodall Mill Road on the westbound side, from approximate Station 177+00 to Goodall Mill Road on the eastbound side, and from the Avondale Road intersection to the new service road at approximate Station 483+00 on the eastbound side, several residential driveways connect to the mainline of Sardis Church Road and Sardis Church Road Extension. No provisions are made for vehicles entering and leaving the driveways.

ALTERNATIVE: (Sketch attached)

Add 6 ft. of pavement to the outside of the 4-ft. wide bike lane in these areas to create a 10-ft. wide shoulder that can serve as a de-facto acceleration/deceleration lane for vehicles desiring to enter or leave the driveways. Do not widen the pavement to create additional acceleration or deceleration lane area where there are cross street intersections or U-turn spaces in this stretch of widened pavement. Provide appropriate pavement striping to limit use of this extra pavement.

ADVANTAGES:

- Increases safety for those accessing the residences

DISADVANTAGES:

- Adds minor cost to the project

DISCUSSION:

The new roadway will have a 45 mile per hour speed limit. Having vehicles slow down in the main travel lane to turn into a driveway is dangerous as is pulling out from a driveway into traffic. By adding the extra pavement width in these isolated areas, acceleration and deceleration for vehicles using the driveway can occur off the main travel lane.

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

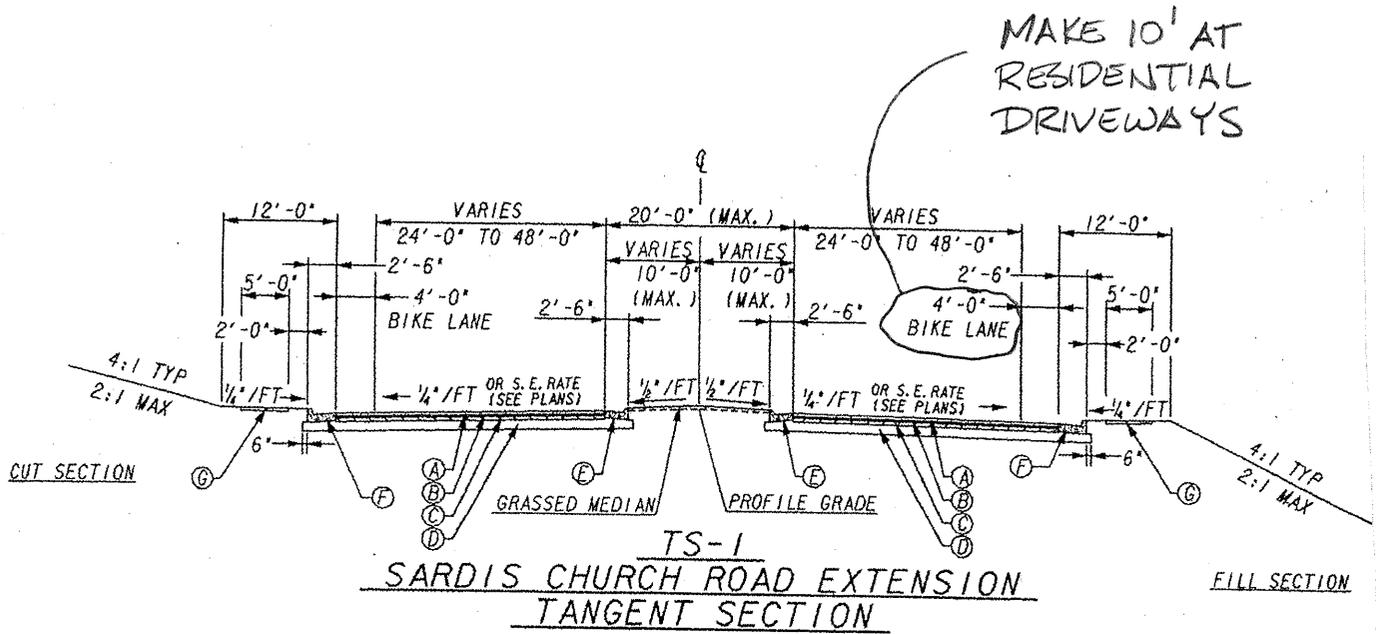


PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **R-6**

AS DESIGNED ALTERNATIVE

SHEET NO.: **2 of 2**



NOT TO SCALE
 STA. 161+43.57 TO STA. 324+36.44
 STA. 326+60.94 TO STA. 329+18.63
 STA. 332+17.13 TO STA. 471+00.00

VALUE ENGINEERING ALTERNATIVE



PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: CG-1

DESCRIPTION: USE A 1-FT. WIDE GUTTER PAN IN LIEU OF A 2-FT. WIDE GUTTER PAN ON THE MEDIAN SIDE OF THE ROAD

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

A 2-ft. wide gutter pan is used for the curb and gutter section on the median side of the road.

ALTERNATIVE: (Sketch attached)

Use a 1-ft. wide gutter pan.

ADVANTAGES:

- Reduces costs
- Increases green space in the median

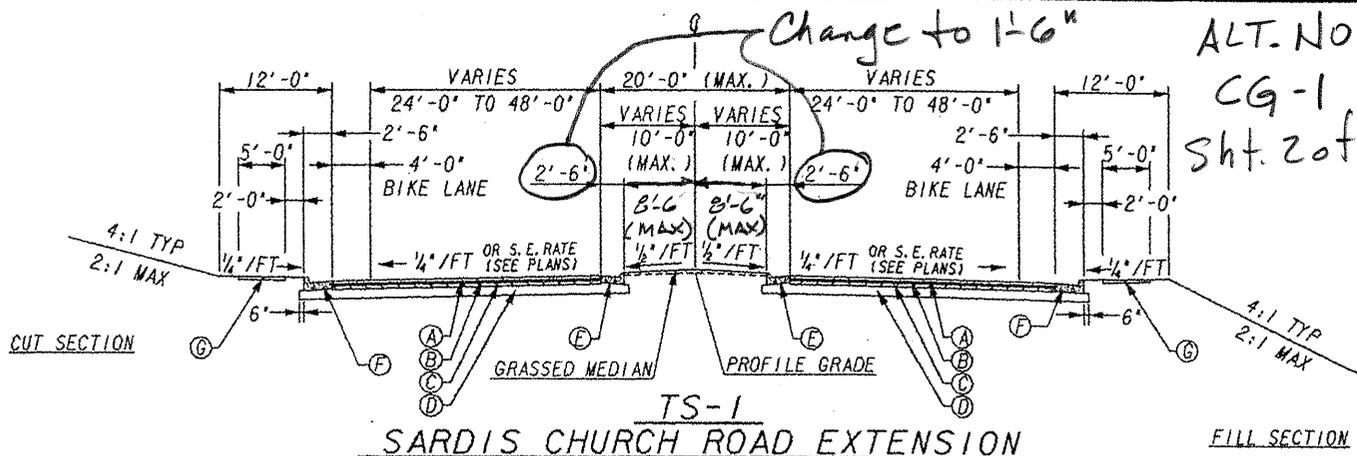
DISADVANTAGES:

- Provides a narrow gutter pan with storm water extending a little further into the travel lane under heavy rain conditions

DISCUSSION:

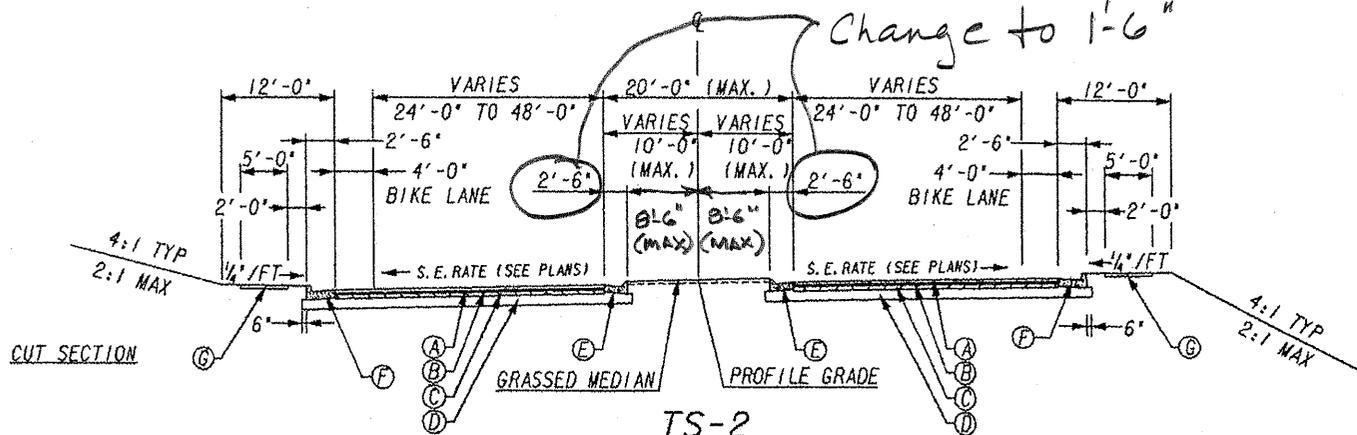
A large portion of the road will have a typical section where the pavement on both sides of the median is sloped to the outside resulting in the gutter pan only providing a shy distance to a mountable curb. Only in the superelevated roadway sections will one side of the road have storm water flowing toward the median. Thus the area where water can potentially build up is limited and an extra catch basin could solve the problem if necessary. Many other jurisdictions use a 1-ft. wide gutter pan as a standard which performs adequately and is more cost-effective.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 893,113 | — | \$ 893,113 |
| ALTERNATIVE | \$ 686,962 | — | \$ 686,962 |
| SAVINGS | \$ 206,151 | — | \$ 206,151 |



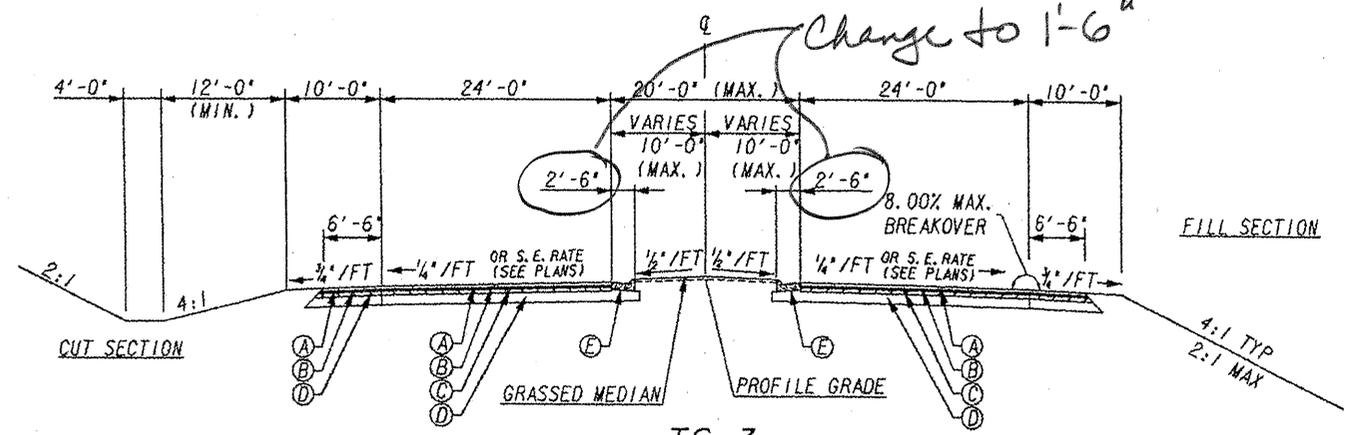
TS-1
SARDIS CHURCH ROAD EXTENSION
TANGENT SECTION

NOT TO SCALE
 STA. 161+43.57 TO STA. 324+36.44
 STA. 326+60.94 TO STA. 329+18.63
 STA. 332+17.13 TO STA. 471+00.00



TS-2
SARDIS CHURCH ROAD EXTENSION
SUPERELEVATED SECTION

NOT TO SCALE
 SEE PLANS FOR STATION RANGES



TS-3
SARDIS CHURCH ROAD EXTENSION

NOT TO SCALE
 STA. 471+00.00 TO STA. 492+41.52
 STA. 497+24.52 TO STA. 503+98.22

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

CALCULATIONS



PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.:
CG-1

SHEET NO.: 3 of 4

The median curb begins at STA. 161+43.57 and ends at STA 503+98.22 for a total length of 34,254.65'

Subtract the length of following openings in the median
Murray Drive : 168+07 - 168+92 = 115'

Goodall Mill Rd : 140'

At STA. 223+00 : 92'

At Houston Rd : 128'

At S. Walden Rd : 120'

At STA. 288+00 : 92'

At STA. 313+00 : 92'

At Industrial Hwy Connector: 159'

At STA. 358+00 : 92'

At STA. 378+00 : 92'

At Avondale Mill Rd : 150'

At STA. 447+00 : 92'

At STA. 471+00 : 125'

Total Subtractions 1,489

Total Curb length at median
 $34,254 - 1,489 = 32,765'$

There are 13 openings which means 26 nose at those openings. Each one has 4' radius.

$$\therefore 32,765 + 26 \times 4 = 32,869$$

Since the median has curb on both sides, the total length is

$$32,869 \times 2 = 65,738'$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **CG-2**

DESCRIPTION: **USE A 1-FT. WIDE GUTTER PAN IN LIEU OF A 2-FT. WIDE GUTTER PAN ON THE OUTSIDE OF THE ROADWAY** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

A 2-ft. wide gutter pan is used on the outside edge of the roadway.

ALTERNATIVE: (Sketch attached)

Use a 1-ft. wide gutter pan.

ADVANTAGES:

- Reduces costs
- Reduces earthwork requirements

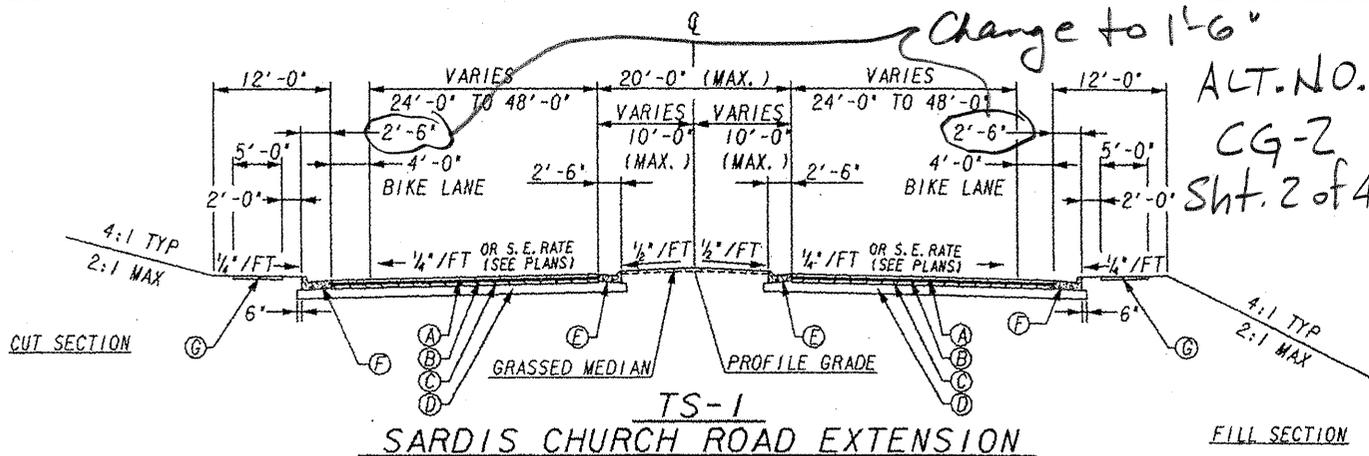
DISADVANTAGES:

- Provides a narrow gutter pan with storm water extending a little further into the travel lane under heavy rain conditions

DISCUSSION:

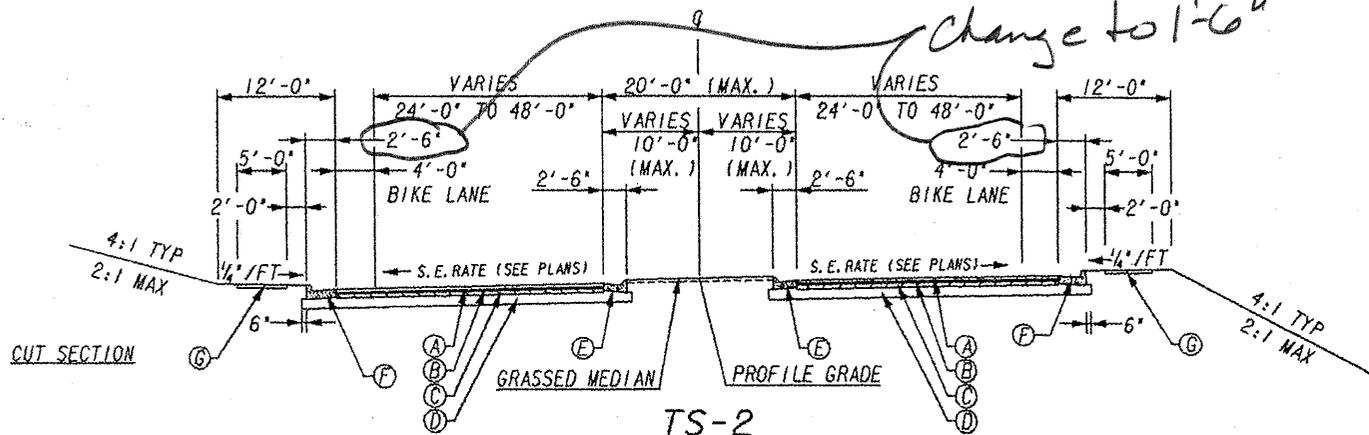
The entire route will have a 4-ft. wide bike lane adjacent to the curb so the potential for storm water building up to affect the vehicle travel lane is minimal. Even if the bike lanes are eliminated by implementing some of the other VE alternatives, reducing the gutter pan to 1 ft. will have a minimal effect on performance. If necessary, additional catch basins could be added to restrict the build-up of storm water on the pavement. Many other jurisdictions use a 1-ft. gutter pan as a standard and achieve satisfactory performance and save substantial costs.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 962,181 | — | \$ 962,181 |
| ALTERNATIVE | \$ 645,988 | — | \$ 645,988 |
| SAVINGS | \$ 316,193 | — | \$ 316,193 |



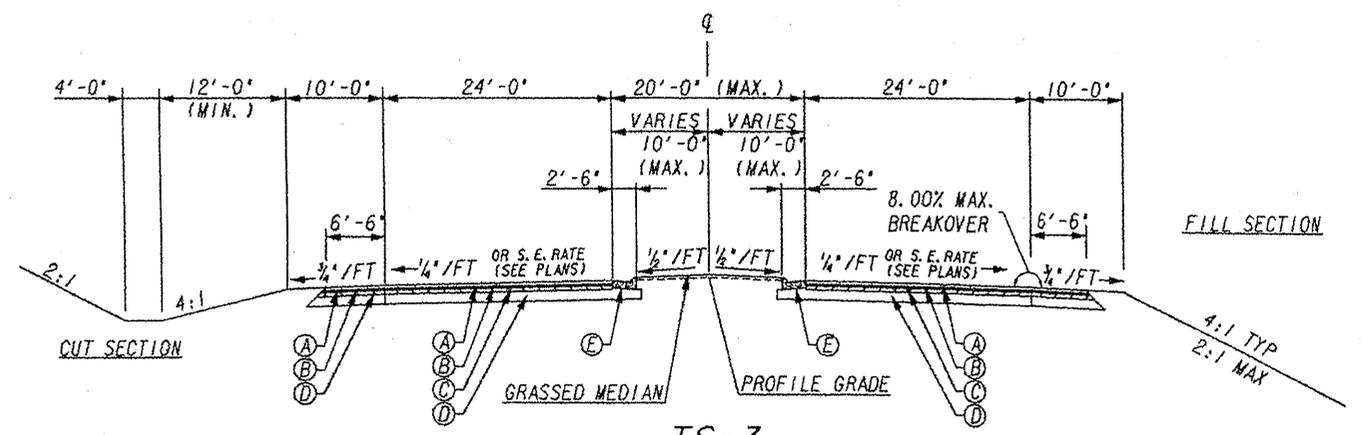
TS-1
SARDIS CHURCH ROAD EXTENSION
TANGENT SECTION
 NOT TO SCALE

STA. 161+43.57 TO STA. 324+36.44
 STA. 326+60.94 TO STA. 329+18.63
 STA. 332+17.13 TO STA. 471+00.00



TS-2
SARDIS CHURCH ROAD EXTENSION
SUPERELEVATED SECTION
 NOT TO SCALE

SEE PLANS FOR STATION RANGES



TS-3
SARDIS CHURCH ROAD EXTENSION
 NOT TO SCALE

STA. 471+00.00 TO STA. 492+41.52
 STA. 497+24.52 TO STA. 503+98.22

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

SKETCHES



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.:

CG-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 3 of 4

Type 2 30" curb & gutter begins at STA. 161+43.57 and ends at STA. 470+52.00. Thus, the total length on one side is $(470.52 - 161.43.57) = 30,908.43'$

The total length on both sides is therefore, 61,817'

The gap in the length of curb at the intersection openings intersections is assumed to be equal to the length of curb returns at those intersections.

VALUE ENGINEERING ALTERNATIVE



PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: SB-1

DESCRIPTION: SUBSTITUTE AN ASPHALT CONCRETE MULTI-USE
PATH ON ONE SIDE OF THE ROAD FOR THE
SIDEWALKS ON EACH SIDE OF THE ROAD

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

A 5-ft. wide concrete sidewalk is to be constructed on each side of the road.

ALTERNATIVE: (Sketch attached)

Delete the concrete sidewalks and provide one 10-ft. wide asphalt concrete, multi-use path.

ADVANTAGES:

- Reduces costs
- Easier to construct
- Allows for two-directional pedestrian/
bicycle traffic

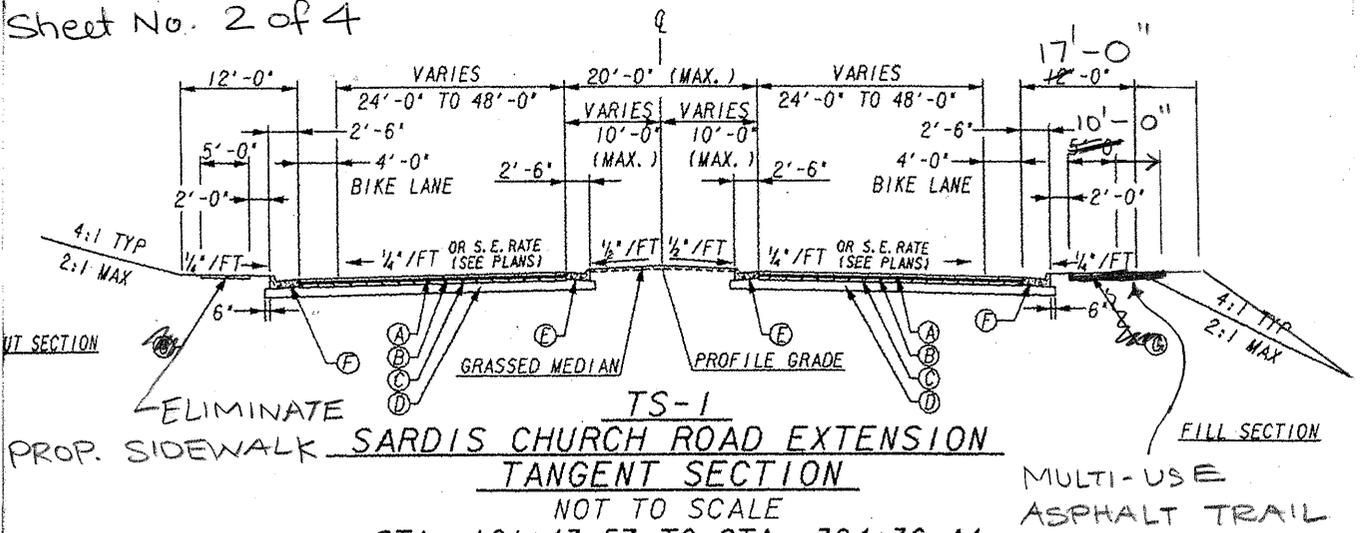
DISADVANTAGES:

- Only one side of the road has a walking surface

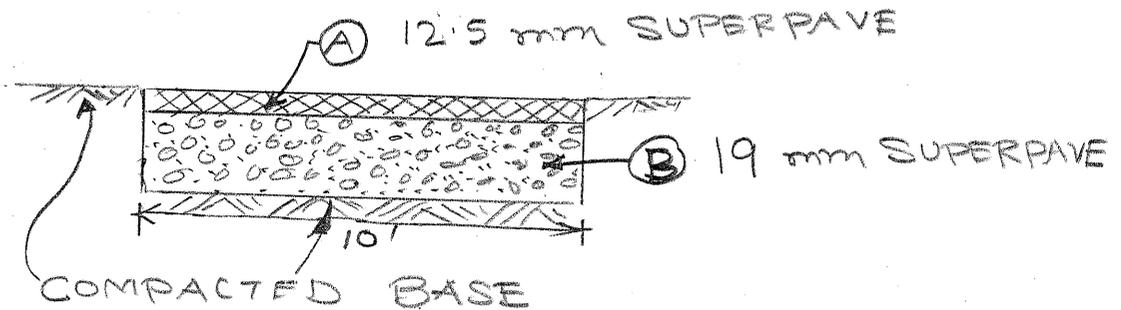
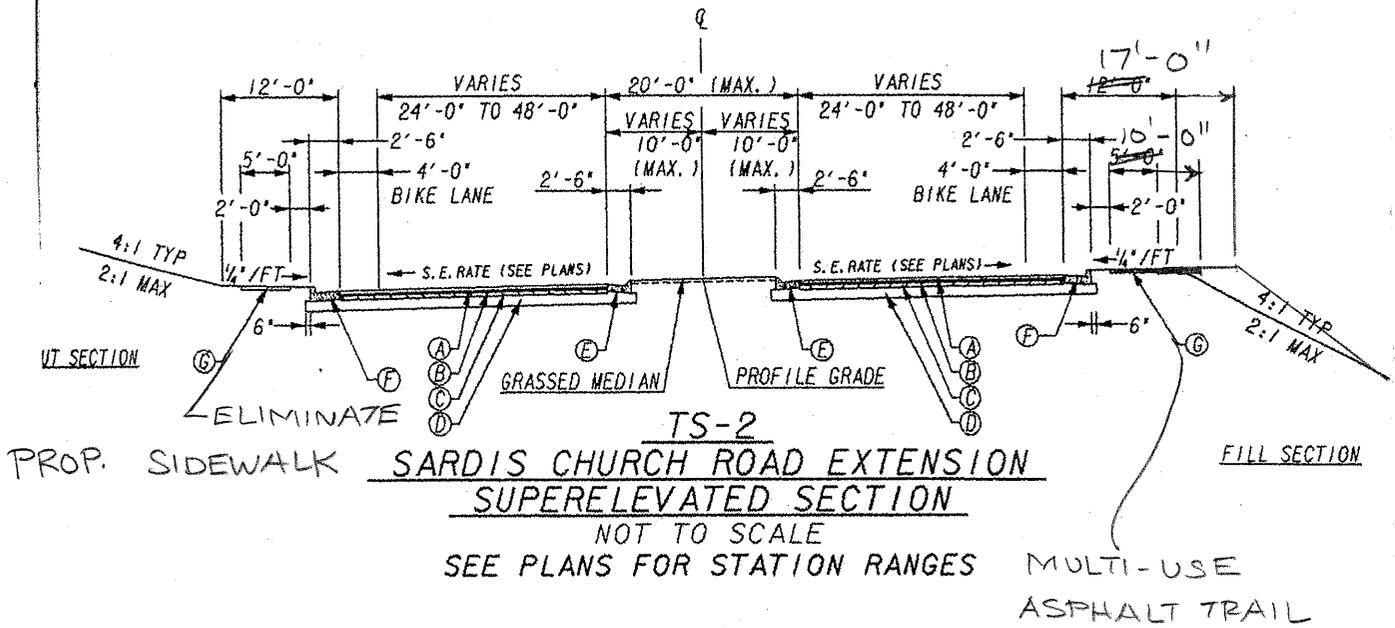
DISCUSSION:

This road passes mostly through undeveloped land, industrial land or land that will be developed for industrial use. Providing a concrete sidewalk that will be rarely used is not cost-effective. Providing a multi-use path allows for pedestrian use at a much lower cost.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|----------------------------------|----------------------------------|
| ORIGINAL DESIGN | \$ 1,014,664 | — | \$ 1,014,664 |
| ALTERNATIVE | \$ 541,794 | — | \$ 541,794 |
| SAVINGS | \$ 472,870 | — | \$ 472,870 |



STA. 161+43.57 TO STA. 324+36.44
STA. 326+60.94 TO STA. 329+18.63
STA. 332+17.13 TO STA. 471+00.00



10' ASPHALT MULTI-USE TRAIL

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.:

SB-1

Substitute Asphalt Multi-Use Trail
in lieu of two sidewalks

SHEET NO.: 3 of 4

The sidewalk begins on both sides of the road at STA. 161+43.57 and ends at STA. 470+53.71 for a total length of 30,910' on one side & 61,820' on both sides.

