



SR 34 SE BYPASS FROM SR 16 TO
TURKEY CREEK ROAD
STP-0007-00(694), P. I. No. 0007694
Coweta County

Value Engineering Study Report
Concept Design Stage

March 2008

Designer



Clough Harbour & Associates, LLP

Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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April 9, 2008

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

re: Project Number STP-0007-00 (694), P. I. No. 0007694,
SR 34 SE Bypass from SR 16 to Turkey Creek Road, Coweta County
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. (LZA) is pleased to submit the referenced value engineering (VE) study report. The objective of the VE effort was to identify opportunities to improve the value of the project in terms of fulfilling the basic function of continuing the bypass, and where possible, reducing capital cost.

The project is a continuation of the existing Newnan Bypass, a rural roadway system having depressed grassed and flush medians with signalized intersections at its termini. The principal concern of the VE team was the relatively low volume of anticipated traffic in the design year of 2030. Significant cost reductions are possible by using a two-lane section throughout, using box culverts in lieu of bridges at two stream crossings, or eliminating the median.

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

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

Luis M. Venegas, PE, CVS, FSAVE, LEED® AP
Vice President

cc: Wayne Kennedy, Coweta County

Attachment

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report summarizes the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the State of Georgia Department of Transportation (GDOT). The subject of the study was the SR 34/Newnan Bypass from State Route (SR) 16 to Turkey Creek Road, Project No. STP-0007-00(694), P. I. No. 0007694, Coweta County (CC). The concept design documents, prepared by Clough Harbour & Associates LLP (CHA), were used as the basis for the study.

The VE workshop was held March 25 – 28, 2008 at GDOT's headquarters in Atlanta. Comprising the VE team was a multidisciplinary group with highway planning, design and construction experience. The team used the following six-phased VE Job Plan to guide its deliberations:

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

PROJECT DESCRIPTION

The project is a continuation of the existing Newnan Bypass, a rural roadway system having depressed grassed and flush medians with signalized intersections at its termini. It is located near the center of Coweta County, southeast of the City of Newnan and slightly northwest of the Interstate 85 (I-85) Interchange 41 for SR 14/US 29. It is an extension of the existing Newnan Bypass which currently terminates at Turkey Creek Road from the north. This segment of the overall bypass will extend approximately 1.6 miles on new alignment between Turkey Creek Road and SR 16, and will include traffic signal controlled intersections at its termini with both Turkey Creek Road and SR 16. The project will cross over the Central of Georgia Railway near the approach to Turkey Creek Road at its northerly terminus, and will cross over wetlands, floodplains, a discharge stream of East Newnan Lake, and Turkey Creek through the central segment of the project before connecting to SR 16 at its southerly terminus. This project will be coordinated with the SR 16 widening (GDOT P. I. No. 0006877) that begins just before the I-85 overpass to its intersection with US 29/US 27 Alt.

The bypass will be a rural cross-section containing four 12-ft. lanes, 10-ft. shoulders (6½ ft. paved), and a 44-ft. depressed median where it begins at Turkey Creek Road, and will transition to an urban cross-section containing four 12-ft. lanes, a 20-ft. raised grass median, and 10-ft. rural shoulders (6½ ft. paved) on the outside after crossing the Central of Georgia Railway. At the signalized intersections, the cross-section will have curb and gutter to reduce right-of-way impacts and sidewalks to facilitate pedestrian travel. All necessary turn lanes will be provided at the intersections.

The cost of construction, based on the concept cost estimate prepared by CHA, is \$36,854,218, which includes \$2,500,000 in right-of-way and \$300,000 in reimbursable utilities. The anticipated let date is April 2012.

CONCERNS AND OBJECTIVES

The principal concern of the VE team was the relatively low volume of anticipated traffic in the design year 2030—an Average Annual Daily Traffic (AADT) of 3,742 on Turkey Creek Road and an AADT of 10,294 for the Newnan Bypass.

The project, at the concept design stage, could lend itself to changes more readily than projects in a more advanced stage of design. As such, the objective of the VE effort was to identify opportunities to improve the value of the project in terms of fulfilling the basic function of continuing the bypass, and where possible and warranted, reducing capital cost.

HIGHLIGHTS OF THE STUDY

Some of the more promising ideas developed by the VE team are highlighted below.

Due to the relatively low traffic count in the design year 2030, several alternatives reduce the size of the facility. Alternative Number (Alt. No.) 3 uses two 12-ft.-wide travel lanes throughout with a 44-ft.-wide median, which would provide sufficient space for future expansion and ameliorate safety concerns. All four lanes remain on the as-designed bridges. The alternative also proposes to purchase the originally intended right-of-way width to allow for future expansion when warranted. Initial savings nearing \$2,200,000 is possible. In a similar manner, Alt. No. 30 uses a two-lane section with two 12-ft.-wide travel lanes and a 20-ft. median with curb and gutter throughout. Expansion for this scheme would occur to the outside. All four lanes remain on the as-designed bridges. As with Alt. No. 3, the originally intended right-of-way width would be purchased now to facilitate future expansion when warranted. Initial cost savings for this scheme are about \$1,900,000.

A more innovative consideration is Alt. No. 4, which uses a three-lane section throughout with two 12-ft.-wide travel lanes and a 14-ft.-wide center turning lane. Purchase the originally intended right-of-way width to allow for future expansion when warranted, and construct all four lanes on the as-designed bridges. Initial savings are \$1,140,000.

Since the design speed is 45 miles per hour for a distance of only 1.6 miles, Alt. No. 26 eliminates the median in its entirety, resulting in a four-lane section throughout and reducing costs by \$3,100,000. Although the AASHTO guidelines do not preclude not having a median, this may not be a prudent investment from a perceived loss of safety standpoint. It is presented as a cost saving measure and an alternative for consideration.

Two additional alternatives recommend reducing the width of the proposed travel lanes. Alt. No. 1 uses 11-ft. travel lanes throughout for a savings of \$500,000, and Alt. No. 2 uses 11-ft.-wide travel lanes on the inside for non-truck traffic and 12-ft.-wide travel lanes on the outside for trucks. Savings in this case would be about \$250,000.

The current design calls for both concrete box culverts and bridges to span streams within the project area. The bridges have not been designed, as the current design is still at the concept stage. However, the space holder pricing of \$3,500,000 is considered adequate. Since the drainage area for the two proposed stream crossing bridges appears to be bound by Poplar Road on the north and SR 16 on the west, the drainage area is approximately one square mile. Typically, culverts are used for watersheds this small. The outfall from the watershed passes under I-85 a short distance downstream and it is reported this crossing is a double culvert. As such, Alt. No. 11 uses concrete box culverts at the two stream crossings in lieu of the proposed bridges at Station 150+00 and Station 160+00. This solution is in-keeping with the concept design that has a box culvert stream crossing at about Station 125+00. Initial savings for this solution are nearly \$5,200,000.

The current concept design documents show the need for 850,000 cubic yards of embankment. Lowering the profile from Station 134+00 to Station 189+00 (the last quadrant approaching the intersection of Turkey Creek Road and the existing Newnan Bypass) to reduce the amount of embankment, as noted in Alt. No. 7, could result in savings approaching \$1,400,000. Finally, Alt. No. 33 proposes the use of 2:1 fill slopes in lieu of 4:1 fill slopes as another means of helping reduce the quantity of barrow required. Savings in this case could be as high as \$1,200,000.

The Summary of Value Engineering Alternatives table following this narrative outlines all of the alternatives developed by the VE team. Some of the alternatives are mutually exclusive or interrelated, so addition of all project cost savings does not equal total savings for the project. A full listing of all of the ideas considered by the VE team can be found in the Creative Idea Listing in the Value Analysis and Conclusions section of the report.



SUMMARY OF VALUE ENGINEERING ALTERNATIVES

PROJECT: STP-0007-00(694), P. I. No. 0007694

SR 34 SE Bypass from SR 16 to Turkey Creek Road

Coweta County

| | | PRESENT WORTH OF COST SAVINGS | | | | |
|----------|--|-------------------------------|------------------|----------------------|------------------------|----------------------|
| ALT. NO. | DESCRIPTION | ORIGINAL COST | ALTERNATIVE COST | INITIAL COST SAVINGS | RECURRING COST SAVINGS | TOTAL PW LCC SAVINGS |
| 1 | Use 11-ft. lanes throughout | \$ 496,554 | \$ - | \$ 496,554 | | \$ 496,554 |
| 2 | Use 12-ft. outside lanes for trucks and 11-ft. inside lanes for other vehicles | \$ 248,277 | \$ - | \$ 248,277 | | \$ 248,277 |
| 3 | Use a two-lane section throughout | \$ 2,248,981 | \$ 11,220 | \$ 2,237,761 | | \$ 2,237,761 |
| 4 | Use a three-lane section throughout | \$ 2,248,981 | \$ 1,107,856 | \$ 1,141,125 | | \$ 1,141,125 |
| 5 | Use mechanically stabilized embankment walls in lieu of end spans at the railroad bridge | \$ 1,724,250 | \$ 1,217,868 | \$ 506,382 | | \$ 506,382 |
| 7 | Lower the profile to reduce the amount of required embankment | \$ 1,401,587 | \$ - | \$ 1,401,587 | | \$ 1,401,587 |
| 11 | Use box culverts in lieu of bridges at the stream crossings at Stations 150+00 and 160+00 | \$ 7,700,000 | \$ 2,511,782 | \$ 5,188,218 | | \$ 5,188,218 |
| 16 | Minimize the right-of-way width to minimum | \$ 453,096 | \$ - | \$ 453,096 | | \$ 453,096 |
| 19 | Use 24-in. in lieu of 30-in. curb and gutter | \$ 83,369 | \$ - | \$ 83,369 | | \$ 83,369 |
| 20 | Use a 20-ft. grassed flush median without a barrier | \$ 514,701 | \$ 272,694 | \$ 242,007 | | \$ 242,007 |
| 25 | Use a 6.5-ft. flush median with a concrete barrier | \$ 2,184,246 | \$ 1,342,357 | \$ 841,889 | | \$ 841,889 |
| 26 | Eliminate the median | \$ 3,107,750 | \$ - | \$ 3,107,750 | | \$ 3,107,750 |
| 30 | Use a two-lane section with a 20-ft. median and curb and gutter throughout | \$ 1,899,181 | \$ 9,636 | \$ 1,889,545 | | \$ 1,889,545 |
| 31 | Eliminate the taper on the bridge over the railroad by reducing the length of the left-turn lane | \$ 363,339 | \$ - | \$ 363,339 | | \$ 363,339 |
| 33 | Use 2:1 fill slopes vs. 4:1 slopes | \$ 1,326,391 | \$ 139,842 | \$ 1,186,549 | | \$ 1,186,549 |
| 34 | Use 1:1 fill slopes with guardrails in lieu of 4:1 slopes between Stations 147+00 and 189+00 | \$ 301,856 | \$ 180,176 | \$ 121,680 | | \$ 121,680 |
| 35 | Use 4-ft.-wide paved sections of the 10-ft.-wide shoulders in lieu of the 6.5-ft. paved sections | \$ 127,240 | \$ 2,002 | \$ 125,238 | | \$ 125,238 |
| | | | | | | |
| | | | | | | |

STUDY RESULTS

INTRODUCTION

The results are the major feature of the value engineering study conducted on the SR 34 SE Bypass project since they portray the benefits that can be realized by GDOT and the users of the corridor. The results will directly affect the project design and require coordination by the Department to determine the disposition of each alternative.

During the VE workshop, many ideas for potential value enhancement were conceived and evaluated by the VE team for technical feasibility, applicability to the project, and the ability to meet the owner's 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 individual elements that comprise the project. These are in the form of VE alternatives accompanied by cost estimates. For each alternative developed, the following information has been 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, if appropriate
- A descriptive evaluation of the advantages and disadvantages of selecting the alternative
- 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 for each alternative use unit quantities from the project cost estimate. If unit quantities were not available, published databases, such as the one produced by the RS Means Company, or team member or owner databases were consulted. A composite markup of 10%, as described in the Value Analysis and Conclusions section of the report, was used to generate the project cost for the construction items being compared.

Each alternative is identified with an alternative number that can be tracked through the value analysis process and facilitate referencing between the Creative Idea Listing and Evaluation worksheets, the alternatives, and the Summary of Value Engineering Alternatives table.

Summaries of the alternatives are provided on the Summary of Value Engineering Alternatives table and the complete documentation of the developed alternatives and design suggestions follows the table.

RESULTS OF THE STUDY

The VE team generated 35 ideas for value enhancement and cost reduction, 17 of which were developed into value engineering alternatives. The evaluation of ideas was based on their potential for capital cost savings, probability of acceptance, availability of information to properly develop an idea, compliance with perceived quality, adherence to universally accepted standards and procedures, life cycle cost efficiency, safety, maintainability, constructibility and soundness of the idea.

The greatest opportunities for cost savings involve using a two-lane section throughout, using box culverts in lieu of bridges at two stream crossings, or eliminating the median. Each of the developed alternatives should be given careful consideration for the potential cost savings that they offer compared to the tradeoffs.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

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

All alternatives were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some are mutually exclusive, so acceptance of one may preclude the acceptance of another. In addition, some of the alternatives are interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative.

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



SUMMARY OF VALUE ENGINEERING ALTERNATIVES

PROJECT: STP-0007-00(694), P. I. No. 0007694
 SR 34 SE Bypass from SR 16 to Turkey Creek Road
 Coweta County

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VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **1**

DESCRIPTION: **USE 11-FT. LANES THROUGHOUT**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current concept uses 12-ft.-wide travel lanes throughout the project.

ALTERNATIVE: (Sketch attached)

Use 11-ft.-wide lanes and keep all other elements of the typical concept section the same. Reduce the right-of-way width required by 2 ft. on each side of the roadway.

ADVANTAGES:

- Reduces costs
- Accelerates construction
- Provides a greener solution due to reduced pavement
- Implements a common practice
- Adheres to a growing industry standard

DISADVANTAGES:

- Results in a perceived narrowing of travel lanes for truck traffic

DISCUSSION:

Inside I-285, there are areas within Atlanta where 11-ft. lanes are used without undue problems or perceived loss of “driving space.” In accordance with *A Policy on Geometric Design of Highways and Streets, 2004* by the American Association of State Highway and Transportation Officials (AASHTO), “Under interrupted-flow operating conditions at low speeds (45 mph or less), narrower width are normally adequate...” and “Lane widths of 11 ft. are used quite extensively for urban arterial street designs[.]”

Implementation of this alternative can result in a substantial cost savings without jeopardizing the intended function or use of the new facility.

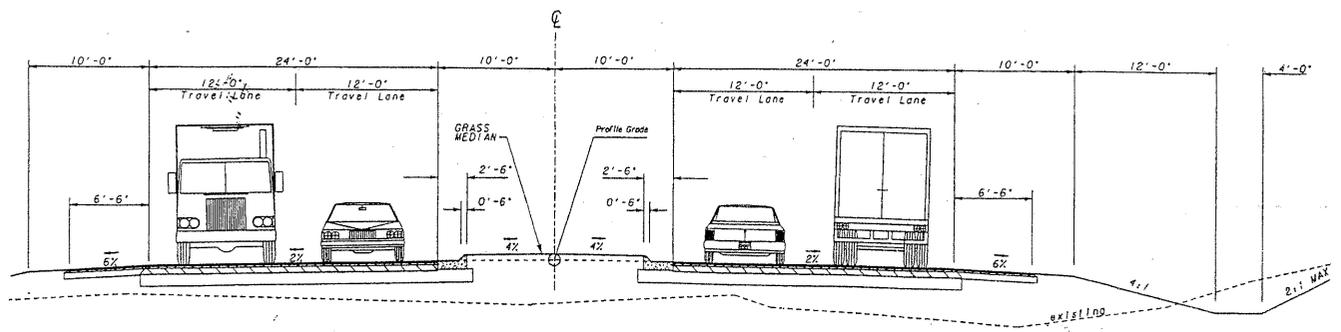
| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 496,554 | — | \$ 496,554 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 496,554 | — | \$ 496,554 |

PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

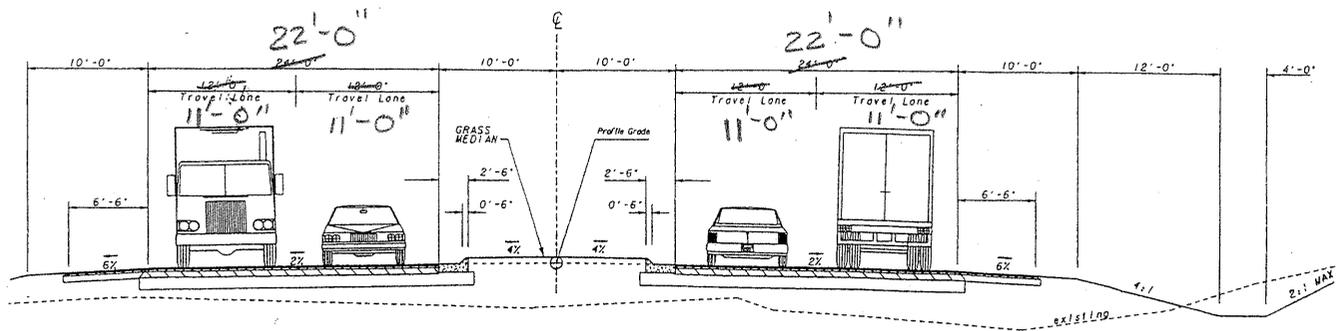
ALTERNATIVE NO.: 1

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

1

SHEET NO.: 3 of 4

PAVEMENT UNIT COSTS

Total length of Pavement: $189 + 50 - 100 + 50 = 8,900'$

MAINLINE PAVEMENT Total SY of pavement per lane =
 $(8,900 \times 1) / 9 = 989 \text{ SY}$

14" GAB BASE @ \$25/TN

880 #/SY 25 mm SUPERPAVE @ \$100/TN

220 #/SY 19 mm SUPERPAVE @ \$100/TN

135 #/SY 9.5 mm SUPERPAVE @ \$100/TN

$$\text{GAB } \frac{1.167(9)(190)}{(2000)} (25) = \$19.69$$

$$\text{PAVING } 100(880 + 220 + 135) / 2000 = 61.75$$

$$\text{R/W Cost: } \$50,000/\text{ac. or } \$11.15/\text{sf} \quad \underline{\$81.44/\text{SY}}$$

SHOULDER PAVEMENT

6" GAB BASE @ \$25/TN

220 #/SY 19 mm SUPERPAVE @ \$100/TN

135 #/SY 9.5 mm SUPERPAVE @ \$100/TN

$$\text{GAB } .5(9)(135)(25) / 2000 = \$8.44$$

$$\text{PAVING } 100(220 + 135) / 2000 = 17.75$$

$$\underline{\$26.19/\text{SY}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: 2

DESCRIPTION: **USE 12-FT. OUTSIDE LANES FOR TRUCKS AND 11-FT. INSIDE LANES FOR OTHER VEHICLES**

SHEET NO.: 1 of 3

ORIGINAL DESIGN: (Sketch attached)

The current concept uses 12-ft.-wide travel lanes throughout the project.

ALTERNATIVE: (Sketch attached)

Use 12-ft.-wide outside lanes for trucks only and 11-ft.-wide inside travel lanes. Keep all other elements of the typical concept section the same. Reduce the right-of-way width required by one ft. on each side of the roadway.

ADVANTAGES:

- Reduces costs
- Accelerates construction
- Provides a greener solution due to reduced pavement

DISADVANTAGES:

- Unconventional construction of using two different lanes width on the same facility
- May result in some construction difficulties
- May require additional construction management

DISCUSSION:

The use of two different lane widths on the same facility, although uncommon, is not without precedent. The 12-ft. lanes acknowledge the potential truck traffic anticipated on the facility. The 11-ft. lanes will easily accommodate through traffic of other types of vehicles without the unwarranted perception of a narrower lane.

Implementation of this alternative can result in a sizeable cost savings without jeopardizing the intended function or use of the new facility.