There are various gaps in the sidewalk on both sides of the road owing to various intersections.

The total length of gaps is 1,120 feet with 210' on the south side & 910' on the north side of the road.

The total length of multi-use trail to replace the sidewalk on the south side = $30,910 - 210 = 30,700'$

Total area of multiuse trail = $\frac{30,700 \times 10}{9} = 34,111$ SY

12.5 mm A.C. Pavement: 165 lbs/SY

$$= \frac{165 \times 34,111}{2,000} = 2,815 \text{ tons}$$

19 mm A.C. Pavement: 220 lbs/SY

$$= \frac{220 \times 34,111}{2,000} = 3,752 \text{ tons}$$

From SB-2, constructing one side of sidewalks costs \$461,120 [grassing is not needed].

Constructing sidewalks on both sides costs 922,240 without 10% mark up.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **SB-2**

DESCRIPTION: **BUILD A CONCRETE SIDEWALK ON ONLY ONE SIDE OF THE ROAD** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The typical roadway cross section has a 5-ft. wide sidewalk on both sides of the road.

ALTERNATIVE: (Sketch attached)

Delete the sidewalk on one side of the road, but maintain the grading to allow future installation. Also retain the sidewalk on the bridges.

ADVANTAGES:

- Reduces cost
- Saves construction time

DISADVANTAGES:

- Pedestrians can only walk on a paved surface on one side of the road

DISCUSSION:

This road passes mostly through undeveloped land, industrial land or land that will be developed for industrial use. Providing concrete sidewalks on both sides of the road that will be rarely used is not cost-effective. Providing a sidewalk on one side allows for pedestrian use at a much lower cost. If residential development occurs, the second sidewalk can be easily added.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,014,464 | — | \$ 1,014,464 |
| ALTERNATIVE | \$ 512,259 | — | \$ 512,259 |
| SAVINGS | \$ 502,205 | — | \$ 502,205 |

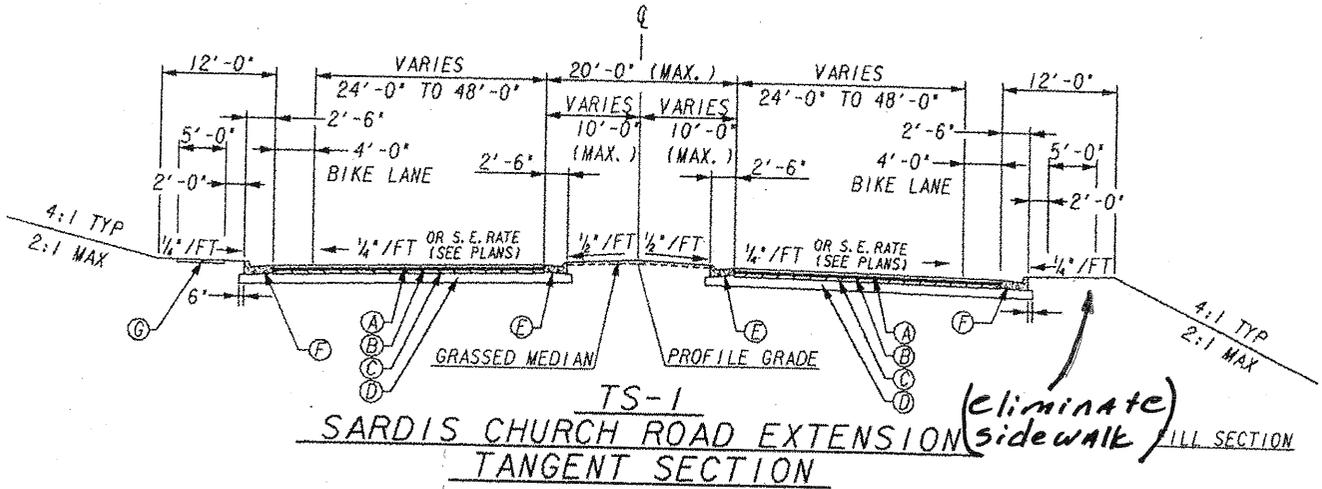


PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
 Georgia Department of Transportation

ALTERNATIVE NO.: **SB-2**

AS DESIGNED ALTERNATIVE

SHEET NO.: **2 of 4**



CALCULATIONS



PROJECT:

SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: SB-2

SHEET NO.: 3 of 4

Cost of Side walk on one side as designed
(original).

$$\frac{32,000 \text{ sy (sidewalk on both sides)}}{2 \text{ (for one side)}} = 16,000 \text{ sy (one side)}$$

4 AC of additional GRASSING required

$$\frac{6.51 \text{ miles} \times 5,280' \times 5'}{43,560} \approx 4 \text{ AC}$$

$$\frac{\$240,000}{210 \text{ AC}} = \$1,143/\text{AC}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **SB-3**

DESCRIPTION: **DELETE THE SIDEWALKS FROM SOUTH WALDEN ROAD TO AVONDALE MILL ROAD EXCEPT BETWEEN THE TWO BRIDGES** SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The typical section for the roadway includes 5-ft.-wide concrete sidewalks beyond the curb on each side of the road and 4-ft.-wide bike lanes adjacent to the right lanes of the 4-lane divided highway.

ALTERNATIVE: (Sketch attached)

Delete the sidewalks on both sides of Sardis Church Road Extension from South Walden Road (Station 264+50) to Avondale Mill Road (Station 399+00) except for the area between the bridges over the Norfolk Southern Railroad and Industrial Highway. Grade the area to accommodate installation in the future.

ADVANTAGES:

- Reduces costs
- Easier and faster to construct

DISADVANTAGES:

- Inconvenient for someone desiring to walk in this area

DISCUSSION:

This road passes mostly through undeveloped land, industrial land or land that will be developed for industrial use. Providing a concrete sidewalk that will be rarely, if ever, used is not cost-effective. By grading the area now for the sidewalks, they can be added when and if development occurs in this stretch of roadway.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,014,464 | — | \$ 1,014,464 |
| ALTERNATIVE | \$ 566,610 | — | \$ 566,610 |
| SAVINGS | \$ 477,854 | — | \$ 477,854 |

CALCULATIONS



PROJECT:

**SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.:

SB-3

SHEET NO.:

2 of 3

Cost estimates show 32,000 SY of sidewalk. The width of the sidewalk is 5 feet.

Therefore total length of sidewalk for the entire project is $(32,000 \times 9) / 5 = 57,600$ feet.

The distance between South Walden Road (STA. 264+50) and Avondale Mill Road (STA. 399+00) is 13,450 feet.

Since we are going to keep sidewalks from the beginning of Railroad bridge to the end of Industrial Highway bridge, subtract 721' $[331+87.13 - 324+66.44]$ from 13,450'. This gives us a length of 12,729. For both sides of road, multiplying it by 2 gives us a length of 25,428'.

Thus, the actual length of sidewalk to be constructed per this alternative is: $57,600 - 25,428 = 32,172$

$$\text{OR } \frac{32,172 \times 5}{9} = 17,873 \text{ SY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **SB-4**

DESCRIPTION: **USE A MULTI-USE TRAIL ON ONE SIDE AND A CONCRETE SIDEWALK ON THE OTHER SIDE OF THE ROAD AND DELETE THE BIKE LANES** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The typical section for the roadway includes 5-ft.-wide concrete sidewalks beyond the curb on each side of the road and 4-ft.-wide bike lanes adjacent to the right lanes of the divided 4-lane highway.

ALTERNATIVE: (Sketch attached)

Delete the bike lanes and construct a 5-ft.-wide concrete sidewalk on one side of the road and a 10-ft. wide asphalt concrete multi-use trail on the other side.

ADVANTAGES:

- Reduces costs
- Easier and faster to construct
- Reduces earthwork requirements
- Could reduce right-of-way requirements in high fill or low cut areas because the area of disturbance is reduced

DISADVANTAGES:

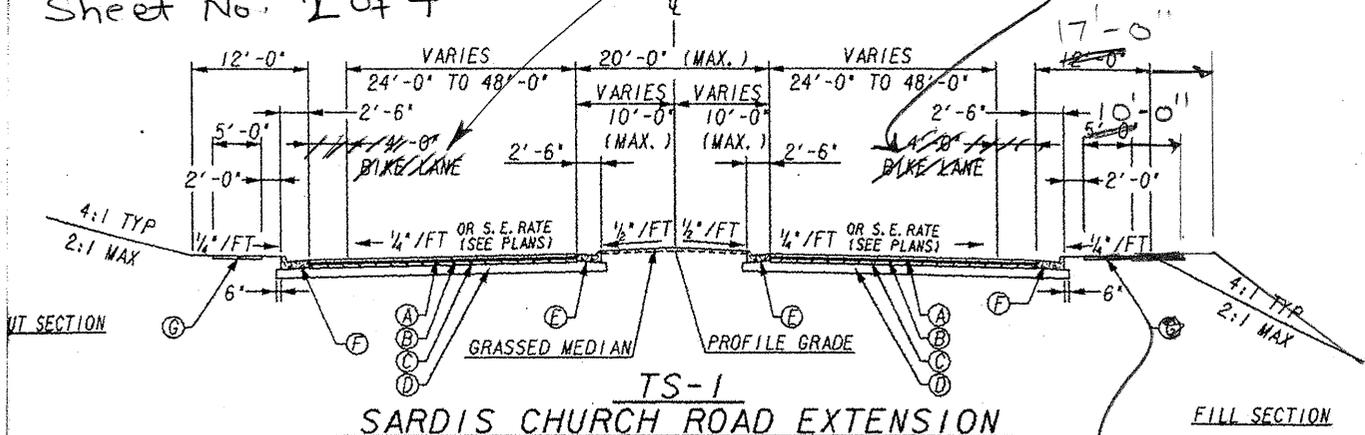
- Bicyclists will have to use the multi-use pavement for travel in both directions

DISCUSSION:

This road passes mostly through undeveloped land, industrial land or land that will be developed for industrial use. Providing a concrete sidewalk on both sides that will be rarely used is not cost-effective. Providing a separate full-depth asphalt pavement bike lane in each direction that has to terminate before reaching US 129/SR 247 because there is no bike route planned for this road, does not appear logical. Thus, providing a multi-use path for bikers and pedestrians and a dedicated sidewalk for pedestrian use provides facilities to these users at a much lower cost.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|---------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 33,871,659 | — | \$ 33,871,659 |
| ALTERNATIVE | \$ 29,506,221 | — | \$ 29,506,221 |
| SAVINGS | \$ 4,365,438 | — | \$ 4,365,438 |

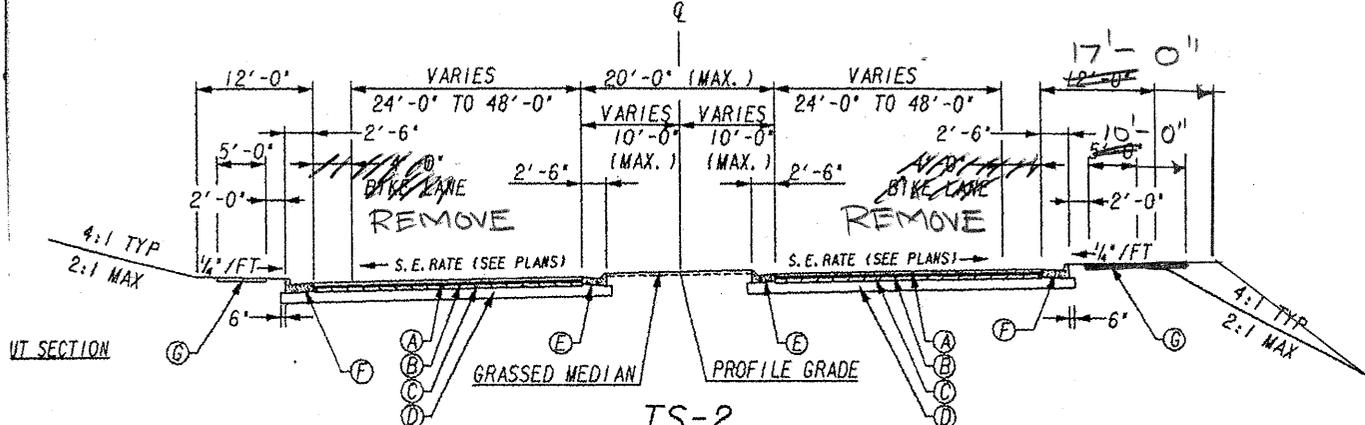
REMOVE BIKE LANES



TS-1
SARDIS CHURCH ROAD EXTENSION
TANGENT SECTION

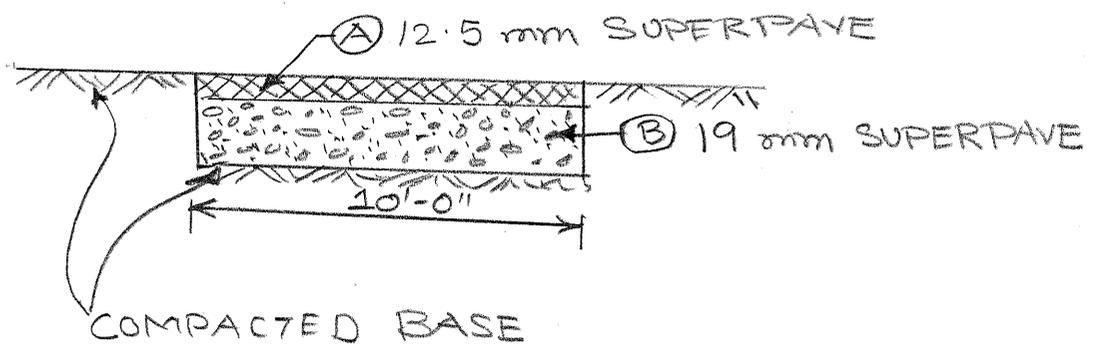
NOT TO SCALE
STA. 161+43.57 TO STA. 324+36.44
STA. 326+60.94 TO STA. 329+18.63
STA. 332+17.13 TO STA. 471+00.00

ASPHALT
MULTI-USE TRAIL



TS-2
SARDIS CHURCH ROAD EXTENSION
SUPERELEVATED SECTION

NOT TO SCALE
SEE PLANS FOR STATION RANGES



10' WIDE MULTI-USE ASPHALT TRAIL

CALCULATIONS



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.:

SB-4

SHEET NO.: 3 of 4

Per R-3, the cost of pavement, grading, drainage bridges etc. is \$29,870,177

Per R-4, the savings in deleting both bike lanes is 4 million dollars

Cost of constructing both sidewalks is given as \$922,240
∴ Cost of constructing only one sidewalk is \$461,120

Per SB-1, the cost of constructing a multi-use trail on south side is \$492,540



SUMMARY OF POTENTIAL COST SAVINGS

PROJECT **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**

Georgia Department of Transportation

PRESENT WORTH OF COST SAVINGS

| ALT. NO. | DESCRIPTION | ORIGINAL COST | ALTERNATIVE COST | INITIAL COST SAVINGS | RECURRING COST SAVINGS | TOTAL PW LCC SAVINGS |
|--------------------|--|---------------|------------------|----------------------|------------------------|----------------------|
| BRIDGES (B) | | | | | | |
| B-1-1 | Reduce the length of the bridge over the Norfolk Southern Railroad by using single girder spans on pile supported end bents behind mechanically stabilized earth walls | \$ 2,065,800 | \$ 1,507,838 | \$ 557,962 | | \$ 557,962 |
| B-1-2 | Reduce the length of the bridge over Industrial Highway by using single girder spans on pile supported end bents behind mechanically stabilized earth walls | \$ 2,972,508 | \$ 2,284,796 | \$ 687,712 | | \$ 687,712 |
| B-1-3 | Reduce the length of the bridge over the Norfolk Southern Railroad and US 129/SR 247 by deleting the end spans and use pile supported end bents behind mechanically stabilized earth walls | \$ 1,382,014 | \$ 690,399 | \$ 691,615 | | \$ 691,615 |
| B-4-A | Substitute a single span concrete girder bridge with extended confined earth ramp section for the curved steel girder bridge for Ramp A over the Norfolk Southern Railroad | \$ 2,214,784 | \$ 2,408,324 | \$ (193,540) | | \$ (193,540) |
| B-4-B | Substitute a single span concrete girder bridge with extended confined earth ramp section for the curved steel girder bridge for Ramp B over the Norfolk Southern Railroad | \$ 2,214,784 | \$ 2,408,324 | \$ (193,540) | | \$ (193,540) |
| B-5 | Substitute a two-span bridge for the three-span Ramp A curved steel girder bridge and convert the end span of the Sardis Church Road Extension bridge to an earth fill section with a mechanically stabilized earth wall at the bridge end bents | \$ 1,523,940 | \$ 770,380 | \$ 753,560 | | \$ 753,560 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **B-1-1**

DESCRIPTION: **REDUCE THE LENGTH OF THE BRIDGE OVER THE NORFOLK SOUTHERN RAILROAD BY USING SINGLE GIRDER SPANS ON PILE SUPPORTED END BENTS BEHIND MECHANICALLY STABILIZED EARTH WALLS** SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

A three-span bridge, 165 ft.-9 in. long, is used for the Sardis Church Road Extension to cross over the Norfolk Southern Railroad. Sloped spillways are used at the end spans.

ALTERNATIVE: (Sketch attached)

Delete the end spans of the bridge and use a single span bridge with the girders supported on pile supported end bents behind mechanically stabilized earth (MSE) walls.

ADVANTAGES:

- Reduces costs
- Less bridge area to maintain
- Simpler construction, no intermediate bents

DISADVANTAGES:

- Must maintain MSE walls
- Adds to borrow material requirement

DISCUSSION:

There are no advantages to providing a spill-through section for a railroad crossing. Reducing the bridge length will save initial costs and long-term maintenance costs and result in simpler construction.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 2,065,800 | — | \$ 2,065,800 |
| ALTERNATIVE | \$ 1,507,838 | — | \$ 1,507,838 |
| SAVINGS | \$ 557,962 | — | \$ 557,962 |

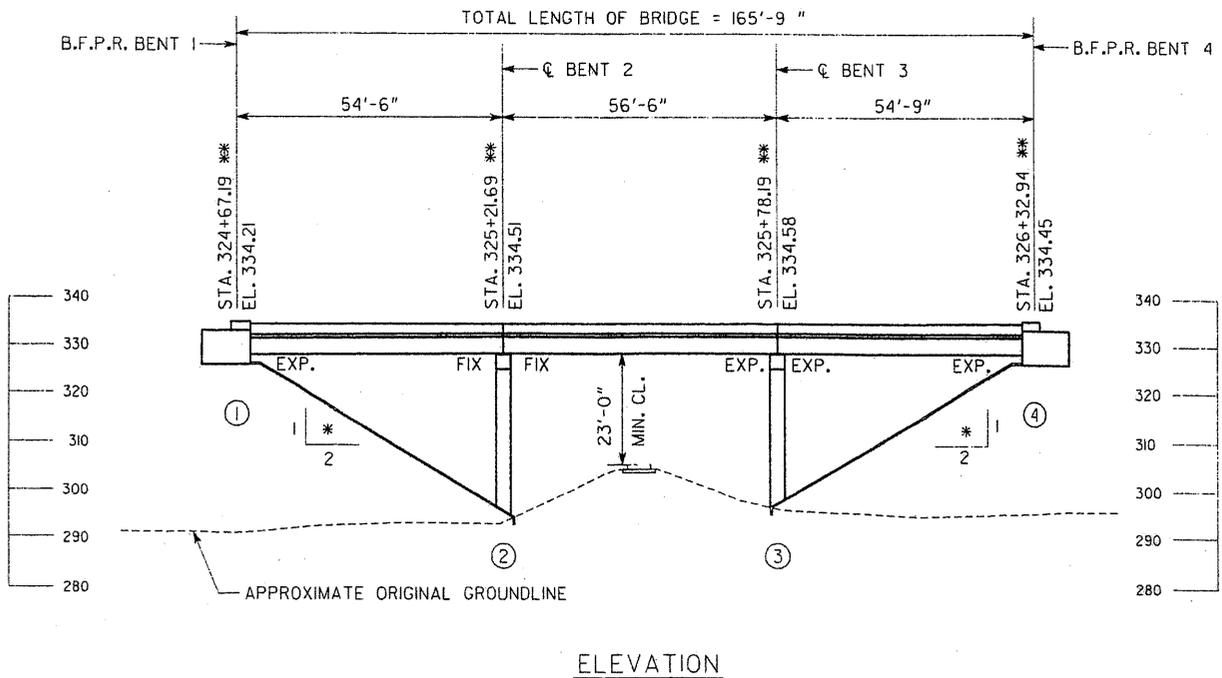
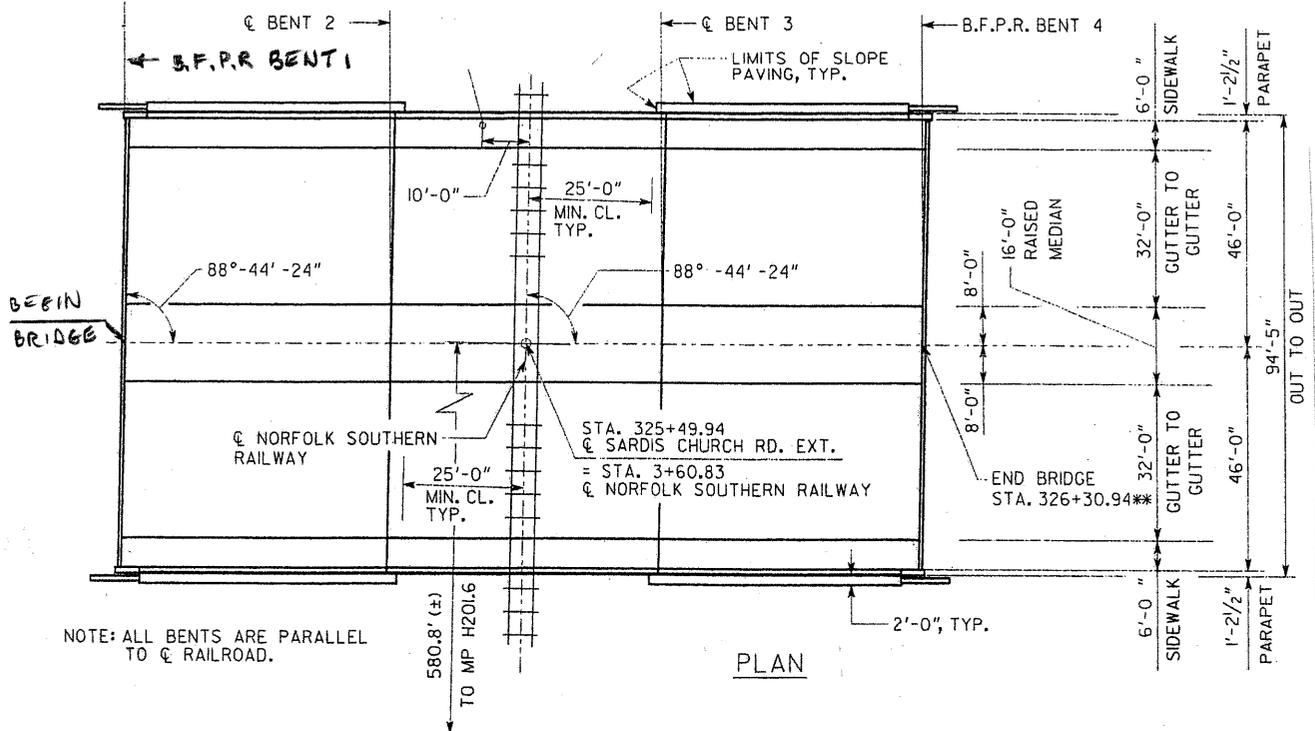


PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **B-1-1**

AS DESIGNED ALTERNATIVE

SHEET NO.: **2 of 5**



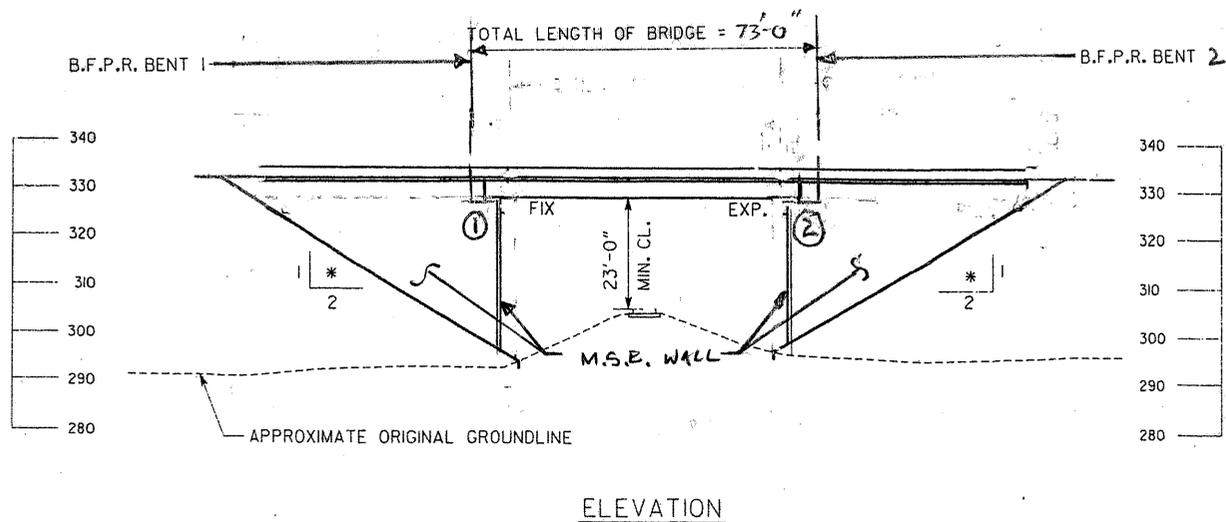
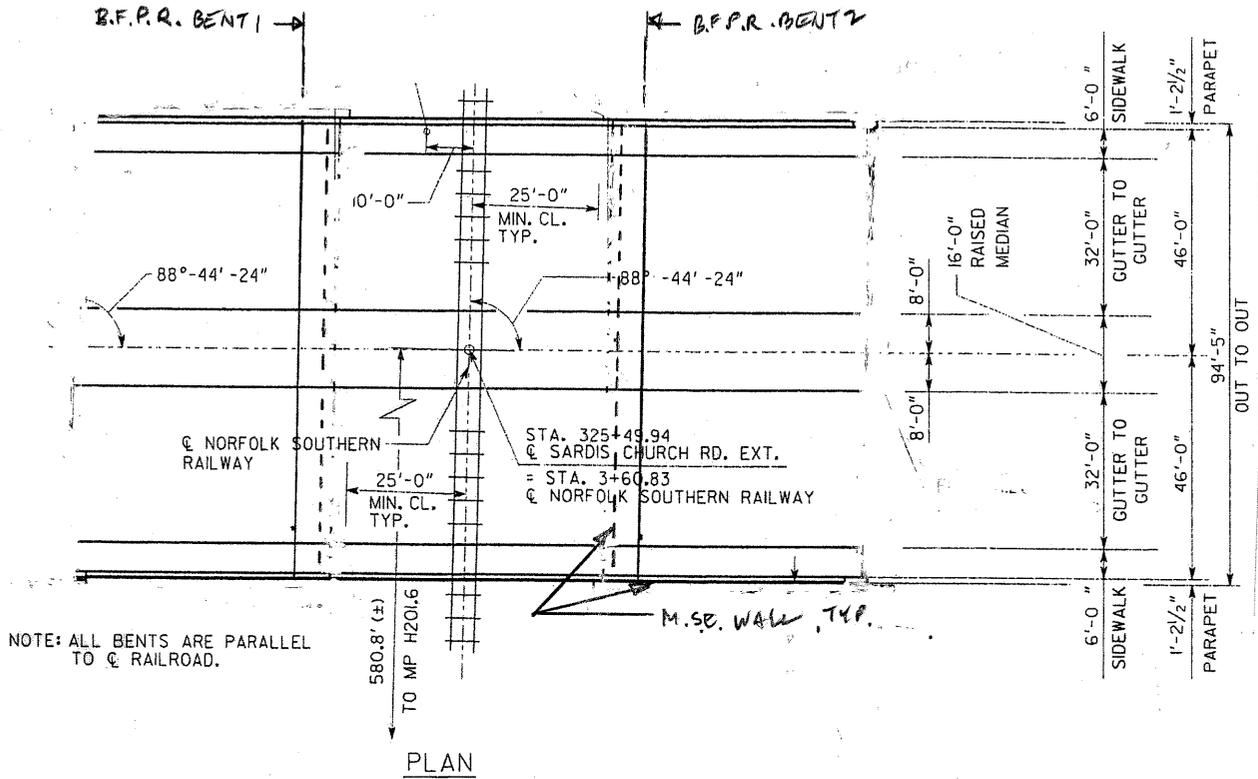


PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **B-1-1**

AS DESIGNED ALTERNATIVE

SHEET NO.: **3** of **5**



CALCULATIONS



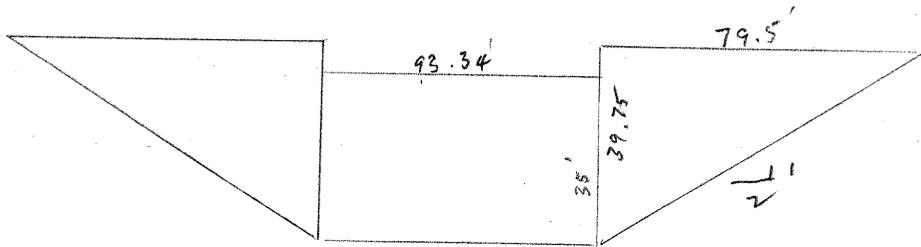
PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: B-1-1

SHEET NO.: 4 of 5

BRIDGE WIDTH = 94.42' OUT-TO-OUT
 LENGTH = 165.75' - 73' = 92.75' (REDUCTION)
 AREA = 94.42' x 92.75' = 8757 SFT.