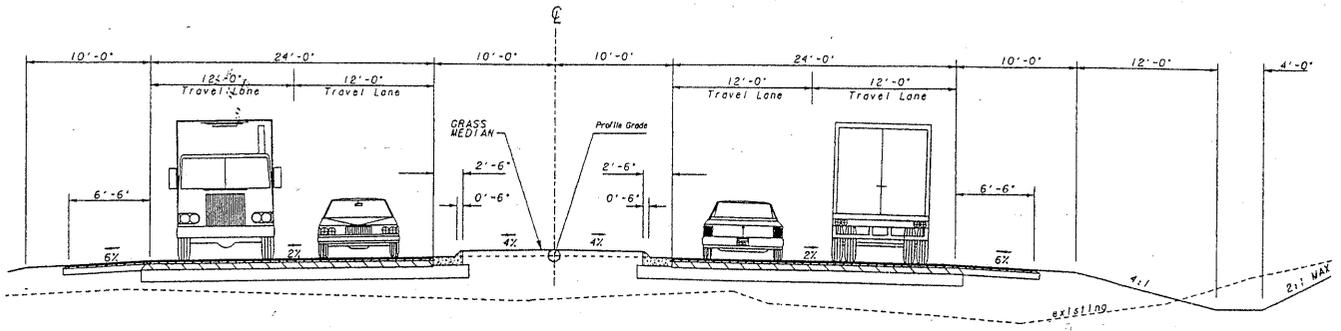
| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 248,277 | — | \$ 248,277 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 248,277 | — | \$ 248,277 |

PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

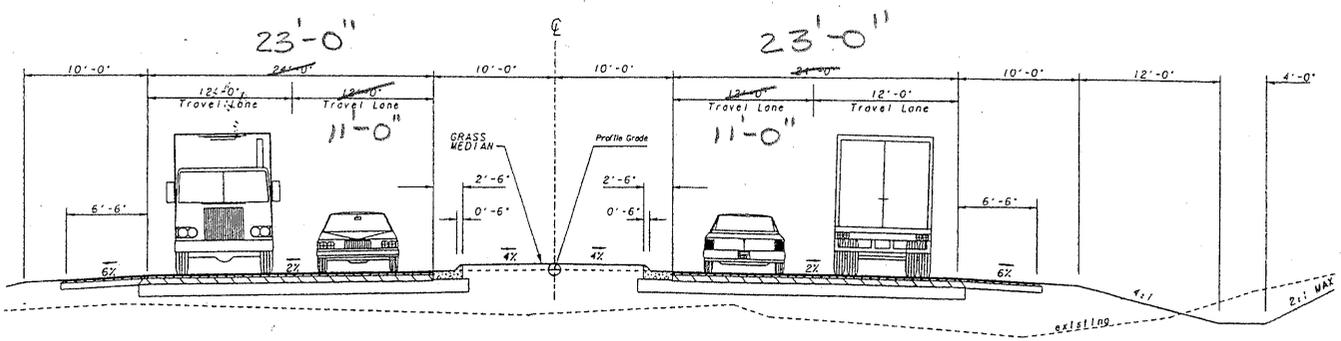
ALTERNATIVE NO.:
2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 3



AS DESIGNED ALTERNATIVE



VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **3**

DESCRIPTION: **USE A TWO-LANE SECTION THROUGHOUT**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The current concept mostly uses four 12-ft.-wide travel lanes, a 20-ft.-raised, grassed median, and 10- and 12-ft. shoulders throughout.

ALTERNATIVE: (Sketch attached)

Construct only two 12-ft.-wide travel lanes throughout the project. Purchase the originally intended right-of-way width to allow for future expansion when warranted. Since it could be difficult to expand the bridges in the future, construct all four lanes on the bridge. The total length of all three bridges is 950 lf.

ADVANTAGES:

- Reduces costs
- Accelerates construction
- Provides a greener solution
- Improves safety

DISADVANTAGES:

- Perceived loss of amenity
- Initially eliminates two travel lanes

DISCUSSION:

The 2030 design year traffic is 10,394 Average Annual Daily Traffic (AADT). A two-lane facility will more than adequately handle the anticipated traffic load. Also, a 44-ft.-wide median provides ample space for future expansion and improved safety.

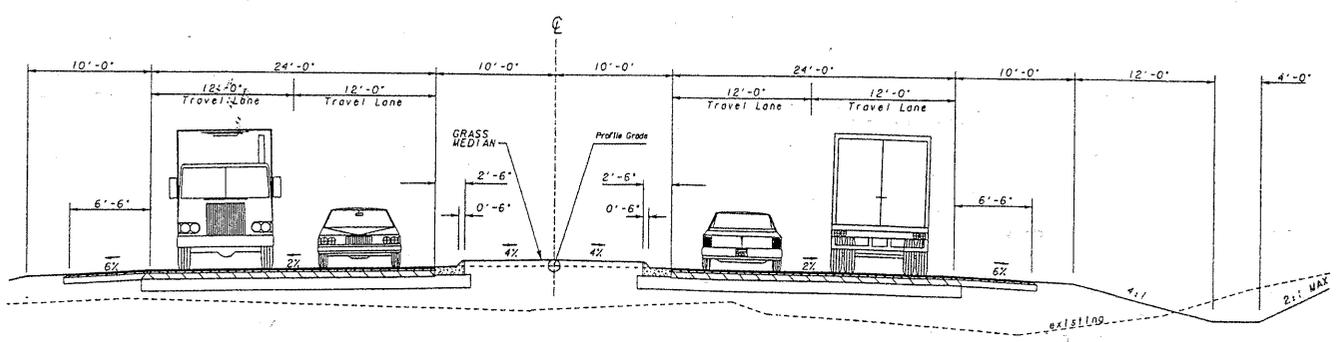
| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 2,248,981 | — | \$ 2,248,981 |
| ALTERNATIVE | \$ 11,220 | — | \$ 11,220 |
| SAVINGS | \$ 2,237,761 | — | \$ 2,237,761 |

PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWMAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

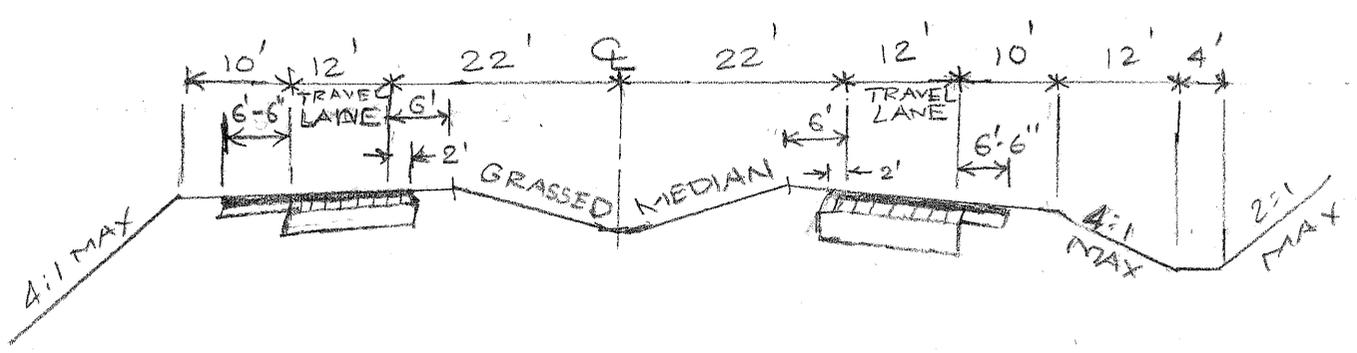
ALTERNATIVE NO.:
3

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 3



AS DESIGNED ALTERNATIVE



VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **4**

DESCRIPTION: **USE A THREE-LANE SECTION THROUGHOUT**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The current concept mostly uses four 12-ft.-wide travel lanes and a 20-ft.-raised, grassed median throughout the project.

ALTERNATIVE: (Sketch attached)

Construct two 12-ft.-wide travel lanes with a 14-ft.-wide center turning lane throughout the project. Purchase the originally intended right-of-way width to allow for future expansion when warranted. Since it could be difficult to widen the bridges in the future, construct all four lanes on the bridge. The total length of all three bridges is 950 lf.

ADVANTAGES:

- Reduces costs
- Accelerates construction
- Provides a greener solution
- Improves safety

DISADVANTAGES:

- Perceived loss of amenity
- Initially eliminates two travel lanes

DISCUSSION:

The 2030 design year traffic is 10,394 AADT; a two-lane facility will more than adequately handle the anticipated traffic load. In the future, the 14-ft.-wide turning lanes can be converted into queued turning lanes.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 2,248,981 | — | \$ 2,248,981 |
| ALTERNATIVE | \$ 1,107,856 | — | \$ 1,107,856 |
| SAVINGS | \$ 1,141,125 | — | \$ 1,141,125 |

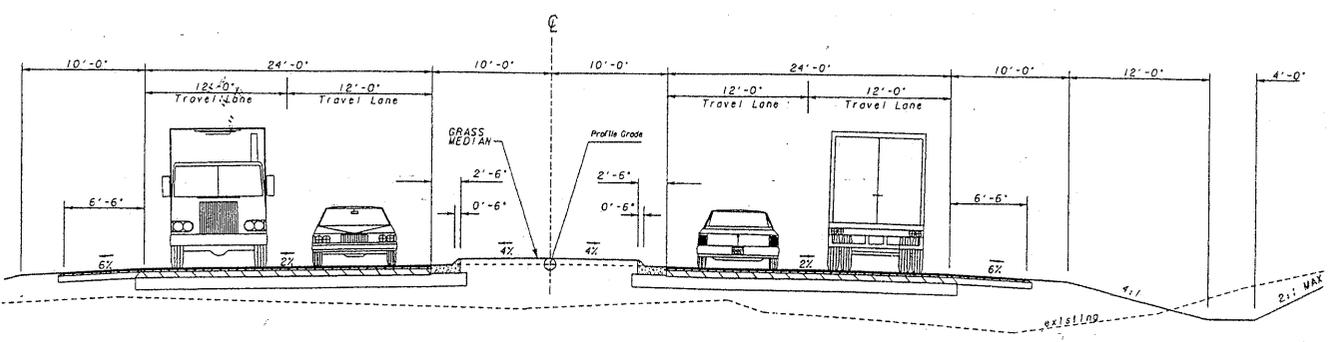
PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWMAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

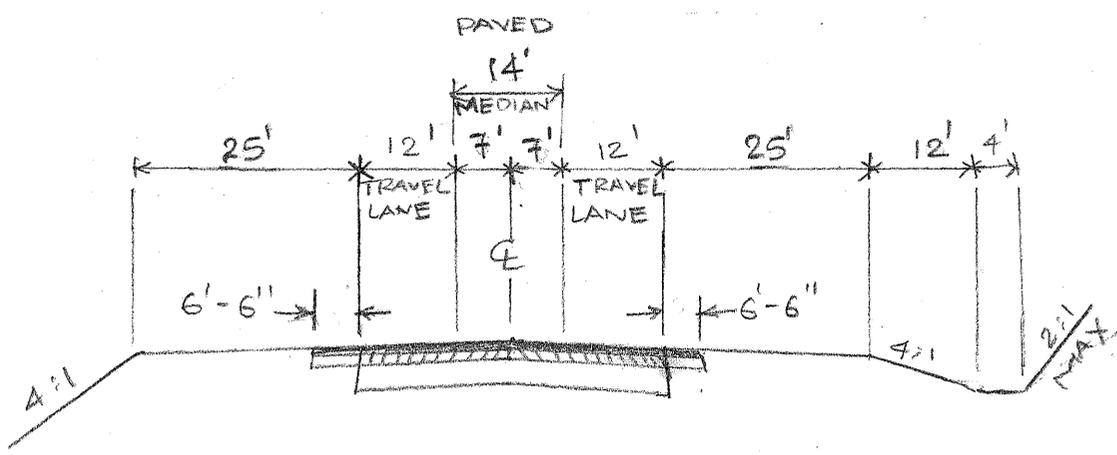
4

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 3



AS DESIGNED ALTERNATIVE



VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **5**

DESCRIPTION: **USE MECHANICALLY STABILIZED EMBANKMENT WALLS**
IN LIEU OF END SPANS AT BRIDGE OVER RAILROAD

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current concept uses a typical bridge over a railroad consisting of three spans—one over the railroad tracks and one over each end fill.

ALTERNATIVE: (Sketch attached)

Use mechanically stabilized embankment (MSE) wall abutments and eliminate the end spans.

ADVANTAGES:

- Reduces cost
- Accelerates construction
- Reduces bridge maintenance

DISADVANTAGES:

- Complicates construction
- Reduces sight distance for the railroad

DISCUSSION:

Although construction of the MSE walls would be more complicated because the bridge end bent piles are already in place, these walls are more economical.

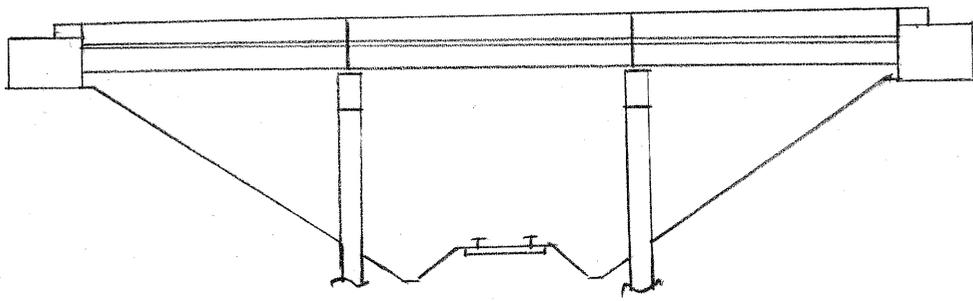
| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,724,250 | — | \$ 1,724,250 |
| ALTERNATIVE | \$ 1,217,868 | — | \$ 1,217,868 |
| SAVINGS | \$ 506,382 | — | \$ 506,382 |

PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
Coweta County, GDOT, District 3
Concept Design Stage

ALTERNATIVE NO.:
5

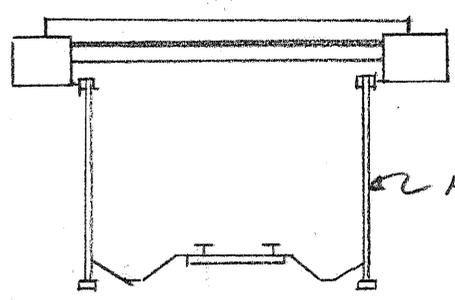
AS DESIGNED ALTERNATIVE

SHEET NO.: **2** of **5**



AS DESIGNED ALTERNATIVE

SHEET NO.: of



USE WALL, TYP.

CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

5

SHEET NO.: 3 of 5

THE CONCEPT BRIDGE COST IS \$3.5M PER SITE
 EVEN THOUGH THE RAILROAD BRIDGE LENGTH IS SHOWN
 ON THE AERIAL PLOT AS 200' AND THE CREEK
 BRIDGES ARE SHOWN AS APPROXIMATELY 400'.

USING THE CREEK BRIDGE AREA OF $400 \times 91.25 = 36,700 \text{ SF}$
 ($4 \times 12 + 20 + 2 \times 10 + 2 \times 1.625 = 91.25$), THE UNIT
 LANES $\left\{ \begin{array}{l} \text{MEDIAN} \\ \text{SHOULDERS} \\ \text{BARRIERS} \end{array} \right.$

BRIDGE COST IS $3500000 / 36700 = 95 \text{ (SF)}$

THIS UNIT COST WILL BE USED FOR THIS
 ALTERNATIVE.

AS DESIGNED: BRIDGE WIDTH = $24 + 4 + 10 + 2 \times 1.625$
 $= 41.25$

BRIDGE AREA = $2(200)(41.25)$
 $= 16,500 \text{ SF}$

ALTERNATIVE: ASSUME SKEW ANGLE = 45°

BRIDGE LENGTH = $[2(25) + 2(6)] / \sin 45$
 $= 87.7 \rightarrow 88'$

25' IS CLEARANCE TO FACE OF WALL
 FROM RR $\&$. 6' IS THE DISTANCE FROM FACE
 OF WALL TO BEGIN BRIDGE.

CALCULATIONS



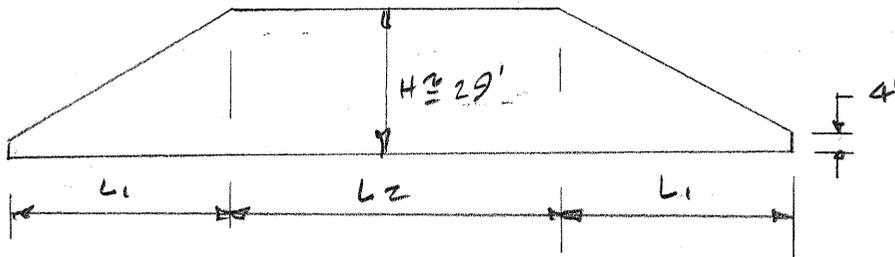
PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

5

SHEET NO.: 4 of 5

WALLS:



$$L_1 = (29 - 4)(2) / \tan 45 = 70.7 \rightarrow 71'$$

$$L_2 = \underbrace{(44)}_{\text{KERAL}} + \underbrace{4 \times 12}_{\text{LANES}} + \underbrace{2 \times 10}_{\text{SHLD}} + \underbrace{\frac{2 \times 20}{12} + 2}_{\text{CALKING WING}} / \tan 45 = 167.3 \rightarrow 168$$

$$\begin{aligned} \text{WALL AREA} &= 71 \left(\frac{29+4}{2} \right) + 168(29) \\ &= 1171.5 + 4872 = 6044 \text{ SF} \end{aligned}$$

ADDITIONAL PAVING:

$$\text{MAINLINE} = (200 - 88)(48 + 4) / 9 = 647 \text{ SY}$$

$$\text{SHOULDER} = (200 - 88)(6.5) / 9 = 81 \text{ SY}$$

$$\text{BRIDGE AREA} = 88(41.25)(2) = 7260 \text{ SF}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: 7

DESCRIPTION: **LOWER THE PROFILE TO REDUCE THE AMOUNT OF EMBANKMENT REQUIRED**

SHEET NO.: 1 of 9

ORIGINAL DESIGN: (Sketch attached)

The current concept requires 850,000 cy of embankment.

ALTERNATIVE: (Sketch attached)

Lower the profile from STA 134+00 to 189+00 to reduce the amount of embankment.