WALL HEIGHT = 39.75' MAX INCL. 2'-BELOW GROUND



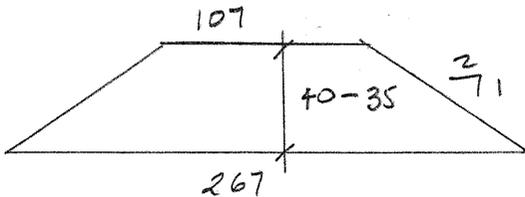
TOTAL AREA = 2 WALLS x (93.34' x 35' + 2 x 39.75' x 0.5 x 79.5') = 6427 SF

ADDITIONAL ROADWAY = 92.75' x 93.34' / 95% = 961.92 SYD.

@ \$65/SY (SEE ALT. R-13)

FILL

LENGTH = 165.75 - 73 = 92.75
 MSE FILL LENGTH 39.75 x .6 = 23.85
 68.90 ft



FILL = $\left(\frac{267 + 107}{2}\right) 69 (40) / 27$
 = 19,115 x .9 = 17,204

↳ APPROXIMATE

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **B-1-2**

DESCRIPTION: **REDUCE THE LENGTH OF THE BRIDGE OVER INDUSTRIAL HIGHWAY BY USING SINGLE GIRDER SPANS ON PILE SUPPORTED END BENTS BEHIND MECHANICALLY STABILIZED EARTH WALLS**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

The bridge for the Sardis Church Road Extension over Industrial Highway is a three-span structure, 238 ft.-6 in. long, with sloped spillways at the end spans.

ALTERNATIVE: (Sketch attached)

Use a single span bridge with the girders supported on pile supported end bents placed behind MSE walls.

ADVANTAGES:

- Reduces costs
- Less bridge area to maintain
- Simpler construction, no intermediate bents

DISADVANTAGES:

- Must maintain MSE walls

DISCUSSION:

Because of the wide bridge opening, there is no reason to use spillways at the end spans. This will save both initial construction costs and long-term bridge maintenance costs.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 2,972,508 | — | \$ 2,972,508 |
| ALTERNATIVE | \$ 2,284,796 | — | \$ 2,284,796 |
| SAVINGS | \$ 687,712 | — | \$ 687,712 |

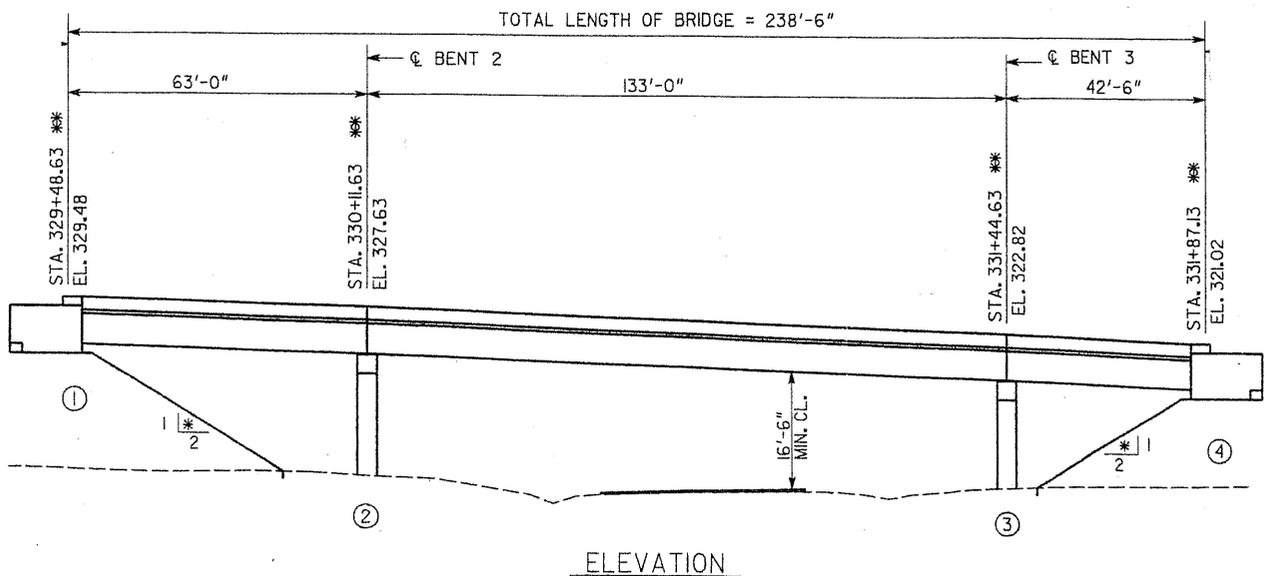
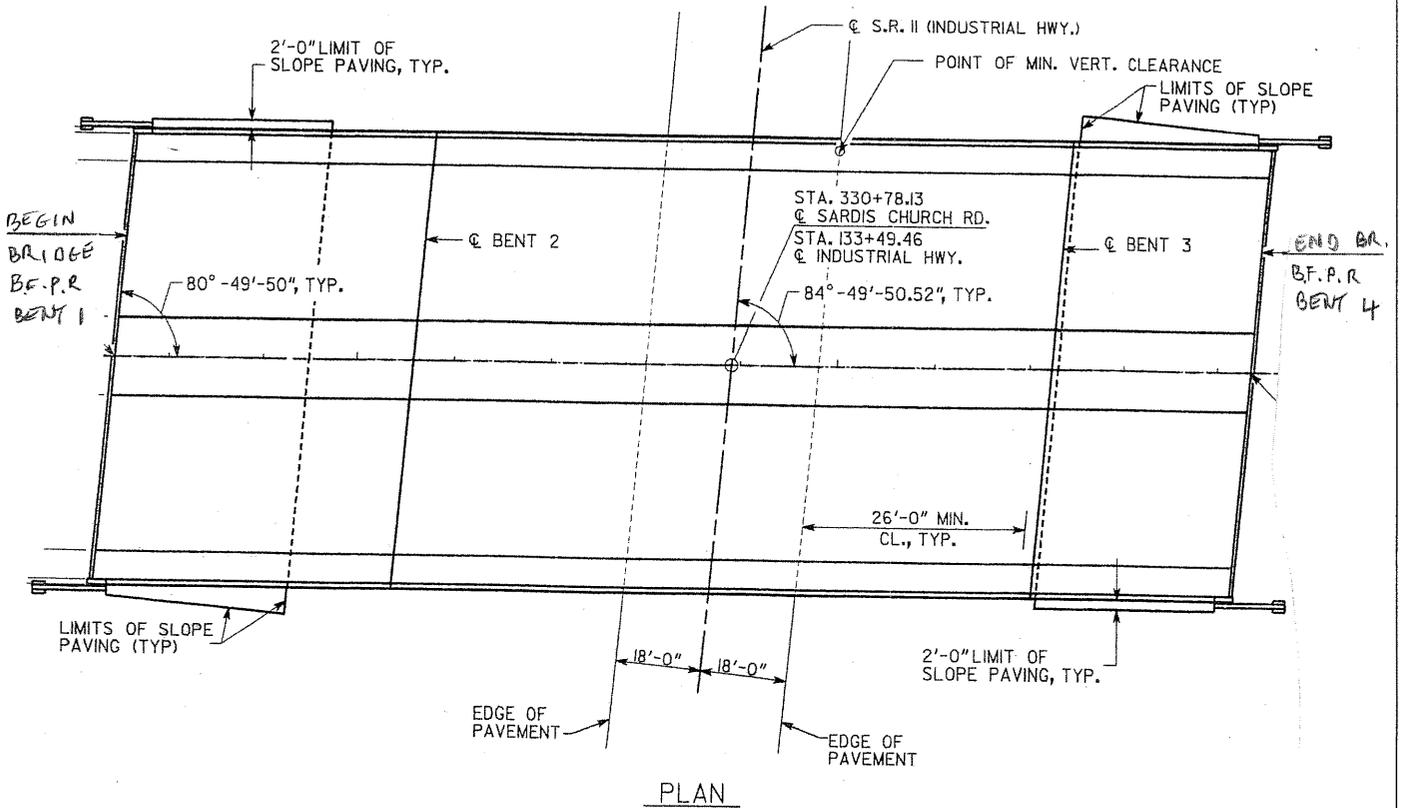


PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **B-1-2**

AS DESIGNED ALTERNATIVE

SHEET NO.: **2 of 6**



SKETCHES

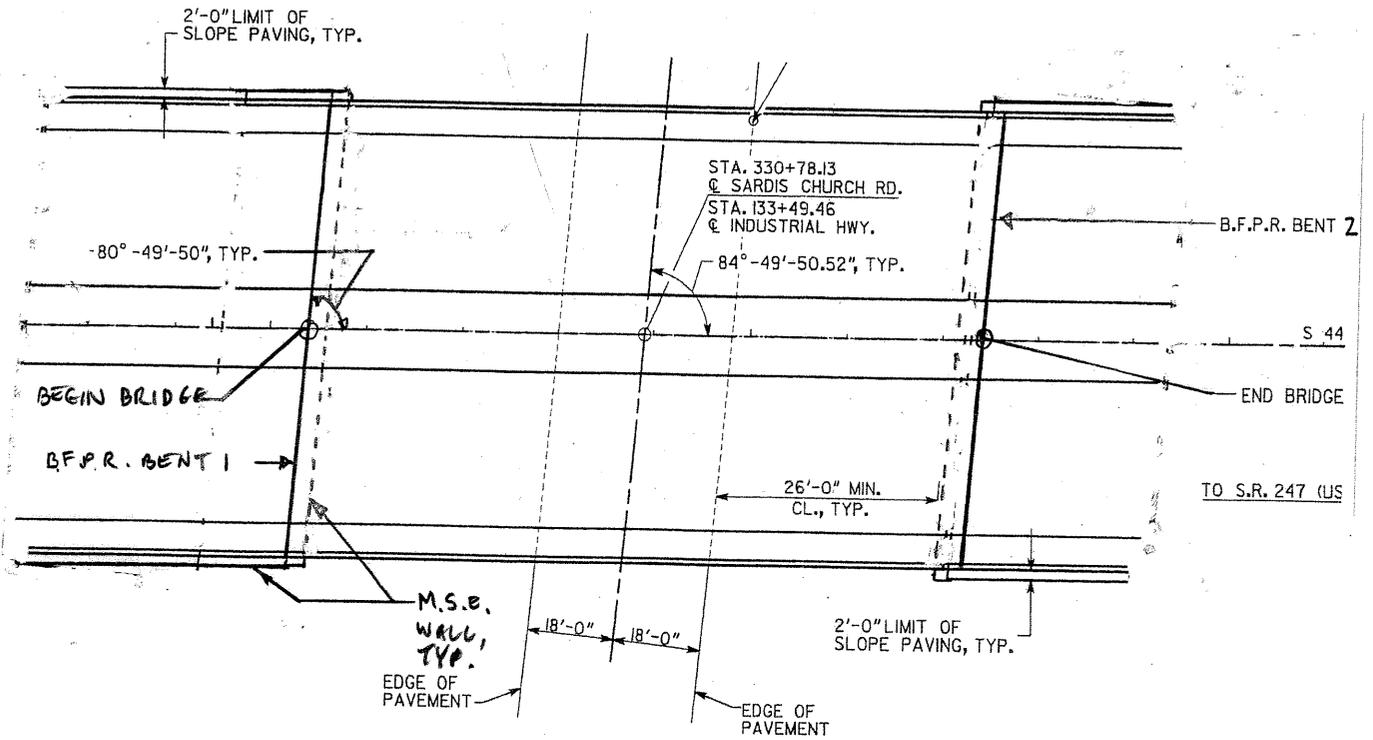


PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

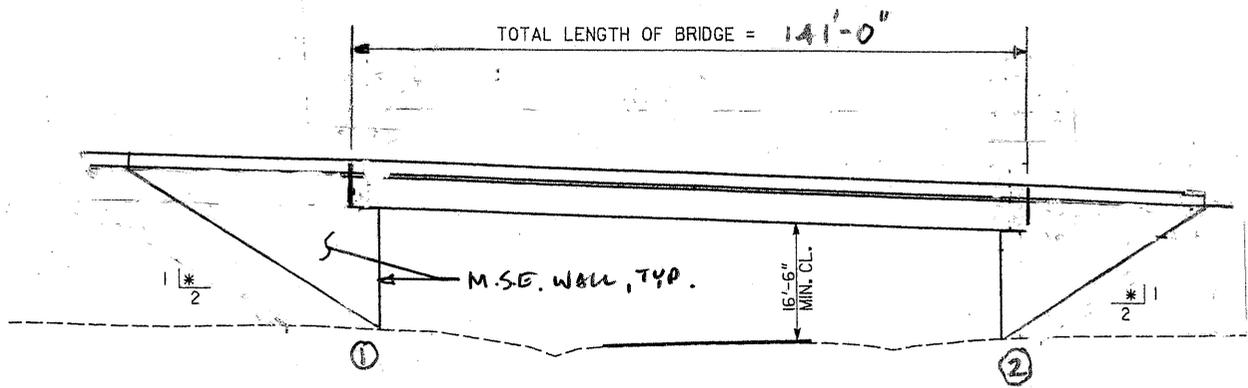
ALTERNATIVE NO.: **B-1-2**

AS DESIGNED ALTERNATIVE

SHEET NO.: **3 of 6**



PLAN



ELEVATION

CALCULATIONS



PROJECT:

SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: B-1-2

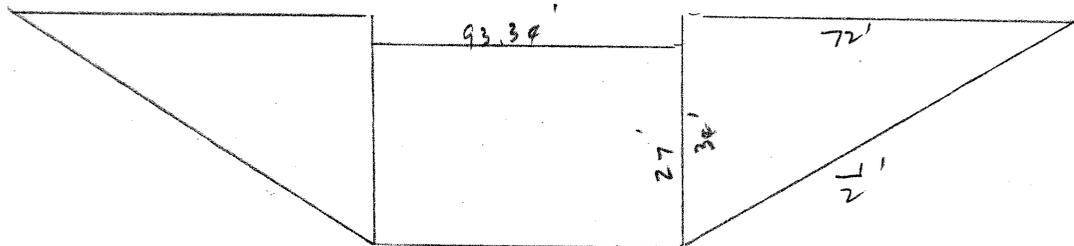
SHEET NO.: 4 of 6

BRIDGE WIDTH = 94.42' OUT-TO-OUT

LENGTH = 738.5' - 141' = 97.5' (REDUCTION)

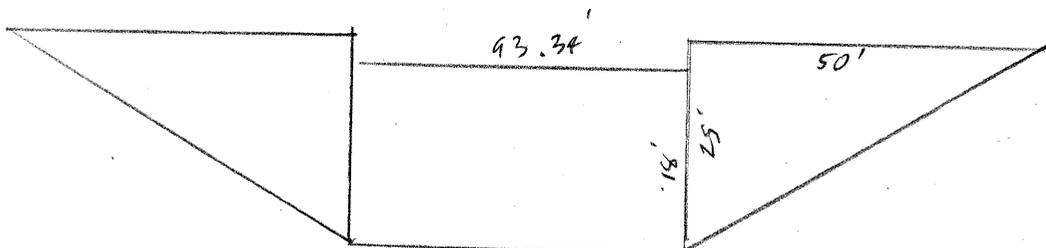
AREA = 94.42' x 97.5' = 9206 SF

WALL HEIGHT = 34' MAX. AT BENT. 1 INCL. 2' BELOW GROUND



TOTAL AREA = 93.34' x 27' + 2 x 0.5 x 34' x 72' = 4968 SF

WALL HEIGHT = 25' MAX. AT BENT 2 INCL. 2' BELOW GROUND



TOTAL AREA = 93.34' x 18' + 2 x 0.5 x 25' x 50' = 2930 SF

GRAND TOTAL = 4968 + 2930 = 7898 SF

ADDITIONAL ROADWAY = 97.5' x 93.34' / 9 SF = 1011 SYD

@ 65/SY (SEE ALT. R-13)

CALCULATIONS



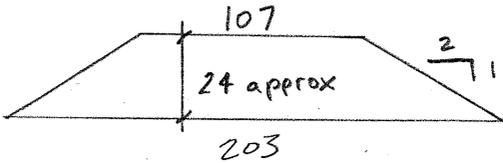
PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: B-1-2

SHEET NO.: 5 of 6

$$\begin{array}{rcl} \text{ORIG. BRIDGE LENGTH} & = & 238' - 6'' \\ \text{ALT. BRIDGE LENGTH} & = & 141 - 0 \\ \text{CHANGE} & & \hline & & 97' - 6'' \end{array}$$

FILL



FILL LENGTH

$$\begin{array}{rcl} \text{MSE FILL} & & 97.5' \\ 24 \times .6 \times 2 & & \hline & & 28.8' \\ & & \hline & & 68.7' \end{array}$$

$$\text{FILL} \approx \left(\frac{203 + 107}{2} \right) 24 \times 68.7 / 27 = 9465 \text{ cu } \text{\textcircled{D}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation ALTERNATIVE NO.: **B-1-3**

DESCRIPTION: **REDUCE THE LENGTH OF THE BRIDGE OVER THE NORFOLK SOUTHERN RAILROAD AND US 129/SR 247 BY DELETING THE END SPANS AND USING PILE SUPPORTED END BENTS BEHIND MECHANICALLY STABILIZED EARTH WALLS** SHEET NO.: **1 of 6**

ORIGINAL DESIGN: (Sketch attached)

A five-span bridge with a total length of 423 ft. is designed for the Sardis Church Bridge Extension crossing of the Norfolk Southern Railroad and US 129/SR 247.

ALTERNATIVE: (Sketch attached)

Shorten the bridge to three spans by deleting the end spans and supporting the new end girders on pile supported end bents behind MSE walls.

ADVANTAGES:

- Reduces costs
- Reduces the amount of bridge area to maintain

DISADVANTAGES:

- Must maintain MSE walls
- Adds to borrow material requirement

DISCUSSION:

The west side of the bridge is adjacent to the railroad so that a spillway is not needed and costs can be saved. The opening to permit the passage of northbound US 129/SR 247 under the bridge is 100 ft. wide to accommodate three lanes of traffic is very generous so that the spillway is not needed on this side of the bridge. Thus, both initial construction costs and long-term bridge maintenance costs can be eliminated by implementing this alternative.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,382,040 | — | \$ 1,382,040 |
| ALTERNATIVE | \$ 690,399 | — | \$ 690,399 |
| SAVINGS | \$ 691,641 | — | \$ 691,641 |

Sht. 2 of 6 DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ----- 30 LBS PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - 79'-0" TYPE III, PSC BEAM SPAN (W/ FASCIA BEAMS) ----- SPECIAL DESIGN
- 3 - 100'-0" BULB TEE, 54" PSC BEAM SPAN ----- SPECIAL DESIGN
- 1 - 44'-0" TYPE II, PSC BEAM SPAN (W/ FASCIA BEAMS) ----- SPECIAL DESIGN
- 4 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

S 89°-45'-01.6"E
END BRIDGE STA. 496+94.52

TO I-75
B.F.P.R. BENT 6

BENCHMARK

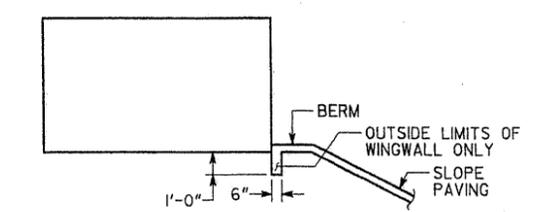
BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION 496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28
N 976446.371, E 2460964.837

TRAFFIC DATA

TRAFFIC----- ADT = 15060 (2006)
ADT = 25932 (2026)
DESIGN SPEED----- 45 MPH
TRUCKS----- 4%
24 HR TRUCKS----- 6%
DIRECTIONAL DIST.----- 50%

UTILITIES

NONE



SLOPE PAVING DETAIL AT WINGS

P.I. NO. 0000566
BRIDGE NO. 3



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RALEIGH, NORTH CAROLINA 27636

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
SARDIS CHURCH ROAD OVER S.R. 247 (U.S. 129)
AND NORFOLK SOUTHERN RAILWAY
BIBB COUNTY STP-0000-00(566)

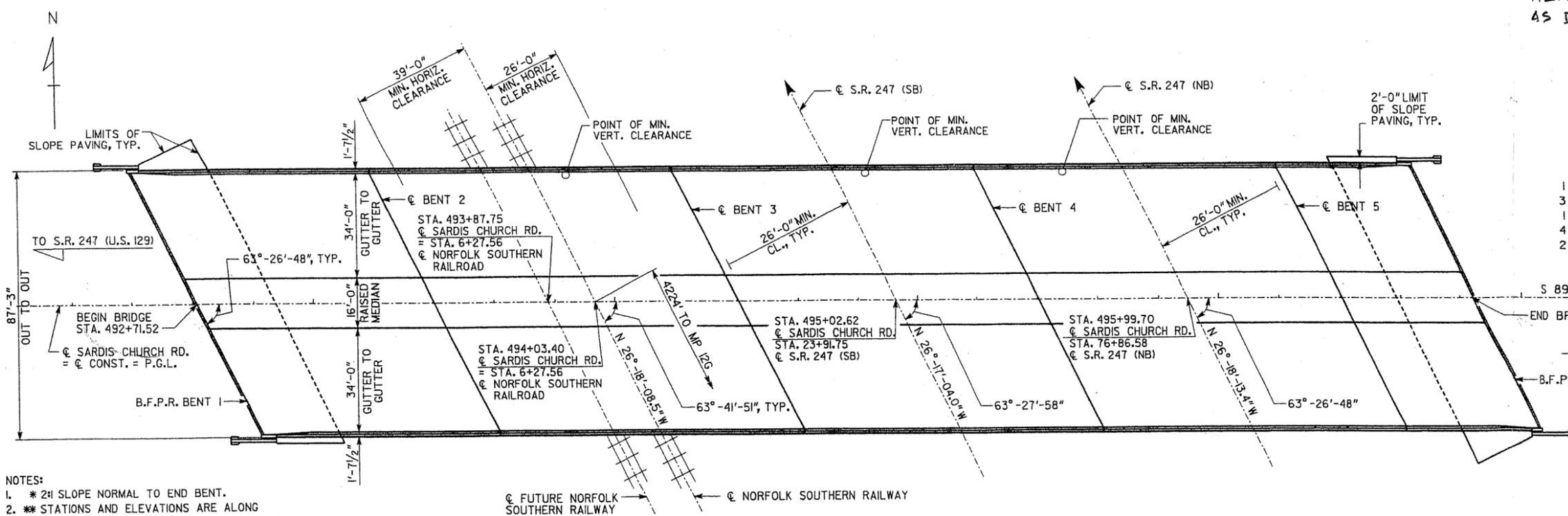
SCALE: 1" = 20'-0"

JUNE 2006

| | | |
|--------------|------------------|----------|
| DESIGNED MLR | CHECKED CLN | REVIEWED |
| DRAWN CEM | DESIGN GROUP KHA | APPROVED |



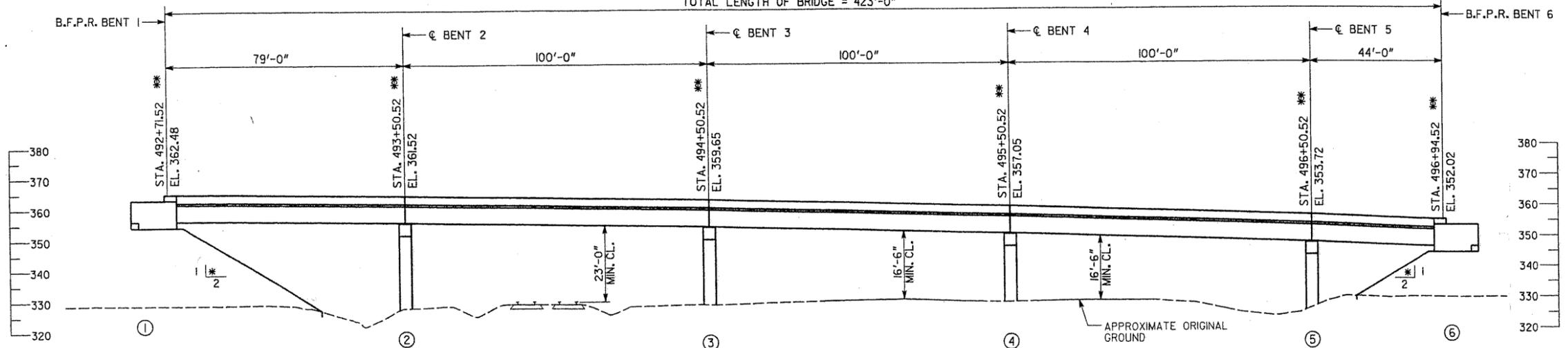
BRIDGE SHEET
1 OF 1



PLAN

- NOTES:
1. * 2H SLOPE NORMAL TO END BENT.
 2. ** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR & BENTS.
 3. ALL BENTS ARE PARALLEL.