ADVANTAGES:

- Reduces cost
- Accelerates construction
- Reduces bridge maintenance

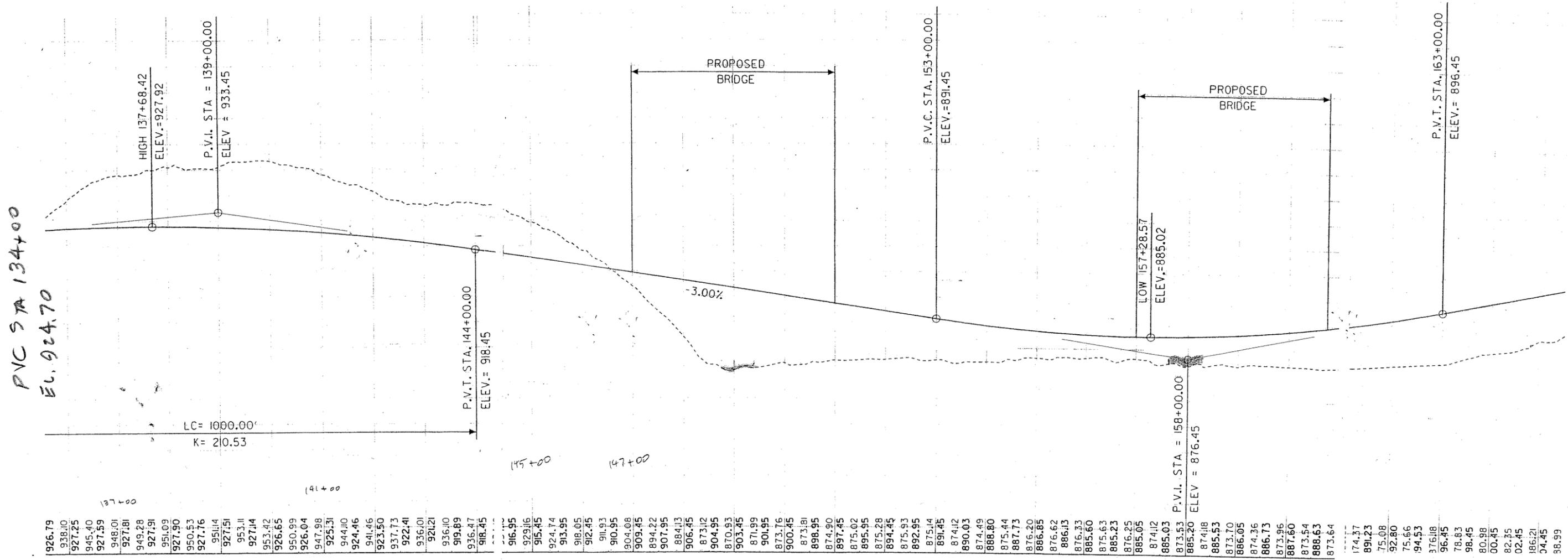
DISADVANTAGES:

- None apparent

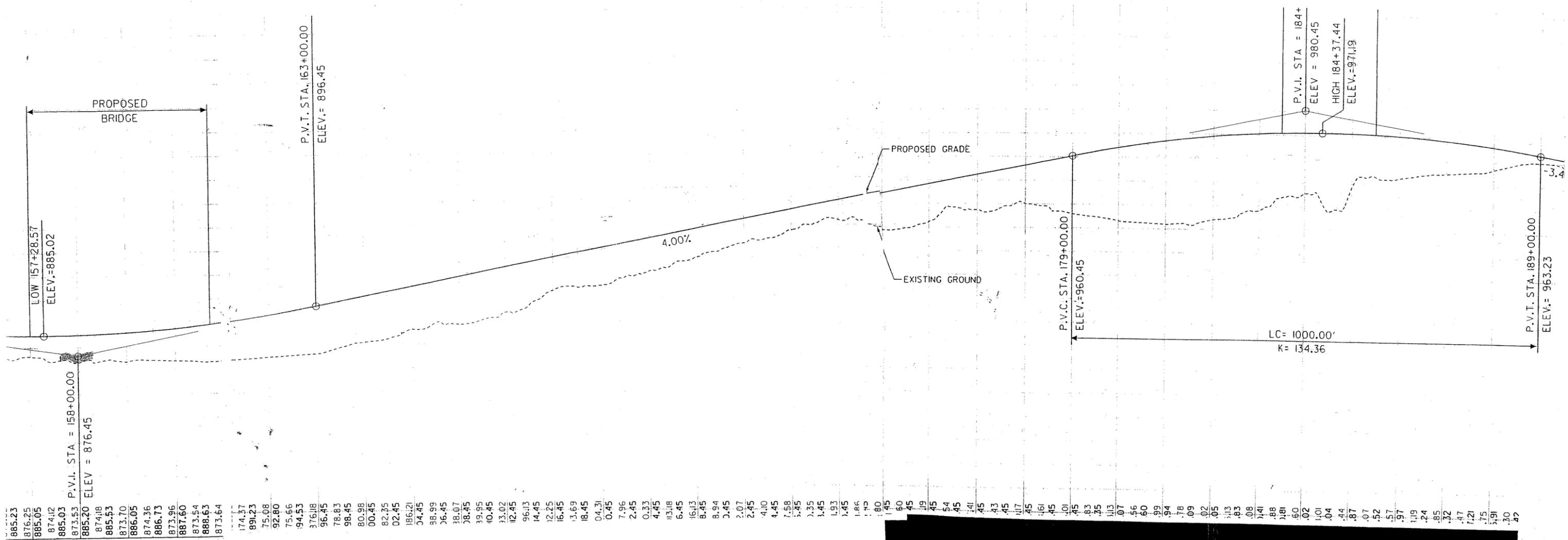
DISCUSSION:

The profile can be lowered beginning at the Vertical Point of Curvature (VPC) [*noted: this is labeled PVC on the Profile Drawing*] at STA 134+00 to reduce the amount of fill required. Minimum K value (rate of vertical curvature) requirements are satisfied.

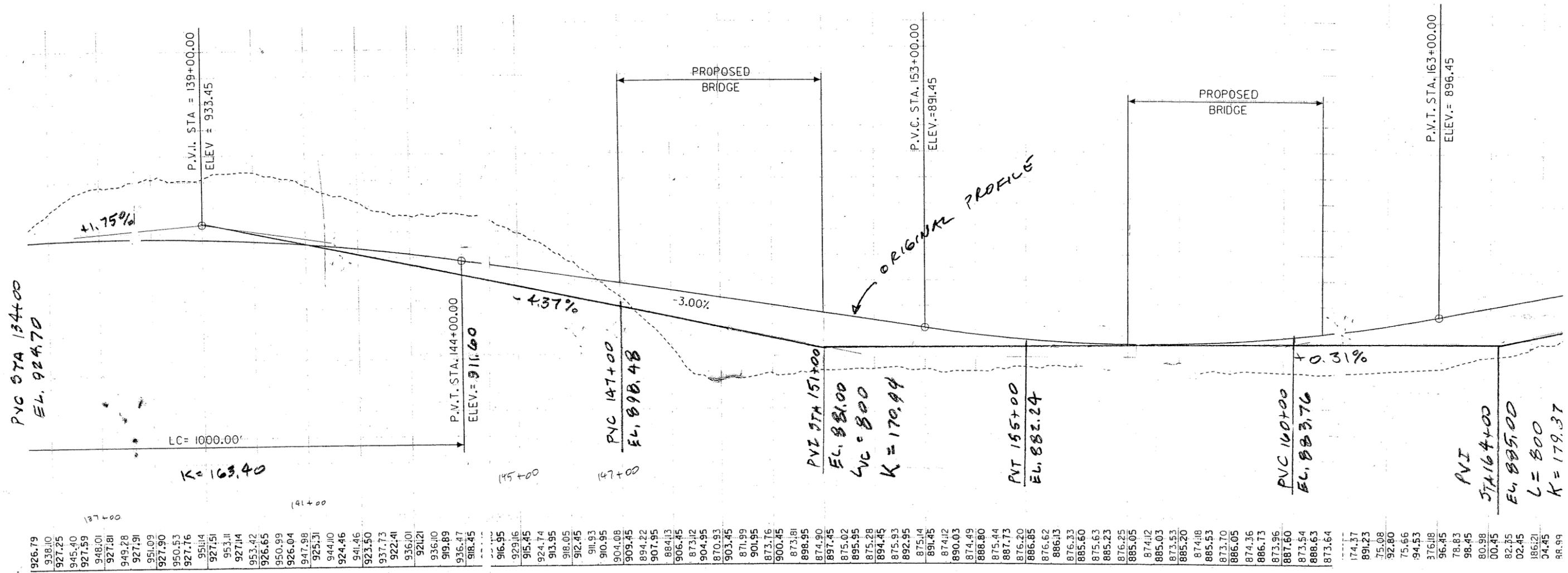
| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,401,587 | — | \$ 1,401,587 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 1,401,587 | — | \$ 1,401,587 |



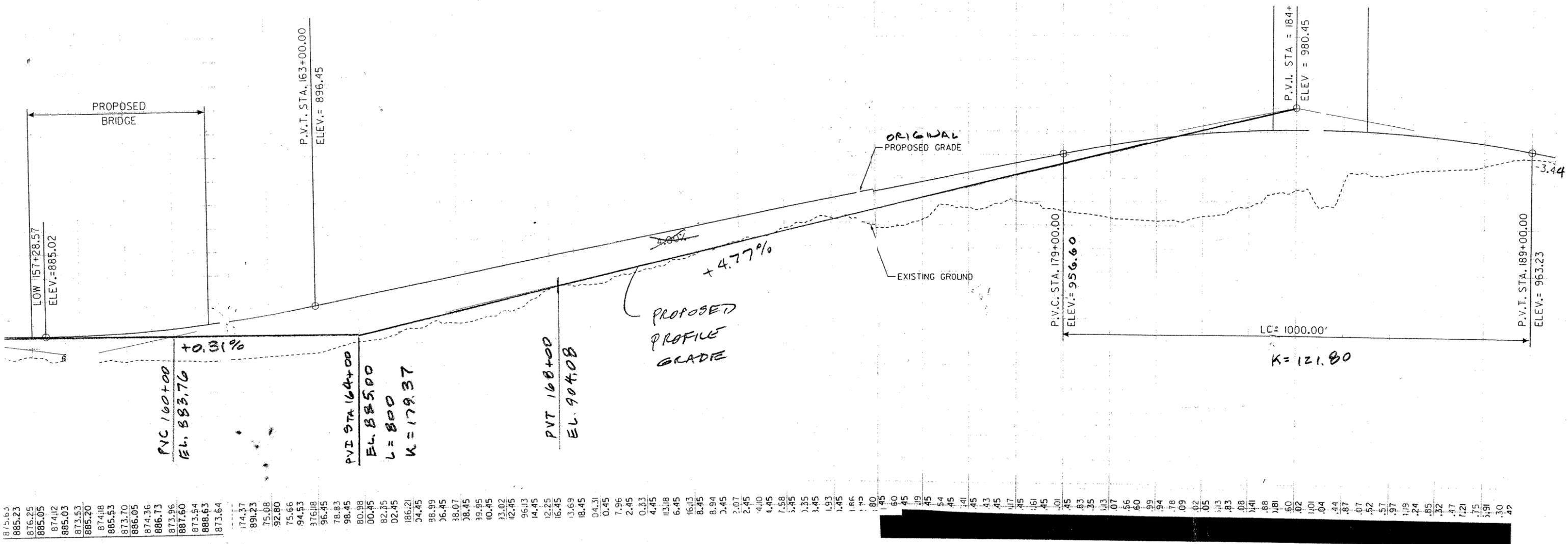
ALTERNATIVE NO.
7
SHEET 3 OF 9
ORIGINAL DESIGN



| | |
|--------|--------|
| 885.23 | 174.37 |
| 876.25 | 891.23 |
| 885.05 | 75.08 |
| 874.12 | 75.66 |
| 885.03 | 94.53 |
| 873.53 | 376.18 |
| 885.20 | 96.45 |
| 874.18 | 78.83 |
| 885.33 | 98.45 |
| 873.70 | 80.98 |
| 886.05 | 00.45 |
| 874.36 | 82.35 |
| 886.73 | 02.45 |
| 873.96 | 186.21 |
| 887.60 | 04.45 |
| 873.54 | 98.99 |
| 888.63 | 06.45 |
| 873.64 | 38.07 |
| | 38.45 |
| | 39.95 |
| | 40.45 |
| | 33.02 |
| | 12.45 |
| | 96.13 |
| | 14.45 |
| | 12.25 |
| | 16.45 |
| | 13.69 |
| | 18.45 |
| | 04.31 |
| | 0.45 |
| | 7.96 |
| | 2.45 |
| | 0.33 |
| | 4.45 |
| | 13.18 |
| | 6.45 |
| | 16.13 |
| | 8.45 |
| | 8.94 |
| | 3.45 |
| | 2.07 |
| | 2.45 |
| | 4.10 |
| | 4.45 |
| | 7.58 |
| | 5.45 |
| | 3.35 |
| | 3.45 |
| | 1.93 |
| | 1.45 |
| | 1.86 |
| | 1.45 |
| | 1.80 |
| | 1.45 |
| | 6.0 |
| | 4.5 |
| | 1.9 |
| | 4.5 |
| | 5.4 |
| | 4.5 |
| | 1.41 |
| | 4.5 |
| | 4.3 |
| | 4.5 |
| | 1.17 |
| | 4.5 |
| | 1.61 |
| | 4.5 |
| | 1.01 |
| | 4.5 |
| | 8.3 |
| | 7.5 |
| | 1.13 |
| | 1.07 |
| | 5.6 |
| | 6.0 |
| | 9.9 |
| | 9.4 |
| | 7.8 |
| | 0.9 |
| | 0.2 |
| | 0.5 |
| | 1.13 |
| | 8.3 |
| | 0.8 |
| | 1.41 |
| | 8.8 |
| | 1.81 |
| | 6.0 |
| | 0.2 |
| | 1.01 |
| | 0.4 |
| | 4.4 |
| | 8.7 |
| | 0.7 |
| | 5.2 |
| | 5.7 |
| | 9.7 |
| | 1.19 |
| | 2.4 |
| | 8.5 |
| | 3.2 |
| | 4.7 |
| | 7.21 |
| | 1.5 |
| | 3.91 |
| | 3.0 |
| | 4.2 |



| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| 926.79 | 938.10 | 927.25 | 945.40 | 927.59 | 948.01 | 927.81 | 949.28 | 927.91 | 951.09 | 927.90 | 950.53 | 927.76 | 951.14 | 927.51 | 953.11 | 927.14 | 953.42 | 926.65 | 950.99 | 926.04 | 947.98 | 925.31 | 944.10 | 924.46 | 941.46 | 923.50 | 937.73 | 922.41 | 936.01 | 921.21 | 936.10 | 919.89 | 936.47 | 918.45 | 916.95 | 929.16 | 915.45 | 924.74 | 913.95 | 918.05 | 912.45 | 911.93 | 910.95 | 904.08 | 909.45 | 894.22 | 907.95 | 884.13 | 906.45 | 873.12 | 904.95 | 870.93 | 903.45 | 871.99 | 901.95 | 873.76 | 900.45 | 873.81 | 898.95 | 874.90 | 897.45 | 875.02 | 895.95 | 875.28 | 894.45 | 875.93 | 892.95 | 875.14 | 891.45 | 874.12 | 890.03 | 874.49 | 888.80 | 875.44 | 887.73 | 876.20 | 886.65 | 876.62 | 886.13 | 876.33 | 885.60 | 875.63 | 885.23 | 876.25 | 885.05 | 874.12 | 885.03 | 873.53 | 885.20 | 874.18 | 885.53 | 873.70 | 886.05 | 874.36 | 886.73 | 873.96 | 887.60 | 873.54 | 888.63 | 873.64 | 174.37 | 891.23 | 75.08 | 92.80 | 75.66 | 94.53 | 376.18 | 96.45 | 78.83 | 98.45 | 80.98 | 00.45 | 82.75 | 186.21 | 34.45 | 88.99 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|-------|-------|



| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|--------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|----|----|----|----|----|----|----|----|-----|----|-----|----|-----|----|----|----|-----|----|----|----|----|----|----|----|----|-----|----|----|-----|----|-----|----|-----|----|----|----|----|----|----|------|----|----|----|----|------|----|----|----|----|
| 875.63 | 885.23 | 876.25 | 885.05 | 874.12 | 885.03 | 873.53 | 885.20 | 874.18 | 885.53 | 873.70 | 886.05 | 874.36 | 886.73 | 873.96 | 887.60 | 873.54 | 888.63 | 873.64 | 174.37 | 891.23 | 75.08 | 92.80 | 75.66 | 94.53 | 376.18 | 96.45 | 78.83 | 98.45 | 80.98 | 00.45 | 82.35 | 02.45 | 186.21 | 04.45 | 88.99 | 06.45 | 38.07 | 08.45 | 39.95 | 10.45 | 33.02 | 12.45 | 112.45 | 96.13 | 14.45 | 12.25 | 16.45 | 13.69 | 18.45 | 04.31 | 0.45 | 7.96 | 2.45 | 0.33 | 4.45 | 113.18 | 6.45 | 16.13 | 8.45 | 8.94 | 3.45 | 2.07 | 2.45 | 4.10 | 4.45 | 7.58 | 3.45 | 3.35 | 3.45 | 1.93 | 3.45 | 1.86 | 1.45 | 1.45 | 1.80 | 1.45 | 60 | 45 | 19 | 45 | 54 | 45 | 41 | 45 | 43 | 45 | 117 | 45 | 161 | 45 | 101 | 45 | 83 | 75 | 113 | 07 | 56 | 60 | 99 | 94 | 78 | 09 | 02 | 113 | 83 | 08 | 141 | 88 | 181 | 60 | 101 | 04 | 44 | 87 | 07 | 52 | 57 | 1.19 | 24 | 85 | 32 | 47 | 1.21 | 75 | 39 | 30 | 42 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|--------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|----|----|----|----|----|----|----|----|-----|----|-----|----|-----|----|----|----|-----|----|----|----|----|----|----|----|----|-----|----|----|-----|----|-----|----|-----|----|----|----|----|----|----|------|----|----|----|----|------|----|----|----|----|



SUBJECT: ALTERNATIVE No. 7

JOB NO: _____

BY: _____ DATE: _____

CHKD: _____ DATE: _____

| STATION | ORIGINAL PROFILE | PROPOSED PROFILE | Δ |
|---------|------------------|------------------|-------|
| 147+00 | 409.45 | 898.48 | 10.97 |
| 148 | 906.45 | 894.40 | 12.05 |
| 149 | 903.45 | 890.91 | 12.54 |
| 150+00 | 900.45 | 888.00 | 12.45 |
| 151 | 897.45 | 885.68 | 11.77 |
| 152 | 894.45 | 883.94 | 10.51 |
| 153 | 891.45 | 882.79 | 8.66 |
| 154 | 888.80 | 882.22 | 6.58 |
| 155 | 886.85 | 882.24 | 4.61 |
| 156 | 885.60 | 882.55 | 3.05 |
| 157 | 885.05 | 882.86 | 2.19 |
| 158 | 885.20 | 883.17 | 2.03 |
| 159 | 886.05 | 883.48 | 2.57 |
| 160+00 | 887.60 | 883.76 | 3.84 |
| 161 | 889.45 | 884.35 | 5.10 |
| 162 | 892.80 | 885.50 | 7.30 |
| 163 | 896.45 | 887.20 | 9.25 |
| 164 | 900.45 | 889.46 | 10.99 |
| 165 | 904.45 | 892.28 | 12.17 |
| 166 | 908.45 | 895.66 | 12.79 |
| 167 | 912.45 | 899.59 | 12.86 |
| 168 | 916.45 | 904.08 | 12.37 |
| 169 | 920.45 | 908.85 | 11.60 |
| 170+00 | 924.45 | 913.62 | 10.83 |

BEGIN CALCULATIONS AT STATION 147+00 SINCE THAT IS WHERE THE MAJOR FILL SECTION BEGINS



SUBJECT: ALTERNATIVE NO. 7

JOB NO: _____

BY: _____ DATE: _____

CHKD: _____ DATE: _____

| STATION | ORIGINAL PROFILE | PROPOSED PROFILE | Δ |
|---------|------------------|------------------|----------|
| 170+00 | 924.45 | 913.62 | 10.83 |
| 171 | 928.45 | 918.39 | 10.06 |
| 172 | 932.45 | 923.16 | 9.29 |
| 173 | 936.45 | 927.93 | 8.52 |
| 174 | 940.45 | 932.70 | 7.75 |
| 175 | 944.45 | 937.47 | 6.98 |
| 176 | 948.45 | 942.24 | 6.21 |
| 177 | 952.45 | 947.01 | 5.44 |
| 178 | 956.45 | 951.78 | 4.67 |
| 179 | 960.45 | 956.55 | 3.85 |
| 180+00 | 964.08 | 960.96 | 3.12 |
| 181 | 966.96 | 964.50 | 2.46 |
| 182 | 969.10 | 967.22 | 1.88 |
| 183 | 970.50 | 969.11 | 1.39 |
| 184 | 971.15 | 970.19 | 0.96 |
| 185 | 971.06 | 970.44 | 0.62 |
| 186 | 970.22 | 969.88 | 0.34 |
| 187 | 968.64 | 968.49 | 0.15 |
| 188 | 966.32 | 966.28 | 0.04 |
| 189+00 | 963.25 | 963.25 | 0 |

$$\text{AREA @ EA. STATION} = \frac{BB + BB + 2(4H)}{2} (H)$$

$$= \frac{176 + 8H}{2} (H)$$

$$A = 88H + 4H^2$$

$$\text{VOLUME} = 100 (A_1 + 2A_2 + \dots + 2A_{n-1} + A_n) / 2 \text{ CF}$$



SUBJECT: ALTERNATIVE No. 7

JOB NO: _____

BY: _____ DATE: _____

CHKD: _____ DATE: _____

PAGE

SHEET
8/9

| STATION | AREA | STATION | AREA |
|---------|------|---------|------|
| 147+00 | 1447 | 170+00 | 1422 |
| 148 | 1641 | 171 | 1290 |
| 149 | 1733 | 172 | 1163 |
| 150+00 | 1716 | 173 | 1040 |
| 151 | 1590 | 174 | 922 |
| 152 | 1367 | 175 | 809 |
| 153 | 1062 | 176 | 701 |
| 154 | 752 | 177 | 597 |
| 155 | 491 | 178 | 498 |
| 156 | 306 | 179 | 398 |
| 157 | 212 | 180+00 | 313 |
| 158 | 195 | 181 | 241 |
| 159 | 253 | 182 | 180 |
| 160+00 | 397 | 183 | 130 |
| 161 | 553 | 184 | 88 |
| 162 | 856 | 185 | 56 |
| 163 | 1156 | 186 | 30 |
| 164 | 1450 | 187 | 13 |
| 165 | 1663 | 188 | 4 |
| 166 | 1780 | 189+00 | 0 |
| 167 | 1793 | | |
| 168 | 1701 | | |
| 169+00 | 1559 | | |

$$\text{VOLUME} = 100(68805)/2 = 3440250 \text{ CF}$$

$$\div 27 = 127417 \text{ CY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **11**

DESCRIPTION: **USE BOX CULVERTS IN LIEU OF BRIDGES AT STREAM CROSSINGS AT STA 150+00 AND 160+00**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current concept uses bridges at the stream crossings at STA 150+00 and 160+00. The cost estimate prices the bridges at \$3,500,000 each.

ALTERNATIVE:

Use concrete box culverts at the stream crossings in lieu of bridges.

ADVANTAGES:

- Reduces cost
- Accelerates construction
- Simplifies design and construction
- Implements a common practice

DISADVANTAGES:

- May increase impacts to wetlands and streams
- Potential hydraulic issues

DISCUSSION:

The drainage areas for the two proposed stream crossing bridges appear to be bound by Poplar Road on the north and SR 16 on the west, with a drainage area of approximately one square mile. Culverts are typically used for watersheds this small. The outfall from these bridges passes under I-85 a short distance downstream. GDOT personnel report the I-85 crossing is a double culvert.

For calculation/cost purposes, a double 8-ft. x 8-ft. culvert is assumed.

It is noted that a box culvert is in the concept design as a stream crossing at approximately STA 125+00.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 7,700,000 | — | \$ 7,700,000 |
| ALTERNATIVE | \$ 2,511,782 | — | \$ 2,511,782 |
| SAVINGS | \$ 5,188,218 | — | \$ 5,188,218 |

CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

11

SHEET NO.: 3 of 4

STATION 160+00 KREW ANGLE = 90°

PROFILE GRADE = 886

BRIDGE L = 350'

STREAM ELEV = 874

30' APPROACH SLABS

COVEL = 886 - 874 - 8 - 1 = 3

USE DESIGN 1

$L = [22 + 24 + 10 + 4(3)] 2 = 136$ USE 140

CONC VOL = 2.315 CY/FT

REBAR = 167 #/FT

CONC = 140(2.315) = 324

REBAR = 167(140) = 23380

ADDITIONAL EMBANKMENT: H = 886 - 874 = 12

TOP W = 112

BOTTOM W = 112 + 2(12)(4) = 208

VOLUME = 300(12) $\left(\frac{112 + 208}{2}\right) / 27 = 21333$ CY

ADDITIONAL # PAVEMENT = 410(26)(2)/9 = 2369 SY

ADDITIONAL SHOULDER PAVEMENT = 410(6.5)(2)/9 = 592 SY

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **16**

DESCRIPTION: **REDUCE THE RIGHT-OF-WAY WIDTH TO MINIMUM**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The concept right-of-way width varies with values of 200 ft., 210 ft., 250 ft., and 300 ft.

ALTERNATIVE:

Reduce the right-of-way to the minimum practical width. Allow five ft. on each side outside the toe of slopes for erosion control.

ADVANTAGES:

- Reduces costs
- Provides a greener solution with less disturbance of surrounding areas
- Reduces damage to the environment

DISADVANTAGES:

- Reduces space for immediate future expansion

DISCUSSION:

Right-of-way widths vary throughout the project and appear to be wider than what is required. In fill sections, the minimum right-of-way will have to include a 5-ft. zone on each side for erosion control.

Since right-of-way acquisitions have not begun along the corridor, this alternative may be a prudent investment.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 453,096 | — | \$ 453,096 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 453,096 | — | \$ 453,096 |

CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

16

SHEET NO.: 2 of 3

| STATIONS | CUT/FILL | AVERAGE REDUCTION/R/W * | AREA |
|-----------------|----------|-------------------------|----------|
| 100+00 → 123+00 | CUT | 12-0 | 27600 SF |
| 123+00 → 131+50 | FILL | 10-5 | 4250 SF |
| 131+50 → 146+50 | CUT | 17-0 | 25500 SF |
| 146+50 → 190+00 | FILL | 18-5 | 56550 SF |

TOTAL 113,900 SF

* FROM AERIAL PLOT OF PROJECT

= 2,161 Ac

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: 19

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

SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The concept design uses 30-in. concrete curb and gutter along the raised median.

ALTERNATIVE:

Use 24-in. concrete curb and gutter along the raised median in lieu of the proposed 30-in. concrete curb and gutter.

ADVANTAGES:

- Reduces cost

DISADVANTAGES:

- Places raised curb 6 in. closer to the travel lanes
- Gutter spread may increase drainage cost

DISCUSSION:

The use of 24-in. vs. 30-in. curb and gutter is merely a cost reduction measure. The possibility of additional drainage outlets due to the 6-in. additional gutter spread is not included in this alternative but is considered negligible at this early stage of design. The current drainage costs/space holder in the estimate would cover this potential increase, if any.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 83,369 | — | \$ 83,369 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 83,369 | — | \$ 83,369 |

CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
Coweta County, GDOT, District 3
Concept Design Stage

ALTERNATIVE NO.:
19

Use 24" Curb + Gutter ILO 30" Curb + Gutter

SHEET NO.: 2 of 3

$$\text{Sta } 100+45 \text{ to Sta } 178+00 = 7,755 \text{ LF} - 65 \text{ (Median Opening)} = 7,690 \text{ LF}$$

$$7,690 \text{ LF} \times 2 = 15,380 \text{ LF} + 60 \text{ LF (C/G around openings)}$$

$$= 15,440 \text{ LF}$$

$$\text{Class A Concrete} = 15,440' \times 0.5' \times 0.5' = 3,860 \text{ Ft}^3 \div 27 \text{ Ft}^3/\text{CY} = 143 \text{ CY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **20**

DESCRIPTION: **USE 20-FT. GRASSED FLUSH MEDIAN WITHOUT BARRIER**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The concept design uses a 20-ft.-wide median with a 16-ft. raised and grassed section and curb and gutter on each side.

ALTERNATIVE: (Sketch attached)

Use a 20-ft.-flush grassed median with a 2-ft. inside paved shoulder.

ADVANTAGES:

- Reduces costs
- Accelerates construction
- Provides a greener solution due to less pavement
- Implements a common practice

DISADVANTAGES:

- Perceived loss of safety
- Eliminates curb and gutter

DISCUSSION:

Although acknowledging the loss of a visual/physical barrier, i.e., the curb and gutter, the use of a flush grassed median for the anticipated design speeds of 45 mph is a common solution.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 514,701 | — | \$ 514,701 |
| ALTERNATIVE | \$ 272,694 | — | \$ 272,694 |
| SAVINGS | \$ 242,007 | — | \$ 242,007 |



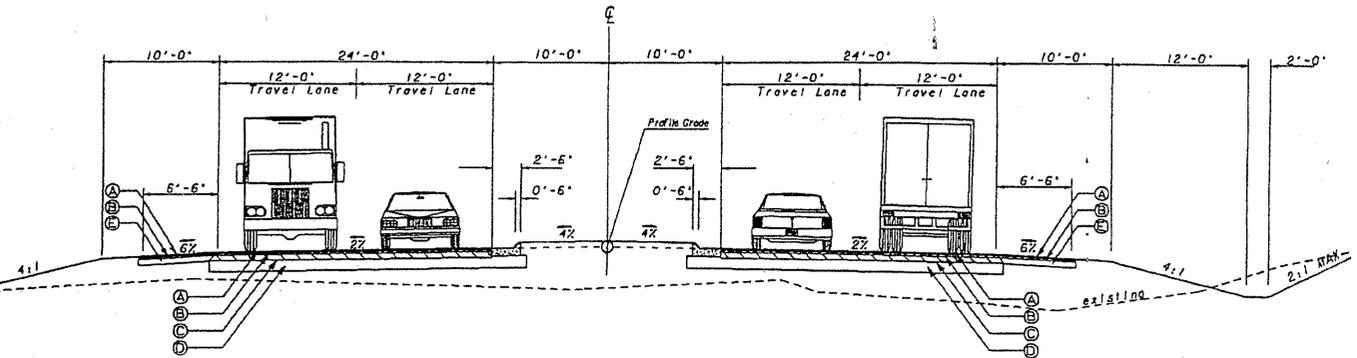
PROJECT: STP-0007-00(694), P. I. No. 0007694
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
Coweta County, GDOT, District 3
Concept Design Stage

ALTERNATIVE NO.:

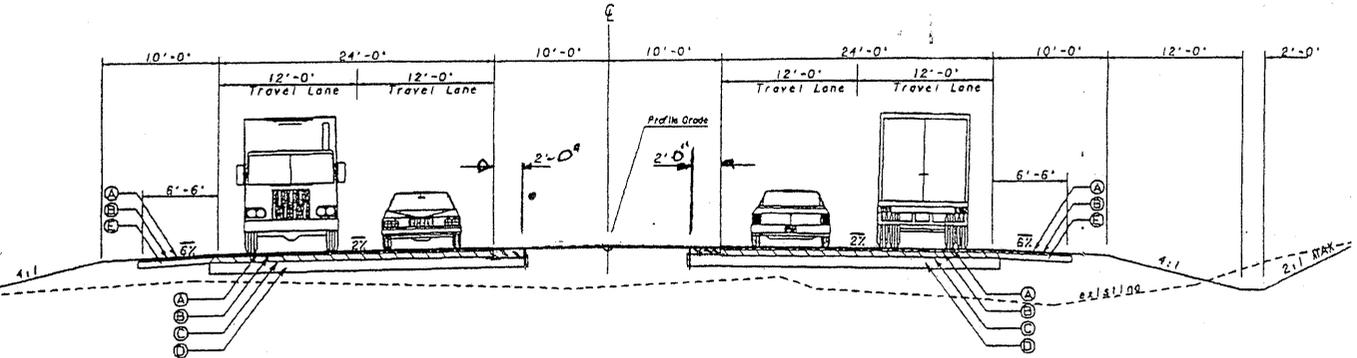
20

SHEET NO.: 2 of 4

AS DESIGNED ALTERNATIVE



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
Coweta County, GDOT, District 3
Concept Design Stage

ALTERNATIVE NO.:

20

SHEET NO.: 3 of 4

$$\text{LENGTH OF URBAN SECTION} = 17650 - 10050 = 7600$$

$$\text{REDUCT FINISHES: } 7600 - 400 - 350 = 6850 \text{ FT}$$

$$\text{REDUCTION IN CURB \& GUTTER} = 2(6850) = 13,700 \text{ LF}$$

$$\text{INCREASE IN MI PAVEMENT} = 2(2)(6850)/9 = 3044 \text{ SY}$$

REDUCTIONS IN BRIDGE MEDIAN CONCRETE

$$= (400 + 350)(16)(1.5)/27 = 222 \text{ CY}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: 25

DESCRIPTION: **USE 6.50-FT. FLUSH MEDIAN WITH A CONCRETE BARRIER**

SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The concept design uses a 20-ft.-wide median with a 16-ft. raised and grassed section and 30-in. curb and gutter on each side.

ALTERNATIVE: (Sketch attached)

Use a 6.50-ft. flush median section comprised of 2-ft. inside paved shoulders and a 2.5-ft. concrete barrier.

ADVANTAGES:

- Reduces costs
- Improves safety
- Reduces the amount of right-of-way

DISADVANTAGES:

- None apparent

DISCUSSION:

This alternative provides for a physical barrier between opposing traffic, thereby improving safety within the reduced width of the facility.

Since right-of-way acquisitions have not begun along the corridor, this alternative may be a prudent investment.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 2,184,246 | — | \$ 2,184,246 |
| ALTERNATIVE | \$ 1,342,357 | — | \$ 1,342,357 |
| SAVINGS | \$ 841,889 | — | \$ 841,889 |

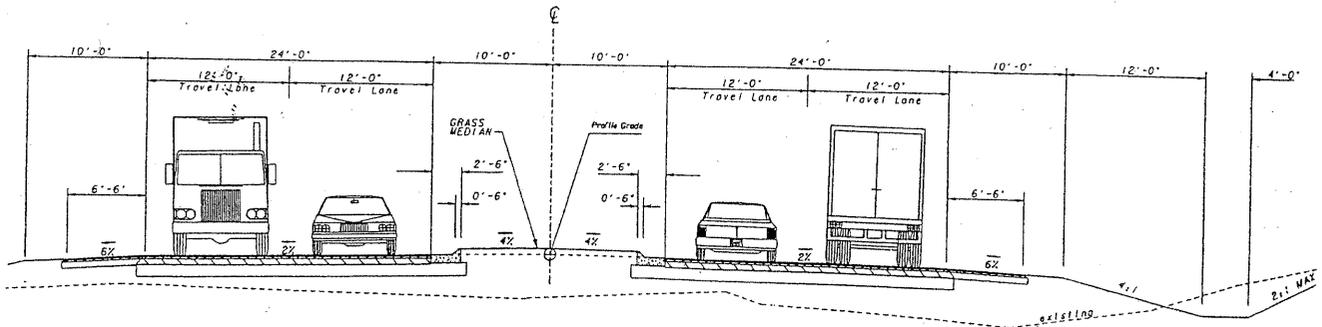


PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

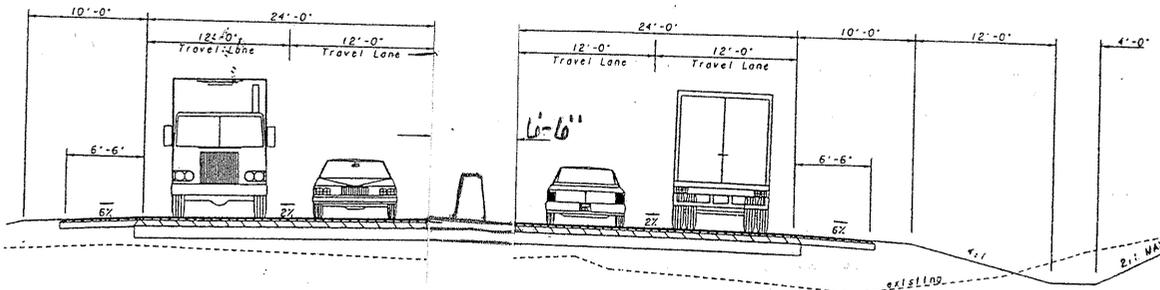
ALTERNATIVE NO.:
 25

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:
 25

SHEET NO.: 3 of 4

Use Minimum Median

Pavement - $80' \times 20'$ (Median Opening) $\div 9 \text{ Ft}^2/\text{sq} = \underline{178.59}$

30" Curb + Gutter - 13,700 LF (from Alt. 20)

Grassing - 3.6 Ac (from Alt 19)

Cross Drain Pipes - 40 Ea. $\times 13.5' = \underline{540 \text{ LF}}$

Right-of-Way - Sta. 100+45 To 177+00 = $7655' \times 13.5' = 103,343 \text{ Ft}^2$

Sta. 177+00 To 181+00 = $400' \times 25.5' = 10,200 \text{ Ft}^2$

Sta. 181+00 To 190+70 = $970 \times 37.5 = \underline{36,375 \text{ Ft}^2}$

$149,918 \text{ Ft}^2 \div 43,500 \text{ Ft}^2/\text{Ac} = \underline{3.4 \text{ Ac}}$

Bridges - over Streams - $400 \times 13.5' \times 2 = 10,800 \text{ SF}$

over Railroad - $200' \times 5' = 1000 \text{ SF}$ 11,800 SF

Additional Pavement - Sta 100+45 to 190+70 = $9,025' - 900'$ (Bridges) = 8,125 LF

$8,125 \text{ LF} \times 6.5' \div 9 \text{ Ft}^2/\text{sq} = 5,868 \text{ sq}$

Conc. Median Barrier - $9,025 \text{ LF} - 80 \text{ LF}$ (Median Opening) = 8,945 LF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **26**

DESCRIPTION: **ELIMINATE THE MEDIAN**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The concept design uses a 20-ft.-wide median with a 16-ft. raised and grassed section and 30-in. curb and gutter on each side. The grassed median tapers to a depressed 44 ft. at STA 177+00.

ALTERNATIVE: (Sketch attached)

Eliminate the median.

ADVANTAGES:

- Reduces costs
- Reduces the amount of right-of-way
- Simplifies design and construction

DISADVANTAGES:

- Perceived loss of safety

DISCUSSION:

This alternative is provided as a cost reduction option only. Although guidelines do not preclude not having a median, this may not be a prudent investment from a safety standpoint.

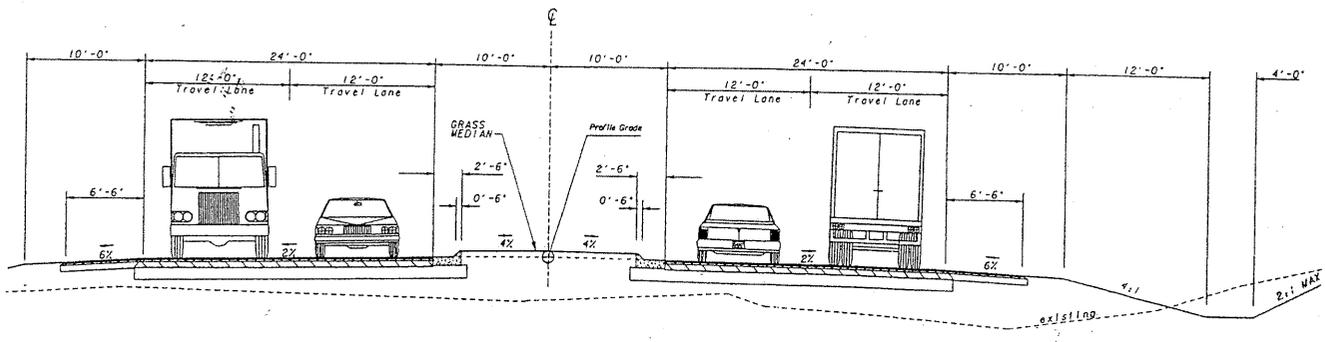
| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 3,107,750 | — | \$ 3,107,750 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 3,107,750 | — | \$ 3,107,750 |

PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage *Eliminate Median*

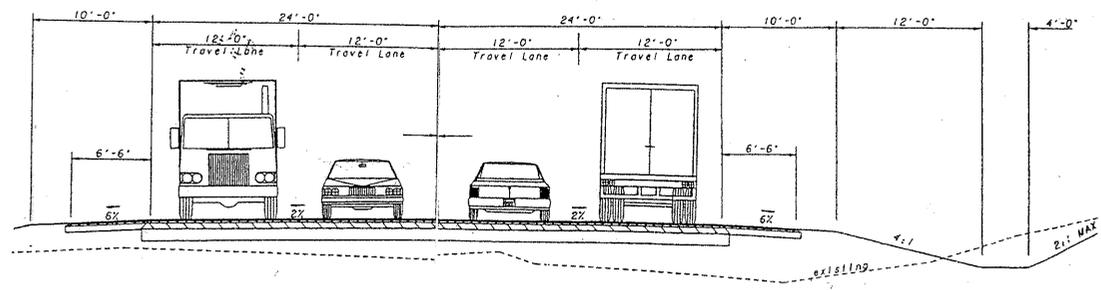
ALTERNATIVE NO.: *2L*

AS DESIGNED ALTERNATIVE

SHEET NO.: *2 of 4*



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:
 26

SHEET NO.: 3 of 4

30' Curb & Gutter - 13,700 LF (from Alt. 20)

Cross Drain Pipes - 40 Ea x 20' = 800 LF

Right-of-Way - Sta 100+45 To 177+00 = 7655' x 20' = 153,100 Ft²

Sta. 177+00 To 181+00 = 400' x 32' = 12,800 Ft²

Sta 181+00 To 190+70 = 970' x 44' = 42,680 Ft²

208,580 Ft² ÷ 43,560 Ft²/Ac

4.8 Ac.

Grassing - 4.8 Ac. x 75% = 3.6 Ac.