TOTAL LENGTH OF BRIDGE = 423'-0"



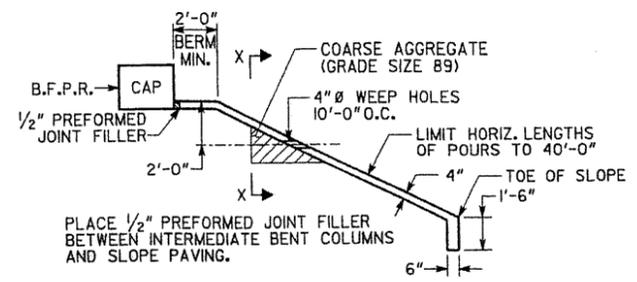
ELEVATION

| STATION | ELEVATION |
|---------|-----------|
| 5+39.09 | 329.41 |
| 5+91.86 | 328.94 |
| 6+48.80 | 328.36 |
| 7+05.90 | 327.76 |
| 7+56.90 | 327.18 |

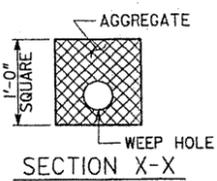
| LOCATION | ELEVATION |
|-----------|-----------|
| BENT 1 LT | 353.77 |
| BENT 1 RT | 353.49 |
| BENT 6 LT | 344.87 |
| BENT 6 RT | 343.23 |

| PVI | ELEVATION | SLOPE |
|----------|-----------|---------|
| 23+00.00 | 327.54 | 2.1200% |
| 23+50.00 | 328.60 | 1.3800% |
| 24+00.00 | 329.29 | 1.2400% |
| 24+50.00 | 329.91 | 1.5600% |
| 25+00.00 | 330.69 | |

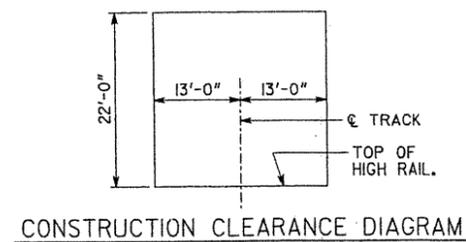
| PVI | ELEVATION | SLOPE |
|----------|-----------|------------|
| 23+00.00 | 327.54 | + 4.7889 % |
| 23+50.00 | 328.60 | |
| 24+00.00 | 329.29 | |
| 24+50.00 | 329.91 | |
| 25+00.00 | 330.69 | - 4.1333 % |



SLOPE PAVING DETAIL



SECTION X-X



CONSTRUCTION CLEARANCE DIAGRAM

| | | | |
|-------|------------------|-----------|--------------|
| STATE | PROJECT NUMBER | SHEET NO. | TOTAL SHEETS |
| GA. | STP-0000-00(566) | 57 | |

SPECIFICATIONS ----- AASHTO (7TH EDITION)
 (DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
 TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
 FUTURE PAVING ALLOWANCE ----- 30 LBS PER SQ. FT.

BRIDGE CONSISTS OF

- 2 - 100'-0" BULB TEE, 54" PSC BEAM SPAN ----- SPECIAL DESIGN
- 1 - 103'-0" BULB TEE, 54" PSC BEAM SPAN ----- SPECIAL DESIGN
- 2 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION 496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28
 N 976446.371, E 2460964.837

TRAFFIC DATA

TRAFFIC ----- ADT = 15060 (2006)
 ADT = 25932 (2026)
 DESIGN SPEED ----- 45 MPH
 TRUCKS ----- 4%
 24 HR TRUCKS ----- 6%
 DIRECTIONAL DIST. ----- 50%

UTILITIES

NONE

P.I. NO. 0000566
 BRIDGE NO. 3



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GEORGIA
 DEPARTMENT OF TRANSPORTATION
 PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
 SARDIS CHURCH ROAD OVER S.R. 247 (U.S. 129)
 AND NORFOLK SOUTHERN RAILWAY
 BIBB COUNTY STP-0000-00(566)

SCALE: 1" = 20'-0"

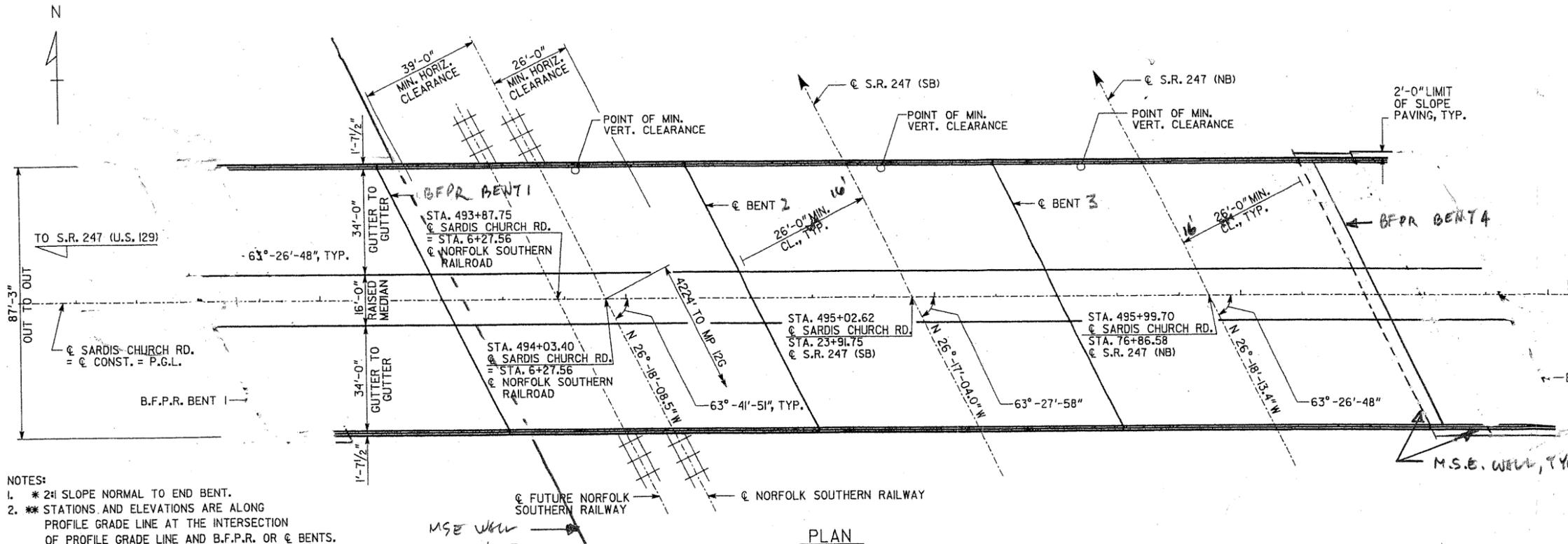
JUNE 2006



BRIDGE SHEET
 1 OF 1

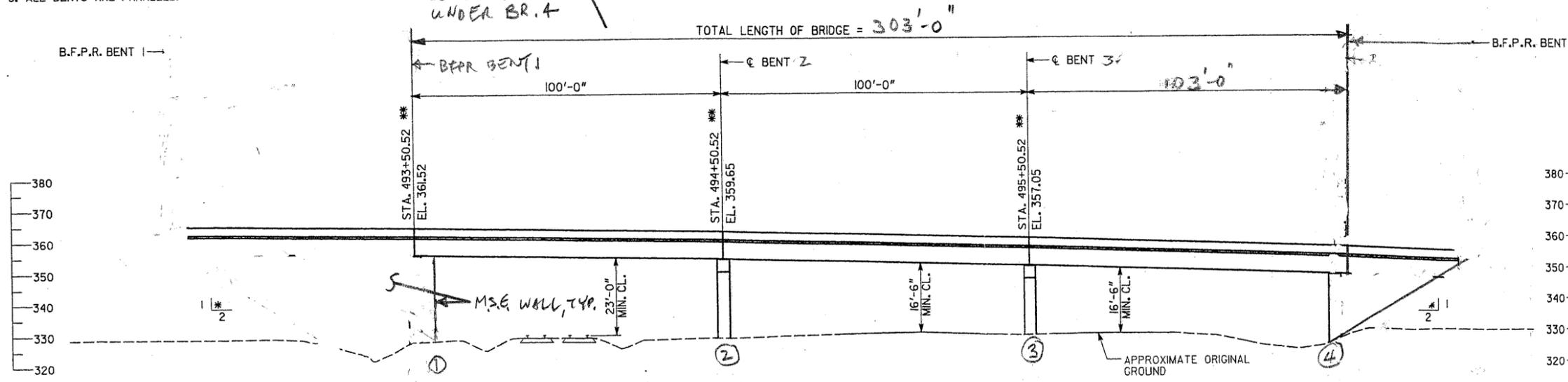
| | |
|-----------|--|
| DATE | |
| REVISIONS | |
| BY | |

| | | |
|--------------|------------------|----------|
| DESIGNED MLR | CHECKED CLN | REVIEWED |
| DRAWN CEM | DESIGN GROUP KHA | APPROVED |



PLAN

TOTAL LENGTH OF BRIDGE = 303'-0"



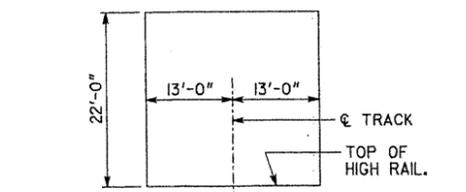
ELEVATION

RAILROAD PROFILE

| STATION | ELEVATION |
|---------|-----------|
| 5+39.09 | 329.41 |
| 5+91.86 | 328.94 |
| 6+48.80 | 328.36 |
| 7+05.90 | 327.76 |
| 7+56.90 | 327.18 |

BERM ELEVATION

| LOCATION | ELEVATION |
|-----------|-----------|
| BENT 1 LT | 353.77 |
| BENT 1 RT | 353.49 |
| BENT 6 LT | 344.87 |
| BENT 6 RT | 343.23 |



CONSTRUCTION CLEARANCE DIAGRAM

PROFILE GRADE DATA - S.R. 247

| | | | | |
|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| PVI 23+00.00 EL. = 327.54 | PVI 23+50.00 EL. = 328.60 | PVI 24+00.00 EL. = 329.29 | PVI 24+50.00 EL. = 329.91 | PVI 25+00.00 EL. = 330.69 |
| 1.3800% | | 1.2400% | | 1.5600% |
| 2.1200% | | | | |

**VERTICAL CURVE DATA - SARDIS CHURCH RD.
 ALONG P.G.L. & CONSTRUCTION**

| | |
|-------------------------------|------------|
| PVI 49+00.00 EL. = 376.600 | |
| + 4.7889 % | - 4.1333 % |
| 1220 FT VC | |

- NOTES:
- * 2% SLOPE NORMAL TO END BENT.
 - ** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR BENTS.
 - ALL BENTS ARE PARALLEL.

CALCULATIONS



PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: B-1-3

SHEET NO.: 4 of 6

BRIDGE WIDTH = 87.25' OUT-TO-OUT

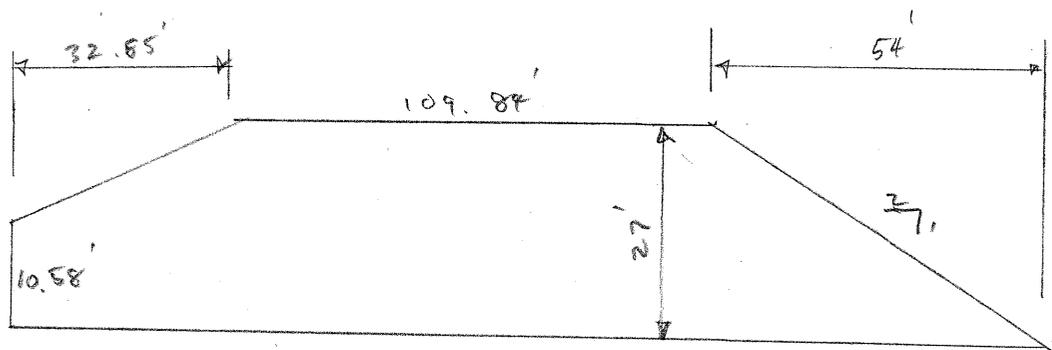
LENGTH = 423' - 303' = 120' REDUCTION

AREA = 87.25' x 120' = 10,470 SF

WALL HEIGHT = 27' MAX. AT BENT 1

LENGTH AT FRONT = 87.25' / sin 63.45° = 97.54'

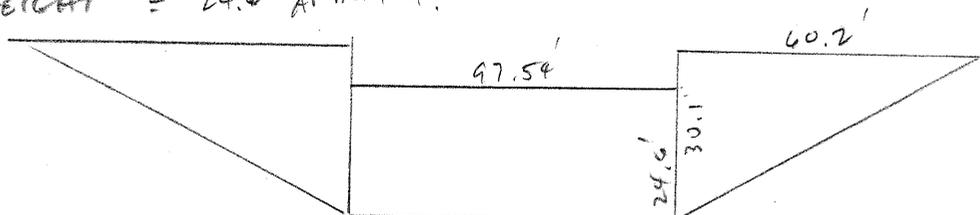
ADDL FLAT TOP = 2 x 5.5' x 2 / sin 63.45° = 12.30'



FRONT FACE OF WALL

AREA = 109.84' x 27' + 0.5(27')(54') + 0.5(10.58' + 27')(32.85') = 4312 SF.

WALL HEIGHT = 24.6' AT BENT 4.



AREA = 97.54' x 24.6' + 2 x 0.5 x 30.1' x 60.2' = 4212 SF.

GRAND TOTAL = 4312 + 4212 = 8524 SF.

FILL = 30'K

ROADWAY: 84' x 120' = 10,080 SF = 1120 SY

@ 655/SY (SEE R-13)

CALCULATIONS



PROJECT:

SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

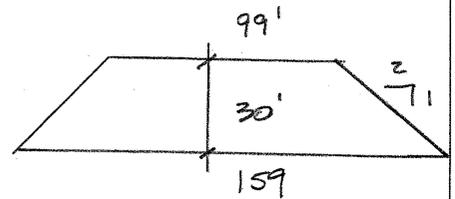
ALTERNATIVE NO.: B-1-3

SHEET NO.: 5 of 6

| | |
|------------------------|----------------|
| Original Bridge length | 423'-0" |
| Proposed bridge length | 303'-0" |
| Difference | <u>120'-0"</u> |

| | |
|---|---------------|
| Fill Provided by MSE Walls at End bent 30' x .6 x 2 | 36'-0" |
| Length of fill required | <u>84'-0"</u> |

$$\left(\frac{99 + 159}{2}\right) 30 \times 84 / 27 = 12,040 \text{ cu yd}$$



VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **B-4-A**

DESCRIPTION: **SUBSTITUTE A SINGLE-SPAN BRIDGE WITH EXTENDED CONFINED EARTH RAMP SECTION FOR THE CURVED STEEL GIRDER BRIDGE FOR RAMP A OVER THE NORFOLK SOUTHERN RAILROAD**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

A three-span bridge, 423 ft. long, using curved steel girders and a cast-in-place concrete deck is used for Ramp A to span over the Norfolk Southern Railroad.

ALTERNATIVE: (Sketch attached)

Construct a single-span bridge consisting of precast, prestressed concrete bulb-tee AASHTO girders and a cast-in-place concrete deck supported on pile supported abutments behind the continuation of the MSE walls used for creating the confined earth ramp section on one end and new MSE walls on the other end to allow the railroad to cross under the ramp.

ADVANTAGES:

- Reduces the amount of bridge to maintain
- Uses concrete in lieu of steel for the bridge, thus eliminating the need for periodic painting
- Extends the use of MSE walls

DISADVANTAGES:

- May add cost to the project
- Requires redesign

DISCUSSION:

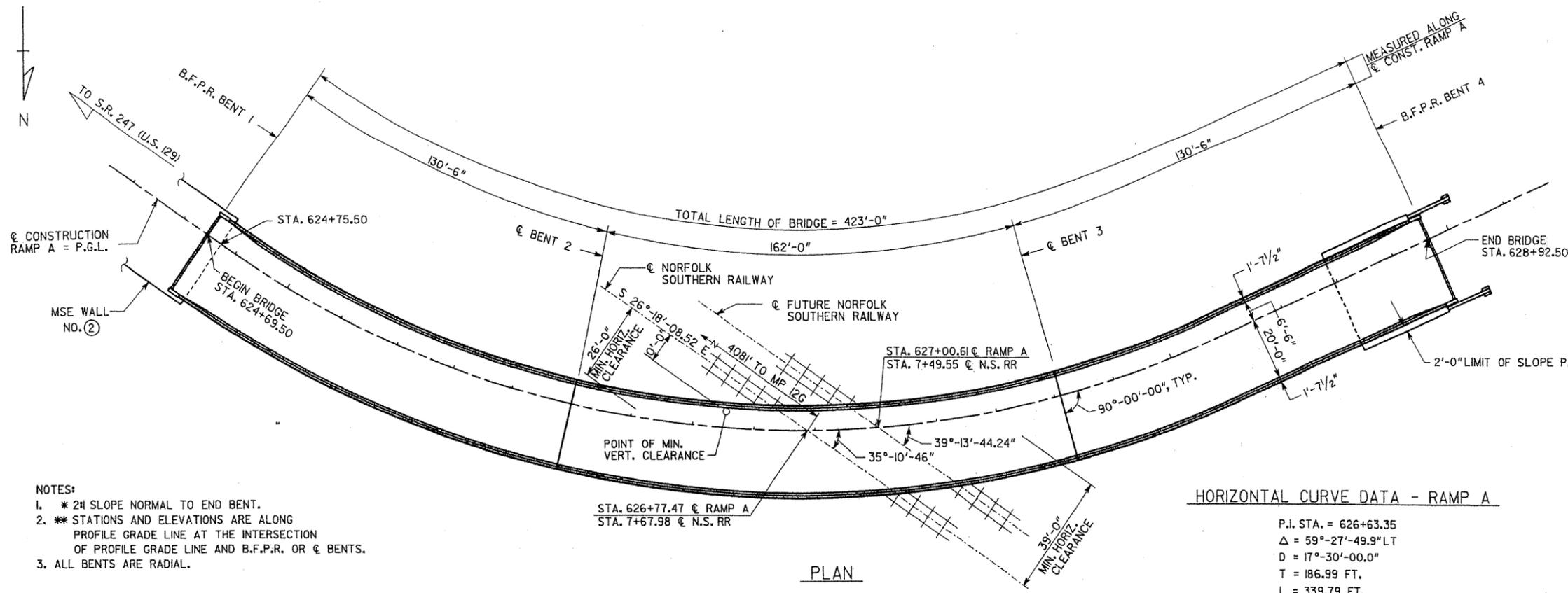
As currently priced, using a \$160/square foot cost for the curved steel bridge, this option is more expensive. However, if the steel bridge turns out to be about \$175/square foot to construct, this option is viable. The proposed single-span length of about 140 ft. is acceptable for precast, prestressed concrete bulb-tees and results in a shorter concrete bridge which is easier to maintain. Extending the use of the confined earth section wall in this location is not detrimental from an aesthetic perspective. If the end span of the Sardis Church Road Extension bridge over the railroad and U.S. 129/S.R. 247 is also converted to an end bent with an MSE wall in front of it at the current location of Bent 2, as shown in Alt. No. B-5 this alternative will become more cost-effective.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 2,214,784 | — | \$ 2,214,784 |
| ALTERNATIVE | \$ 2,408,324 | — | \$ 2,408,324 |
| SAVINGS | \$ (193,540) | — | \$ (193,540) |

ALT. NO. B-4-A
AS DESIGNED

| | | | |
|-------|------------------|-----------|--------------|
| STATE | PROJECT NUMBER | SHEET NO. | TOTAL SHEETS |
| GA. | STP-0000-00(566) | 526 | |

Sht. 2 of 5



DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ----- 30 LBS. PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - CURVED STEEL PLATE GIRDER ----- SPECIAL DESIGN
- CONTINUOUS UNIT (130'-6", 162'-0", 130'-6")
- 2 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION
496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28
N 976446.371, E 2460964.837

TRAFFIC DATA

TRAFFIC ----- ADT = 3816 (2006)
ADT = 7125 (2026)
DESIGN SPEED ----- 35 MPH
TRUCKS ----- 4%
24 HR TRUCKS ----- 6%

HORIZONTAL CURVE DATA - RAMP A

P.I. STA. = 626+63.35
Δ = 59°-27'-49.9" LT
D = 17°-30'-00.0"
T = 186.99 FT.
L = 339.79 FT.
R = 327.40 FT.
S.E. = 8.00%

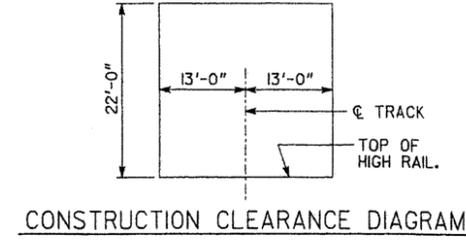
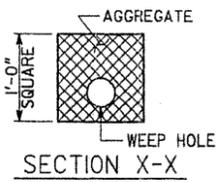
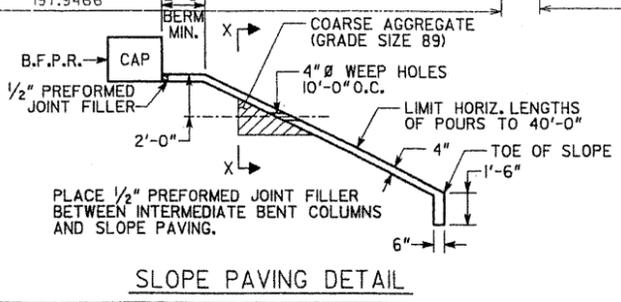
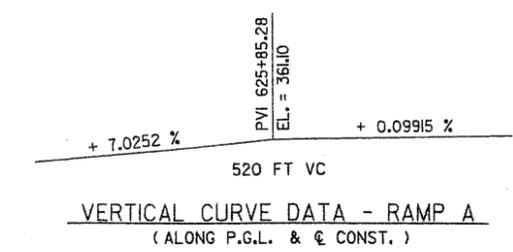
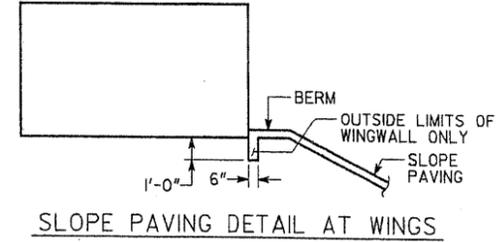
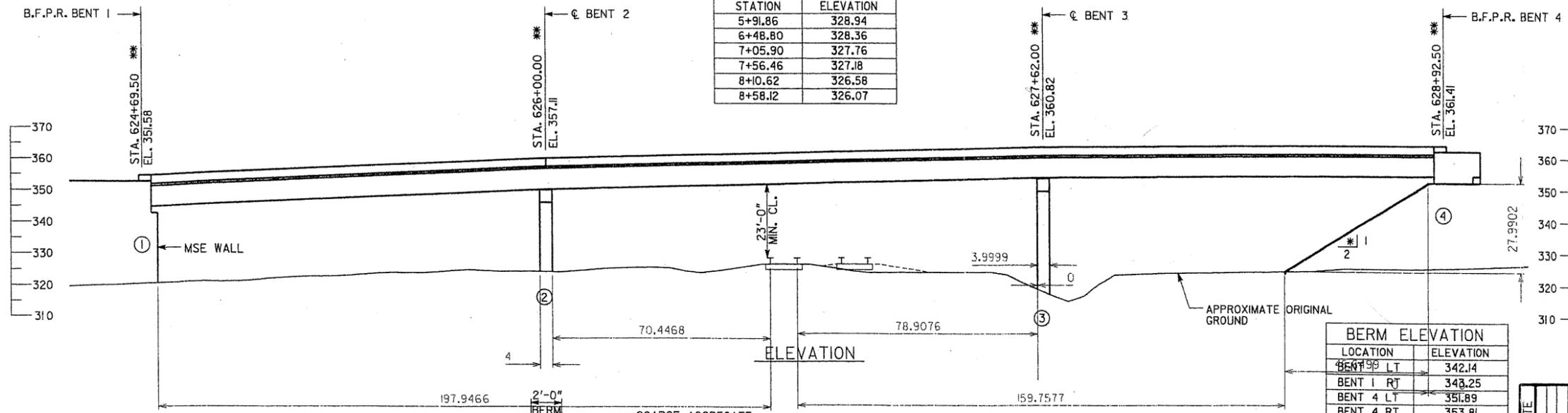
PLAN

- NOTES:
1. * 2H SLOPE NORMAL TO END BENT.
 2. ** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR BENTS.
 3. ALL BENTS ARE RADIAL.

UTILITIES

NONE

| RAILROAD PROFILE | |
|------------------|-----------|
| STATION | ELEVATION |
| 5+91.86 | 328.94 |
| 6+48.80 | 328.36 |
| 7+05.90 | 327.76 |
| 7+56.46 | 327.18 |
| 8+10.62 | 326.58 |
| 8+58.12 | 326.07 |



| BERM ELEVATION | |
|----------------|-----------|
| LOCATION | ELEVATION |
| BENT 1 LT | 342.14 |
| BENT 1 RT | 343.25 |
| BENT 4 LT | 351.89 |
| BENT 4 RT | 353.81 |



| DATE | REVISIONS |
|------|-----------|
| | |

P.I. NO. 0000566
BRIDGE NO. 4

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GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
RAMP A OVER NORFOLK SOUTHERN RAILWAY
BIBB COUNTY STP-0000-00(566)

SCALE: 1" = 20'-0" JUNE 2006

| | | |
|--------------|------------------|----------|
| DESIGNED MLR | CHECKED CLN | REVIEWED |
| DRAWN CEM | DESIGN GROUP KHA | APPROVED |

CALCULATIONS



PROJECT:

SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: B-4-A

SHEET NO.: 4 of 5

BRIDGE AREA $423 \times 29.75 = 12,584 \text{ SF}$

NEW BRIDGE AREA 4928 SF MEASURED PERPENDICULAR TO RR
 $39 + 26 + 2 \times 6 = 77'$
 $\text{AREA} = 0.5(80 + 48)(77) = 4928 \text{ SF}$

PAVEMENT AREA AT MSE WALL SECTION

$\approx 423 \times 26.5 - 4928 \times \frac{26.5}{29.75} = 6820 \text{ SF} / 9 = 758 \text{ SF}$

MSE WALLS

$122 + 23 + 45 + 142 + 175 + 238 = 745'$

AVE HEIGHT $\approx 33'$ AREA = $745 \times 33 = 24,585$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **B-4-B**

DESCRIPTION: **SUBSTITUTE A SINGLE-SPAN BRIDGE WITH EXTENDED CONFINED EARTH RAMP SECTION FOR THE CURVED STEEL GIRDER BRIDGE FOR RAMP B OVER THE NORFOLK SOUTHERN RAILROAD**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

A three-span bridge, 423 ft. long, using curved steel girders and a cast-in-place concrete deck is used for Ramp B to span over the Norfolk Southern Railroad.