Bridges - over streams - 400' x 20' x 2 = 16,000 SF

over Railroad - 200' x 11.5' = 2,300 SF

18,300 SF

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: 30

DESCRIPTION: **USE A TWO-LANE SECTION WITH A 20-FT. MEDIAN AND CURB AND GUTTER THROUGHOUT**

SHEET NO.: 1 of 3

ORIGINAL DESIGN: (Sketch attached)

The concept mostly uses four 12-ft.-wide travel lanes, a 20-ft.-raised grassed median, and 10- and 12-ft. shoulders throughout the project.

ALTERNATIVE: (Sketch attached)

Construct two 12-ft.-wide travel lanes with a 20-ft. median and curb and gutter throughout the project. Purchase the originally intended right-of-way width to allow for future expansion when warranted.

ADVANTAGES:

- Reduces costs
- Accelerates construction
- Provides a greener solution
- Four lanes not required

DISADVANTAGES:

- Perceived loss of amenity
- Initially eliminates two travel lanes

DISCUSSION:

The 2030 design year traffic is 10,394 AADT; a two-lane facility will more than adequately handle the anticipated traffic load. Also, a 20-ft.-wide median provides ample safety while allowing for expansion to the outside when warranted in the future.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,899,181 | — | \$ 1,899,181 |
| ALTERNATIVE | \$ 9,636 | — | \$ 9,636 |
| SAVINGS | \$ 1,889,545 | — | \$ 1,889,545 |

SKETCHES

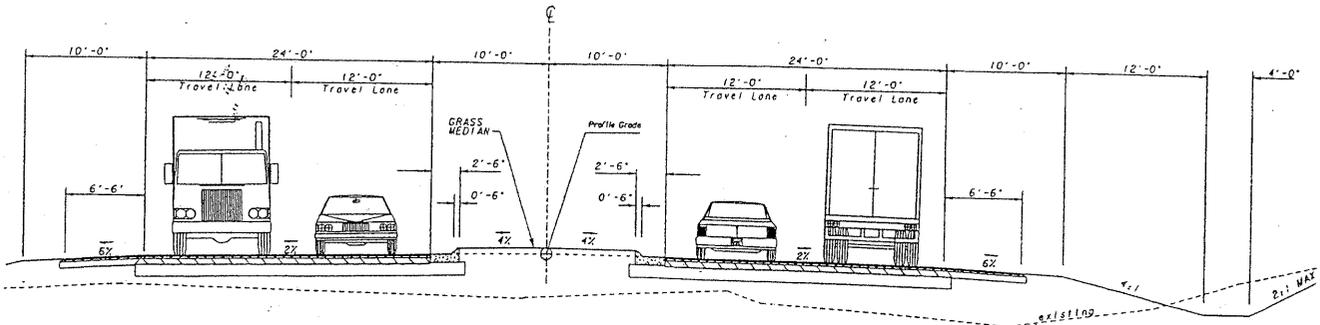
PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

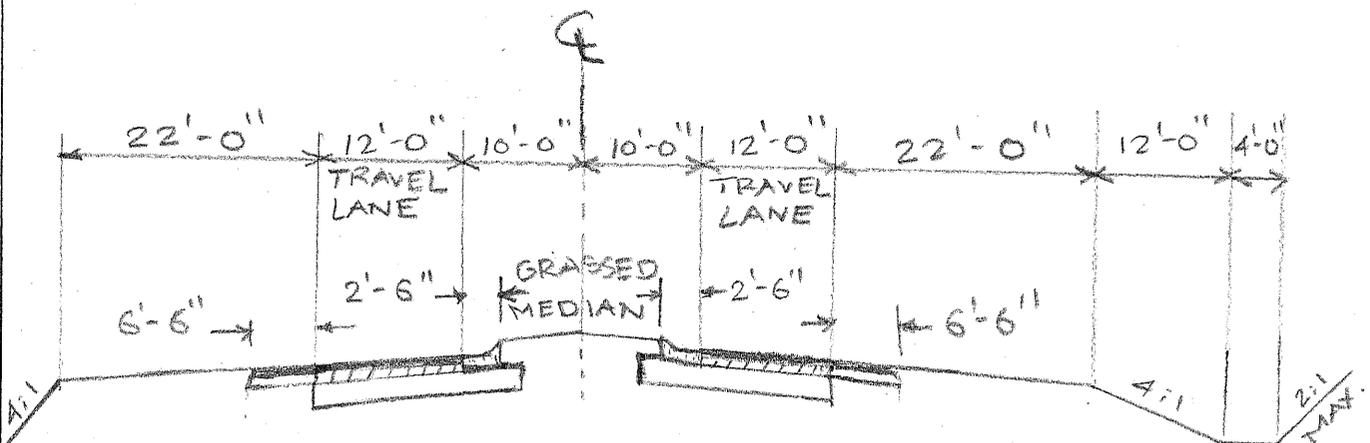
30

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 3



AS DESIGNED ALTERNATIVE



VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: 31

DESCRIPTION: **ELIMINATE THE TAPER ON THE BRIDGE OVER THE RAILROAD BY REDUCING THE LENGTH OF THE LEFT-TURN LANE**

SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The taper of the left-turn lane from the proposed Newnan Bypass to Turkey Creek Road extends onto the railroad bridge.

ALTERNATIVE:

Commence the left-turn lane from the proposed Newnan Bypass onto Turkey Creek Road after the railroad bridge. The proposed geometry is like the left-turn lane from the Newnan Bypass onto East Gordon Road on the south end of the project.

ADVANTAGES:

- Reduces costs
- Accelerates construction slightly
- Reduces the quantity of pavement

DISADVANTAGES:

- None apparent

DISCUSSION:

The left turn onto Turkey Creek Road has a very low hourly turning movement of 40 Design Hourly Volume (DHV). This situation is ideally suited to commence the left-turn lane after, i.e., north of, the new railroad bridge.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 363,339 | — | \$ 363,339 |
| ALTERNATIVE | \$ 0 | — | \$ 0 |
| SAVINGS | \$ 363,339 | — | \$ 363,339 |

CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
Coweta County, GDOT, District 3
Concept Design Stage

ALTERNATIVE NO.:
31

Eliminate Taper on RR Bridge

SHEET NO.: 2 of 3

Taper on Bridge = Taper is from 0' to 30' in 400 LF = 1' width every 13.3' in length

Bridge is located between 100' to 300' of taper

$$100' \div 13.3 = 7.5' \text{ additional width}$$

$$300 \div 13.3 = 22.6' \quad " \quad "$$

$$\text{Additional Bridge Width} = (7.5 + 22.6) \div 2 = 15.1 \times 200' = 3020 \text{ Ft}^2$$

$$\text{Pavement} = 400' \times 12' = 4800 \text{ Ft}^2 \div 9 \text{ Ft}^2/\text{sq} = 533.59$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **33**

DESCRIPTION: **USE 2:1 FILL SLOPES IN LIEU OF 4:1 SLOPES**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The typical section shows the use of 4:1 fill slopes regardless of the fill height.

ALTERNATIVE: (Sketch attached)

Use 2:1 fill slopes for all fill areas and install guardrails where fill height exceeds ten ft.

ADVANTAGES:

- Reduces cost
- Accelerates construction
- Reduces barrow material to haul

DISADVANTAGES:

- Perceived reduction in safety
- Affects aesthetics – requires the use of guardrails

DISCUSSION:

This project requires 850,000 cy of fill material. Steepening the fill slopes will help reduce the amount of barrow material required.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 1,326,391 | — | \$ 1,326,391 |
| ALTERNATIVE | \$ 139,842 | — | \$ 139,842 |
| SAVINGS | \$ 1,186,549 | — | \$ 1,186,549 |



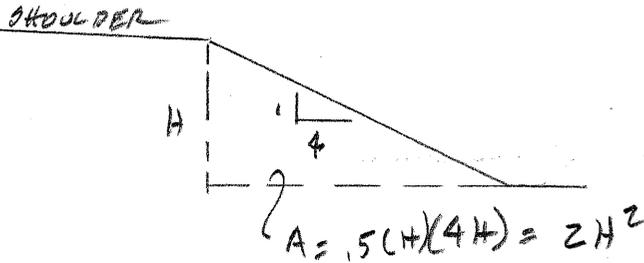
PROJECT: STP-0007-00(694), P. I. No. 0007694
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Coweta County, GDOT, District 3
Concept Design Stage

ALTERNATIVE NO.:

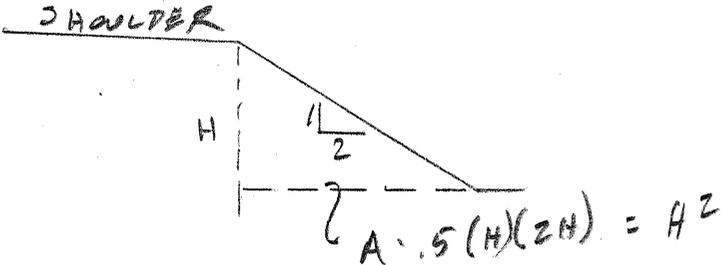
33

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



$\Delta = 2H^2 - H^2 = H^2$

CALCULATIONS



PROJECT: STP-0007-00(694), P. I. No. 0007694
 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
 Concept Design Stage

ALTERNATIVE NO.:

33

SHEET NO.: 3 of 4

| FILL RANGE | AVG HT | VOLUME DIFF (CY) |
|-----------------|--------|------------------|
| 100+00 → 123+00 | 5' | 4259 |
| 146+50 → 190+00 | 19' | 116,322 |

$$\text{VOLUME DIFF} = L(H^2)(2)/27$$

$$\text{TOTAL} = 120,581 \text{ CY}$$

GUARDRAIL (2 LINES) IS REQUIRED WHERE
 FILL HEIGHT EQUALS OR EXCEEDS 10'

THIS APPLIES:

$$147+20 \rightarrow 156+80 \quad 960$$

$$158+50 \rightarrow 172+00 \quad 1350$$

$$174+30 \rightarrow 188+00 \quad 1370$$

$$\Sigma = 3680$$

$$\times 2 = 7360 \text{ LF}$$

GUARDRAIL ANCHORS, TYPE 12

6 REQ'D.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **34**

DESCRIPTION: **USE 1:1 FILL SLOPES IN LIEU OF 4:1 SLOPES WITH**
GUARDRAILS BETWEEN STA 147+00 AND 189+00

SHEET NO.: **1 of 3**

ORIGINAL DESIGN: (Sketch attached)

The typical section shows the use of 4:1 fill slopes regardless of the fill height on both sides of the facility.

ALTERNATIVE: (Sketch attached)

Use 1:1 fill slope reinforced with permanent erosion control mats and guardrails two ft. from the edge of the shoulders. This will save nine ft. of right-of-way.

ADVANTAGES:

- Reduces costs
- Reduces disruption to the existing property owners
- Reduces right-of-way

DISADVANTAGES:

- Constructing driveways would be more difficult in the future
- Perceived danger while driving on roads with guardrails and steep slopes
- Uses 8-ft. shoulders vs. 10-ft. shoulders, a 20% reduction in width, but wide enough for a vehicle
- Slightly more construction time to install reinforcing mats and guardrails

DISCUSSION:

This project requires 850,000 cy of fill material. Steepening the fill slopes will help reduce the amount of barrow material required.

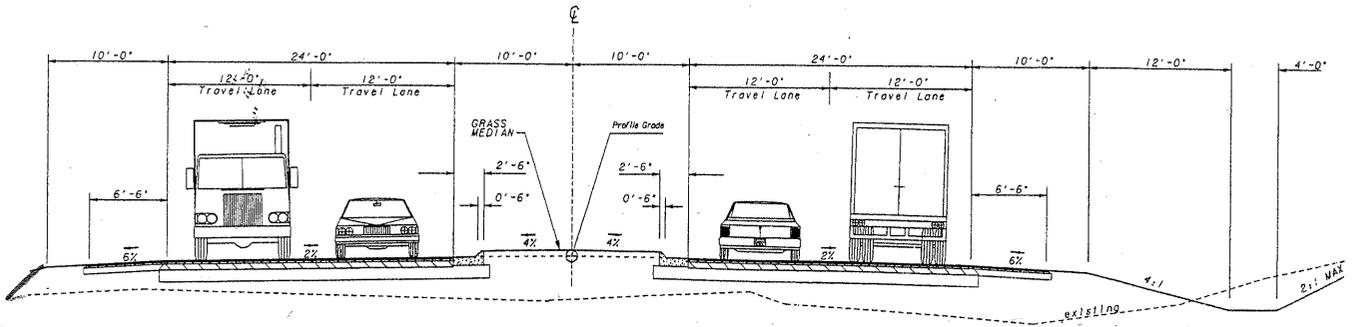
| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 301,856 | — | \$ 301,856 |
| ALTERNATIVE | \$ 180,176 | — | \$ 180,176 |
| SAVINGS | \$ 121,680 | — | \$ 121,680 |

PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWANAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
 Coweta County, GDOT, District 3
Concept Design Stage

ALTERNATIVE NO.:
34

AS DESIGNED ALTERNATIVE

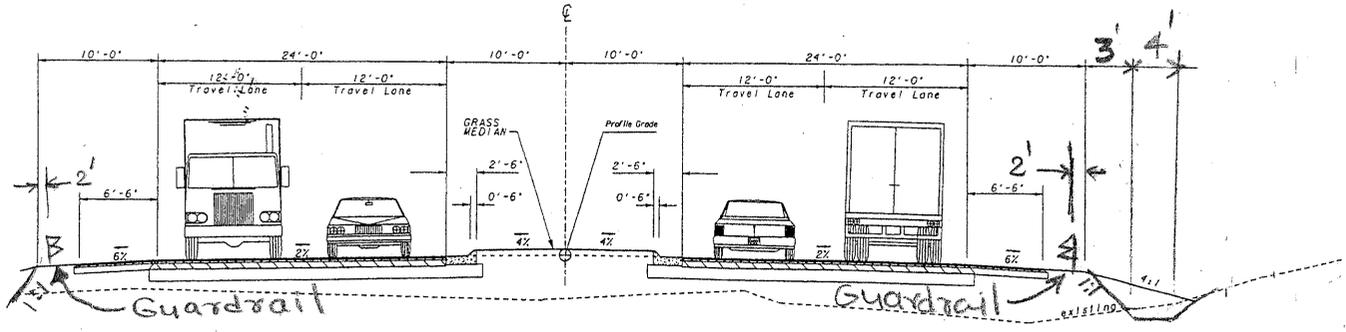
SHEET NO.: 2 of 3



The fill is only from Sta. 147+00 to 189+00.

AS DESIGNED ALTERNATIVE

Length of 1:1 slope = $\sqrt{3^2 + 3^2} = 4.24'$



VALUE ENGINEERING ALTERNATIVE



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
SR 34 SE Bypass from SR 16 to Turkey Creek Road
Coweta County

ALTERNATIVE NO.: **35**

DESCRIPTION: **USE 4-FT.-WIDE PAVED SECTIONS IN LIEU OF 6.5-FT. PAVED SECTIONS OF THE 10-FT.-WIDE SHOULDERS**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN: (Sketch attached)

The concept design uses 10-ft.-wide shoulders on both sides of the facility with the inside sections being paved for 6.5 ft.

ALTERNATIVE: (Sketch attached)

Use 4-ft.-wide paved sections of the shoulders on both sides of the facility, thereby reducing the overall shoulder width by 2.5 ft. on each side. No deductions are taken for the bridges with total lengths of 950 lf.

ADVANTAGES:

- Reduces costs
- Accelerates construction
- Provides a greener solution

DISADVANTAGES:

- Perceived loss of safety

DISCUSSION:

Travelers prefer to park on paved shoulders rather than grassed shoulders. Reducing the paved area from 6.5 ft. to 4 ft. does not reduce safety, although it may cause a perceived safety loss. The overall shoulder width is 7.5 ft.

| COST SUMMARY | INITIAL COST | PRESENT WORTH RECURRING COSTS | PRESENT WORTH LIFE-CYCLE COST |
|-----------------|--------------|-------------------------------|-------------------------------|
| ORIGINAL DESIGN | \$ 127,240 | — | \$ 127,240 |
| ALTERNATIVE | \$ 2,002 | — | \$ 2,002 |
| SAVINGS | \$ 125,238 | — | \$ 125,238 |

PROJECT DESCRIPTION

NEED AND PURPOSE

The Newnan Bypass (SR 34 Bypass) was originally contemplated as a seven-mile-long circumferential road to function as an alternate route around the City of Newnan in Coweta County. The construction of the bypass has been advanced in segments which have been phased over time and opened to traffic as segments are completed. Approximately one-half of the overall bypass is currently constructed and open to traffic. The State of Georgia Department of Transportation (GDOT), under separate contract, is currently advancing separate segments of the bypass (P. I. Nos. 322400 and 322405) in the southwesterly quadrant of the City.

This project's proposed segment of the bypass (approximately 1.6 miles) is a connecting link on new alignment. This segment has independent utility and function which will provide connectivity and access between one of the previously constructed segments of the bypass and the existing state highway system at State Route 16 (SR 16) in the southeasterly quadrant of the City. The previously constructed adjoining segment of the bypass extends from SR 34 (Bullsboro Road) through Lower Fayetteville Road to Turkey Creek Road. Terminating at Turkey Creek Road, the existing bypass is a four-lane, median divided arterial roadway that provides access between the central commercial district on SR 34 and Turkey Creek Road. Completion of this segment of the bypass will improve accessibility to Interstate Highway 85 (I-85) at Interchange 41 via SR 16 and United States Route 29 (US 29)/US 27 Alternate (Alt) and provides a parallel facility to I-85 between Interchange 40 at SR 34 and Interchange 41.

The project is proposed as a new facility on new alignment and is included as a roadway capacity improvement in the 2030 Regional Transportation Plan (RTP) and fiscal year (FY) 2006 - 2011 Transportation Improvement Program (TIP) as Project CW-007 SR 34 Bypass (Newnan Bypass Southeast Segment), and identified by GDOT P. I. No. 0007694. The project is approximately 1.6 miles in length, with the northern terminus being at Turkey Creek Road and the southern terminus at SR 16. As currently programmed, Project CW-007 is sponsored by Coweta County with an anticipated construction date of 2009.

The termini of the project have been established to provide connectivity, continuity and consistency with the local and regional transportation initiatives that are currently underway or programmed through GDOT and the Atlanta Regional Commission (ARC). At the northern terminus, the existing Newnan Bypass is a four-lane arterial roadway and Turkey Creek Road is a two-lane local, rural roadway, both with posted 45 miles per hour (mph) speed limits. Turkey Creek Road is approximately two miles in length, running northwest to southeast, from Poplar Road west of I-85 to SR 16 on the east side of I-85. Turkey Creek Road crosses under I-85 but does not provide access to I-85 at this crossing. The existing intersection of the Newnan Bypass with Turkey Creek Road is a T-type intersection. The proposed project will extend the Newnan Bypass through the Turkey Creek Road intersection and convert the T-type intersection into a 4-way controlled signalized intersection.