ALTERNATIVE: (Sketch attached)

Construct a single-span bridge consisting of precast, prestressed concrete bulb-tee AASHTO girders and a cast-in-place concrete deck supported on pile supported abutments behind the continuation of the MSE walls used for creating the confined earth ramp section on one end and new MSE walls on the other end to allow the railroad to cross under the ramp.

ADVANTAGES:

- Reduces the amount of bridge to maintain
- Extends the use of MSE walls
- Uses concrete for the bridge in lieu of steel, thus eliminating the need for periodic painting

DISADVANTAGES:

- May add cost to the project
- Redesign required

DISCUSSION:

As currently priced, using a \$160/square foot cost for the curved steel bridge, this option is more expensive. However, if the steel bridge turns out to be about \$175/square foot to construct, this option is viable. The proposed single-span length of about 140 ft. is acceptable for precast, prestressed concrete bulb-tees and results in a shorter concrete bridge which is easier to maintain. Extending the use of the confined earth section wall in this location is not detrimental from an aesthetic perspective.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 2,214,784 | — | \$ 2,214,784 |
| ALTERNATIVE | \$ 2,408,324 | — | \$ 2,408,324 |
| SAVINGS | \$ (193,540) | — | \$ (193,540) |

ALT. NO. B-4-B
AS DESIGNED

| | | | |
|-------|------------------|-----------|--------------|
| STATE | PROJECT NUMBER | SHEET NO. | TOTAL SHEETS |
| GA. | STP-0000-00(566) | 5/19 | |

Sh. 2 of 5

DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ----- 30 LBS. PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - CURVED STEEL PLATE GIRDER ----- SPECIAL DESIGN
CONTINUOUS UNIT (130'-6", 162'-0", 130'-6")
- 2 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

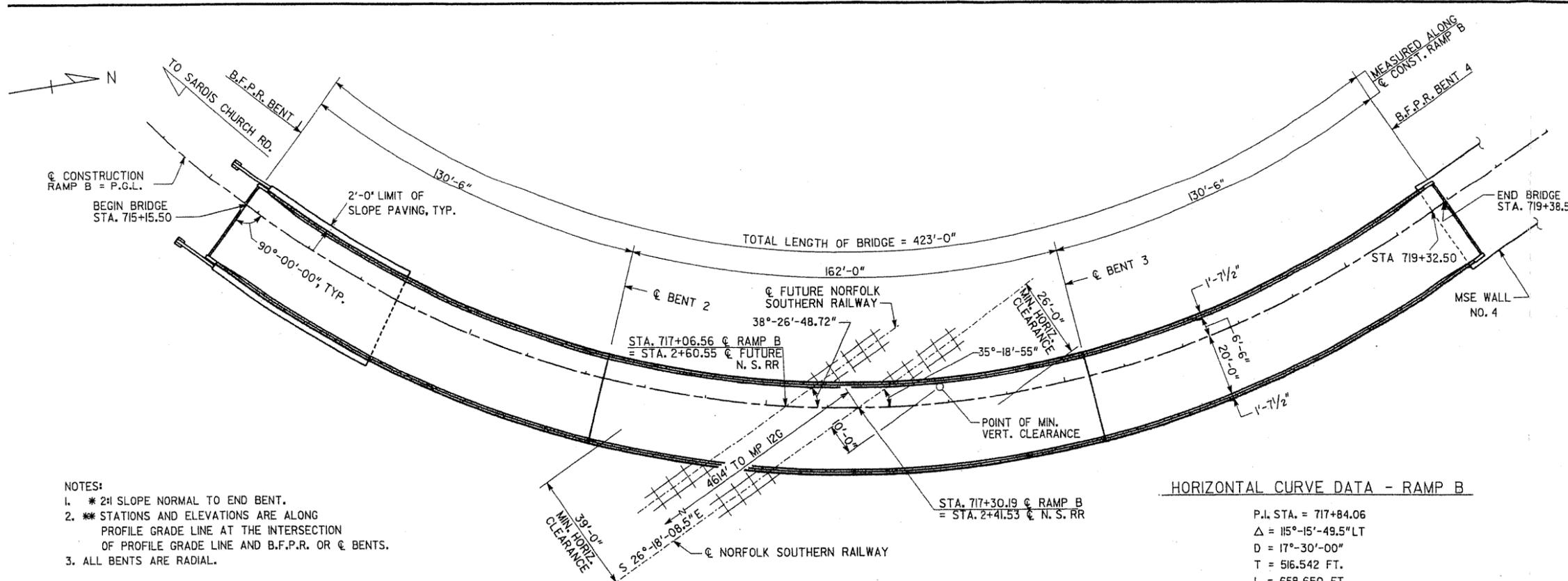
BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION
496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28
N 976446.371, E 2460964.837

TRAFFIC DATA

TRAFFIC ----- ADT = 3816 (2006)
ADT = 7125 (2026)
DESIGN SPEED ----- 35 MPH
TRUCKS ----- 4%
24 HR TRUCKS ----- 6%

UTILITIES

NONE

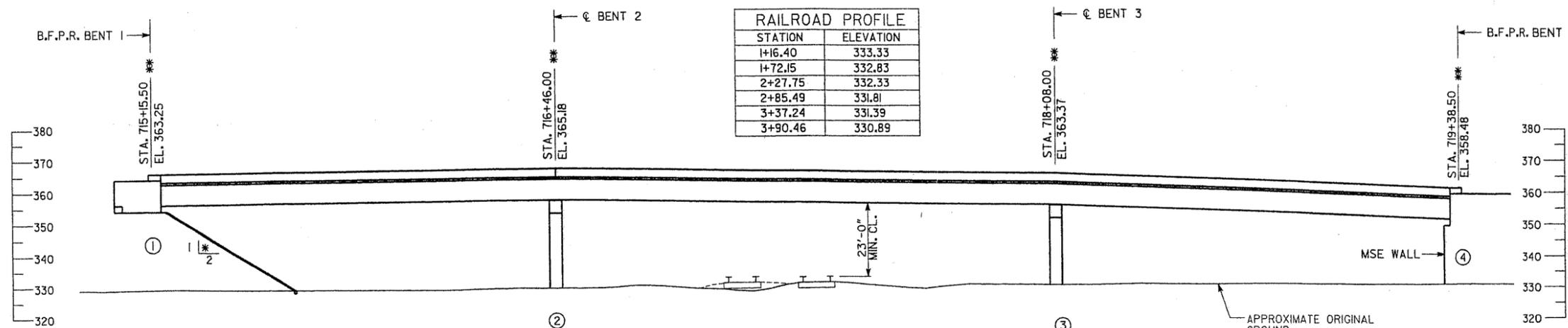


HORIZONTAL CURVE DATA - RAMP B

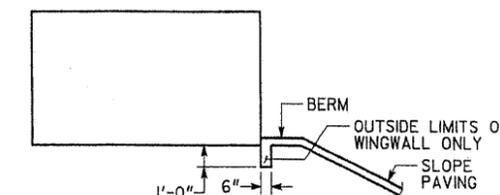
P.I. STA. = 717+84.06
Δ = 115°-15'-49.5" LT
D = 17°-30'-00"
T = 516.542 FT.
L = 658.650 FT.
R = 327.405 FT.
S.E. = 8.00%

- NOTES:
1. * 2H SLOPE NORMAL TO END BENT.
 2. ** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR Q BENTS.
 3. ALL BENTS ARE RADIAL.

PLAN



ELEVATION



SLOPE PAVING DETAIL AT WINGS

P.I. NO. 0000566

BRIDGE NO. 5

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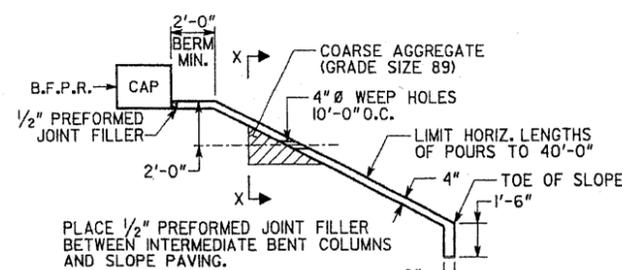
©, 2006

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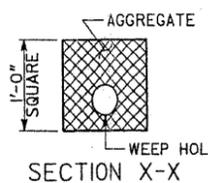
GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
RAMP B OVER NORFOLK SOUTHERN RAILWAY
BIBB COUNTY STP-0000-00(566)

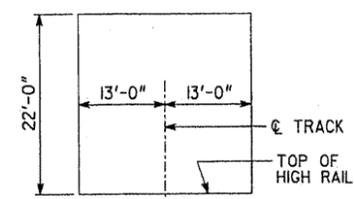
SCALE: 1" = 20'-0" JUNE 2006



SLOPE PAVING DETAIL



SECTION X-X



CONSTRUCTION CLEARANCE DIAGRAM

| LOCATION | ELEVATION |
|-----------|-----------|
| BENT 1 LT | 353.77 |
| BENT 1 RT | 355.69 |
| BENT 4 LT | 349.04 |
| BENT 4 RT | 350.96 |



BRIDGE SHEET
1 OF 1

| DATE | REVISIONS |
|------|-----------|
| | |
| | |
| | |

| | | |
|--------------|------------------|----------|
| DESIGNED MLR | CHECKED CLN | REVIEWED |
| DRAWN CEM | DESIGN GROUP KHA | APPROVED |

ALT. B-4-B
ALTERNATIVE

| | | | |
|-------|------------------|-----------|--------------|
| STATE | PROJECT NUMBER | SHEET NO. | TOTAL SHEETS |
| GA. | STP-0000-00(566) | 579 | |

Sht. 3 of 5

DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ----- 30 LBS. PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - 142'-0" BULB TEE, 72" PSC ----- SPECIAL DESIGN
- BEAM SPAN ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

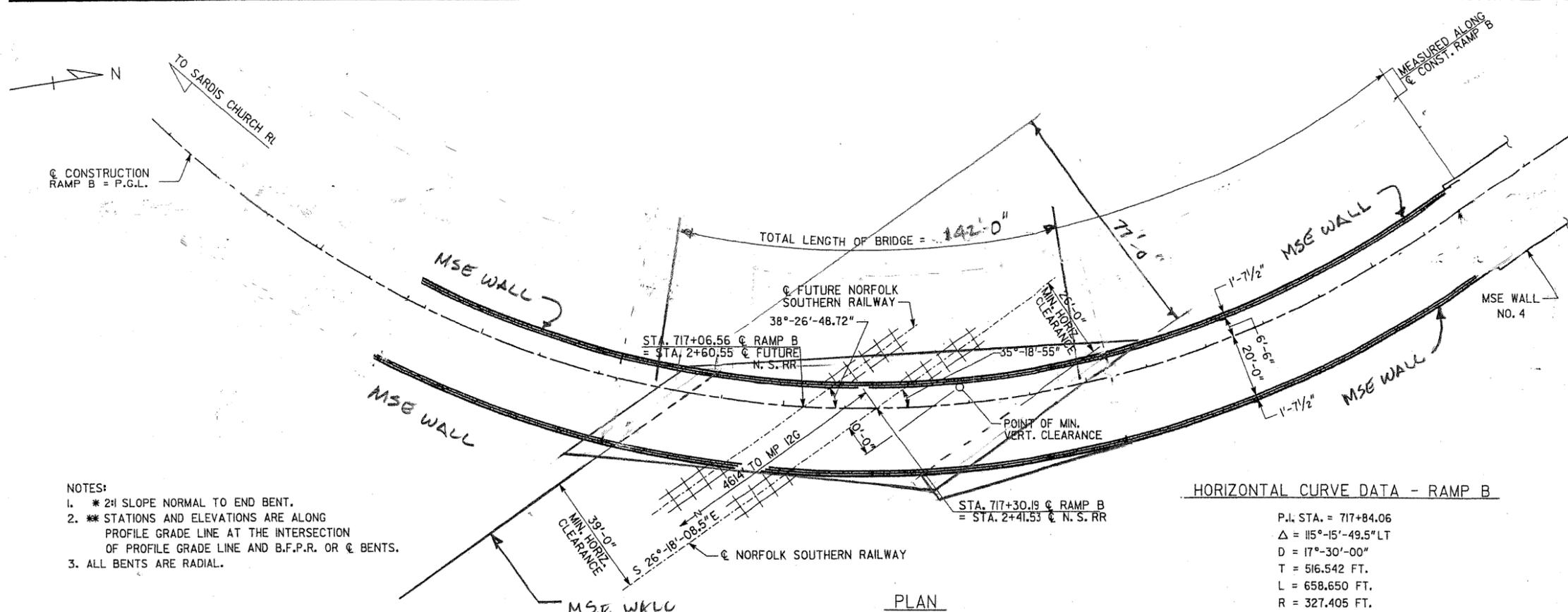
BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION
496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28
N 976446.37, E 2460964.837

TRAFFIC DATA

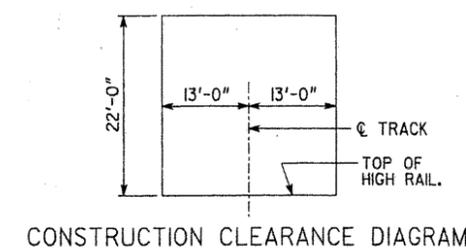
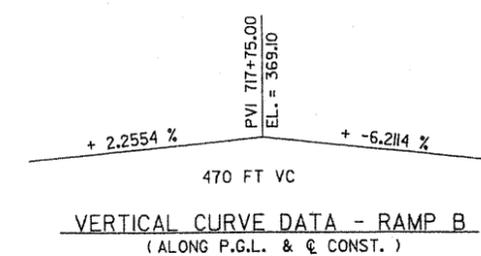
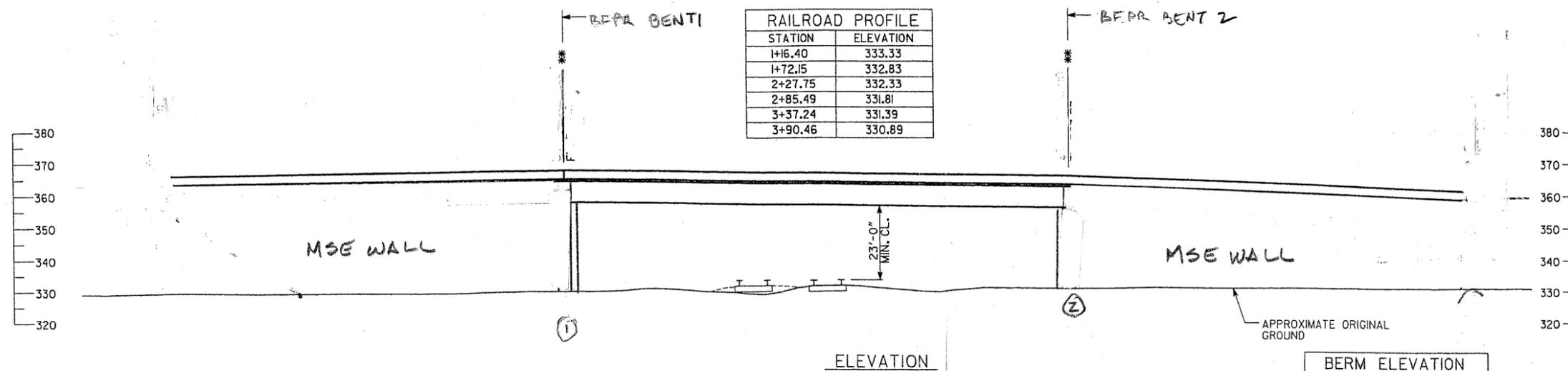
TRAFFIC ----- ADT = 3816 (2006)
ADT = 7125 (2026)
DESIGN SPEED ----- 35 MPH
TRUCKS ----- 4%
24 HR TRUCKS ----- 6%

UTILITIES

NONE



- NOTES:
- * 2H SLOPE NORMAL TO END BENT.
 - ** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ϕ BENTS.
 - ALL BENTS ARE RADIAL.



| BERM ELEVATION | |
|----------------|-----------|
| LOCATION | ELEVATION |
| BENT 1 LT | 353.77 |
| BENT 1 RT | 355.69 |
| BENT 4 LT | 349.04 |
| BENT 4 RT | 350.96 |

P.I. NO. 0000566
BRIDGE NO. 5

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GEORGIA
DEPARTMENT OF TRANSPORTATION
 PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
 RAMP B OVER NORFOLK SOUTHERN RAILWAY
 BIBB COUNTY STP-0000-00(566)

SCALE: 1" = 20'-0" JUNE 2006



| | | |
|--------------|------------------|----------|
| DESIGNED MLR | CHECKED CLN | REVIEWED |
| DRAWN CEM | DESIGN GROUP KHA | APPROVED |

CALCULATIONS



PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247
Georgia Department of Transportation

ALTERNATIVE NO.: B-4-B

SHEET NO.: 4 of 5

$$\text{BRIDGE AREA} \quad 423 \times 29.75 = 12,584 \text{ SF}$$

$$\begin{aligned} \text{NEW BRIDGE AREA} \quad 4928 \text{ SF} \quad & \text{MEASURED PERPENDICULAR TO RR} \\ & 39 + 26 + 2 \times 6 = 77' \\ & \text{AREA} = 0.5(80 + 48)(77) = 4928 \text{ SF} \end{aligned}$$

PAVEMENT AREA AT MSE WALL SECTION

$$\approx 423 \times 26.5 - 4928 \times \frac{26.5}{29.75} = 6820 \text{ SF} / 9 = 758 \text{ SY}$$

MSE WALLS

$$122 + 23 + 45 + 142 + 175 + 238 = 745'$$

$$\text{AVE HEIGHT} \approx 33'$$

$$\text{AREA} = 745 \times 33 = 24,585$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

ALTERNATIVE NO.: **B-5**

DESCRIPTION: **SUBSTITUTE A TWO-SPAN BRIDGE FOR THE THREE-SPAN RAMP A CURVED STEEL GIRDER BRIDGE AND CONVERT THE END SPAN OF THE SARDIS CHURCH ROAD EXTENSION BRIDGE TO AN EARTH FILL SECTION WITH A MECHANICALLY STABILIZED EARTH WALL AT THE BRIDGE END BENT**

SHEET NO.: **1 of 9**

ORIGINAL DESIGN: (Sketch attached)

A three-span bridge, 423 ft. long, using curved steel girders and a cast-in-place concrete deck is used for Ramp A to span over the Norfolk Southern Railroad. Sloped paving is used at the west end span. A five-span bridge with end bents and fronted with concrete sloped paving is used for the adjacent Sardis Church Road Extension bridge over the railroad and U.S. 129/S.R. 247.

ALTERNATIVE: (Sketch attached)

Construct a two-span bridge for Ramp A consisting of curved steel girders and a cast-in-place concrete deck ending at the current location of Bent 3. Support the end spans on pile supported end bents behind MSE walls to allow the railroad to cross under the ramp. Convert the end span of the Sardis Church Road Extension bridge and Ramp A to earth fill roadway. Move the end bent of the bridge to the current location of Bent 2 and use an MSE wall in front of the end bent that connects to the MSE wall in front of the end bent for the Ramp A bridge.

ADVANTAGES:

- Reduces the amount of bridge to maintain
- Extends the use of MSE walls
- Reduces cost

DISADVANTAGES:

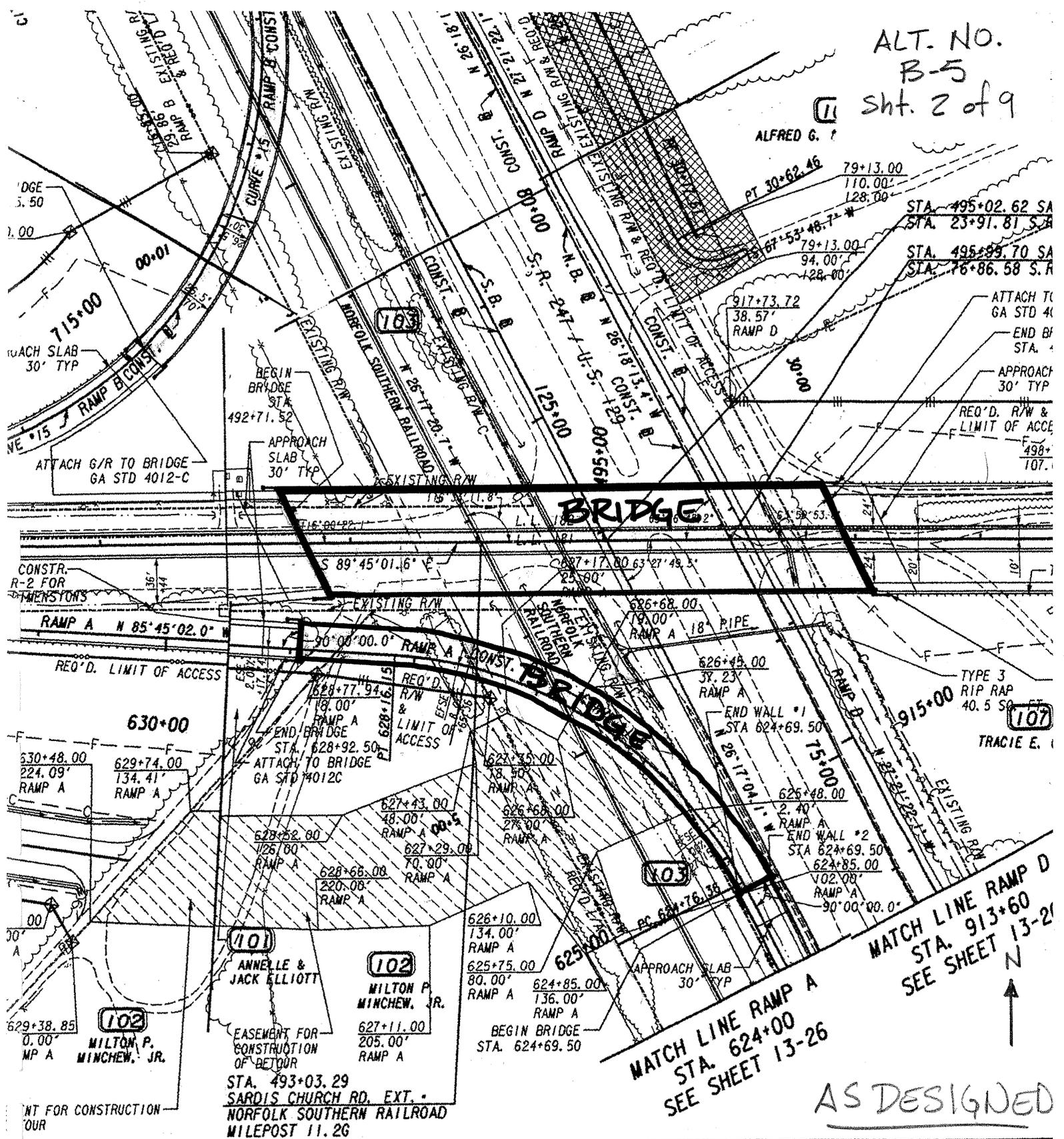
- Increase borrow material requirement
- Redesign required

DISCUSSION:

There is no reason to have a sloped fill area next to the railroad tracks for the Sardis Church Road Extension bridge. By converting it to a roadway on earth fill with an MSE wall in front of the new end bent, it can be connected to the MSE wall in front of the Ramp A end bent. This combination significantly reduces the amount of bridge deck to build and maintain and saves project costs.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,523,940 | — | \$ 1,523,940 |
| ALTERNATIVE | \$ 770,380 | — | \$ 770,380 |
| SAVINGS | \$ 753,560 | — | \$ 753,560 |

ALFRED G. 1



MATCH LINE RAMP D
STA. 913+60
SEE SHEET 13-2

MATCH LINE RAMP A
STA. 624+00
SEE SHEET 13-26

AS DESIGNED

| | | |
|------------------------------|----------------------------|-----|
| STATE OF GEORGIA | AND EXISTING R/W LINE | --- |
| DEPARTMENT OF TRANSPORTATION | R/W LINE | --- |
| URBAN DESIGN | CONSTRUCTION LIMITS | --- |
| MAINLINE | FOR CONSTRUCTION | --- |
| | Maintenance of Slopes | --- |
| | FOR CONSTRUCTION OF SLOPES | --- |
| | FOR CONSTRUCTION OF DRIVES | --- |

BOTH BRIDGES HAVE 2:1
END SLOPES UNDER
WEST END SPAN

ACT. NO. B-5
Sht. 3 of 3

DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ----- 30 LBS PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - 79'-0" TYPE II, PSC BEAM SPAN (W/ FASCIA BEAMS) ----- SPECIAL DESIGN
- 3 - 100'-0" BULB TEE, 54" PSC BEAM SPAN ----- SPECIAL DESIGN
- 1 - 44'-0" TYPE II, PSC BEAM SPAN (W/ FASCIA BEAMS) ----- SPECIAL DESIGN
- 4 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

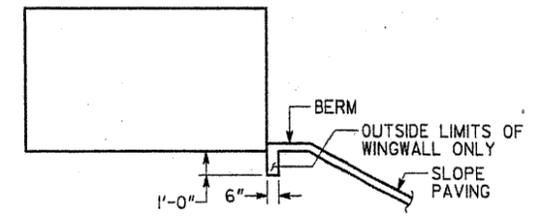
BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION 496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28
N 976446.371, E 2460964.837

TRAFFIC DATA

TRAFFIC ----- ADT = 15060 (2006)
ADT = 25932 (2026)
DESIGN SPEED ----- 45 MPH
TRUCKS ----- 4%
24 HR TRUCKS ----- 6%
DIRECTIONAL DIST. ----- 50%

UTILITIES

NONE



SLOPE PAVING DETAIL AT WINGS

P.I. NO. 0000566
BRIDGE NO. 3

AS DESIGNED

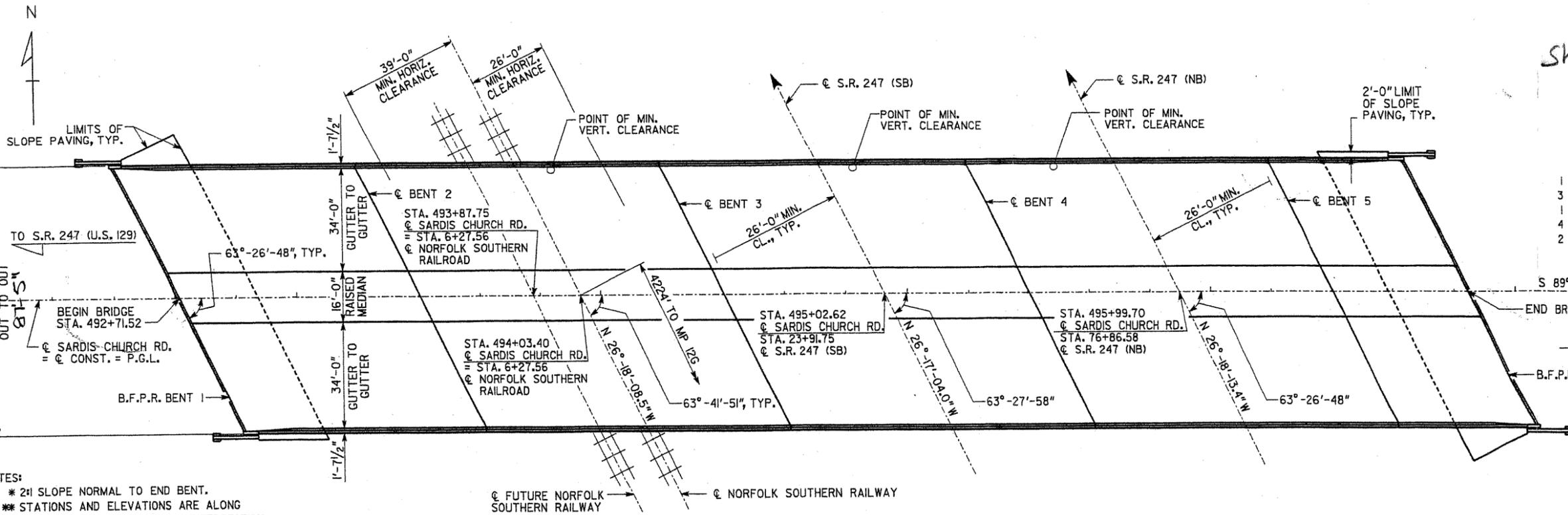
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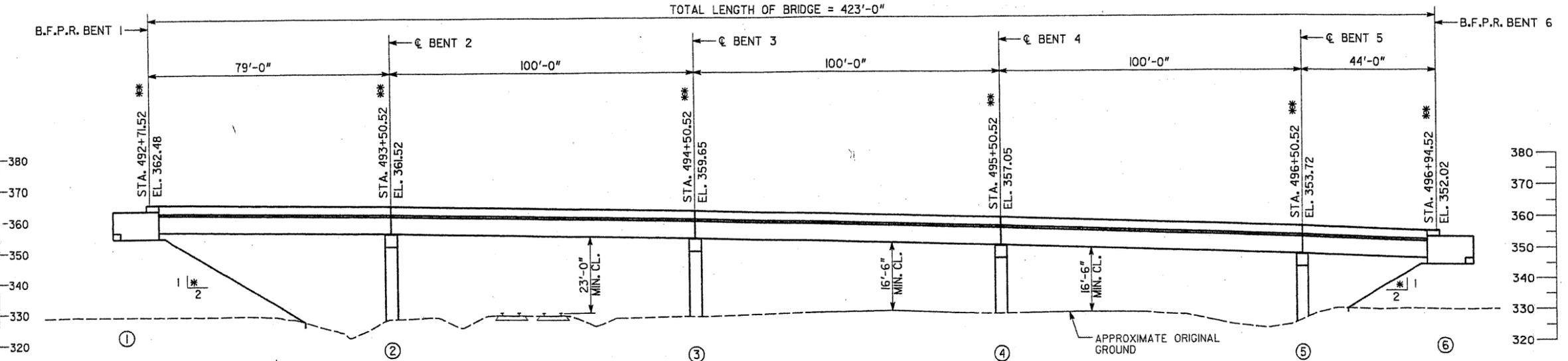
GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
SARDIS CHURCH ROAD OVER S.R. 247 (U.S. 129)
AND NORFOLK SOUTHERN RAILWAY
BIBB COUNTY STP-0000-00(566)