At the southern terminus, SR 16 is a two-lane roadway with a posted speed limit of 45 mph in the vicinity of US 29/US 27 Alt. SR 16 extends diagonally across central Coweta County and runs primarily east-west from its westerly intersection with US 29/US 27 Alt to Senoia in the easterly part

of the county. Within the county, SR 16 provides primary surface transportation access between the populated centers of Newnan, Sharpsburg and Senoia. SR 16 crosses over I-85 slightly to the east of this proposed segment of the bypass but does not provide access to I-85 at the crossing. The nearest access to I-85 is provided at Interchange 41, a distance of approximately 0.4 miles from the intersection of SR 16 with US 29/US 27 Alt. The proposed project will bring the Newnan Bypass into a T-type intersection with SR 16. The intersection will be traffic signal controlled with additional lanes added to SR 16 on the approaches as part of a coordinated project with GDOT P. I. No. 0006877.

The termini of the proposed project are consistent with the local and regional transportation initiatives that are currently underway. Those projects are included in the RTP and TIP as Project Nos.: (1) CW-006A (GDOT P. I. No. 322400) SR 34 Bypass from SR 16/US 27Alt to Jefferson Parkway; (2) CW 006B (GDOT P. I. No. 322405) SR 34 Bypass from Jefferson Parkway to SR 34 east of Newnan; (3) CW-034 (GDOT P. I. No. 0006877) SR 16 from I-85 south to US 29; and (4) CW-033C (GDOT P. I. No. 0006293) Coweta County Intersection Improvements, Phase III - specifically the improvements to SR 16 and Pine Road at US 29/SR 14.

Existing traffic information and design year forecasting has been developed from the travel demand model for the Coweta County Joint Comprehensive Transportation Plan (CTP) and Implementation Program. The travel demand modeling files were obtained from the ARC for the years 2005, 2010 and 2030. The 2005 forecast model was used as the base year. From 2005, the Estimated Time of Completion (ETC) was forecasted to 2010 for use as the existing condition. From the 2010 existing condition, the design year was forecasted ahead 20 years to 2030 for this project. Because this is a new facility on new alignment, there are no actual existing traffic volumes or accident data available for the facility.

Subsequent to the initial traffic forecasting stated above, it was determined that additional traffic investigations are conducted to assess the effects of the project on the regional transportation network. A travel demand modeling analysis was completed for the proposed bypass consistent with the county's CTP and the current, proposed and planned future transportation initiatives within the region.

The existing project corridor is undeveloped or sparsely developed open land. The adjacent and abutting environs are of a rural character with land uses generally being undeveloped open space or agricultural, with limited commercial uses and low-density residential subdivisions.

The Newnan Bypass has been and still remains a priority transportation initiative for Coweta County to improve access around the City of Newnan and be a catalyst to promote and support economic development. This segment of the bypass has no known or readily identified community concerns. The project has received support from the community for its continuation. Completion of this segment of the bypass will support and promote economic development in this quadrant of Coweta County by providing: (1) an additional and alternate route for access between I-85 at Interchange 41 and commercial and industrial land uses in Newnan; (2) access to previously undeveloped land in close proximity to I-85; (3) additional capacity to supplement US 29/US 27 Alt., and (4) advancing the completion of the full circumferential route around Newnan.

The proposed project will be coordinated with GDOT P. I. No. 0006877, SR 16 from I-85 to US 29/US 27 Alt, as it moves through environmental review and the design development process. Both GDOT projects, P. I. No.0007694 and P. I. No. 0006877, will be let, awarded, and constructed as one contract.

The project will be consistent with Executive Order 12898 as it pertains to environmental justice. The project will include: (1) feasible and prudent design decisions to avoid, minimize and/or mitigate adverse human health and environmental effects, including social and economic effects; (2) the design development process will provide opportunities for full and fair public participation of potentially effected individuals or groups of individuals; and (3) the process will not discriminate against any individual or group of individuals in the receipt of benefits.

DESCRIPTION OF THE PROPOSED PROJECT

The project is located near the center of Coweta County, to the southeast of the City of Newnan, and slightly northwest of I-85 Interchange 41 for SR 14/US 29. The project is an extension of the existing Newnan Bypass which currently terminates at Turkey Creek Road from the north. This segment of the overall Newnan Bypass will extend approximately 1.6 miles on new alignment between Turkey Creek Road and SR 16, and will include traffic signal controlled intersections at its termini with both Turkey Creek Road and SR 16. The project will cross over the Central of Georgia Railway near the approach to Turkey Creek Road at its northerly terminus; and will cross over wetlands, floodplains, a discharge stream of East Newnan Lake, and Turkey Creek through the central segment of the project before connecting to SR 16 at its southerly terminus. This project will be coordinated with the SR 16 widening (GDOT P. I. No. 0006877) that begins just before the I-85 overpass to its intersection with US 29/US 27 Alt.

This project is within Coweta County, a non-attainment area according to the Region's Air Quality Conformity Analysis.

Plan Development Process (PDP) Classification: Major.

Federal Oversight: Exempt.

Functional Classification:

Turkey Creek Road - Urban Local Street within the Newnan Urban Area Boundary and Rural Local Road outside of the Newnan Urban Area Boundary

Newnan Bypass - Urban Principal Arterial - the proposed Turkey Creek Road to SR 16 segment is partial controlled access

SR 16 - Urban Minor Arterial - partial controlled access.

U. S. Route Number: N/A

State Route Number: 16.

Traffic Average Annual Daily Traffic (AADT):

| | | |
|--------------------------|-----------------------------|-----------------------------|
| <u>Turkey Creek Road</u> | Current Year, 2010 = 4,574 | Design Year, 2030 = 3,742. |
| <u>Newnan Bypass</u> | Current Year, 2010 = 3,950 | Design Year, 2030 = 10,394. |
| <u>SR 16</u> | Current Year, 2010 = 14,760 | Design Year, 2030 = 32,016. |

Existing Design Features: This is a new location project.

The existing design features are representative of the abutting section of the Newnan Bypass from Lower Fayetteville Road to Turkey Creek Road, which was previously constructed under separate contract and which is currently operational and open to traffic.

- Typical Section: The bypass is a four-lane rural cross-section with 12-ft. lanes, 10-ft. shoulders (4-ft. paved), and a 44-ft. depressed median.
- Posted speed: 45 mph.
- Maximum degree of curvature: 3°/minimum radius: 1,909 ft.
- Maximum grade: 4.5 %.
- Width of right-of-way: 200 - 300 ft.
- Major structures: two – 7 ft. x 6 ft. reinforced concrete box culverts
- Major interchanges or intersections along the project:
 - Newnan Bypass at Lower Fayetteville Road - stop sign controlled
 - Newnan Bypass at Big Poplar Road - stop sign controlled
 - Newnan Bypass at Turkey Creek Road - stop sign controlled
- Existing length of roadway segment and the beginning mile logs for each county segment: zero

PROPOSED DESIGN FEATURES:

- Proposed typical section(s): The bypass will be a rural cross-section containing four 12-ft. lanes, 10-ft. shoulders (6.5 ft. paved), and a 44-ft. depressed median where it begins at Turkey Creek Road. The bypass will transition to an urban cross-section containing four 12-ft. lanes, a 20-ft. raised grass median, and 10-ft. rural shoulders (6.5 ft. paved) on the outside after crossing the Central of Georgia Railway. The intersections with both Turkey Creek Road and SR 16 will be signalized. At these intersections the cross-section will have curb and gutter to reduce right-of-way impacts and sidewalks to facilitate pedestrian travel. All necessary turn lanes will be provided at the intersections.
- Proposed design speed mainline: 45 mph.
- Proposed maximum grade mainline: 6 %, maximum grade allowable: 6 %
- Proposed maximum grade side street: 4 %, maximum grade allowable: 8 %
- Proposed maximum grade driveway: 15 %.
- Proposed minimum radius of curve: 1,200 ft., minimum radius allowable: 711 ft.
- Right-of-Way
 - Width: 200-300 ft.
 - Easements: temporary (X), permanent (X), utility (), other (X).
 - Type of access control: By Permit.
 - Number of parcels: 7, number of displacements: 0
- Structures:
 - Bridges: A minimum of three crossings will be required. One crossing will be over the existing Central of Georgia Railway and the others will be over the wetlands, water courses and floodplains associated with East Newnan Lake and Turkey Creek. The bridge types, a single bridge to include a median per crossing location versus two parallel and independent bridges per crossing location, will be determined based upon completion of maintenance and economic analyses in the preliminary design.
 - Retaining walls: None anticipated.

- Box Culvert: One 7-ft. x 7-ft. culvert will be required south of East Newnan Lake where an existing drainage ditch carries runoff to the lake.
- Major intersections and interchanges:
 - SR 34 Newnan Bypass at Turkey Creek Road (signalized).
 - SR 34 Newnan Bypass at SR 16 (signalized) GDOT P. I. Nos. 0007694/0006877.
- Traffic control during construction: The construction is primarily off-line since it is new construction. The termini and connections at the existing roads, Turkey Creek Road and SR 16, will affect existing travel lanes and will require on-site traffic control and minimal staged construction.
- No Design Exceptions to controlling criteria anticipated.
- Design Variances: None.
- Environmental Concerns:
 - A Nationwide Permit (NWP) 14 for linear transportation projects is anticipated for unavoidable impacts to wetlands and perennial streams in the project corridor.
 - One closed UST [underground storage tank] site was found within ¼ mile of the project corridor, and two listed LUST [Leaking Underground Storage Tank] sites were identified within a ½ mile radius of the project corridor. The closed UST was installed in 1978, closed in-place in 1988, and is not listed in the EPD's [(Georgia) Environmental Protection Division of the Department of Natural Resources (DNR)] LUST Database. Two listed LUST sites were also identified within ½ mile of the project corridor. Both sites have been monitored and reviewed by EPD and no further regulatory action has been required for either site. All three UST sites are located down gradient of the project corridor and are not an environmental concern.
 - The following invasive species were found: Common Privet [Ligustrum Vulgare] and Parrot's Feather [Myriophyllum Aquaticum] (aquatic plant species).
 - There are approximately 29 acres of wetlands located within the proposed project corridor, located primarily south and west of Turkey Creek between I-85 and East Newnan Lake. Non-wetland waters of the U.S. associated with the project corridor consist of East Newnan Lake, the discharge stream from the lake, two farm ponds, Turkey Creek and several smaller streams and creeks that are tributaries of Turkey Creek.
 - Based on file review, four archaeological studies have been conducted in the vicinity of the corridor, from which no sites were identified as being included on, or eligible for, inclusion on, the National Register of Historic Places (NRHP). Based on file review of previous historical studies, one residence on Turkey Creek Road is a previously recorded historic structure and the Central of Georgia Railroad is a historical feature. A total of 34 additional properties 50 years of age or older not identified in the DNR survey were identified within the proposed project's APE [Area of Potential Effect] during the field survey. Resource 1 is the East Newnan Cotton District. Resources 2 and 3 are individual bungalows, c. 1930, and located at 28 and 45 Magnolia Drive respectively, and Resource 4 is the Newnan Truck and Equipment Company, built c. 1920 and located at SR 16 and US 29/US 27. Resources 1.01 through 1.29 appear to be part of a much larger Cotton Mill District, containing 116 additional historic resources, that extends to the West of the proposed APE. However, since these properties were not directly in the view shed of the proposed APE they were not surveyed. The final historical survey for structures 50 years of age or older, archaeological shovel testing, and Assessment of Effects reviews will be completed as a part of the comprehensive environmental review process for the selection of a preferred alternative.
 - No cemeteries are located within the project corridor. One church, the East Newnan Baptist Church, is located on East Gordon Road near the intersection of SR 16.

- No parklands are located within the project corridor.
- No Section 6(F) lands or properties have been identified within the project corridor.
- Level of environmental analysis:
 - Are Time Savings Procedures appropriate? No.
 - Environmental Assessment/Finding of No Significant Impact: FONSI.
 - Note: This project will be combined with GDOT P. I. No. 0006877 in a common environmental approval document.

Utility Involvement

- | | |
|--|------------------------|
| • Georgia Power | Power |
| • Coweta Fayette EMC | Power |
| • Atlanta Gas Light | Natural Gas |
| • Charter Communications | Cable TV |
| • Comcast | Cable TV |
| • Bellsouth | Telephone |
| • Coweta County Water & Sewer Department | Water and Sewer |
| • Newnan Utilities | Power, Water, Cable TV |

Project Responsibilities

- | | |
|-------------------------------|----------------------|
| • Design | Coweta County |
| • Right-of-Way acquisition | Coweta County |
| • Relocation of utilities | Coweta County |
| • Letting to contract | GDOT |
| • Supervision of construction | GDOT |
| • Providing material pits | Contractor to secure |
| • Providing detours | None Required |

Coordination

- Initial Concept Meeting held January 23, 2006.
- Draft Concept Team Meeting held April 14, 2006.
- Concept Team Meeting held August 28, 2007.
- FEMA [Federal Emergency Management Agency], USCG [United States Coast Guard], and/or TVA [Tennessee Valley Authority]: This project may require FEMA coordination as it is located in the 100 year floodplain.
- Public involvement. A Public Information Open House will be required. (March 6, 2008)
- Local government comments. Coordination with Coweta County is in progress and will be ongoing throughout the life of the project.
- Other projects in the area:
 - GDOT P. I. No. 0006293, Pine Road and SR 16 at US 29 intersection improvements.
 - GDOT P. I. No. 0006877, SR 16 widening; note - this project needs to be let with GDOT P. I. No.0007694.
 - GDOT P. I. No. 322400, Newnan Bypass - SR 16/US 27A to Jefferson Parkway.
 - CW-AR-003, Poplar Road - New Interchange.
- Railroads: Central of Georgia Railway (Norfolk Southern). GDOT has requested information from the Railroad on possible future track requirements. (February 26, 2008)

Scheduling-Responsible Parties' Estimate

- Time to complete the environmental process: 16 months
- Time to complete preliminary construction plans: 6 months
- Time to complete right-of-way plans: 3 months
- Time to complete the Section 404 Permit: 3 months following selection of a Preferred Alternative
- Time to complete final construction plans: 5 months
- Time to complete to purchase right-of-way: 9 months
- List other major items that will affect the project schedule: railroad coordination

OTHER ALTERNATES CONSIDERED

No Build

The No Build Alternative has been considered but not selected due to its inability to satisfy the Need and Purpose.

Build Alternative 1 (East Alternate Alignment)

The East Alternate Alignment was originally conceptualized as a curvilinear alignment which would be biased toward the easterly side of the project study area. The project study area is bounded by East Newnan Lake to the west, I-85 to the east, Turkey Creek Road to the north and SR 16 to the south. Beginning at the southerly terminus, the East Alternate Alignment begins as an at-grade T-intersection with SR 16, intersecting SR 16 approximately 2/3 of the distance between the SR 16 intersection with US 29 to the west and the overpass crossing I-85 to the east. From the intersection with SR 16 the proposed bypass would begin by heading in a northerly direction. The alignment would then cross and bisect East Gordon Road at a distance of approximately 500 ft. north of the intersection with SR 16. After crossing East Gordon Road, the alignment would then curve slightly to the east and follow along a tangent alignment in a northeasterly direction for approximately 3,500 ft., allowing the bypass to come in close proximity to the I-85. As the bypass alignment approached I-85, it would then curve back toward the west, departing away from I-85. From its near point with I-85, the alignment progressed along a north, northwesterly course for approximately 2,000 ft. toward its intersection with Turkey Creek Road. As the alignment approached Turkey Creek Road it curved slightly back toward a more northerly direction as it crossed over the Central of Georgia Railroad approximately 500 ft. south of Turkey Creek Road. The northerly terminus for the East Alternate Alignment was an at-grade intersection with Turkey Creek Road. The East Alternate Alignment would be aligned directly across from the previously constructed segment of the Newnan Bypass which extends up to and through SR 34. The northerly terminus of the East Alternate Alignment is at the intersection with Turkey Creek Road would become the fourth leg of the existing Newnan Bypass/Turkey Creek Road intersection. The East Alternate Alignment has been dismissed from further consideration because it is not the least environmentally damaging, practicable alternative which satisfies the goals and objectives of the project.

Build Alternative 2 (West Alternate Alignment)

The West Alternate Alignment was developed as a concept which would reduce the number, degree and extent of environmental consequences when compared against the East Alternate Alignment. Beginning at the same southerly terminus as the East Alternate Alignment, the West Alternate Alignment forms an at-grade T -intersection with SR 16, intersecting SR 16 approximately 2/3 of the distance between the SR 16 intersection with US 29 to the west and the overpass crossing of I-85 to the east. From the intersection with SR 16 the proposed West Alternate Alignment would begin by heading in a more northerly direction than the East Alternate Alignment. The alignment then crosses and bisects East Gordon Road at a distance of approximately 500 ft. north of the intersection with SR 16. After crossing East Gordon Road, the alignment then curves very slightly to the east and follows along a tangent alignment in a northerly direction along a course slightly to the east of East Newnan Lake. The tangent section from East Gordon Road along East Newnan Lake is approximately 2,000 ft.. From there the West Alternate Alignment follows a more northerly direction for 2,200 ft. crossing over Turkey Creek just to the east of an unnamed pond. Just to the north of the unnamed pond, the alignment then curves to the east and continues on a northeasterly course for approximately 500 ft. toward its terminus at Turkey Creek Road. As the alignment approaches Turkey Creek Road it curves back slightly toward a more northerly direction as it crossed over the Central of Georgia Railroad approximately 500 ft. south of Turkey Creek Road. The northerly terminus for the West Alternate Alignment is the same as the terminus for the East Alternate Alignment. The West Alternate Alignment forms an at-grade intersection with Turkey Creek Road, aligned directly across from the previously constructed segment of the Newnan Bypass which extends up to and through SR 34. The northerly terminus of the West Alternate Alignment at the intersection with Turkey Creek Road becomes the fourth leg of the existing Newnan Bypass/Turkey Creek Road intersection. The West Alternate Alignment has less environmental consequences than the East Alternate Alignment. The West Alternate Alignment is the preferred alternate.

COMMENTS

As an outcome of the Draft Concept Team Meeting, it was concluded the continued concept development of this GDOT P. I. No. 0007694 would be delayed and the concept development for GDOT P. I. No. 0006877 would be expedited. This determination was made so the intersection geometry of the southern terminus of this project and geometry and lane configurations of GDOT P. I. No. 0006877 could be effectively coordinated and advanced concurrently through the design development process.

It is intended the design development, letting and awarding of GDOT P. I. No. 0007694, SR 34 Bypass from Turkey Creek Road to SR 16, and GDOT P. I. No. 0006877, SR 16 from I-85 to US 29/US27 Alt, will be performed concurrently.

From the Concept Team Meeting, it was determined that a Practical Alternative Report (PAR) would be required due to the amount of wetland impacts of the Preferred Alternate alignment. Subsequent surveys and detailed wetland studies revealed that with minor adjustments to the Preferred Alternative alignment, wetland impacts could be minimized enough to eliminate the need for the PAR. This adjusted alignment is presented under the "Alternates Considered" as Build Alternative 2, the West Alternative Alignment.