SCALE: 1" = 20'-0"
JUNE 2006
DESIGNED MLR CHECKED CLN REVIEWED



PLAN



ELEVATION

| RAILROAD PROFILE | |
|------------------|-----------|
| STATION | ELEVATION |
| 5+39.09 | 329.41 |
| 5+91.86 | 328.94 |
| 6+48.80 | 328.36 |
| 7+05.90 | 327.76 |
| 7+56.90 | 327.18 |

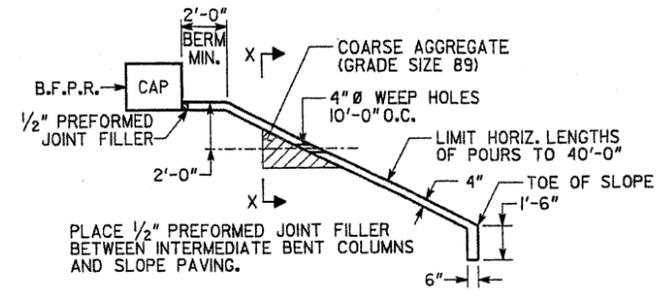
| BERM ELEVATION | |
|----------------|-----------|
| LOCATION | ELEVATION |
| BENT 1 LT | 353.77 |
| BENT 1 RT | 353.49 |
| BENT 6 LT | 344.87 |
| BENT 6 RT | 343.23 |

| PROFILE GRADE DATA - S.R. 247 | |
|-------------------------------|--------|
| PVI | EL. |
| 23+00.00 | 327.54 |
| 23+50.00 | 328.60 |
| 24+00.00 | 329.29 |
| 24+50.00 | 329.91 |
| 25+00.00 | 330.69 |

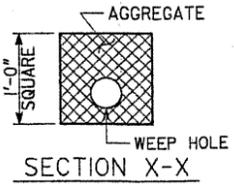
PROFILE GRADE DATA - S.R. 247

| VERTICAL CURVE DATA - SARDIS CHURCH RD. | |
|---|---------|
| PVI | EL. |
| 49+00.00 | 376.600 |
| 1220 FT VC | |
| 4.7889 % | |
| -4.1333 % | |

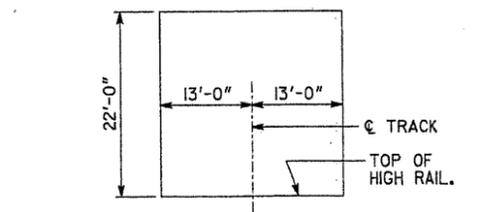
VERTICAL CURVE DATA - SARDIS CHURCH RD.



SLOPE PAVING DETAIL



SECTION X-X



CONSTRUCTION CLEARANCE DIAGRAM



BRIDGE SHEET

ALT. No.
B-5
Sht. 4 of 9

DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ----- 30 LBS. PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - CURVED STEEL PLATE GIRDER ----- SPECIAL DESIGN
CONTINUOUS UNIT (130'-6", 162'-0", 130'-6")
- 2 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

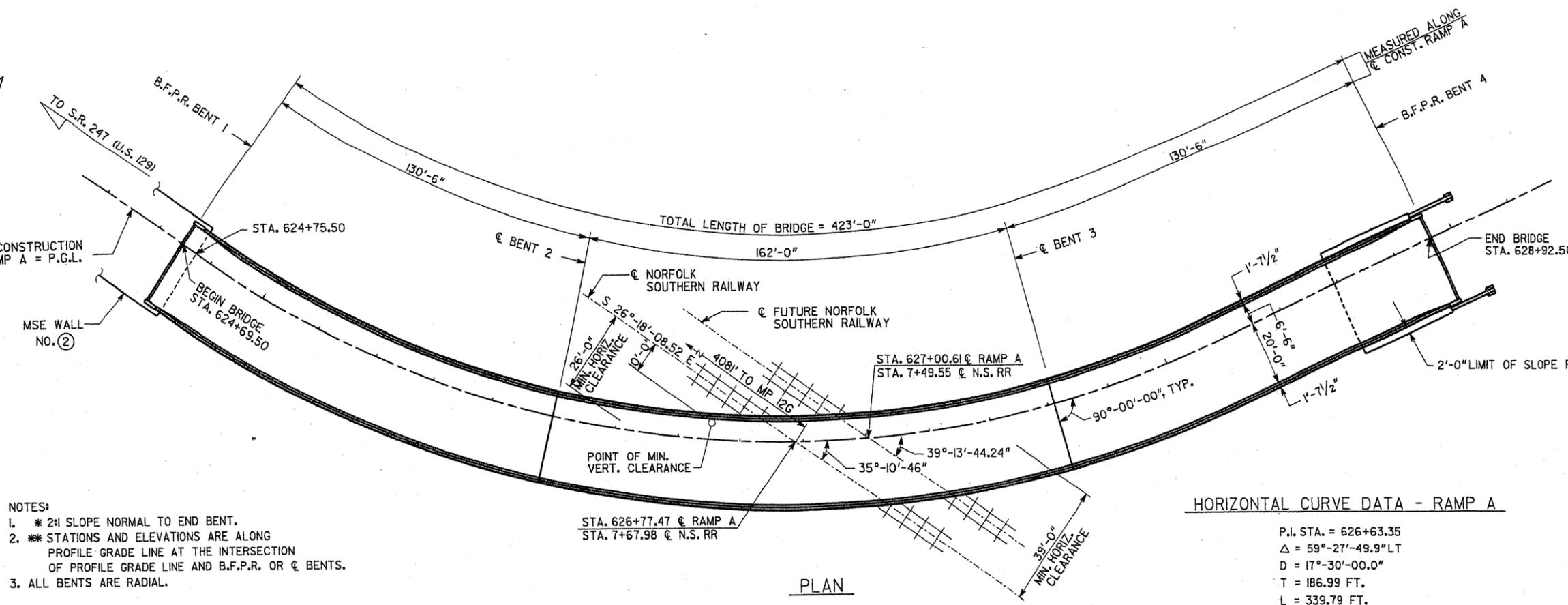
BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION
496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28
N 976446.37, E 2460964.837

TRAFFIC DATA

TRAFFIC ----- ADT = 3816 (2006)
ADT = 7125 (2026)
DESIGN SPEED ----- 35 MPH
TRUCKS ----- 4%
24 HR TRUCKS ----- 6%

UTILITIES

NONE

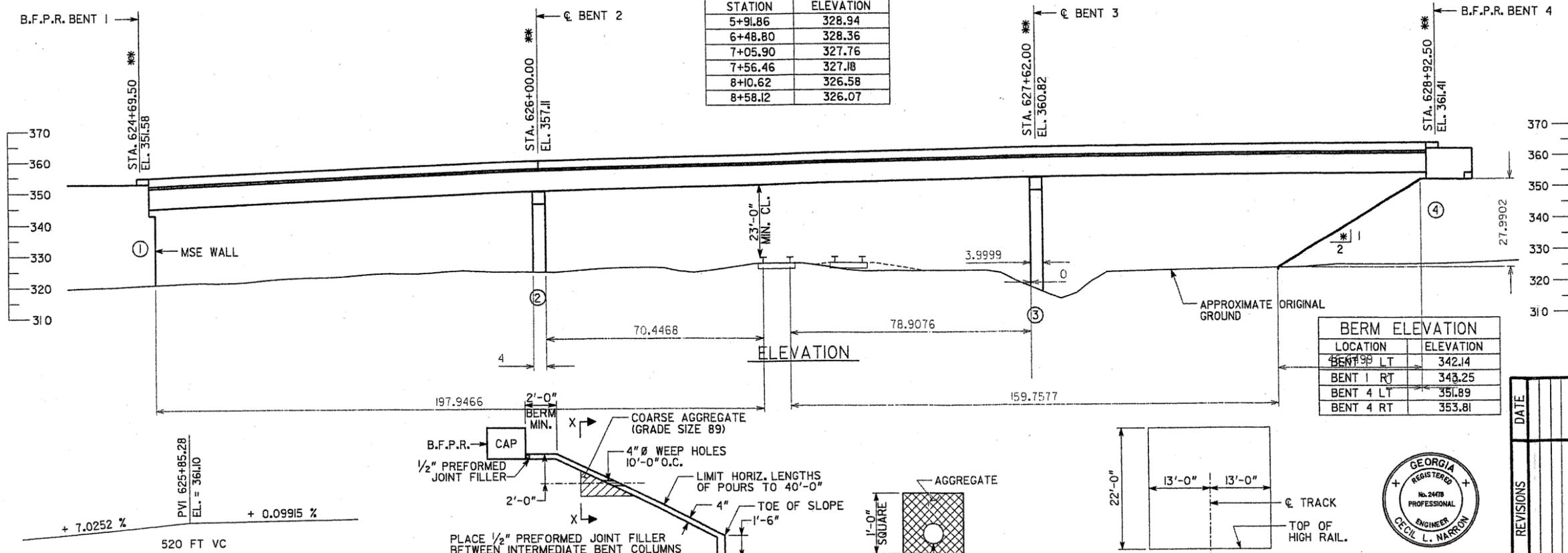


- NOTES:
- * 2H SLOPE NORMAL TO END BENT.
 - ** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ϵ BENTS.
 - ALL BENTS ARE RADIAL.

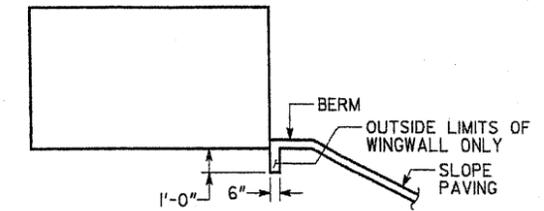
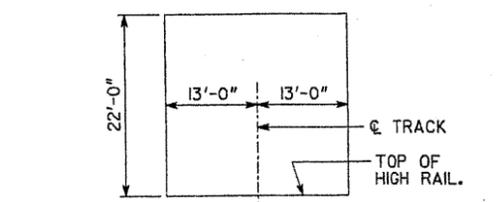
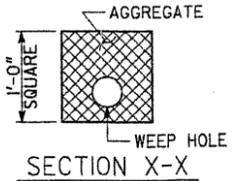
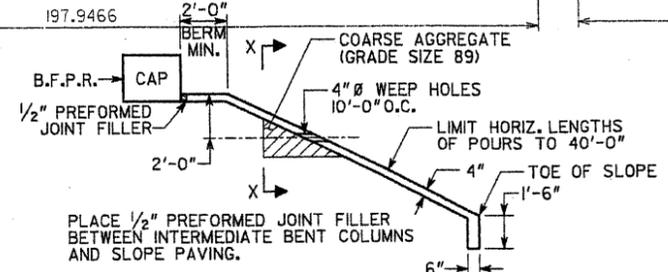
HORIZONTAL CURVE DATA - RAMP A

P.I. STA. = 626+63.35
 Δ = 59°-27'-49.9" LT
D = 17°-30'-00.0"
T = 186.99 FT.
L = 339.79 FT.
R = 327.40 FT.
S.E. = 8.00%

| RAILROAD PROFILE | |
|------------------|-----------|
| STATION | ELEVATION |
| 5+91.86 | 328.94 |
| 6+48.80 | 328.36 |
| 7+05.90 | 327.76 |
| 7+56.46 | 327.18 |
| 8+10.62 | 326.58 |
| 8+58.12 | 326.07 |



VERTICAL CURVE DATA - RAMP A
(ALONG P.G.L. & ϵ CONST.)



SLOPE PAVING DETAIL AT WINGS

AS DESIGNED

P.I. NO. 0000566
BRIDGE NO. 4



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GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
RAMP A OVER NORFOLK SOUTHERN RAILWAY
BIBB COUNTY STP-0000-00(566)

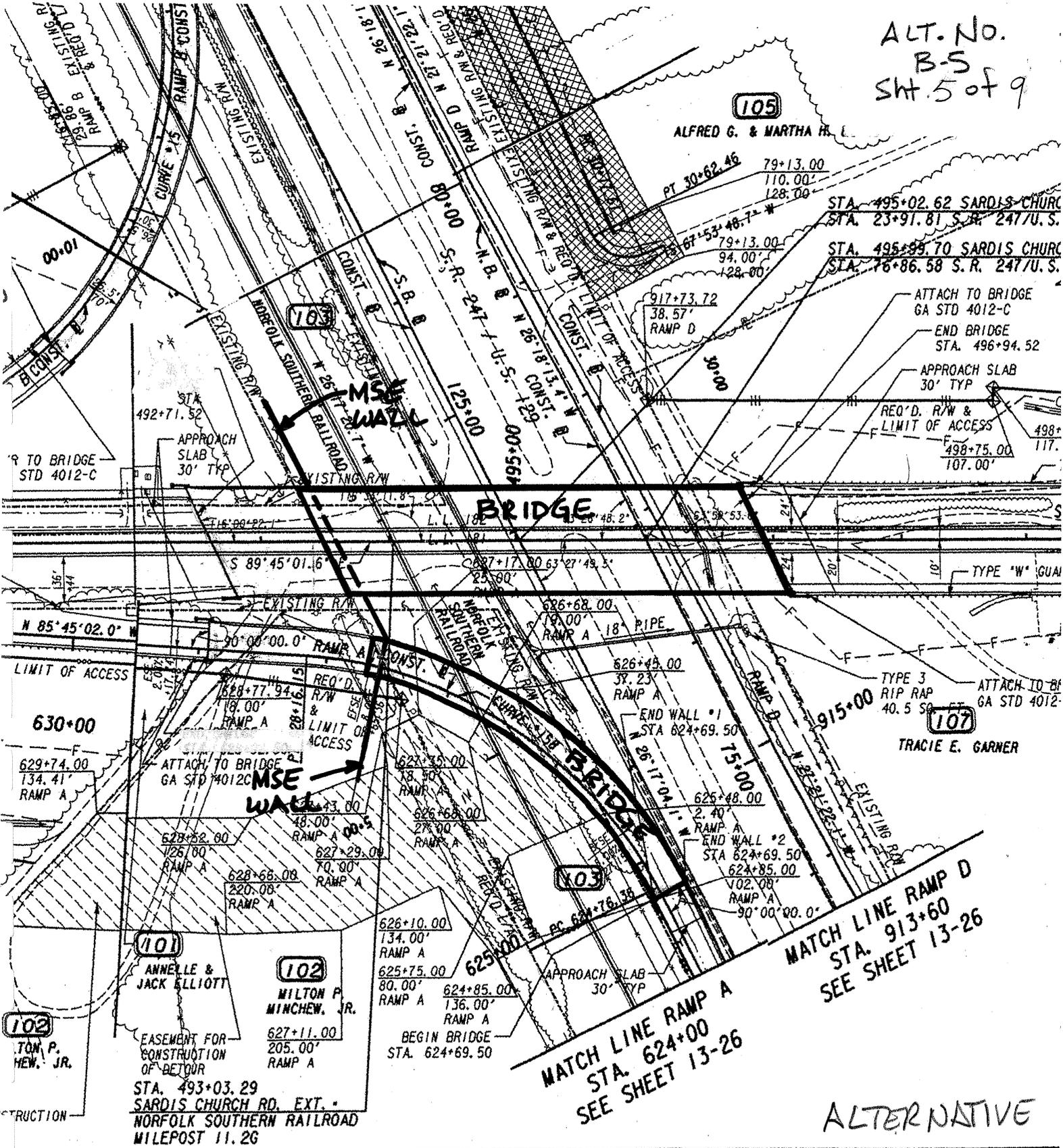
SCALE: 1" = 20'-0" JUNE 2006



BRIDGE SHEET
1 OF 1

| DATE | REVISIONS |
|------|-----------|
| | |
| | |
| | |
| | |

| | | |
|--------------|------------------|----------|
| DESIGNED MLR | CHECKED CLN | REVIEWED |
| DRAWN CEM | DESIGN GROUP KHA | APPROVED |



MATCH LINE RAMP D
STA. 913+60
SEE SHEET 13-26

MATCH LINE RAMP A
STA. 624+00
SEE SHEET 13-26

ALTERNATIVE

| | | |
|------------|-----------------------|-------|
| DATE OF GE | AND EXISTING R/W LINE | --- |
| VT OF TR | R/W LINE | --- |
| DESIGN | CTION LIMITS | ---</ |

ACT. NO.
B-5
Sht. 6 of 9

DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION
(DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ----- 30 LBS PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - 79'-0" TYPE III, PSC BEAM SPAN (W/ FASCIA BEAMS) --- SPECIAL DESIGN
- 3 - 100'-0" BULB TEE, 54" PSC BEAM SPAN ----- SPECIAL DESIGN
- 1 - 44'-0" TYPE II, PSC BEAM SPAN (W/ FASCIA BEAMS) --- SPECIAL DESIGN
- 4 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

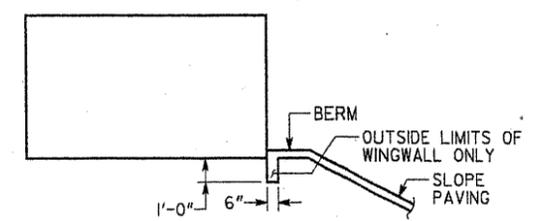
BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION 496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28 N 976446.371, E 2460964.837

TRAFFIC DATA

TRAFFIC----- ADT = 15060 (2006)
ADT = 25932 (2026)
DESIGN SPEED ----- 45 MPH
TRUCKS ----- 4%
24 HR TRUCKS ----- 6%
DIRECTIONAL DIST. ----- 50%

UTILITIES

NONE



SLOPE PAVING DETAIL AT WINGS

P.I. NO. 0000566
BRIDGE NO. 3

ALTERNATIVE

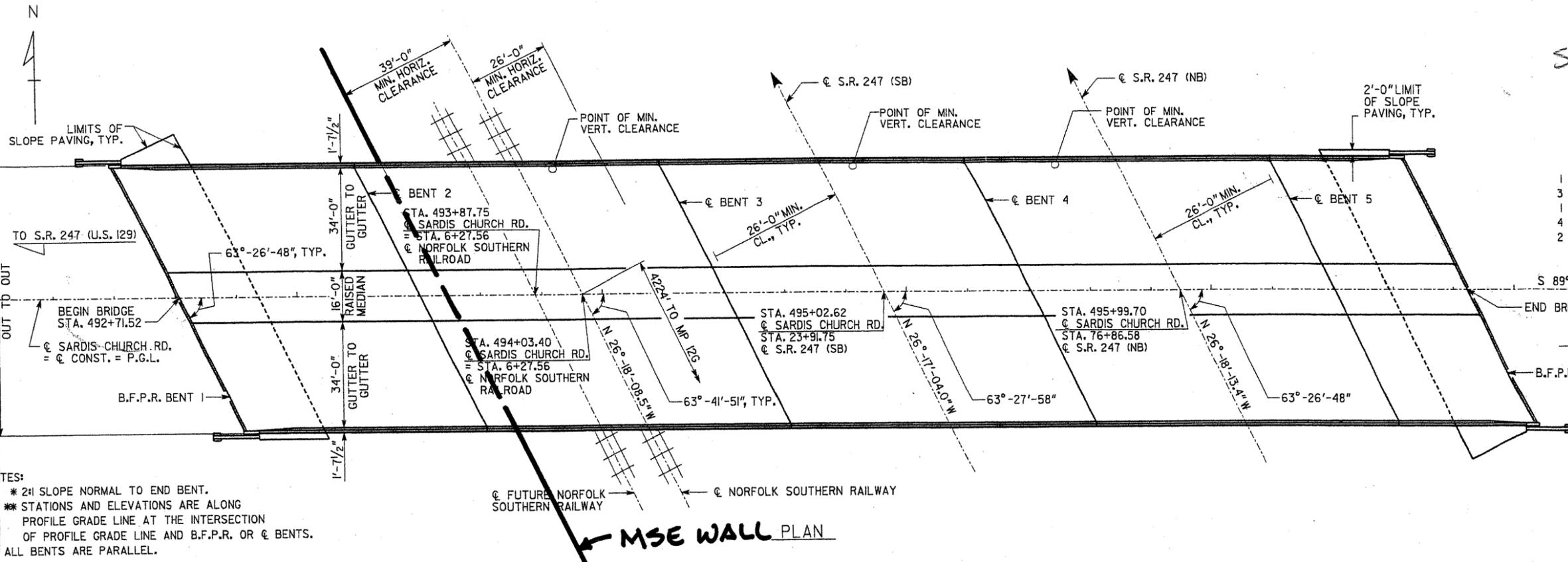
Kimley-Horn and Associates, Inc.

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RALEIGH, NORTH CAROLINA 27636

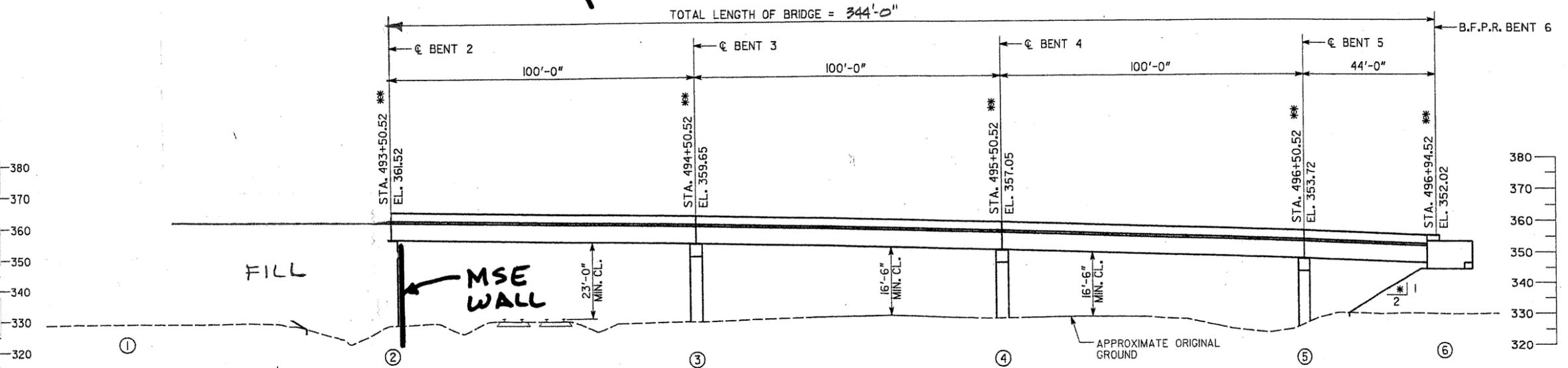
GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
SARDIS CHURCH ROAD OVER S.R. 247 (U.S. 129)
AND NORFOLK SOUTHERN RAILWAY
BIBB COUNTY STP-0000-00(566)

SCALE: 1" = 20'-0" JUNE 2006
DESIGNED MLR CHECKED CLN REVISIONS



NOTES:
* 2H SLOPE NORMAL TO END BENT.
** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR @ BENTS.
ALL BENTS ARE PARALLEL.



TOTAL LENGTH OF BRIDGE = 344'-0"

ELEVATION

| STATION | ELEVATION |
|---------|-----------|
| 5+39.09 | 329.41 |
| 5+91.86 | 328.94 |
| 6+48.80 | 328.36 |
| 7+05.90 | 327.76 |
| 7+56.90 | 327.18 |

| LOCATION | ELEVATION |
|-----------|-----------|
| BENT 1 LT | 353.77 |
| BENT 1 RT | 353.49 |
| BENT 6 LT | 344.87 |
| BENT 6 RT | 343.23 |

PROFILE GRADE DATA - S.R. 247

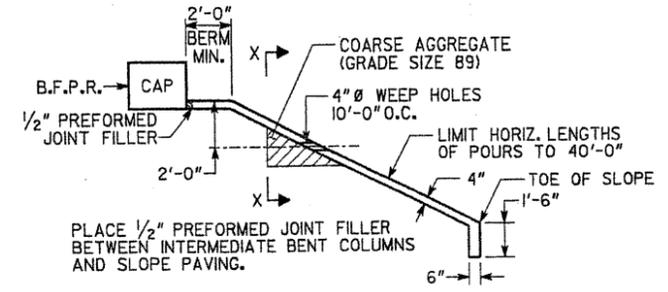
| | |
|--------------|--------------|
| PVI 23+00.00 | EL. = 327.54 |
| PVI 23+50.00 | EL. = 328.60 |
| PVI 24+00.00 | EL. = 329.29 |
| PVI 24+50.00 | EL. = 329.91 |
| PVI 25+00.00 | EL. = 330.69 |

Grades: 1.3800%, 1.2400%, 1.5600%, 2.1200%

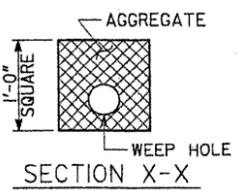
VERTICAL CURVE DATA - SARDIS CHURCH RD.

| | |
|--------------|---------------|
| PVI 49+00.00 | EL. = 376.600 |
| PVI 49+00.00 | EL. = 376.600 |
| PVI 49+00.00 | EL. = 376.600 |

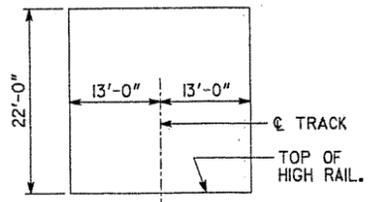
Grades: +4.7889%, -4.1333%
1220 FT VC



SLOPE PAVING DETAIL



SECTION X-X



CONSTRUCTION CLEARANCE DIAGRAM



BRIDGE SHEET

ALT. NO. B-5
 SH-7 of 9
 DESIGN DATA

SPECIFICATIONS ----- AASHTO 17TH EDITION (DESIGN FOR SEISMIC PERFORMANCE CATEGORY A)
 TYPICAL HS-20 AND/OR MILITARY LOADING ----- IMPACT ALLOWED
 FUTURE PAVING ALLOWANCE ----- 30 LBS. PER SQ. FT.