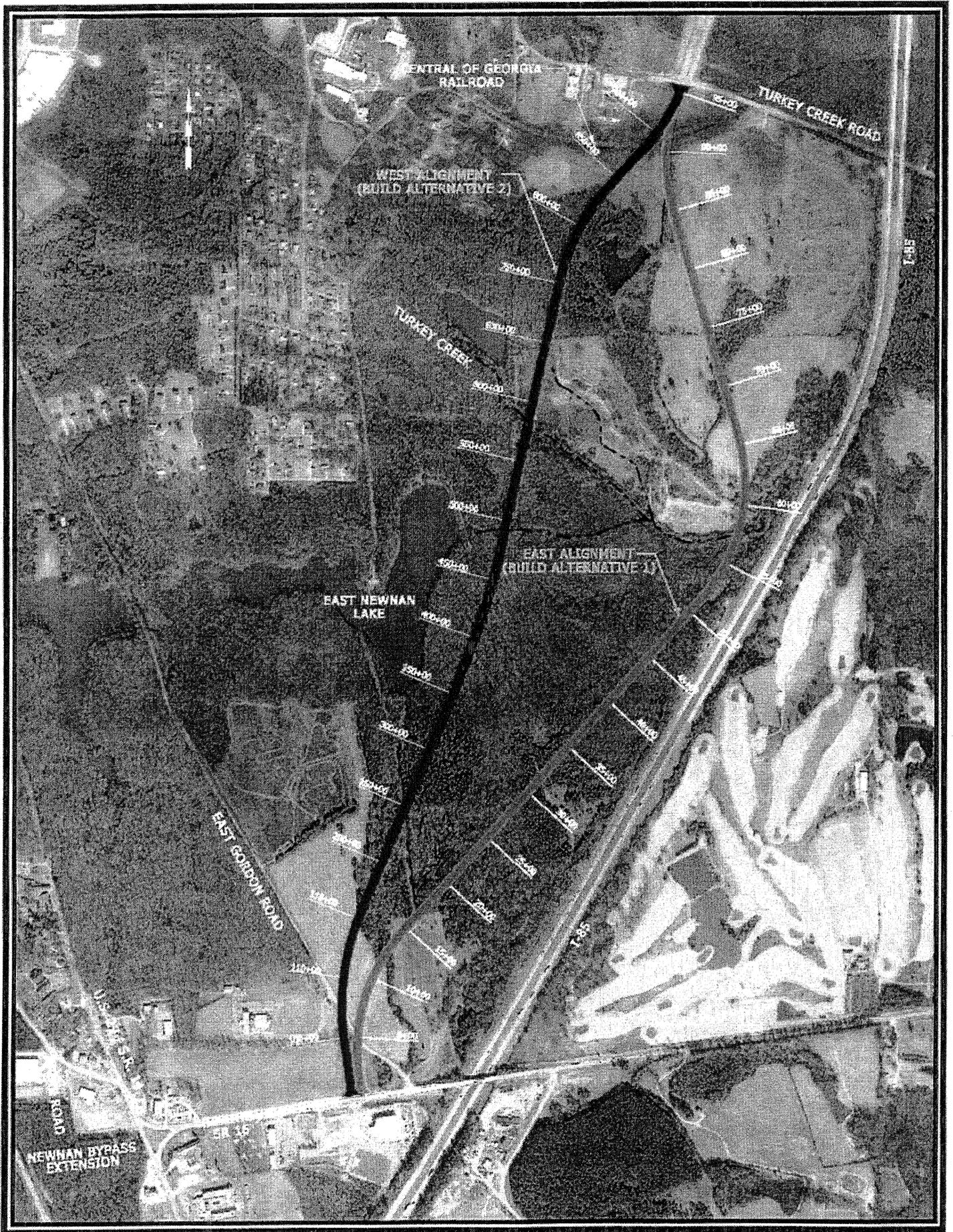
CONSTRUCTION COSTS

The anticipated cost of construction, based on the concept cost estimate prepared by Clough Harbour & Associates, LLP, is \$36,854,218 which includes \$2,500,000 in right-of-way and \$300,000 in reimbursable utilities. The numbers include the following markups:

- Construction: Engineering and Construction at 10.00%.
- Right-of-Way: (1) Scheduling Contingency at 55.00%
 (2) Administration/Court Costs at 60.00%
 (3) Inflation Factor at 40.00%

Reimbursable Utilities: Included in the pricing.

Following is a site plan of the area.



VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

This section describes the procedures used during the value engineering study of the SR 34 Bypass. It is followed by separate narratives and conclusions concerning:

- Workshop Agenda
- Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Histograms
- 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 workshop; and 3) post-study. A Task Flow Diagram that outlines each of the procedures included in the VE study is attached for reference.

PREPARATION EFFORT

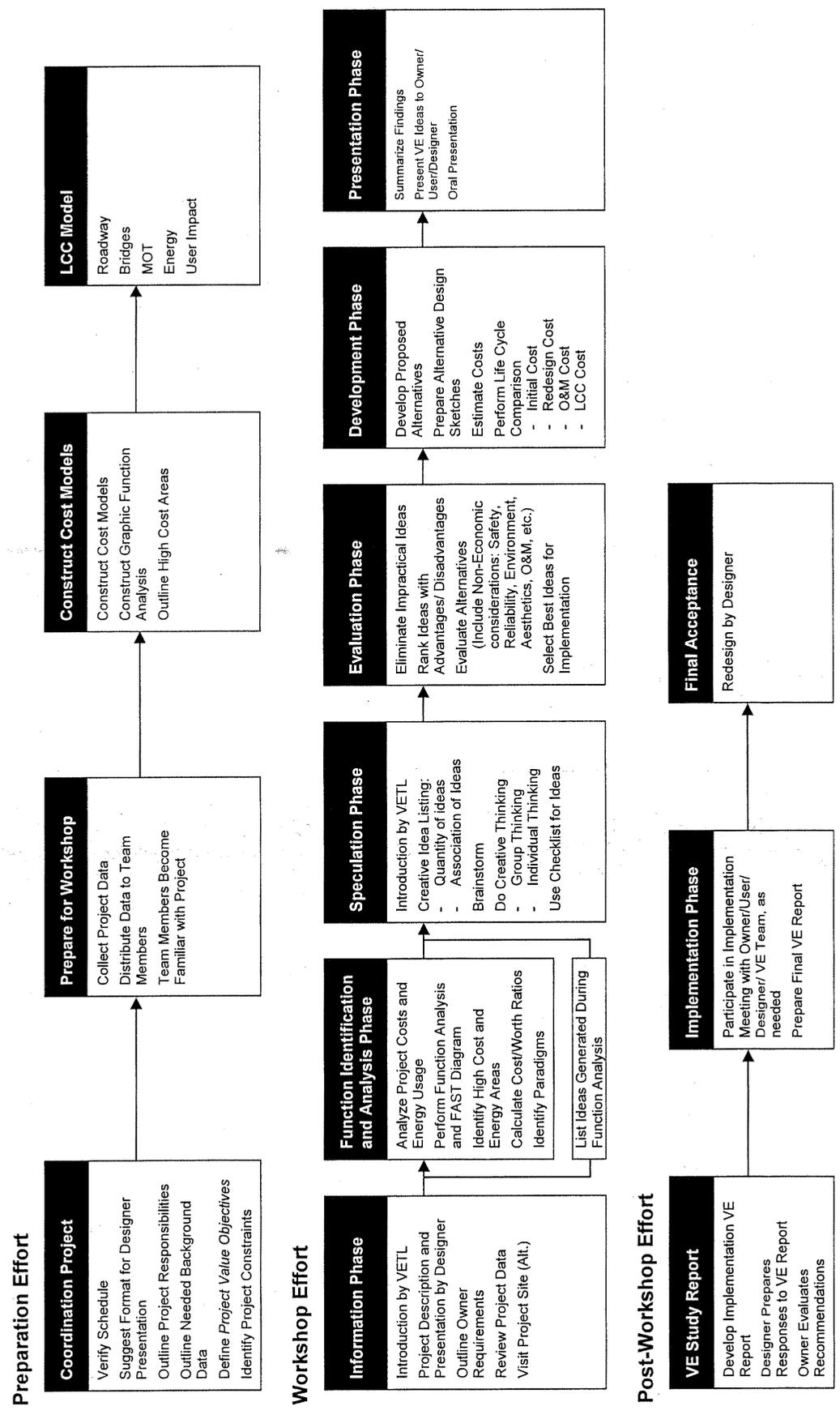
Pre-study preparation for the VE effort consisted of scheduling study participants and tasks, gathering necessary background information on the facility, and compiling project data into a cost model and graphic cost histogram. Information relating to the design, construction, and operation of the facility is important as it forms the basis of comparison for the study effort. Information relating to funding, project planning operating needs, systems evaluations, basis of cost, soil conditions, and construction of the facility was also a part of the analysis.

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It includes six phases:

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

Value Engineering Study Task Flow Diagram



Information Phase

At the beginning of the study, the conditions and decisions that have influenced the development of the project must be reviewed and understood. For this reason, the development manager presented information about the project to the VE team on first day of the session. Following the presentation, the VE team discussed the project using the following documents:

- Draft Project Concept Report, Department of Transportation, State of Georgia, District 3 Design; Project Number: STP-0007-00(694), County: Coweta; P. I. No. 0007694; Federal Route Number: N/A; State Route Number: 16; Newnan Bypass from Turkey Creek Road to SR 16; undated
- Project Concept Report, Department of Transportation, State of Georgia, District 3 Design; Project Number: CSSTP-0006-00(877), County: Coweta; P. I. No. 0006877; Federal Route Number: N/A; State Route Number: 16; Continuation of the proposed Newnan Bypass at SR 16; dated September 20, 2007; includes: (1) Need and Purpose, (2) Scoring Results as Per TOPPS [Transportation Online Policy & Procedure System] 2440-3, (3) Concept Cost Estimate, (4) Typical Section, (5) Abridged Summary of Design Memorandum prepared by URS, May 2007, (6) Review of Potential Environmental Impacts by Applied Technology & Management, Inc. dated December 8, 2006, (7) Utility Cost Estimate, (8) Agreement between Department of Transportation State of Georgia and Coweta County for Transportation Facility Improvements dated May 4, 2007, (9) Notice of Location and Design Approval, undated, (10) Concept Meeting minutes dated August 28, 2007
- Concept Cost Estimate for Project Number STP-0007-00(694), Coweta County; P. I. No. 0007694; prepared by Clough Harbour & Associates, LLP; dated February 29, 2008
- Concept Right of Way Cost Estimate for Project CCSTP-0007-00(694), Coweta County; P. I. No. 0007694; Newnan Bypass Extension; undated
- Concept Profile for Project STP-0007-00(694), prepared by Clough Harbour & Associates, LLP; undated
- Traffic Design Memorandum *for SR 16 & Newnan By-Pass, Final – May 2007*; prepared by URS for Coweta County, Georgia
- Review of Potential Environmental Concerns - DRAFT for Newnan Bypass Extension – Turkey Creek Road to SR 16, P. I. No. 0007694; prepared by Applied Technology & Management, Inc.; dated June 24, 2005
- Agreement Between Department of Transportation State of Georgia and Coweta County for Transportation Facility Improvements dated May 4, 2007
- Notice of Location and Design Approval, STP-0007-00(694) – Coweta County, P. I. Number 0007694; undated (not yet approved)
- Initial Concept Meeting Minutes for STP-0007-00(694), P. I. No. 0007694, Newnan Bypass (Turkey Creek Road to SR 16); dated January 23, 2006
- Draft Concept Team Meeting Minutes for STP-0007-00(694), P. I. No. 0007694, Newnan Bypass; dated April 14, 2006
- Aerial Map superimposed with Concept alignment; undated
- Federal Emergency Management Agency (FEMA) Floodway Map superimposed with Concept alignment; undated
- Contour Map superimposed with Concept alignment; undated
- General Highway Map Coweta Count, Georgia prepared by the Department of Transportation, Division of Planning and Programming, Office of Information Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, dated 1997

- Transportation Projects (TPro) for CSSTP-0007-00(694), P. I. No. 0007694, SR 34 Bypass from SR 16/US 27 Alt to CR [County Road] 122/Turkey Creek Road; print date March 24, 2008;
- TPro for CSSTP-0006-00(877), P. I. No. 0006877, SR 16 from I-85 to US 27 Alt US 29; run date March 24, 2008
- Georgia Department of Transportation, Bridge and Structures Design Policy Manual, Office of Bridge and Structural Design; dated October 2005, revised April 2007
- GDOT Design Policy Manual, A Georgia Department of Transportation Publication; Version 2.0 revised June 1, 2007
- State of Georgia, Standard Specifications, Construction of Transportation Systems; 2001 Edition
- A Policy of Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials; 2004

Function Identification and Analysis Phase

Based on historical and background data, a cost model and graphic function analysis were developed for this project by major construction elements. They were used to distribute costs by project element, serve as a basis for alternative functional categorization, and assign worth to the categories, where worth is the least cost to provide the required function, as determined by the VE team. The VE team identified the functions of the various project elements and subsystems by using random function generation techniques resulting in the attached Random Function Analysis worksheet and/or Function Analysis Systems Technique (F.A.S.T.) diagram.

Creative Phase

This VE study phase involved the creation and listing of ideas. Creative idea worksheets were organized by project element. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower cost to the owner, 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 association of ideas.

The Georgia Department of Transportation (GDOT), Coweta County (CC) and Clough Harbour & Associates, LLP (CHA) representatives may wish to review the creative list since it may contain ideas that can be further evaluated for potential 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 schematic design concepts, in terms of how well it met the design intent. Advantages and disadvantages were discussed, and each team member rated the ideas on a scale of 1-5, with the best ideas rated 5. Total scores were summed for each idea and only highly-rated ideas 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 during the process of 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 high-rated items may not have been developed into alternatives.

Development Phase

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

Presentation Phase

The last phase of the VE study was the presentation of the findings. The VE alternatives were screened by the VE team before draft copies of the Summary of Value Engineering Alternatives worksheets were provided to GDOT, CC, and CHA representatives during an informal presentation on the last day of the workshop. The VE alternatives were arranged in the same order as the idea listing sheets to facilitate cross-referencing.

POST-WORKSHOP EFFORT

The post-study portion of the VE study includes the preparation of this Value Engineering Study Report. Personnel from GDOT, CC, and CHA 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. Lewis & Zimmerman Associates, Inc. is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

VALUE ENGINEERING STUDY AGENDA

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 36-hour Value Engineering (VE) study on the following project: STP-0007-00(649), P. I. No. 0007649, NEWNAN BYPASS FROM TURKEY CREEK ROAD TO STATE ROUTE 16. The project is located in Coweta County, Georgia. It is expected the owner, the Georgia Department of Transportation (GDOT) and Coweta County, and the design consultants, Clough Harbour & Associates, LLP (CHA), will be available to make a formal presentation concerning the project at the beginning of the workshop and be available to answer questions during the VE study effort.

VE Study Agenda

The VE study will follow the outline described below and be conducted March 25 - 29, 2008, in the Engineering Service's Conference Room, Room 264 of GDOT's General Office located at No. 2 Capitol Square Street, Atlanta, Georgia 30334. The point-of-contact is Ms. Lisa L. Myers, Design Review Engineer Manager, and Value Engineering Coordinator, who can be reached at 404-651-7468.

Tuesday, March 25th

9:00 am – 9:15 am **General Introduction of all Parties and review of the VE Process**

9:15 am - 11:15 am **Owner's/Designer's Presentation**

GDOT, Coweta County, and CHA are to present information concerning the projects including, but not necessarily limited to: rationale for design, criteria for specific areas of study, project constraints, and the reasons for design decisions.

11:15 am - 12:00 noon **Commence Function Analysis Phase**

The VE team will continue their familiarization with the cost models and project data for each area of study. The cost model(s) will be refined, as necessary; define the function of each project element or system in the cost model, select the primary or basic functions, and determine the worth, or least cost, to provide the function. Cost/worth or value index ratios will be calculated, and high cost/low worth areas for study identified. In addition, the VE team will continue defining the function of each element/system to gain a thorough understanding of the project's needs and requirements.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Conclude the Function Analysis Phase and Commence the Creative Phase**

The VE team will conduct a brainstorming session and list as many ideas as possible for consideration. The aim is to obtain a large quantity of ideas through free association, by eliminating roadblocks to creativity and deferring judgment.

Wednesday, March 26th

8:30 am - 10:00 am **Conclude Creative Phase and Complete Evaluation/Analytical Phase**

The VE team will analyze the ideas listed in the creative phase and select the best ideas for further development.

10:00 am - 12:00 noon **Development Phase**

VE team will develop creative ideas into alternate design solutions. Initial and life cycle cost estimates comparing original and proposed alternatives will be prepared. Selected alternatives for change will be developed and supported with sketches, calculations and written substantiation.

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 5:00 pm **Continue Development Phase**

Thursday, March 27th

8:30 am - 12:00 am **Continue Development Phase**

12:00 noon - 1:00 pm **Lunch**

1:00 pm - 4:00 pm **Conclude Development Phase**

4:00 pm – 5:00 pm **Commence Summary Worksheets for Information oral Presentation**

Upon completion of the Development Phase, the VE facilitator will commence preparation of the summary worksheets based on the alternatives developed by the VE team. The summary worksheets will form the basis of the informal oral presentation.

Friday, March 28th

8:00 am - 9:00 am **Finalize Summary Worksheets**

9:00 am – 11:00 am **Informal Oral Presentation**

The VE team presents its alternatives to the owner and design team representatives and is available to clarify any points. The process for accepting/rejecting VE alternatives is described and a target schedule for meeting to finalize implementation decisions is established.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

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

| | | |
|---|---------------------------|------------------------------|
| John P. Tiernan, PE | Senior Bridge Engineer | ARCADIS U.S., Inc. |
| Paresh J. Parikh, PE | Constructability Engineer | Delon Hampton and Associates |
| Dominic F. Saulino | Roadway Engineer | HNTB |
| Luis M. Venegas, PE, CVS FSAVE, LEED® AP | Team Leader | Lewis & Zimmerman Associates |

DESIGN PRESENTATION

Georgia Department of Transportation and Coweta County, the owners, and Clough Harbour & Associates, LLP, the designer, presented an overview of the project on Tuesday, March 25, 2008. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team up-to-speed regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING PRESENTATION

The VE team conducted an informal presentation on Friday, March 28, 2008 to GDOT, CC, and CHA representatives. Copies of the draft Summary of Value Engineering Alternatives worksheets were provided for interim use.

A copy of the meeting participants is attached for reference.

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



| PROJECT: STP-0007-00(694), P. I. No. 0007694 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16 Coweta County, GDOT, District 3 <i>Concept Design Stage</i> | | Date: March 25 - 28, 2008 |
|---|--|--|
| NAME & E-MAIL (PLEASE PRINT) | ORGANIZATION/TITLE | PHONE/FAX |
| Name: Wayne Kennedy em: wkennedy@coweta.ga.us | Organization: Coweta County, Georgia Title: County Engineer | ph: 770-254-3775 cell: 678-201-6433 fx: 770-683-2014 |
| Name: Kenneth (Ken) D. Crabtree, Jr. em: kcrabtree@dot.ga.gov | Organization: Georgia Department of Transportation (GDOT), District 3, Construction Title: Assistant District Construction Engineer | ph: 706-646-6913 cell: fx: 706-646-6716 |
| Name: David B. Millen em: dmillen@dot.ga.gov | Organization: GDOT, District 3, Construction Title: District Preconstruction Engineer | ph: 706-646-6987 cell: 706-741-3449 fx: 706-646-6722 |
| Name: Jason W. Mobley, EIT em: jmobley@dot.ga.gov | Organization: GDOT, District 3, Design Title: District Design Squad Leader | ph: 706-646-6661 cell: fx: 706-646-6822 |
| Name: Bill Rountree, PE em: brountree@dot.ga.gov | Organization: GDOT, District 3, Design Title: District Design Engineer | ph: 706-646-6990 cell: fx: 706-646-6822 |
| Name: Havard Sheldon em: hseldon@dot.ga.gov | Organization: GDOT, District 3, Construction Title: Area Engineer | ph: 706-845-4115 cell: fx: 706-845-4310 |
| Name: Jeffrey M. Swiderski em: jswiderski@dot.ga.gov | Organization: GDOT, District 3, Design Title: Design Engineer 2 | ph: 706-646-0997 cell: fx: 706-646-6822 |
| Name: Douglas (Doug) D. Franks, PE em: dfranks@dot.ga.gov | Organization: GDOT, Office of Bridge Design Title: Bridge Design Engineer 3 | ph: 404-656-5289 cell: fx: 404-651-7076 |
| Name: Todd Long, PE em: tlong@dot.ga.gov | Organization: GDOT, Preconstruction Division Title: Preconstruction Division Director | ph: 404-656-5187 cell: fx: 404-463-7071 |
| Name: James (Mag) Magnus, CPESC em: jmagnus@dot.ga.gov | Organization: GDOT, Office of Construction Title: Assistant State Construction Engineer | ph: 404-656-5306 cell: fx: 404-656-3507 |

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



| PROJECT: STP-0007-00(694), P. I. No. 0007694 NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16 Coweta County, GDOT, District 3 <i>Concept Design Stage</i> | | Date: March 25 - 28, 2008 |
|--|--|--|
| NAME & E-MAIL (PLEASE PRINT) | ORGANIZATION/TITLE | PHONE/FAX |
| Name: Lisa L. Myers em: lmyers@dot.ga.gov | Organization: GDOT, Office of Engineering Services Title: Design Review Engineer Manager, Value Engineering Coordinator | ph: 404-651-7468 cell: fx: 404-463-6131 |
| Name: Katherine Russett em: krusset@dot.ga.gov | Organization: GDOT, Office of Environmental / Location Title: Transportation Environmental Planner Associate | ph: 404-699-6882 cell: fx: 404-699-4440 |
| Name: Brian K. Summers, PE em: brian.summers@dot.ga.gov | Organization: GDOT, Office of Engineering Services Title: Project Review Engineer | ph: 404-656-6846 cell: fx: 404-463-6131 |
| Name: Ron Wishon em: rwishon@dot.ga.gov | Organization: GDOT, Office of Engineering Services Title: Assistant Project Review Engineer | ph: 404-651-7470 cell: fx: 404-463-6131 |
| Name: Christopher (Chris) Edmondson, PE em: cedmondson@cha-llp.com | Organization: Clough Harbour & Associates, LLP (CHA) Title: Project Manager | ph: 404-352-9200 cell: fx: 404-351-1196 |
| Name: Thomas (Tom) P. Karis, PE em: tkaris@cha-llp.com | Organization: CHA Title: Principal | ph: 404-352-9200 cell: fx: 404-351-1196 |
| Name: John P. Tiernan, PE em: john.tiernan@arcadis-us.com | Organization: ARCADIS Title: Senior Bridge Engineer | ph: 770-431-8666 cell: fx: 77-435-2666 |
| Name: Paresh J. Parikh, PE em: pparikh@delonhampton.com | Organization: Delon Hampton & Associates, Chartered Title: Manager of Engineering Services | ph: 404-419-8434 cell: fx: 404-524-2575 |
| Name: Dominic F. Saulino em: dsaulino@hntb.com | Organization: HNTB Corporation Title: Director of Transportation | ph: 404-946-5745 cell: 678-206-9205 fx: 404-841-2820 |
| Name: Luis M. Venegas, PE, CVS-Life, LEED® AP, FSAVE em: lvenegas@lza.com | Organization: Lewis & Zimmerman Associates, Inc. Title: Value Engineering Facilitator / Team Leader | ph: 770-992-3032 cell: 678-488-4287 fx: 770-435-2666 |

ECONOMIC DATA

The VE team developed economic criteria used for evaluation with information gathered from the State of Georgia Department of Transportation, Coweta County, and Clark Harbour & Associated, LLP. 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: | 2008 |
| Construction Start Up: | February 2011 (Scheduled Let Date) |
| Construction Duration: | ±24 Months (CC/CHA) |
| Economic Planning Life: | 35 years for Pavement |
| Economic Planning Life: | 50 years for Bridges |
| Discount Rate/Interest: | 2.30% (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2008) |
| Inflation/Escalation Rate: | N/A (Per GDOT) |
| Uniform Present Worth (UPW) Factor: | 23.8616 for 35 years 29.5310 for 50 years |
| Cost of Power: | \$0.07/kWhr (kilowatt hour) (assumed) |
| Operation and Maintenance Costs (Industry Norms): | |
| Equipment - With Many Moving Parts | 5.00%-5.50%+ of Capital Cost |
| Equipment - With Minimal Moving Parts | 3.50%-4.00% of Capital Cost |
| Equipment - Electronic | 3.00% of Capital Cost |
| Structural | 1.00%-2.00% (or less) of Capital Cost |
| Composite Construction Mark-Up: (Composed of: Engineering and Construction at 10.00%.) | 10.00% (1.1000) |
| Composite Mark-Up (Right-of-Way): (Composed of: Scheduling Contingency at 55.00%; Administration/Court Costs at 60.00%; and Inflation Factor at 40.00 %.) | 247.20% (3.4720) |

COST ESTIMATE SUMMARY AND COST HISTOGRAMS

The VE Team Leader prepared the attached cost models for the project. The cost models are arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas and are based on the Concept Cost Estimate prepared by Clough Harbour & Associates dated February 29, 2008. As can be expected, judgments at this stage of the study are based on experience and intuition rather than facts, which are not uncovered until well along in the analysis of function. As a result of these qualified hypotheses, there appears to be a potential for initial savings in the following areas:

- Special Features
- Grading and Drainage
- Base and Paving
- Lump Items

DESIGNER'S COST ESTIMATE

In order to facilitate the cost developments of the selected ideas, the VE team generated numerous "unit" prices for specific roadway costs that are noted below:

Mainline Pavement

- 14 inches (") Graded Aggregate Base (GAB) at \$25.00/Ton
- 800 pounds (lbs)/square yard (SY) of 25 millimeter (mm) Superpave at \$100.00/Ton
- 750 lbs/SY of 19 mm of Superpave at \$100.00/Ton
- 135 lbs/SY of 9.5 mm of Superpave at \$100.00/Ton
- $GAB = (14''/12''/\text{foot}) \times (9 \text{ square feet/SY}) \times (150 \text{ lbs/SY}) \div (2,000 \text{ lbs/Ton}) \times (\$25.00/\text{Ton}) = \$19.69/\text{SY}.$
- $Paving = (800 \text{ lbs} + 220 \text{ lbs} + 135 \text{ lbs}) \div (2,000 \text{ lbs/Ton}) \times (\$100.00/\text{Ton}) = \$61.57/\text{SY}.$
- $\therefore \$19.69/\text{SY} + \$61.57/\text{SY} = \underline{\$81.44/\text{SY}}$

Shoulder Pavement:

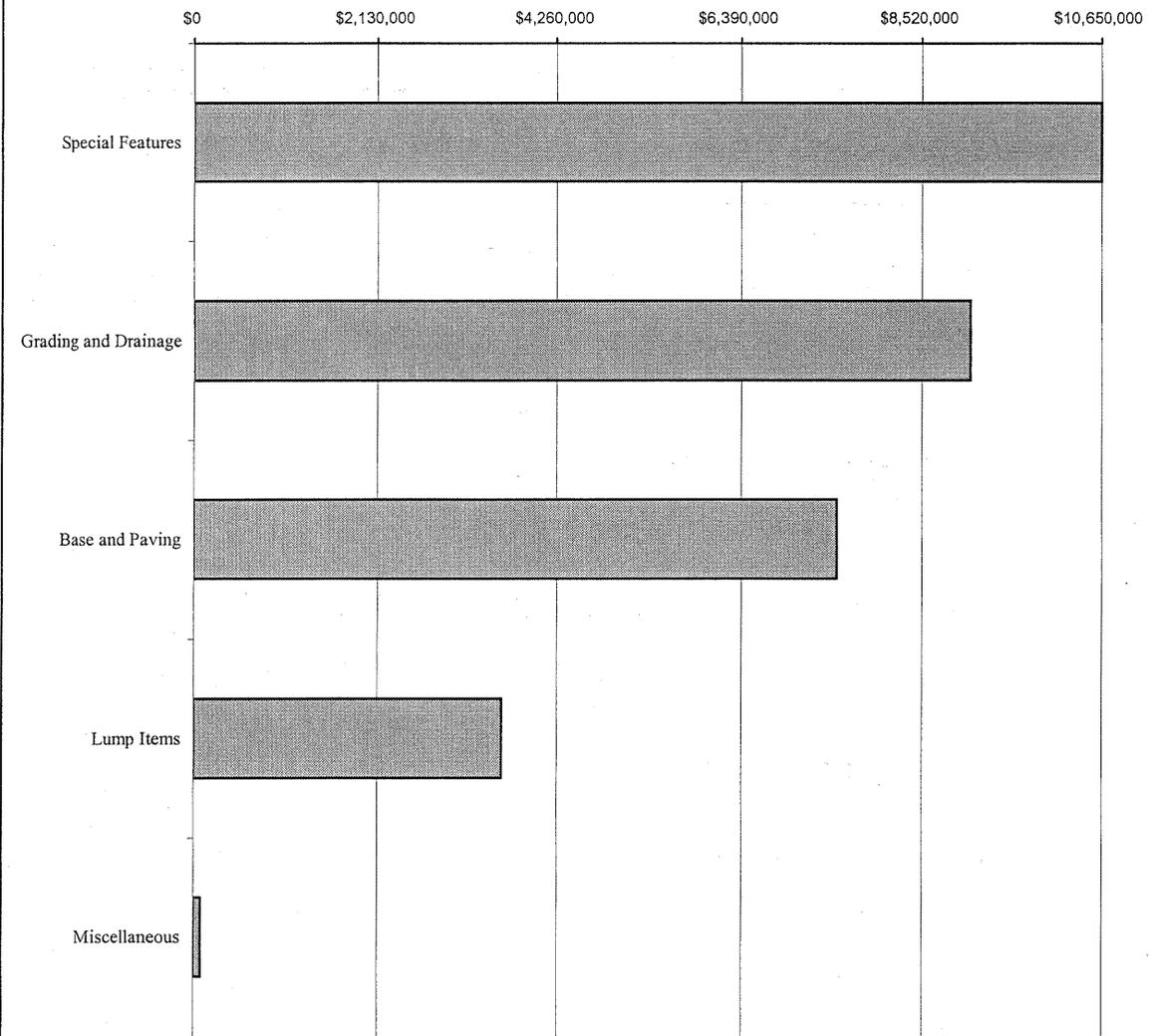
- 6" GAB at \$25.00/Ton
- 220 lbs/SY of 19 mm of Superpave at \$100.00/Ton
- 195 lbs/SY of 9.5 mm of Superpave at \$100.00/Ton
- $GAB = (6''/12''/\text{foot}) \times (9 \text{ square feet/SY}) \times (150 \text{ lbs/SY}) \div (2,000 \text{ lbs/Ton}) \times (\$25.00/\text{Ton}) = \$8.44/\text{SY}.$
- $Paving = (220 \text{ lbs} + 195 \text{ lbs}) \div (2,000 \text{ lbs/Ton}) \times (\$100.00/\text{Ton}) = \$17.75/\text{SY}.$
- $\therefore \$8.44/\text{SY} + \$17.75/\text{SY} = \underline{\$26.19/\text{SY}}$

COST HISTOGRAM



Project: **STP-0007-00(649), P. I. No. 0007649**
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
Coweta County, Georgia

| TOTAL PROJECT COST | COST | PERCENT | CUM. PERCENT |
|---|----------------------|---------------------|-----------------|
| Special Features | 10,650,000 | 34.40% | 34.40% |
| Grading and Drainage | 9,100,800 | 29.40% | 63.80% |
| Base and Paving | 7,516,100 | 24.28% | 88.08% |
| Lump Items | 3,607,000 | 11.65% | 99.73% |
| Miscellaneous | 84,480 | 0.27% | 100.00% |
| Construction Subtotal | \$ 30,958,380 | 100.00% | |
| Engineering and Construction at 10.00% | \$ 3,095,838 | Construction | |
| Construction Total | \$ 34,054,218 | Mark-Up: | 10.00% |
| Right-of-Way Costs; STP-0007-00(649), P. I. No. 0007649 | \$ 720,046 | | |
| Right-of-Way Subtotal | \$ 720,046 | | |
| Scheduling Contingency 55.00% | \$ 396,025 | | |
| Administration / Court Costs 60.00% | \$ 669,643 | | |
| Inflation Factor 40.00% | \$ 714,286 | ROW | |
| Right-of-Way Total | \$ 2,500,000 | Mark-Up: | 247.20% |
| Reimbursable Utilities Costs; STP-0007-00(649), P. I. No. 0007649 | \$ 300,000 | | |
| Reimbursable Utilities Subtotal | \$ 300,000 | | |
| GRAND TOTAL | \$ 36,854,218 | | |



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 project is attached. This part of the function analysis stimulated the VE team members to think in terms of the areas in which to channel their creative idea development.

Function analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. These elements add cost to the final product, but have a relatively low worth to the basic function.

In addition to the random function analysis, the VE Team Leader worked with members of the study team to develop a Function Analysis System Technique (F.A.S.T.) diagram for each phase. The F.A.S.T. diagrams were used to show the flow of function within the phases. It helps to confirm the project is addressing those issues that have been voiced by the owner as being important. The diagrams were generated by asking the key question: "What is the most important function to be accomplished by this phase?" The answer is characterized by a verb/noun pair. In turn, another question is asked: "Why?" The answer is again listed in a verb/noun pair, and the process continued from left to right. If the result is a true F.A.S.T. diagram, the flow of functions from right to left will answer the question "Why?" No F.A.S.T. diagram is ever completed. The readers of this report may wish to challenge themselves to see how far they can carry the construction of the F.A.S.T. diagram.

This F.A.S.T. diagram notes the critical function paths and identifies the project's basic function as BYPASS/NEWNAN by Continuing/Bypass and Providing/Truck Route. The F.A.S.T. diagram is included at the end of this section of the report.

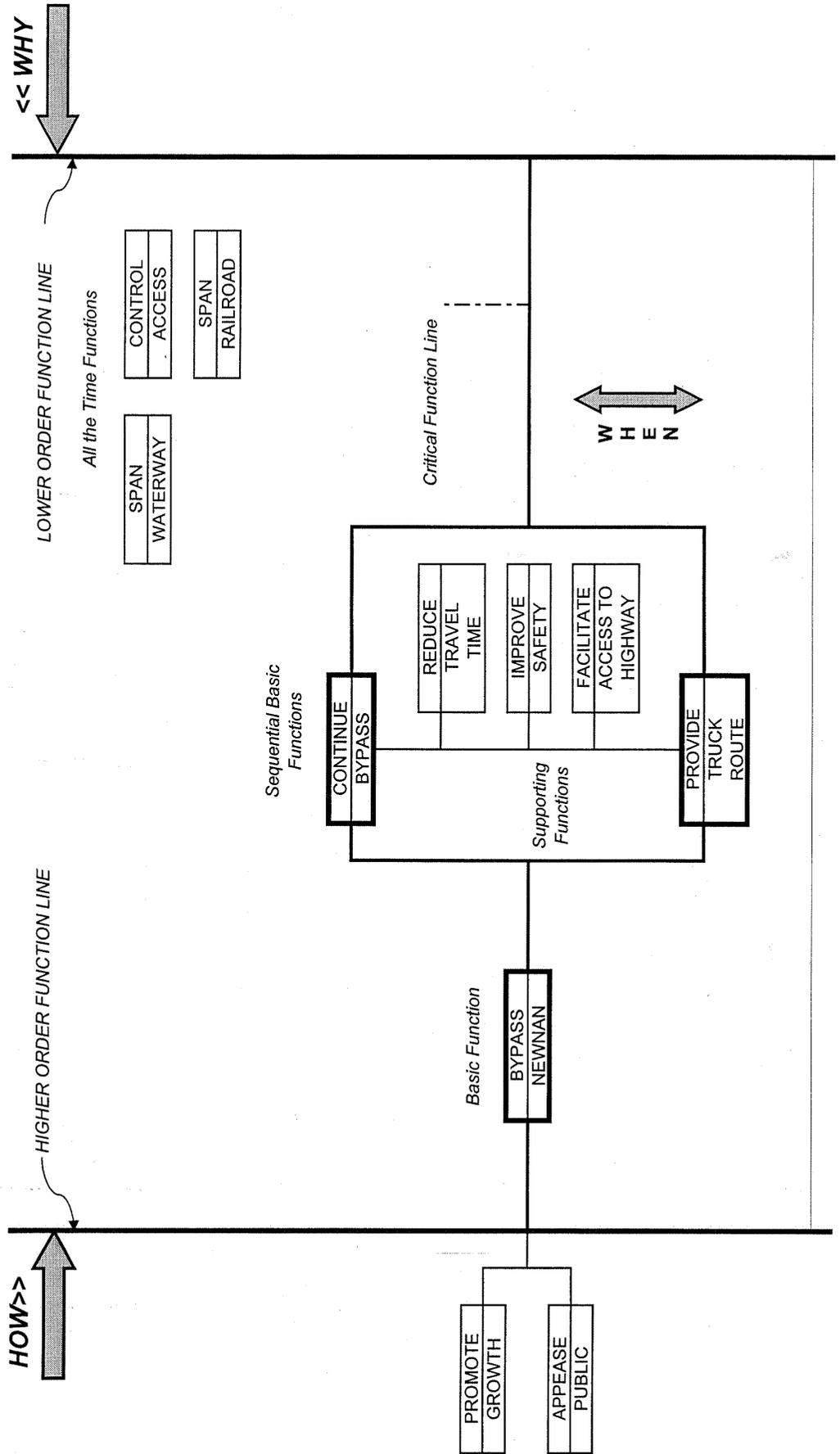


FUNCTION ANALYSIS SYSTEMS TECHNIQUE (F. A. S. T.)

NEWMAN BYPASS FROM TURKEY CREEK RD. TO SR 16

STP-0007-00(694), P. I. No. 0007694

Georgia Department of Transportation, District 3
Coweta County, Georgia



CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the creative phase, numerous ideas, alternative proposals and/or recommendations were generated using conventional brainstorming techniques as recorded on the following pages.

These ideas were then discussed and the advantages/disadvantages of each listed. The VE design team compared each of the ideas with the concept solution determining whether it improved value, was equal in value, or lessened the value of the solution.

The ideas were ranked on a scale of 1 to 5 on how well the VE design team believed the idea met necessary criteria and program needs. The higher rated ideas were developed into formal alternatives and included in the VE workshop. Some ideas were judged to have minimal cost impacts on the project but provided enhancements in the form of improved operations, efficiency, constructibility or potential to save unknown or hidden costs. These were given the designation "DS" which indicates a design suggestions. This designation is also used when an idea is difficult to price but improves the functionality of the project or system, and is deemed to be of significant value to the owner, user, operator or designer.

Typically, all ideas rated 4 or 5 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.

All readers are encouraged to review the Creative Idea Listing and Evaluation worksheets since they may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING



PROJECT: **STP-0007-00(694), P. I. No. 0007694**
NEWNAN BYPASS FROM TURKEY CREEK ROAD TO SR 16
Coweta County, Georgia

SHEET NO.: 1 of 2

| NO. | IDEA DESCRIPTION | RATING |
|-----|---|--------|
| 1 | Use 11-ft. lanes throughout the project | 5 |
| 2 | Use 12-ft. outside lanes (for trucks) and 11-ft. inside lanes (for cars) | 4 |
| 3 | Use a two-lane section throughout | 4 |
| 4 | Use three-lane section throughout | 4 |
| 5 | Use MSE walls at the railroad bridge in lieu of end spans | 4 |
| 6 | Balance the cut and fill, i.e., earthwork | 3 |
| 7 | Lower the profile | 4 |
| 8 | Bridge the entire floodplain | 2 |
| 9 | Grade separate SR 16 and the Bypass | 1 |
| 10 | Grade separate Turkey Creek Road and the Bypass | 1 |
| 11 | Use culvert in lieu of bridges at stream crossings | 4 |
| 12 | Use an at-grade railroad crossing | 3 |
| 13 | Use a single bridge at the railroad crossing | 2 |
| 14 | Shift alignment from Station 145+00 to SR 16 further east | 2 |
| 15 | Straighten the alignment from Station 120+00 to SR 16 | 2 |
| 16 | Minimize the right-of-way | 4 |
| 17 | Add an interchange at Turkey Creek Road and I-85 and eliminate the Bypass (0007694) | 3 |
| 18 | Add a frontage road on the west side of I-85 | 2 |
| 19 | Use 24-in. curb and gutter in lieu of 30-in. curb and gutter | 4 |
| 20 | Use a flush, grassed, 20-ft. median without a barrier | 4 |
| 21 | Eliminate the curb and gutter, reduce the median width and use cable barrier | 4 |
| 22 | Tunnel between Station 120+00 and 185+00 | 1 |
| 23 | Use concrete paving | 2 |
| 24 | Use concrete paving at interchanges only | 3 |
| 25 | Minimize the median width | 4 |
| 26 | Eliminate the median | 4 |
| 27 | Provide a ramped free flow right between the Bypass and SR 16 | 3 |

Rating: 1 → 2 = Not to be Developed; 3 – 4 = Varying Degree of Development Potential; 5 = Most Likely to be Developed;
 DS = Design Suggestion; ABD = Already Being Done; N/A = Not Applicable