BRIDGE CONSISTS OF

- 1 - CURVED STEEL PLATE GIRDER ----- SPECIAL DESIGN CONTINUOUS UNIT (130'-6", 162'-0", 130'-6")
- 2 - CONCRETE INTERMEDIATE BENTS ----- SPECIAL DESIGN
- 2 - PILE END BENTS ----- SPECIAL DESIGN

BENCHMARK

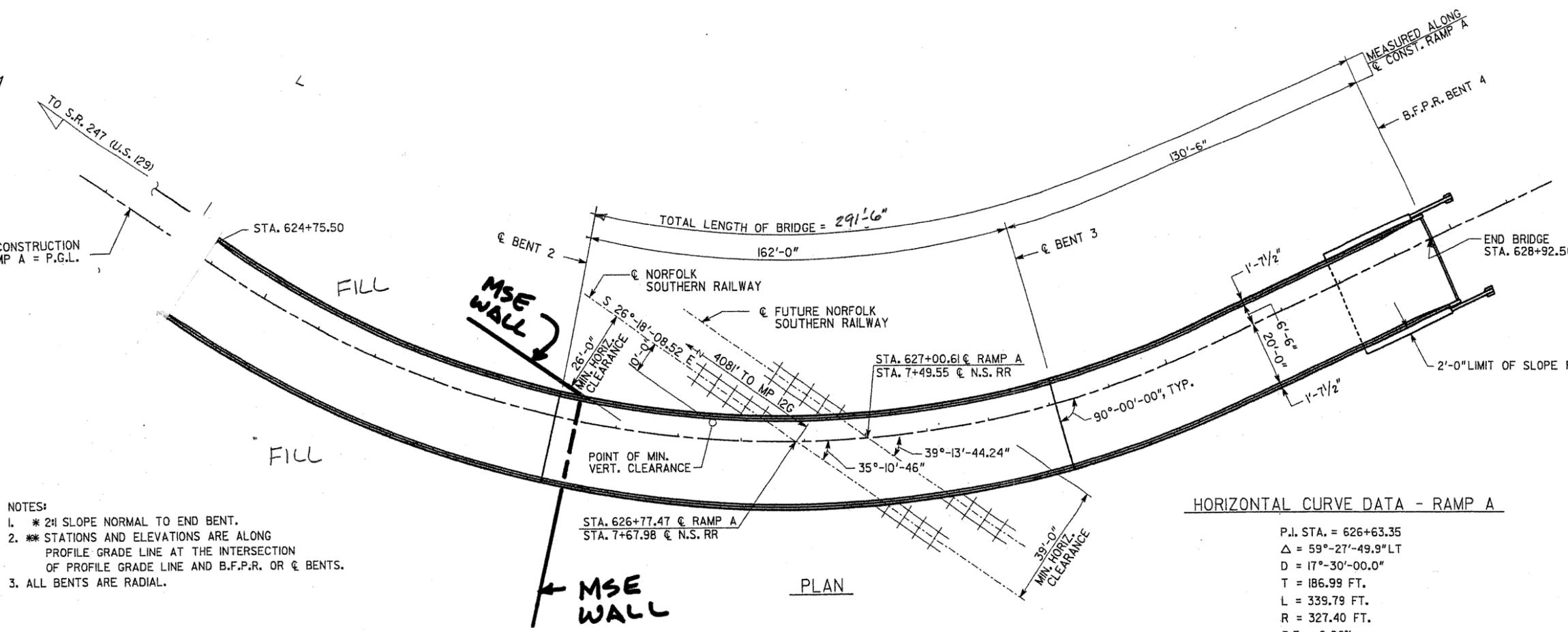
BENCHMARK IS A #5 REBAR LOCATED 14.42 FT. LEFT OF STATION 496+06.39 ON SARDIS CHURCH RD. ALIGNMENT, ELEVATION = 328.28 N 976446.371, E 2460964.837

TRAFFIC DATA

TRAFFIC ----- ADT = 3816 (2006)
 DESIGN SPEED ----- ADT = 7125 (2026) 35 MPH
 TRUCKS ----- 4%
 24 HR TRUCKS ----- 6%

UTILITIES

NONE

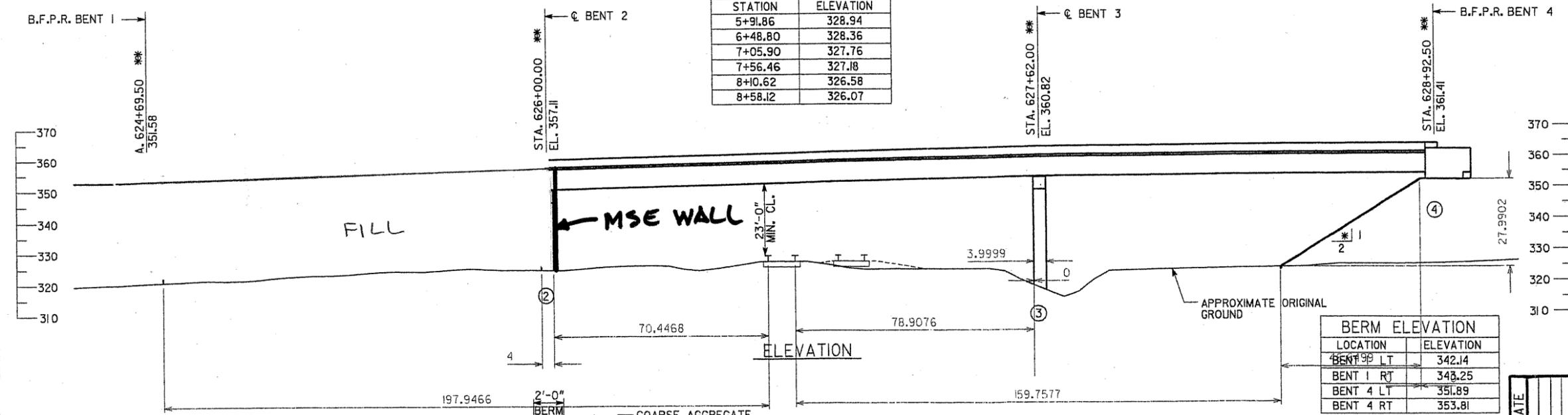


HORIZONTAL CURVE DATA - RAMP A

P.I. STA. = 626+63.35
 $\Delta = 59^\circ-27'-49.9''$ LT
 $D = 17^\circ-30'-00.0''$
 $T = 186.99$ FT.
 $L = 339.79$ FT.
 $R = 327.40$ FT.
 $S.E. = 8.00\%$

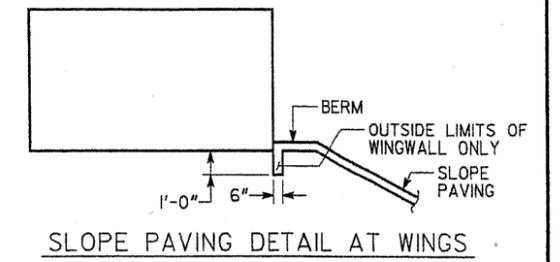
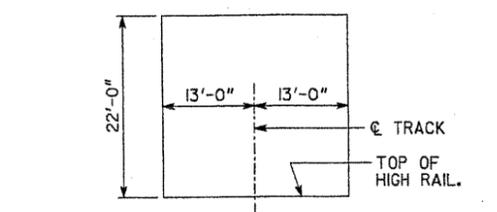
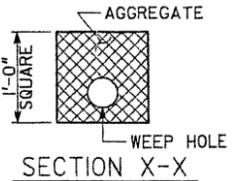
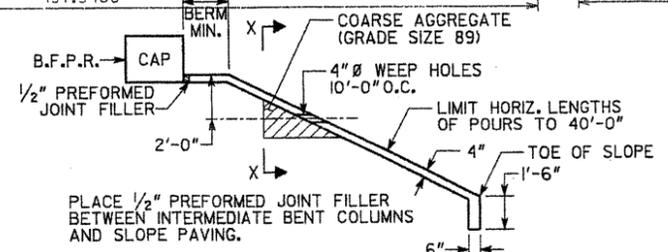
- NOTES:
- * 2H SLOPE NORMAL TO END BENT.
 - ** STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ϵ BENTS.
 - ALL BENTS ARE RADIAL.

| RAILROAD PROFILE | |
|------------------|-----------|
| STATION | ELEVATION |
| 5+91.86 | 328.94 |
| 6+48.80 | 328.36 |
| 7+05.90 | 327.76 |
| 7+56.46 | 327.18 |
| 8+10.62 | 326.58 |
| 8+58.12 | 326.07 |



VERTICAL CURVE DATA - RAMP A
 (ALONG P.G.L. & ϵ CONST.)

| | | | | |
|-----------|---------------|--------------|------------|-------------|
| 520 FT VC | PVI 625+85.28 | EL. = 361.10 | + 7.0252 % | + 0.09915 % |
|-----------|---------------|--------------|------------|-------------|



P.I. NO. 0000566
 BRIDGE NO. 4

ALTERNATIVE



GEORGIA DEPARTMENT OF TRANSPORTATION
 PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
 RAMP A OVER NORFOLK SOUTHERN RAILWAY
 BIBB COUNTY STP-0000-00(566)

SCALE: 1" = 20'-0" JUNE 2006



BRIDGE SHEET 1 OF 1

| DATE | REVISIONS | BY |
|------|-----------|----|
| | | |

| | | |
|--------------|------------------|----------|
| DESIGNED MLR | CHECKED CLN | REVIEWED |
| DRAWN CEM | DESIGN GROUP KHA | APPROVED |

CALCULATIONS



PROJECT:

**SARDIS CHURCH ROAD EXTENSION FROM EAST OF
SKIPPER ROAD TO U.S. 129/S.R. 247**
Georgia Department of Transportation

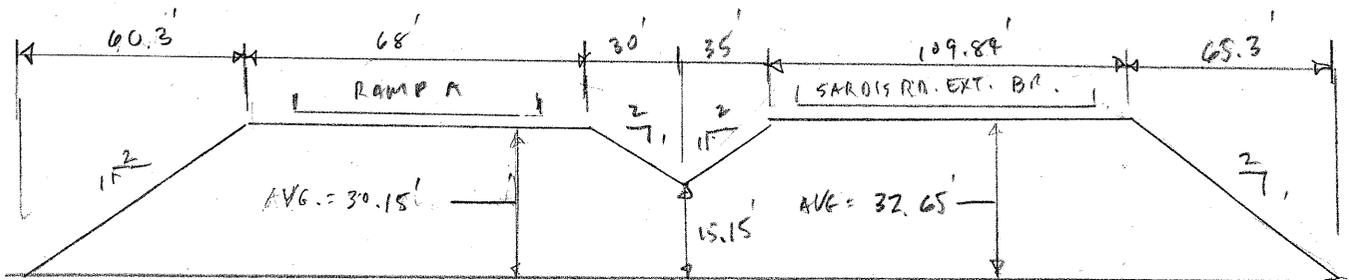
ALTERNATIVE NO.: B-5

SHEET NO.: B of 9

SARDIS CHURCH RD. EXT. BR. REDUCED AREA = $87.25' \times 73' = 6369$ SF. (CONCRETE BR.)

RAMP A BR = $29.75' \times 130.5'$ (SP. 1) = 3882 SF. (STEEL BR.)

COMBINED MSE WALL



$$\begin{aligned} \text{AREA} &= 0.5(60.3') 30.15' + 68' \times 30.15' + 0.5(30.15' + 15.15') 30' \\ &+ 0.5(15.15' + 32.65') 35' + 109.84' \times 32.65' + 0.5(65.3') 32.65' = 9,128 \text{ SF.} \end{aligned}$$

PAVEMENT AREA $\approx 84' \times 73' + 26.5' \times 130.5' = 9590$ SF = 1066 SY.
AT MSE WALL
SECTION

CONCRETE BARRIER = $2 \times 73' + 2 \times 130.5' = 407$ LF.

ADDL BACK AT SARDIS RT. EXT.

$$(87.25 - 2 \times 6 \times 39.65') \times 0.5(39.65') 73' / 27 \text{ CF} = 2126 \text{ CY}$$

PROJECT DESCRIPTION

The Sardis Church Road Extension project from just east of Skipper Road at I-75, then easterly on a new and existing location to SR 247/US 129/Hawkinsville Road for a total of 6.3 miles, provides an east-west arterial to accommodate the future growth in the Bibb County, City of Macon corridor and to improve access from I-75 to the Middle Georgia Regional Airport, its associated industrial park and Robins Air Force Base. The connector will also improve access for the traveling public and emergency vehicles by providing two grade separated railroad crossings. The rail corridor at SR 247/US 129 is a future passenger rail corridor to be used by the Georgia Passenger Rail Authority.

The project widens existing Sardis Church Road from 1,100 ft. east of Skipper Road east approximately 0.85 mile. From this point, the alignment continues easterly on a new location, bridging over the Norfolk Southern Railroad and Industrial Highway/US 41, then turns east and connects with existing Avondale Mill Road. The alignment follows Avondale Mill Road for the next 1.7 miles and terminates at the intersection of Avondale Mill Road and SR 247/US 129 where a trumpet interchange will be constructed.

The typical section will consist of two, 12-ft. wide lanes in each direction with 4-ft. bike lanes adjacent to the right lane, a 20-ft. wide raised median, 2.5-ft. curb and gutter section, and a two-foot wide grass area between the curb and a 5-ft. wide sidewalk on each side. The project is being designed for 45 miles per hour.

Another project will create an interchange for Sardis Church Road and I-75 to the west of this project and expand Sardis Church Road to a four-lane divided highway to 1,100 feet east of Skipper Road. This project takes off from this point and expands Sardis Church Road from two lanes to four lanes with a divided median. Left turn lanes in the median are added in the eastbound direction to access Murray Drive and then Fairystone Drive. In the westbound direction, left turn lanes in the median are provided at both locations for U-turns. The eastbound shoulder is widened to accommodate the U-turns.

A signalized intersection will be created at Goodall Mill Road where both right and left turn lanes will be added in each direction and the lanes on Goodall Mill Road will be widened for a short distance. East of Goodall Mill Road, Sardis Church Road will turn southwest off the current alignment onto a new alignment. Existing Sardis Church Road will be connected into the Sardis Church Road Extension with a new right-in/right-out intersection. A right turn lane to access the existing road will be provided in the westbound direction.

Southeast of the intersection with existing Sardis Church Road, provisions for U-turns will be constructed with left turn lanes in the median and widened shoulders to accommodate turning vehicles. A noise wall will be added on the northeast side of the road to protect a new residential subdivision in this area. There will be a signalized intersection with Houston Road where left and right turn lanes will be added to the Sardis Church Road Extension. Houston Road will be widened for a short distance on each side of the intersection.

Moving southeast from the intersection, the Sardis Church Road Extension will turn to the south and continue to an intersection with South Walden Road. Left and right turn lanes will be added to the Sardis Church Road Extension for the intersection movements. Proceeding south the road will cross over a double concrete box culvert and turn southeast. Provisions for U-turns from both directions including left turn lanes in the median and enlarged shoulders will be provided. A noise wall will be added on the northwest side of the road to reduce noise transmission to two residential cul-de-sacs in this area. The road then crosses a triple box culvert and two, side-by-side concrete box culverts leading to another U-turn area.

The new road will then bridge over the Norfolk Southern Railroad with one 94'-5" wide, 165'-9" long, three-span bridge, then Industrial Highway with a 94-ft. wide, 238'-6" long, three span bridge. The bridges will be constructed of precast, prestressed concrete AASHTO girders with a cast-in-place concrete deck supported on column piers and end abutments with sloped paving in front of the abutments. Southeast of Industrial Highway, a connector road will be constructed to connect the Sardis Church Road Extension to Industrial Highway. At the signalized intersection, an eastbound left turn lane in the median and a westbound left turn lane in the median for U-turns will be constructed along with a widened eastbound shoulder for the U-turns and a dedicated westbound right turn lane. A signalized intersection will be provided on Industrial Highway for the new T-intersection with the connector road.

Provisions for U-turns will be provided on Sardis Church Road Extension southeast of the T-intersection for the Industrial Highway Connector road. After the U-turn area, the Sardis Church Road Extension will turn to the east and another U-turn area will be created.

Further east, the road will cross to bridge culverts and intersect with Avondale Mill Road with a T-intersection. Left turn lanes will be provided in the median in each direction with the westbound lane providing a U-turn opportunity. Avondale Mill Road will be widened for a short distance north of the intersection to add a right-turn lane.

Continuing east the Sardis Church Road Extension meets the existing alignment of Avondale Mill Road and widens it to achieve the new typical cross-section. The new road will cross over a bridge culvert and the median will transition to 10'-6" wide with a concrete median barrier and paved inside shoulders for a short distance before it expands again to a 20-ft. wide raised median. It then proceeds to a U-turn area, followed by a double concrete box culvert crossing.

Three entrances to a City of Macon parking lot will be provided with a left turn lane in the eastbound direction for access to the parking lot and a left turn lane in the westbound direction for U-turns provided at the middle entrance.

Proceeding east the road transition to a rural cross section with 20-ft. wide raised median, two, 12-ft. wide travel lanes in each direction and 6'-6" wide paved shoulders. The road will bridge over the Norfolk Southern Railroad and SR 247/US 129 which are adjacent to each other. The bridge will be an 87'-3" wide, 5-span structure, 423'-4" long constructed of precast, prestressed concrete AASHTO girders with cast-in-place concrete deck supported on cast-in-place concrete column and cap beam pier bents, supported on foundations, and end bents with sloped paving in front of them.

Beyond the bridge the road will loop to the south and the westbound lanes will connect to northbound SR 247/US 129, Ramp C, and the eastbound lanes will continue to loop under the bridge and form the northbound on ramp, Ramp D, to SR 247/US 129. Additional ramps will be provided

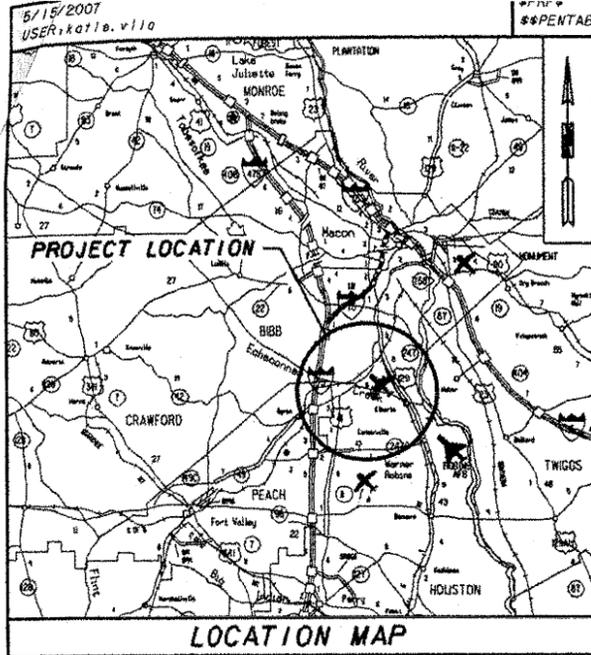
for the Ramp A, eastbound to southbound, and Ramp B, southbound to westbound movements. These ramps will bridge over the railroad using 29'-9" wide, three-span curved steel bridge girders 423'-0" long and composite cast-in-place concrete decks. The steel and concrete superstructure will be supported on cast-in-place concrete column bents with pier caps and concrete foundations. The end spans will be supported on end bents with sloped paving in front of them. The ramps will be placed in the space between the railroad and SR 247/US 129 using mechanically stabilized earth walls to form a confined earth section for the ramps.

Included in the project will be surface, paved and unpaved culverts, and piped storm water drainage feeding sediment basins along the route and discharges from the ponds to existing water courses. At major water crossing, combinations of precast concrete, multi-cell bridge culverts will be used. Eighteen-inch diameter culvert pipes will be used under driveways. Guardrail will be included where fill slopes are less than 4:1.

A map of the project follows.

Project Cost

Construction of the project is estimated to cost approximately \$47 million. Right-of-way will have to be acquired along the entire length of road to accommodate the widening, location on a new alignment, the addition of ramps, and storm water management.



DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247



FEDERAL AID PROJECT
BIBB COUNTY
STP-0000-00(566)

FEDERAL ROUTE * N/A
STATE ROUTE * N/A
P. I. NO. 0000566

BEGIN PROJECT
STA. 167+43.57
MACON/BIBB CO.
PROJECT NO. 5240-47
END GDOT PROJECT
NH-75-1-(246)

| DESIGN DATA: | SARDIS CHURCH RD | RAMPS @ US 129/SR 247 |
|------------------------|------------------|-----------------------|
| TRAFFIC A.D.T.: (2010) | 15060 | 430 TO 3816 |
| TRAFFIC A.D.T.: (2030) | 25932 | 1041 TO 7125 |
| TRAFFIC D.H.V.: (2030) | 2445 | 96 TO 732 |
| DIRECTIONAL DIST.: | 50/50 | 85/15 |
| % TRUCKS: | 4% | 4% |
| % 24 HR. TRUCKS: | 6% | 6% |
| SPEED DESIGN: | 45 MPH | 30-35 MPH |

NOTE: THE CO-ORDINATES LISTED ARE WEST ZONE
GRID CO-ORDINATES BASED ON THE GA. STATE PLANE
CO-ORDINATE SYSTEM OF 1985.
HORIZONTAL DATUM : NAD 1983
VERTICAL DATUM : NAVD 1988

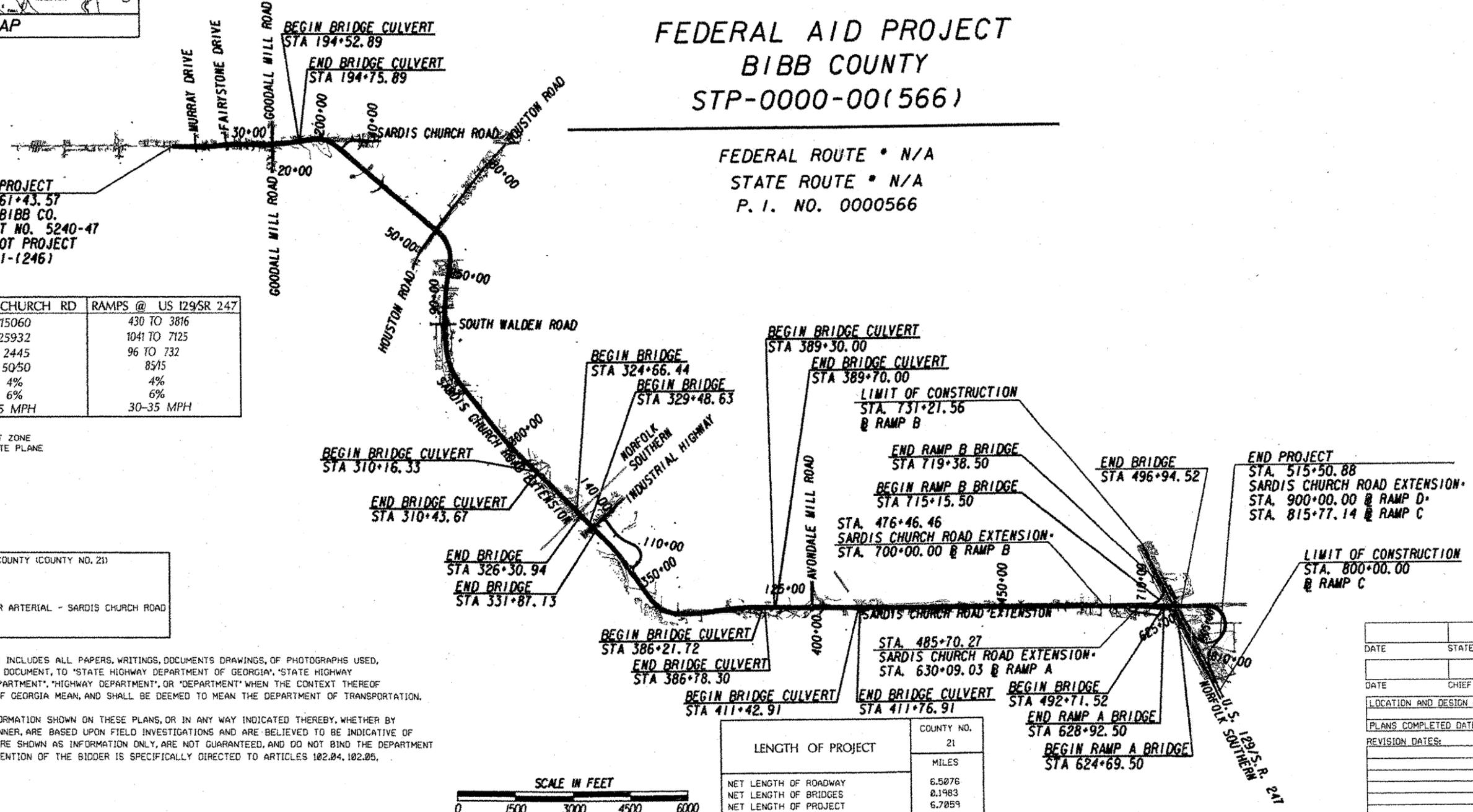
| MIDPOINT COORDINATE |
|---------------------|
| STATION 338+47.230 |
| N 978067.2470 |
| E 2446203.656 |

THIS PROJECT IS LOCATED 100% IN BIBB COUNTY (COUNTY NO. 21)
AND CONGRESSIONAL DISTRICT 8 .

PROJECT DESIGNATION :
PDP CLASSIFICATION :
FUNCTIONAL CLASSIFICATION : URBAN MINOR ARTERIAL - SARDIS CHURCH ROAD
THIS PROJECT IS IN ENGLISH UNITS.
THIS PROJECT IS EXEMPT

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

THE DATA, TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS, OR IN ANY WAY INDICATED THEREBY, WHETHER BY
DRAWINGS OR NOTES, OR IN ANY OTHER MANNER, ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF
ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED, AND DO NOT BIND THE DEPARTMENT
OF TRANSPORTATION IN ANY WAY. THE ATTENTION OF THE BIDDER IS SPECIFICALLY DIRECTED TO ARTICLES 102.04, 102.05,
AND 104.03 OF THE SPECIFICATIONS.



| LENGTH OF PROJECT | COUNTY NO. |
|--------------------------|------------|
| NET LENGTH OF ROADWAY | 21 |
| NET LENGTH OF BRIDGES | MILES |
| NET LENGTH OF PROJECT | 6.5076 |
| NET LENGTH OF EXCEPTIONS | 0.1983 |
| GROSS LENGTH OF PROJECT | 6.7059 |

| | | |
|-----------------------------------|----------------|-----------------|
| DATE | STATE | DESIGN ENGINEER |
| DATE | CHIEF ENGINEER | |
| LOCATION AND DESIGN APPROVAL DATE | | |
| PLANS COMPLETED DATE | | |
| REVISION DATES: | | |
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VALUE ANALYSIS AND CONCLUSION

INTRODUCTION

This section describes the value methodology followed during the VE study on the Sardis Church Road Extension. It is followed by narratives and conclusions concerning:

- Value Engineering Workshop Participants
- Economic Data
- Cost Model
- Function Analysis
- Creative Idea Listing and Judgment of Ideas

A systematic approach was used in the VE study and the key procedures involved were organized into three distinct parts: 1) preparation; 2) VE orientation meeting and workshop; and 3) post-study. A task flow diagram that outlines the procedures included in the VE study follows.

PREPARATION EFFORT

Preparation for the VE effort consisted of scheduling study participants and tasks, gathering necessary background information on the facility, and compiling project cost data into a cost histogram. Information relating to the design, construction, and operation of the facility is important as it forms the basis of comparison for the study effort. Information relating to funding, community needs, route and bridge evaluations, and the basis of cost were also a part of the analysis.

VALUE ENGINEERING WORKSHOP EFFORT

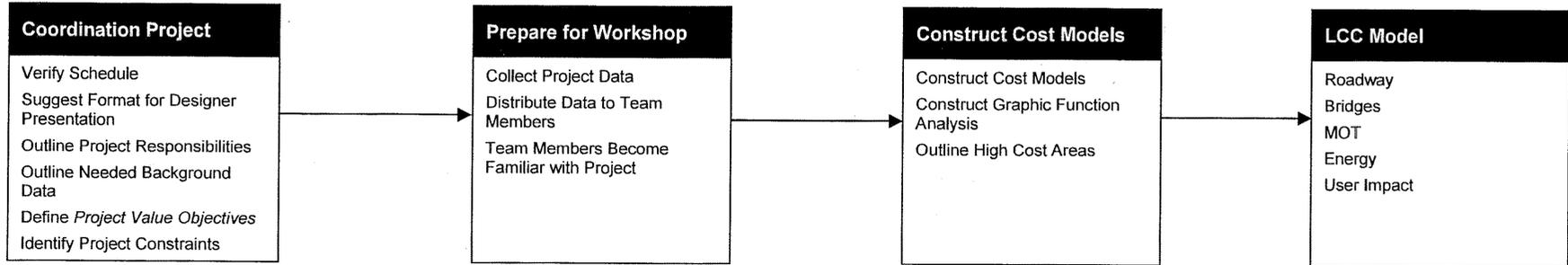
The VE effort consisted of a three and one-half day, 28-hour workshop. During the workshop, the VE job plan was followed. The job plan guided the search for alternatives to enhance value. It included six phases:

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

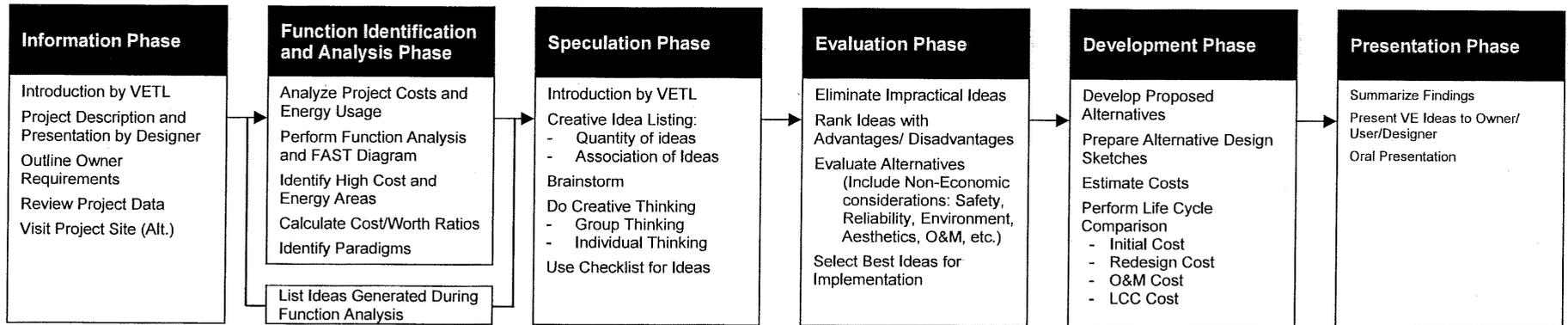


Value Engineering Study Task Flow Diagram

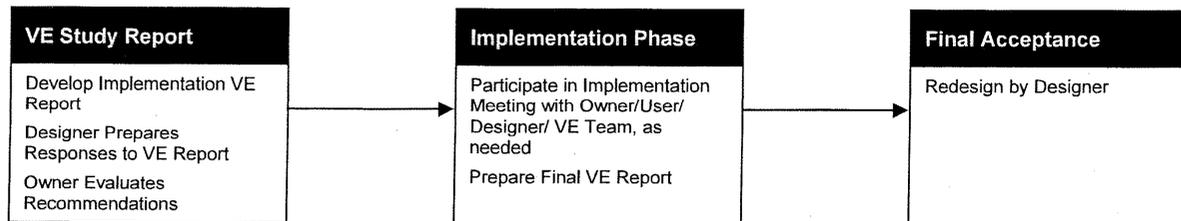
Preparation Effort



Workshop Effort



Post-Workshop Effort



Information Phase

At the beginning of the study, the decisions that influenced the development of the design must be reviewed and understood. For this reason, the designers from Kimley-Horn and Associates, Inc. presented information about the project to the VE team on first day of the VE session.

The cost histogram developed during the workshop preparation was reviewed to identify the major construction elements.

Function Identification and Analysis Phase

Function Analysis was used to evaluate the project to see if the expenditures actually perform the requirements of the project or if there are disproportionate amounts of money spent on support functions. These elements add cost to the final product but have a relatively low worth to the basic function. This creates a high cost-to-worth ratio, and the VE team targets these areas for value improvement.

Creative Phase

This VE study phase involved the creation and listing of ideas. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower total life cycle cost to GDOT, or to improve the quality of the project. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and free association of ideas.

GDOT and its design consultant may wish to review the creative list since it may contain ideas that can be further evaluated for use in the design.

Evaluation Phase

During this phase of the workshop, the VE team judged the ideas generated during the creative phase. Advantages and disadvantages of each idea were discussed to find the best ideas for development. Ideas found to be irrelevant or not worthy of additional study were discarded. Those that represented the greatest potential for cost savings or improvement to the project were then developed further.

The VE team would like to develop all ideas, but time constraints usually limit the number that can be developed. Therefore, each idea was compared with the present design concept in terms of how well it met the design criteria. Advantages and disadvantages were discussed and recorded and the ideas were rated on a scale of 1-5, with the best ideas rated 5. Generally, only ideas rated 4 of 5 were developed into alternatives. In cases where there was little cost impact but an improvement to the project was anticipated, the designation DS, for design suggestion, was used. The design team should review this listing for possible incorporation of ideas into the project.

The creative listing was re-evaluated frequently while developing alternatives. As the relationship between creative ideas became more clearly defined, their importance and ratings may have changed, or they may have been combined into a single alternative. For these reasons, some of the originally highly-rated items may not have been developed into alternatives.

Development Phase

During the development phase, the best ideas were expanded into workable solutions. The development consisted of a description of the alternative, life cycle cost comparisons, where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed alternatives. Each alternative was written with a brief narrative to compare the original design to the proposed change. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in the section entitled: Study Results.

Presentation Phase

The last phase of the VE team's work is to present the alternatives. This is done in two parts; first there was an informal presentation of the developed alternatives and design suggestions on the last day of the VE study. Secondly, this written report is submitted as a record of the works of the VE team, and to serve as a tool for GDOT and its consultant staff to work out an implementation plan for the best, selected alternatives and design suggestions.

POST-WORKSHOP EFFORT

The post-workshop portion of the VE study includes the preparation of this report. Professionals from GDOT and the design team will analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. LZA is available at your convenience as you review the alternatives.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise on the project elements involved. Team members consisted of a multidisciplinary group with professional highway planning, design, and construction experience. The VE team included the following:

| <u>Participant</u> | <u>Specialization</u> | <u>Organization</u> |
|-------------------------------|-----------------------|------------------------------|
| Howard B. Greenfield, PE, CVS | VE Team Leader | Lewis & Zimmerman Associates |
| Joseph Leoni, PE | Highway Design | ARCADIS U.S., Inc. |
| Alex Pascual, PE | Bridge Engineering | HNTB Corporation |
| Paresh Parikh, PE | Cost/Constructability | Delon Hampton & Associates |

The study was conducted at GDOT's Central Office, Atlanta, Georgia June 11 – 14, 2007.

DESIGNER'S PRESENTATION

Bryon Letourneau, PE from Kimley-Horn presented an overview of the project on Monday, June 11, 2007. The purpose of this meeting, in addition to being an integral part of the Information Phase of the VE study, was to bring the VE team "up-to-speed" regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail those areas of the project requiring additional or special attention. The attendees at that meeting are indicated on the following sign-in sheet.

VALUE ENGINEERING TEAM'S PRESENTATION

A VE presentation was conducted on Thursday, June 14, 2007. The purpose of this meeting was to review the alternatives developed during the study and allow representatives from GDOT and the design team to obtain clarification from the VE of the alternatives and design suggestions presented. A Draft Summary of Potential Cost Savings table with all the alternatives and design suggestions was provided to the attendees. A copy of the attendance list for this meeting is also attached.

VE STUDY SIGN-IN SHEET

Project No.: STP-0000-00(566)

County: Bibb

PI No.: 0000566

Date: June 11-14, 2007

| NAME | EMPLOYEE ID NO. | DOT OFFICE OR COMPANY | PHONE NUMBER | EMAIL ADDRESS |
|----------------------|-----------------|-----------------------------|---------------|----------------------------------|
| Lisa L. Myers | 00244168 | Engineering Services | 404-651-7468 | lisa.myers@dot.state.ga.us |
| Joe Leoni | | ARCADIS | 770-431-8666 | Joe.Leon@ARCADIS-US.COM |
| KEN WERHO | 00258268 | GDOT-OTO-DESIGN/REV | 404-635-8144 | KEN.WERHO@DOT.STATE.GA.US |
| JEFF SIMMONS | 00232176 | GDOT-URBAN | 404-656-5444 | jeff.simmons@dot.state.ga.us |
| PARESH PARIKH | | DHA | 404-419-8434 | pparikh@delonhampton.com |
| RON WISHON | 00208180 | ENG. SRVCS | 404-651-7470 | ron.wishon@dot.state.ga.us |
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| RICHARD MARSHALL | 00212033 | GDOT-CONSTRUCT. | 404-656-5306 | richard.marshall@dot.state.ga.us |
| HOWARD GREENFIELD | | LEWIS & ZIMMERMAN ASSOC. | 301-984-9590 | hgreenfield@lza.com |
| BEAU QUARLES | 00818616 | GDOT - ROAD DESIGN | | |
| NICOLE LAW | 008163049 | GDOT - URBAN DESIGN | 404-656-5444 | nicole.law@dot.state.ga.us |
| Doug Franks | 00809138 | GDOT - Bridge Design | 404-656-5289 | douglas.franks@dot.state.ga.us |
| LAMAR M. FRUITT, JR. | 00229230 | GDOT - DIST. 3 CONST. | 706 646-6569 | lamar.pruitte@dot.state.ga.us |
| Chuck Hasty | 00293112 | GDOT - Urban | 404) 656-5454 | chuck.hasty@dot.state.ga.us |
| Jennifer Mathis | 00818263 | GDOT - OEL | 404) 699-4408 | jennifer.mathis@dot.state.ga.us |
| Jenny MILLIGAN | | GDOT R/W | 770 986 1541 | Jmilligan@dot |
| Clinton Ford | 00316300 | GDOT Dist 3 Const | 478-757-2606 | Clinton.Ford@dot.state.ga.us |
| ALEX PASCUAL | | HNTB | 404-946-5738 | apascual@hntb.com |

VE STUDY SIGN-IN SHEET

Project No.: STP-0000-00(566)

County: Bibb

PI No.: 0000566

Date: June 11-14, 2007

| | NAME | EMPLOYEE ID NO. | DOT OFFICE OR COMPANY | PHONE NUMBER | EMAIL ADDRESS |
|---|----------------------|-----------------|-----------------------------|--------------|----------------------------------|
| x | Lisa L. Myers | 00244168 | Engineering Services | 404-651-7468 | lisa.myers@dot.state.ga.us |
| x | Joe Leoni | | ARCADIS | 770-431-8666 | Joe.Leonie@ARCADIS-US.COM |
| | KEN WERHO | 00258268 | GDOT-OTD-DESIGN/REV | 404-635-8144 | KEN.WERHO@DOT.STATE.GA.US |
| X | JEFF SIMMONS | 00282176 | GDOT-URBAN | 404-656-5444 | jeff.simmons@dot.state.ga.us |
| x | PARESH PARIKH | | DHA | 404-419-8434 | pparikh@dolanhampton.com |
| X | RON WISHON | 00208180 | ENG. SVCS. | 404-651-7470 | ron.wishon@dot.state.ga.us |
| | BRYAN LETOURNEAU | | KIMLEY-HORN AND ASSOC. INC. | 770-825-0744 | Bryan.Letourneau@Kimley-Horn.com |
| | RICHARD MARSHALL | 00212033 | GDOT-CONTRACT. | 404-656-5306 | richard.marshall@dot.state.ga.us |
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| | BEAU QUARLES | 00918616 | GDOT - ROAD DESIGN | | |
| | NICOLE LAW | 008163049 | GDOT - URBAN DESIGN | 404-656-5444 | nicole.law@dot.state.ga.us |
| | Doug Franks | 00809138 | GDOT - Bridge Design | 404-656-5289 | douglas.franks@dot.state.ga.us |
| | LAMAR M. FRUITT, JR. | 00229230 | GDOT-DIST. 3 CONST. | 706-646-6369 | lamar.pruitte@dot.state.ga.us |
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| | Jennifer Mathis | 00818263 | GDOT - OEL | 404-699-4408 | jennifer.mathis@dot.state.ga.us |
| | Jenny MILLIGAN | | GDOT R/W | 770-986-1541 | Jmilligan@dot |
| | Clinton Ford | 00316300 | GDOT Dist 3 Conn | 478-757-2606 | Clinton.Ford@dot.state.ga.us |
| x | ALEX PASCUAL | | HNTB. CORP. | 404-546-5738 | apascual@mindspring.com |

x BRIAN SUMMERS GADOT-Eng. Services

ECONOMIC DATA

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

| | |
|------------------------------------|------------------|
| Year of Analysis: | 2006 |
| Current Construction Cost Estimate | \$46.4 million * |
| Right-of-Way Cost | \$22 million |
| Expected Construction Start | 2008 |
| Construction Duration | 24 months |
| Economic Planning Life: | 50 years |

***Note:** The cost estimate provided to the VE team showed a \$42.6 million cost for the project. However, there were no costs included for the mechanically stabilized earth (MSE) walls to be used at Ramps A and B and all the bridges were priced using \$88/square foot. The VE team added \$1.6 million for the MSE walls and changed the bridge costs to \$120/square foot for the bridges using precast, prestressed concrete AASHTO girders and \$160/square foot for the ramp bridges with curved steel girders based on current costs for these types of bridges. This brought the total project cost to \$46.4 million.

The VE team also believes the costs will escalate further because of inflation between the time of the current cost estimate and the actual bid date and the fact that there is about \$500,000 cubic yards of borrow material needed to complete the project.

COST MODEL

The VE team prepared a cost histogram model, or Pareto Chart, for the project that follows this page. This cost model displays the major construction elements in each project and reflects the information that appeared in the GDOT cost estimate for the construction. The Pareto Chart is an aid to identify high cost areas in the projects.

The high cost elements are:

- Pavement Section
- Grading
- Storm Drainage
- Bridge for Sardis Church Road Extension over the Norfolk Southern Railroad and U.S. 129/S.R. 247
- Bridge for Ramp A over the Norfolk Southern Railroad
- Bridge for Ramp B over the Norfolk Southern Railroad
- Bridge for Sardis Church Road Extension over Industrial Highway

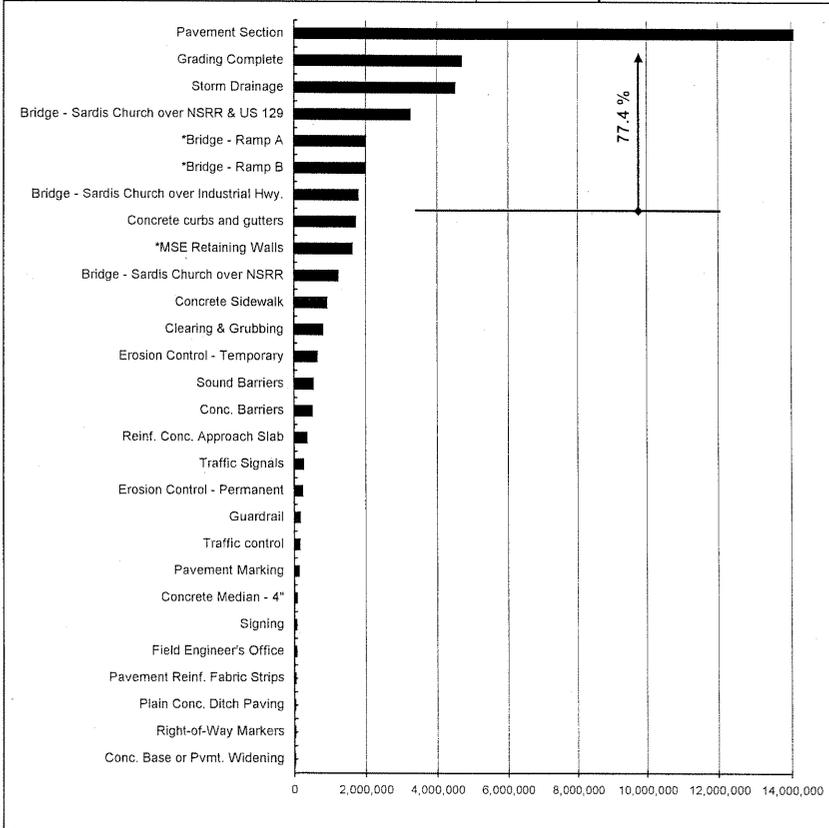
These elements represent about 77% of the cost of each project.

COST HISTOGRAM



PROJECT: SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.R. 247

| PROJECT ELEMENT | COST | PERCENT | CUM. PERCENT |
|---|----------------------|--------------------------|--------------|
| Pavement Section | 14,421,950 | 34.19% | 34.19% |
| Grading Complete | 4,678,600 | 11.09% | 45.28% |
| Storm Drainage | 4,499,627 | 10.67% | 55.94% |
| Bridge - Sardis Church over NSRR & US 129 | 3,247,500 | 7.70% | 63.64% |
| *Bridge - Ramp A | 2,000,000 | 4.74% | 68.38% |
| *Bridge - Ramp B | 2,000,000 | 4.74% | 73.12% |
| Bridge - Sardis Church over Industrial Hwy. | 1,792,500 | 4.25% | 77.37% |
| Concrete curbs and gutters | 1,717,399 | 4.07% | 81.44% |
| *MSE Retaining Walls | 1,625,400 | 3.85% | 85.29% |
| Bridge - Sardis Church over NSRR | 1,230,000 | 2.92% | 88.21% |
| Concrete Sidewalk | 922,240 | 2.19% | 90.40% |
| Clearing & Grubbing | 800,000 | 1.90% | 92.29% |
| Erosion Control - Temporary | 638,805 | 1.51% | 93.81% |
| Sound Barriers | 518,500 | 1.23% | 95.04% |
| Conc. Barriers | 493,322 | 1.17% | 96.20% |
| Reinf. Conc. Approach Slab | 355,369 | 0.84% | 97.05% |
| Traffic Signals | 256,650 | 0.61% | 97.66% |
| Erosion Control - Permanent | 238,041 | 0.56% | 98.22% |
| Guardrail | 165,069 | 0.39% | 98.61% |
| Traffic control | 150,000 | 0.36% | 98.97% |
| Pavement Marking | 129,503 | 0.31% | 99.27% |
| Concrete Median - 4" | 73,892 | 0.18% | 99.45% |
| Signing | 65,063 | 0.15% | 99.60% |
| Field Engineer's Office | 61,263 | 0.15% | 99.75% |
| Pavement Reinf. Fabric Strips | 32,025 | 0.08% | 99.82% |
| Plain Conc. Ditch Paving | 30,410 | 0.07% | 99.90% |
| Right-of-Way Markers | 26,448 | 0.06% | 99.96% |
| Conc. Base or Pvmt. Widening | 17,526 | 0.04% | 100.00% |
| Subtotal | \$ 42,187,102 | 100.00% | |
| E&C @ 10.00% | \$ 4,218,710 | | |
| Subtotal Construction | \$ 46,405,812 | | |
| Right-of-Way | \$ 21,995,120 | | |
| Reimbursed Utilities | \$ 200,000 | | |
| TOTAL | \$ 68,600,932 | Comp Mark-up: 10% | |



Costs in graph are not marked-up.

FUNCTION ANALYSIS

Function Analysis was performed to define the requirements for each project element and ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain a given requirement. A random function analysis worksheet for the overall project is attached. This sheet stimulated the VE team members to think of the areas in which to channel their creative idea development. Areas where poor value appears to be provided or where there are opportunities to save cost include:

- Pavement
- Grading
- Concrete sidewalk
- Storm Drainage
- Bridges

FUNCTION ANALYSIS AND COST-WORTH



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO**
U.S. 129/S.4.247
Bibb County

SHEET NO.: **1 of 3**

| NO. | ELEMENT | FUNCTION | | | COST (000) | WORTH (000) | COMMENTS |
|-----|------------------------|-------------|----------------|------|---------------|----------------|----------|
| | | VERB | NOUN | KIND | | | |
| | PROJECT | Connect | Areas | HO | \$42.6M | | |
| | 6.8 Miles | Promote | Growth | HO | | | |
| | \$6.2M/Mile | Enhance | Safety | HO | | | |
| | | Add | Lanes | B | | | |
| | PAVEMENT | Provide | Riding Surface | B | \$14.4M | \$13.0M | |
| | | Support | Loads | B | | | |
| | | Accommodate | Bicycles | S | | | |
| | GRADING | Establish | Elevation | B | \$4.7M | \$4.2M | |
| | STORM DRAINAGE | Remove | Storm Water | R/S | \$4.5M | \$4.0M | |
| | | Redirect | Flow | S | | | |
| | BRIDGE @ SR-247 | Separate | Traffic | B | \$3.3M | \$3.0M | |
| | | Enhance | Safety | B | | | |

Function defined as: Action Verb
 Measurable Noun

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

Cost/Worth Ratio =
 (Total Cost ÷ Basic Worth)

FUNCTION ANALYSIS AND COST-WORTH



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO**
U.S. 129/S.4.247
Bibb County

SHEET NO.: **2 of 3**

| NO. | ELEMENT | FUNCTION | | | COST (000) | WORTH (000) | COMMENTS |
|-----|-----------------------------------|----------|-----------------|------|---------------|----------------|----------|
| | | VERB | NOUN | KIND | | | |
| | BRIDGE AT RAILROAD (RR) | Separate | Traffic From RR | B | \$1.2M | | |
| | | Enhance | Safety | B | | | |
| | BRIDGE @ INDUSTRIAL ROAD | Separate | Traffic | B | \$1.8M | | |
| | | Enhance | Safety | B | | | |
| | CONCRETE CURB & GUTTER | Confine | Vehicles | B | \$1.7M | \$1.0M | |
| | | Conveys | Storm Water | S | | | |
| | | Redirect | Vehicles | B | | | |
| | | Defines | Travel Lane | S | | | |
| | RAMP BRIDGE | Separate | Traffic | B | \$1.1M ea. | \$2.0M ea. | |
| | | Enhance | Operations | B | | | |
| | | Enhance | Safety | B | | | |

Function defined as: Action Verb
 Measurable Noun

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

Cost/Worth Ratio =
 (Total Cost + Basic Worth)

FUNCTION ANALYSIS AND COST-WORTH



PROJECT: **SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO**
U.S. 129/S.4.247
Bibb County

SHEET NO.: **3 of 3**

| NO. | ELEMENT | FUNCTION | | | COST (000) | WORTH (000) | COMMENTS |
|-----|----------------------------------|----------|-----------------------------|------|---------------|----------------|----------|
| | | VERB | NOUN | KIND | | | |
| | RETAINING WALLS | Reduce | Right-of-way Requirements | S | \$1.6M | | |
| | | Reduce | Bridge Lengths | S | | | |
| | | Support | Earth | S | | | |
| | CONCRETE SIDEWALK | Support | Pedestrians | B | \$.9M | \$.5M | |
| | CLEARING & GRUBBING | Create | Space | B | \$.8M | | |
| | TEMPORARY EROSION CONTROL | Prevent | Erosion During Construction | S | \$.6M | | |
| | SOUND BARRIER | Prevent | Sound Transmission | S | \$.5M | \$0 | |
| | CONCRETE BARRIER | Enhance | Safety | B | \$.5M | | |
| | | Separate | Traffic | B | | | |
| | | Redirect | Traffic | B | | | |

Function defined as: Action Verb
 Measurable Noun

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

Cost/Worth Ratio =
 (Total Cost ÷ Basic Worth)

CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the creative phase, numerous ideas, alternatives proposals and/or recommendations were generated using conventional brainstorming techniques as recorded on the following pages. These ideas were then discussed and compared against the value objectives determined from conversations with GDOT and the design team during the presentation of the project. According to these discussions, the top criteria are:

1. Save cost
2. Enhance safety
3. Do not affect the Environmental Impact Statement
4. Do not affect right-of-way requirements
5. Maintain design criteria
6. Constructability

The ideas were then ranked on a scale of 1-5 on how well the VE team believed the idea met these criteria overall. The higher rated ideas were then developed into formal alternatives and included in the Study Report. Some ideas were judged to have minimal cost impacts on the project but provided enhancements in the form of improved safety, efficiency, constructability or potential to save unknown or hidden costs. These were given the designation "DS" which indicates a design suggestion. This designation is also used when an idea increases cost resulting from improving the functionality of the project or system, and is deemed by the VE team to be of significant value to the owner and designers.

Typically, all ideas rated 4 or above are included in the Study Report. When this is not the case, an idea was combined with another related idea or discarded, as a result of additional research that indicated the concept as not being cost-effective or technically feasible.

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

CREATIVE IDEA LISTING



| | | | |
|----------|---|------------|---------------|
| PROJECT: | SARDIS CHURCH ROAD EXTENSION FROM EAST OF SKIPPER ROAD TO U.S. 129/S.4.247 <i>Bibb County</i> | SHEET NO.: | 1 of 2 |
|----------|---|------------|---------------|

| NO. | IDEA DESCRIPTION | RATING |
|----------------------------------|---|------------|
| SIDEWALKS/BIKE PATHS (SB) | | |
| SB-1 | Substitute asphalt multi-use lane for two sidewalks | 4 |
| SB-2 | Delete sidewalk on one side | 4 |
| Sb-3 | Delete sidewalks on both sides of industrial highway | 3 |
| SB-4 | Use multi-use trail on one side and sidewalk on the other side and delete bike lanes | 4 |
| BRIDGES (SB) | | |
| B-1 | Replace bridge spans with MSE walls – shorten bridges | 5 |
| B-2 | Replace bridge with intersection at grade crossing | ? |
| B-3 | For ramp A bridge, make third span precast, prestressed AASHTO girders | 2 |
| B-4 | Use a braided ramp bridge for curved ramp bridges over railroad | 5 |
| CURB AND GUTTER (CG) | | |
| CG-1 | Use smaller gutter on median side of road | 4 |
| CG-2 | Use smaller gutter on outside edge of road where bike lanes are located | 5 |
| ROADWAY (R) | | |
| R-1 | Delete some u-turns/median openings | See Others |
| R-2 | Delete dedicated left-turn lanes at selected median openings | See Others |
| R-3 | Narrow lanes from 12 ft. wide to 11 ft. wide | 4 |
| R-4 | Delete bike lanes | 4 |
| R-5 | Delete bike lanes east of South Walden Road | 4 |
| R-6 | Move alignment to southwest where the road starts its new alignment | 3 |
| R-7 | Move alignment northeast where road changes from southeast to east | 3 |
| R-8 | Change industrial highway connector road to an interchange – add a lane on eastbound bridge | 2 |
| R-9 | Use a different pavement section for minor side roads being modified | 5 |
| R-10 | Lower road profile on sheet 15-09 to reduce rill | 2 |

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

